ACADEMIC CURRICULA

UNDERGRADUATE/ INTEGRATED POST GRADUATE DEGREE PROGRAMMES

(With exit option of Diploma)

(Choice Based Flexible Credit System)

Regulations 2021

Volume – 1

(Revised in July 2023)

SRM INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University u/s 3 of UGC Act, 1956)

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Kattankulathur, Chengalpattu District 603203,

Tamil Nadu, India

Table of Contents

1. B.Tech.in Aerospace Engineering

1. (a) Mission of the Department

Mission Stmt - 1	To impart *students with quality education centered on altering global requirements and add values to their career desires*
Mission Stmt - 2	*To enhance the knowledge and skill of students in collaboration with public and private sectors*
Mission Stmt - 3	*To identify and acknowledge economic, social and environmental issues that influences the quality of life in the vicinity and the globe*
Mission Stmt - 4	*To inculcate leadership qualities needed for automotive industries through robust curriculum with international outlook for sustainable future*
Mission Stmt - 5	*To build trust and co-operation at the workplace through effective inter-personal and communication skills*

1. (b) Program Educational Objectives (PEO)

PEO - 1	*Offer the students those skill sets and domain knowledge based on contemporary requirements*
PEO - 2	*Provide the students with the capabilities in the areas of analysis, design, manufacture and testing*
PEO - 3	*Ignite the minds of students to take up research and development in aerospace engineering with missionary zeal*
PEO - 4	*Train the students to become effective communicators in professional as well as general aspects of life*
PEO - 5	*Prepare the students into balanced individuals who are keen to leave a mark by excelling in their profession*

1. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3	Mission Stmt. - 4	Mission Stmt. - 5
PEO - 1	*3*	*3*	*2*	*3*	*2*
PEO - 2	*3*	*2*	*3*	*3*	*3*
PEO - 3	*2*	*3*	*2*	*3*	*3*
PEO - 4	*3*	*3*	*3*	*1*	*2*
PEO - 5	*1*	*3*	*2*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

1. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)														
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
PEO - 1	*3*	*3*	*3*	*3*	*3*	*1*	*2*	*1*	*2*	*2*	*3*	*3*	*2*	*3*	*3*
PEO - 2	*3*	*3*	*3*	*3*	*3*	*1*	*2*	*1*	*2*	*3*	*2*	*2*	*3*	*3*	*2*
PEO - 3	*3*	*3*	*3*	*3*	*3*	*2*	*3*	*2*	*2*	*2*	*3*	*3*	*3*	*2*	*2*
PEO - 4	*3*	*2*	*2*	*3*	*3*	*3*	*2*	*3*	*3*	*3*	*3*	*1*	*2*	*2*	*3*
PEO - 5	*2*	*2*	*3*	*3*	*2*	*3*	*2*	*3*	*3*	*3*	*2*	*2*	*3*	*2*	*2*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Expertise in theoretical and experimental aspects of various thrust areas of Aerospace Engineering*
PSO - 2	*Ability to use modern engineering tools applicable to design and analysis of systems and components of flight vehicles*
PSO - 3	*Able to inculcate awareness about environmental impact, safety aspects, cost sustainability, multidisciplinary project management, ethics and human values.*

1. (e) Program Structure: B.Tech. in Aerospace Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21ASS101T	Applied Engineering Mechanics	3	0	0	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**20**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21ASP302L	Project	0	0	6	3
21ASP303T	MOOC	3	0	0	
21ASP401L	Major Project	0	0	30	15
21ASP402L	Major Project	0	0	20	
21ASP403L	Internship#	0	0	10	
	Total Credits				**19**

Open Elective Courses (O)
(Any 3 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21ASO301T	Elements of Aeronautics	3	0	0	3
21ASO302T	Creativity, Innovation. and New Product Development	3	0	0	3
21ASO303T	Aviation and Airline Maintenance Management	3	0	0	3
21ASO304T	Aircraft General Engineering and Maintenance Practices	3	0	0	3
21ASO305T	Flow Visualization Techniques	3	0	0	3
21ASO306T	Airport Engineering	3	0	0	3
21ASO307T	Molecular Gas Dynamics	3	0	0	3
	Total Credits				**09**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				**28**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21ASC201J	Elements of Aerospace Engineering	2	0	2	3
21ASC202T	Applied Solid Mechanics	3	0	0	3
21ASC203T	Applied Fluid Mechanics	3	0	0	3
21ASC204T	Incompressible Aerodynamics	3	0	0	3
21ASC205T	Aero Engineering Thermodynamics	3	0	0	3
21ASC206T	Air Breathing Propulsion	3	0	0	3
21ASC207T	Aircraft Materials and Production Techniques	3	0	0	3
21ASC221L	Fluid Mechanics Lab	0	0	2	1
21ASC223L	Manufacturing Process Lab	0	0	2	1
21ASC225L	Aircraft Component Drawing Lab	0	0	2	1
21ASC222L	Applied Solid Mechanics Lab	0	0	2	1
21ASC224L	Incompressible Aerodynamics Lab	0	0	2	1
21ASC301T	Aircraft Structures	3	0	0	3
21ASC303T	Compressible Aerodynamics	3	0	0	3
21ASC305T	Rocket Propulsion	3	0	0	3
21ASC307T	Aircraft Performance	3	0	0	3
21ASC321L	Aircraft Structures Lab	0	0	2	1
21ASC323L	Compressible Aerodynamics Lab	0	0	2	1
21ASC325L	Aerospace Propulsion Lab	0	0	2	1
21ASC302T	Aircraft Systems and Instruments	3	0	0	3
21ASC304T	Space Mechanics	3	0	0	3
21ASC306T	Aircraft Stability and Control	3	0	0	3
21ASC322L	Aircraft Design Project	0	0	2	1
21ASC324L	Aerospace Computational Analysis lab	0	0	2	1
21ASC326L	Aircraft Maintenance Repair Lab	0	0	2	1
21CSC206T	Artificial Intelligence	2	1	0	3
	Total Credits				**56**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

Professional Elective Courses (E) (Any 5 Courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
21ASE301T	Industrial Aerodynamics	3	0	0	3
21ASE302T	Helicopter Aerodynamics	3	0	0	3
21ASE303T	Applied Structural Mechanics	3	0	0	3
21ASE304T	Experimental Stress Analysis	3	0	0	3
21ASE305T	Composite Materials and Structures	3	0	0	3
21ASE306T	Theory of Elasticity	3	0	0	3
21ASE307T	Fundamentals of Combustion	3	0	0	3
21ASE308T	Heat Transfer	3	0	0	3
21ASE309T	Theory of Fire Propagation and Safety	3	0	0	3
21ASE310T	Airframe Maintenance and Repair	3	0	0	3
21ASE311T	Aircraft Engine and Instrument Systems	3	0	0	3
21ASE312T	Helicopter Maintenance	3	0	0	3
21ASE313T	Space Mission Design and Analysis	3	0	0	3
21ASE314T	Aero Engine Maintenance and Repair	3	0	0	3
21ASE315T	Experimental Methods in Structural Mechanics	3	0	0	3
21ASE316T	Aviation Legislation	3	0	0	3
21ASE317T	Optical Methods in Fluid and Solid Mechanics	3	0	0	3
21ASE318T	Combustion and Flow Diagnostics	3	0	0	3
21ASE319T	Design of Gas Turbine Engine Components	3	0	0	3
21ASE320T	Experimental Methods in Gas Dynamics and Propulsion	3	0	0	3

Professional Elective Courses (E)					
Course Code	Course Title	Hours/ Week L	T	P	C
21ASE401T	Rocket Aerodynamics	3	0	0	3
21ASE402T	Computational Heat Transfer and Fluid Dynamics	3	0	0	3
21ASE403T	Turbulence and Turbulence Modeling	3	0	0	3
21ASE404T	High Temperature Gas Dynamics	3	0	0	3
21ASE405T	Theory of Plates and Shells	3	0	0	3
21ASE406T	Vibrations and Elements of Aeroelasticity	3	0	0	3
21ASE407T	Fatigue and Fracture Mechanics	3	0	0	3
21ASE408T	Rockets and Missiles	3	0	0	3
21ASE409T	Cryogenic Engineering	3	0	0	3
21ASE410T	Hypersonic Aerothermodynamics	3	0	0	3
21ASE411T	Digital Avionics	3	0	0	3
21ASE412T	Aircraft Control Systems	3	0	0	3
21ASE413T	Aerial Robotics	3	0	0	3
21ASE414T	Airborne Sensors and Actuators	3	0	0	3
21ASE415T	Aviation Safety Management	3	0	0	3
	Total Credits				**15**

1. (f) Programme Articulation: B.Tech. in Aerospace Engineering

Course Code	Course Name	Program Learning Outcomes (PLO)														
		Graduate Attributes												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
21ASS101T	Applied Engineering Mechanics	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
21ASC201J	Elements of Aerospace Engineering	3	1	-	-	2	-	-	-	-	-	-	1	3	-	-
21ASC203T	Applied Fluid Mechanics	3	3	-		-	-	-	-	-	-	-	1	3	-	-
21ASC205T	Aero Engineering Thermodynamics	3	2	2	-	-	-		-	-		-	1	2	-	-
21ASC207T	Aircraft Materials and Production Techniques	3	-	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASC221L	Fluid Mechanics Lab	3	3	-	-	1	-	-	-	-	-	-	-	3	-	-
21ASC223L	Manufacturing Process Lab	3	-	-	-	2	-	-	-	-	-	-	-	3	-	-
21ASC225L	Aircraft Component Drawing Lab	3	-	3	-	3	-	-	-	-	-	-	-	-	3	-
21ASC202T	Applied Solid Mechanics	3	3	-	-	-	-	-	-	-	-	-	1	1	-	-
21ASC204T	Incompressible Aerodynamics	3	3	-	-	-	-	-	-	-	-	-	2	3	-	-
21ASC206T	Air Breathing Propulsion	3	2	2	-	-	-	-	-	-	-	-	1	2	-	-
21ASC222L	Applied Solid Mechanics Lab	3	3	-	-	2	-	-	-	-	-	-	-	1	-	-
21ASC224L	Incompressible Aerodynamics Lab	3	3	-	-	2	-	-	-	-	-	-	-	3	-	-
21ASC301T	Aircraft Structures	3	3	-	-	-	-	-	-	-	-	-	2	3	-	-
21ASC303T	Compressible Aerodynamics	3	3	-	-	-	-	-	-	-	-	-	2	3	-	-
21ASC305T	Rocket Propulsion	2	3	-	-	-	-	-	-	-	-	-	2	2	-	-
21ASC307T	Aircraft Performance	3	3	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASC321L	Aircraft Structures Lab	3	3	-	-	2	-	-	-	-	-	-	2	3	-	-
21ASC323L	Compressible Aerodynamics Lab	3	3	-	-	2	-	-	-	-	-	-	-	3	-	-
21ASC325L	Aerospace Propulsion Lab	2	-	3	2	2	-	-	-	-	-	-	-	2	-	-
21ASC302T	Aircraft Systems and Instruments	3	-	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASC304T	Space Mechanics	3	3	-	-	-	-	-	-	-	-	-	2	3	-	-
21ASC306T	Aircraft Stability and Control	3	3	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASC322P	Aircraft Design Project	3	2	1	-	-	-	-	-	-	-	-	1	3	-	-
21ASC324L	Aerospace Computational Analysis lab	3	3	-	-	3	-	-	-	-	-	-	-	-	3	-
21ASC326L	Aircraft Maintenance Repair Lab	3	-	3	-	3	-	-	-	-	-	-	-	-	3	-
21ASE301T	Industrial Aerodynamics	3	2	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASE302T	Helicopter Aerodynamics	3	3	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASE303T	Applied Structural Mechanics	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-
21ASE304T	Experimental Stress Analysis	3	3		-	-	-	-	-	-	-	-	3	3	-	-
21ASE305T	Composite Materials & Structures	3	2		-	-	-	-	-	-	-	-	1	3	-	-
21ASE306T	Theory of Elasticity	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
21ASE307T	Fundamentals of Combustion	3	2	2	-	-	-	-	-	-	-	-	1	3	-	-
21ASE308T	Heat Transfer	3	3	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASE309T	Theory of Fire Propagation and Safety	3	2	2	-	-	-	-	-	-	-	-	1	3	-	-
21ASE310T	Airframe Maintenance and Repair	3	-	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASE311T	Aircraft Engine and Instrument Systems	3	-	-	-	-	-	-	-	-	-	-	1	2	-	-
21ASE312T	Helicopter Maintenance	3	-	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASE313T	Space Mission Design and Analysis	3	3	3	1	-	-	-	-	-	-	-	1	3	2	-
21ASE314T	Aero Engine Maintenance and Repair	3	-	-	-	-	-	-	-	-	-	-	1	2	-	-
21ASE315T	Experimental Methods in Structural Mechanics	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-
21ASE316T	Aviation legislation	3	-	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASE317T	Optical Methods in Fluid and Solid Mechanics	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-
21ASE318T	Combustion and Flow Diagnostics	3	-	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASE319T	Design of Gas Turbine Engine Components	3	-	-	-	-	-	-	-	-	-	-	1	1	-	-
21ASE320T	Experimental Methods in Gas Dynamics and Propulsion	3	-	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASE401T	Rocket Aerodynamics	3	3	-	-	-	-	-	-	-	-	-	2	3	-	-
21ASE402T	Computational Heat Transfer & Fluid Dynamics	3	3	-		1	-	-	-	-	-	-	1	3	-	-
21ASE403T	Turbulence and Turbulence Modeling	3	-	3	1	3	-	-	-	-	-	-	1	3	-	-
21ASE404T	High Temperature Gas Dynamics	2	3	-	-	-	-	-	-	-	-	-	1	2	-	-
21ASE405T	Theory of Plates and Shells	3	2	-	1	-	-	-	-	-	-	-	1	3	-	-
21ASE406T	Vibrations and Elements of Aeroelasticity	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-
21ASE407T	Fatigue and Fracture Mechanics	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-
21ASE408T	Rockets and Missiles	3	2	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASE409T	Cryogenic Engineering	2	2	3	-	-	-	-	-	-	-	-	2	3	-	-
21ASE410T	Hypersonic Aerothermodynamics	2	3	-	-	-	-	-	-	-	-	-	1	3	2	-
21ASE411T	Digital Avionics	3	2	-	-	-	-	-	-	-	-	1	1	2	-	-
21ASE412T	Aircraft Control Systems	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
21ASE413T	Aerial Robotics	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
21ASE414T	Airborne Sensors and Actuators	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
21ASE415T	Aviation Safety Management	2	-	-	-	-	-	-	-	-	-	-	1	3	-	-
21ASO301T	Elements of Aeronautics	3	1	-	-	-	-	-	-	-	-	-	1	-	-	-

21ASO302T	*Creativity, Innovation. & New Product Development*	*3*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1*	*-*	*-*	*-*
21ASO303T	*Aviation and Airline Maintenance Management*	*3*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1*	*-*	*-*	*-*
21ASO304T	*Aircraft General Engineering and Maintenance Practices*	*3*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1*	*-*	*-*	*-*
21ASO305T	*Flow Visualization Techniques*	*3*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1*	*-*	*-*	*-*
21ASO306T	*Airport Engineering*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1*	*-*	*-*	*-*
21ASO307T	*Molecular Gas Dynamics*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*2*	*-*	*-*	*-*
21ASP301L	*Community Connect*	*-*	*-*	*-*	*-*	*-*	*3*	*2*	*2*	*2*	*2*	*1*	*-*	*-*	*-*	*3*
21ASP303T	*MOOC*	*3*	*2*	*2*	*3*	*3*	*3*	*-*	*3*	*3*	*3*	*-*	*3*	*3*	*-*	*-*
21ASP302L	*Project*	*3*	*2*	*2*	*3*	*3*	*3*	*1*	*3*	*3*	*3*	*3*	*3*	*3*	*-*	*2*
21ASP401L/ 21ASP402L/ 21ASP403L	*Major Project*	*3*	*2*	*2*	*3*	*3*	*3*	*1*	*3*	*3*	*3*	*3*	*3*	*3*	*-*	*2*
	Program Average	*3*	*3*	*2*	*3*	*3*	*3*	*1*	*3*	*3*	*3*	*3*	*1*	*3*	*3*	*3*

1. (g) Implementation Plan: B.Tech. in Aerospace Engineering

Semester - I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				18

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21ASS101T	Applied Engineering Mechanics	3	0	0	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				25

Semester - III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21ASC201J	Elements of Aerospace Engineering	2	0	2	3
21ASC203T	Applied Fluid Mechanics	3	0	0	3
21ASC205T	Aero Engineering Thermodynamics	3	0	0	3
21ASC207T	Aircraft Materials and Production Techniques	3	0	0	3
21PDH201T	Social Engineering	2	0	0	2
21ASC221L	Fluid Mechanics Lab	0	0	2	1
21ASC223L	Manufacturing Process Lab	0	0	2	1
21ASC225L	Aircraft Component Drawing Lab	0	0	2	1
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				24

Semester - IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21ASC202T	Applied Solid Mechanics	3	0	0	3
21ASC204T	Incompressible Aerodynamics	3	0	0	3
21ASC206T	Air Breathing Propulsion	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21ASC222L	Applied Solid Mechanics Lab	0	0	2	1
21ASC224L	Incompressible Aerodynamics Lab	0	0	2	1
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				21

Semester - V

Code	Course Title	Hours/ Week L	T	P	C
21ASC301T	Aircraft Structures	3	0	0	3
21ASC303T	Compressible Aerodynamics	3	0	0	3
21ASC305T	Rocket Propulsion	3	0	0	3
21ASC307T	Aircraft Performance	3	0	0	3
E	Professional Elective - I				3
O	Open Elective – I				3
21ASC321L	Aircraft Structures Lab	0	0	2	1
21ASC323L	Compressible Aerodynamics Lab	0	0	2	1
21ASC325L	Aerospace Propulsion Lab	0	0	2	1
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				22

Semester - VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21ASC302T	Aircraft Systems and Instruments	3	0	0	3
21ASC304T	Space Mechanics	3	0	0	3
21ASC306T	Aircraft Stability and Control	3	0	0	3
E	Professional Elective - II				3
O	Open Elective – II				3
21ASP303T	MOOC	3	0	0	3
21ASP302L	Project	0	0	6	
21ASC322L	Aircraft Design Project	0	0	2	1
21ASC324L	Aerospace Computational Analysis lab	0	0	2	1
21ASC326L	Aircraft Maintenance Repair Lab	0	0	2	1
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				23

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective - III				3
E	Professional Elective - IV				3
E	Professional Elective - V				3
O	Open Elective - III				3
	Total Credits				15

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21ASP401L	Major Project	0	0	30	15
21ASP402L	Major Project	0	0	20	
21ASP403L	Internship#	0	0	10	
	Total Credits				15

 # Students have to register either 21ASP401L or 21ASP402L and 21ASP403L both in eighth semester

2. B.Tech.in Artificial Intelligence

2. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt – 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	*To produce successful Artificial Intelligence graduates with the ability to develop, test, iterate and demonstrate how Artificial Intelligence can be used to tackle the problems in divergent domains with commitment to lifelong learning*

2. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO – 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO – 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO – 5	*Graduates will be able to analyze the problems by applying the principles of computer science, mathematics, and scientific investigation and to design and implement industry accepted solutions using latest AI technologies to meet ever changing developments in computer science*

2. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3	Mission Stmt. - 4	Mission Stmt. - 5
PEO - 1	*3*				*2*
PEO - 2			*2*		
PEO - 3		*3*	*3*		
PEO - 4				*2*	*3*
PEO - 5	*2*				*3*

2. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

				Program Outcomes (PO)											
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
PEO - 1	*3*	*3*	*3*		*2*				*2*				*3*	*3*	*3*
PEO - 2	*3*	*3*	*3*	*3*		*3*		*2*					*3*	*3*	*3*
PEO - 3		*3*	*3*	*3*	*2*			*1*		*3*	*3*			*3*	*3*
PEO - 4			*2*	*2*		*3*	*3*	*3*	*3*		*3*	*2*	*1*	*2*	*3*
PEO - 5	*2*			*2*	*3*	*3*	*2*		*3*	*2*		*3*	*2*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes (PSO)

PSO - 1	*To apply technology and algorithms that allows Computers and Machines to work Intelligently.*
PSO - 2	*To Understand, analyze and develop the Artificial Intelligence based Systems.*
PSO - 3	*Ability to apply the Artificial Intelligence Technology and to adapt to the Technological revolutions in building the Artificial Intelligence based systems for solving the real-world problems.*

2. (e) Program Structure: B.Tech. in Artificial Intelligence

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21AIS101J	Foundation of Data Analysis	2	0	2	3
21AIS201J	Foundation of Artificial Intelligence	2	0	2	3
	Total Credits				**25**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21AIP302L	Project	0	0	6	3
21AIP303T	MOOC	3	0	0	
21AIP401L	Major Project	0	0	30	15
21AIP402L	Major Project	0	0	20	
21AIP403L	Internship#	0	0	10	
	Total Credits				**19**

Open Elective Courses
(Any 3 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21AIO351T	Introduction to Artificial Intelligence	2	1	0	3
21AIO352T	Machine Learning	2	1	0	3
21AIO353T	Python for Data Analytics	2	1	0	3
21AIO354T	Soft Computing	2	1	0	3
	Total Credits				**09**

5. Professional Elective Courses (E)
(Any 5 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21AIE321T	Stochastic Decision Making	3	0	0	3
21AIE322T	Cognitive Science and Analytics	3	0	0	3
21AIE323T	Internet of Things Architecture and Protocols	3	0	0	3
21AIE324T	Intelligent Autonomous Systems	3	0	0	3
21AIE325T	Intelligence of Biological Systems	3	0	0	3
21CSE398T	Logic and Knowledge Representation	3	0	0	3
21CSE320T	Evolutionary Computing	3	0	0	3
21AIE338P	High Performance Computing System	2	1	0	3
21CSE439T	Virtual Reality and Augmented Reality	3	0	0	3
21AIE422T	Autonomous Navigation and Vehicles	3	0	0	3
21AIE423T	Mobile Game Development	3	0	0	3
21CSE311P	Robot Programming	2	1	0	3
21CSE312P	Software Engineering in Artificial Intelligence	2	1	0	3
21CSE313P	Accelerated Data Science	2	1	0	3
21CSE323T	Marketing Analytics	2	1	0	3
21AIE330T	Text Processing	3	0	0	3
21AIE331T	Advanced Social, Text and Media Analytics	3	0	0	3
21AIE332T	Image and Video processing	3	0	0	3
21CSE252T	Biometrics	2	1	0	3
21AIE335T	Surveillance Video Analytics	3	0	0	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB304T	Probability and Applied Statistics	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21AIC202J	Neural Networks and Machine Learning	2	0	2	3
21CSC202J	Operating Systems	3	0	2	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC205P	Database Management Systems	3	1	0	4
21AIC301J	Deep Learning Techniques	3	0	2	4
21AIC302J	Reinforcement Learning Techniques	2	0	2	3
21AIC303T	Computer Networks and Communications	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21AIC401T	Inferential Statistics and Predictive Analytics	3	0	0	3
21AIC402T	Design of Artificial Intelligence Products	3	0	0	3
	Total Credits				**47**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

5. Professional Elective Courses (E)
(Any 5 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE411T	Artificial Intelligence in Genomics and Disease Prediction	3	0	0	3
21CSE412T	Machine Learning in Drug Discovery	3	0	0	3
21CSE418T	Cyber Physical Systems	3	0	0	3
21CSE421T	Business Intelligence and Analytics	2	1	0	3
21AIE337T	Speech Recognition and Understanding	3	0	0	3
21AIE428T	Time Series Analysis	3	0	0	3
21CSE362T	Cloud Computing	2	1	0	3
21AIE430T	Distributed Systems	3	0	0	3
21AIE431T	Big Data Analytics: Hadoop, Spark and NoSQL	3	0	0	3
21CSE376T	Nature Inspired Computing Techniques	3	0	0	3
21AIE434T	Bio Informatics	3	0	0	3
21AIE435T	Theoretical and Computational Neuroscience	3	0	0	3
	Total Credits				**15**

2. (f) Programme Articulation Matrix: B.Tech. in Artificial Intelligence

		Program Outcomes (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21AIS101J	Foundation of Data Analysis		2			2							2	3		
21AIS201J	Foundation of Artificial Intelligence		2					2			2		2	3	2	
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21AIC202J	Neural Networks and Machine Learning		3			3						3		2	3	
21AIM201T	Professional Ethics for Artificial Intelligence							3	3	3			1			3
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21AIC303T	Computer Networks and Communications	2		3		3										
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21AIC301J	Deep Learning Techniques		3			3						3		2	3	3
21AIC302J	Reinforcement Learning Techniques		3			3						3		2	3	3
21AIC401T	Inferential Statistics and Predictive Analytics		3		3								2	1	2	3
21AIC402T	Design of Artificial Intelligence Products			3		3							1	3	3	3
21AIE321T	Stochastic Decision Making		2			2								1	2	3
21AIE322T	Cognitive Science & Analytics	1	2			2								3	3	2
21AIE323T	Internet of Things Architecture and Protocols					2		2						1		3
21AIE324T	Intelligent Autonomous Systems			2					2					2	2	3
21AIE325T	Intelligence of Biological Systems			2		2								2	3	
21CSE398T	Logic and Knowledge Representation		2		3									2		3
21CSE320T	Evolutionary Computing	3	1	2	2									2	3	
21CSE439T	Virtual Reality and Augmented Reality	3	3	2	2	3								2		2
21AIE422T	Autonomous Navigation and Vehicles				2	2		2							2	3
21AIE423T	Mobile Game Development			3		3							3		3	
21CSE311P	Robot Programming	2	2		3		2							2		3

21CSE312P	Software Engineering in Artificial Intelligence		3	3		3								2	2	3
21CSE313P	Accelerated Data Science	1	2		3									1		2
21CSE323T	Marketing Analytics								3		3			2	2	1
21AIE330T	Text Processing		3			3						3			3	2
21AIE331T	Advanced Social, Text and Media Analytics		3			3						3			3	
21AIE332T	Image and Video processing			3		3			2						3	3
21CSE252T	Biometrics	3		1	2					2					2	
21AIE335T	Surveillance Video Analytics			3		3			2						2	3
21CSE411T	Artificial Intelligence in Genomics and Disease Prediction	3	3	2												3
21CSE412T	Machine Learning in Drug Discovery	3	2	3												3
21AIE337T	Speech Recognition and Understanding		2			2			2		2			2	3	
21AIE428T	Time Series Analysis				3			2							2	3
21CSE362T	Cloud Computing	2	3	2	1	2										3
21AIE430T	Distributed Systems	2		3		3										3
21AIE431T	Big Data Analytics: Hadoop, Spark and NoSQL		3			3							2		2	3
21CSE376T	Nature Inspired Computing Techniques	3	2													3
21AIE434T	Bio Informatics			3					3				2	2	2	
21AIE435T	Theoretical and Computational Neuroscience		3	3			2							3		

2. (g) Implementation Plan: B.Tech. in Artificial Intelligence

Semester - I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**22**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21AIS101J	Foundation of Data Analysis	2	0	2	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**21**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**22**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB304T	Probability and Applied Statistics	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21AIS201J	Foundation of Artificial Intelligence	2	0	2	3
21AIC202J	Neural Networks and Machine Learning	2	0	2	3
21CSC202J	Operating Systems	3	0	2	4
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC205P	Database Management Systems	3	1	0	4
21AIC301J	Deep Learning Techniques	3	0	2	4
E	Professional Elective – I				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**22**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21AIC303T	Computer Networks and Communications	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21AIC302J	Reinforcement Learning Techniques	2	0	2	3
E	Professional Elective – II				3
E	Professional Elective – III				3
O	Open Elective – II				3
21AIP302L	Project	0	0	6	3
21AIP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
21AIC401T	Inferential Statistics and Predictive Analytics	3	0	0	3
21AIC402T	Design of Artificial Intelligence Products	3	0	0	3
E	Professional Elective – IV				3
E	Professional Elective – V				3
O	Open Elective –III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21AIP401L	Major Project	0	0	30	15
21AIP402L	Major Project	0	0	20	
21AIP403L	Internship	0	0	10	
	Total Credits				**15**

#Students have to register either 21AIP401L or 21AIP402L and 21AIP403L both in eighth semester

3. B.Tech. in Automation and Robotics

3. (a) Mission of the Department

Mission Stmt - 1	*To have a scholarly and professional environment to make long lasting contributions for the advancement of knowledge.*
Mission Stmt - 2	*To foster research and development for the benefit of global community.*
Mission Stmt - 3	*To have an innovative, dynamic, flexible devising academic program and structure.*

3. (b) Program Educational Objectives (PEO)

PEO - 1	*Graduates will be able to take up career in robotics and automation of industrial process with environment protection and safety concern.*
PEO - 2	*Graduates will be able to solve technical problems to serve the society in a responsible and ethical manner.*
PEO - 3	*Graduates will be able to serve the end users with cutting edge technologies to meet industry standards*
PEO - 4	*Graduates will be able to achieve broad and in depth knowledge of automation and robotics to practice and pursue higher studies*
PEO - 5	*Graduates will be able to work as a team on multidisciplinary projects and excel in their career*

3. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3
PEO - 1	*3*	*2*	*3*
PEO - 2	*3*	*1*	*3*
PEO - 3	*1*	*1*	*2*
PEO - 4	*2*	*3*	*3*
PEO - 5	*2*	*3*	*3*

3. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)														
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
PEO - 1	*3*	*2*	*3*	*-*	*3*	*2*	*3*	*2*	*2*	*2*	*2*	*3*	*3*	*2*	*3*
PEO - 2	*3*	*3*	*2*	*3*	*2*	*3*	*2*	*3*	*2*	*2*	*-*	*-*	*2*	*2*	*3*
PEO - 3	*3*	*3*	*2*	*1*	*3*	*-*	*-*	*3*	*-*	*3*	*3*	*-*	*3*	*2*	*3*
PEO - 4	*3*	*2*	*3*	*2*	*1*	*-*	*-*	*2*	*-*	*2*	*-*	*3*	*1*	*3*	*1*
PEO - 5	*3*	*3*	*3*	*3*	*2*	*1*	*1*	*2*	*3*	*3*	*3*	*3*	*2*	*3*	*2*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Design and develop a suitable control methodology for an industrial process automation system.*
PSO - 2	*Apply the knowledge gained on robotics through the process of design, development, and implementation of automation system.*
PSO - 3	*Undertake higher education, research and entrepreneurship in the field of automation and robotics.*

3. (e) Program Structure: B.Tech. in Automation and Robotics Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	1	2
21GNH401T	Behavioral Psychology	2	1	0	3
21PDH201T	Social Engineering	2	0	0	2
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21EIS204T	Industrial Data Communication	3	0	0	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**20**

Open Elective Courses (O)
(Any 3 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21EIO131J	Virtual Instrumentation	2	0	2	3
21EIO132T	Analytical Instrumentation	3	0	0	3
21EIO133T	Industrial Automation Systems	3	0	0	3
21EIO134T	Introduction to Sensors	3	0	0	3
21EIO135T	Introduction to MEMS	3	0	0	3
21EIO136J	PLC for Industrial Automation	2	0	2	3
21EIO138T	Logical Foundations of Cyber-Physical Systems	3	0	0	3
	Total Credits				**09**

Professional Elective Courses (E)
(Any 6 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
	Sub-stream: Manufacturing				
21EIE201T	Reliability and Safety Engineering	3	0	0	3
21EIE203T	Fundamental of MEMS	3	0	0	3
21EIE251T	Bio medical Instrumentation	3	0	0	3
21EIE301T	Building Automation System	3	0	0	3
21EIE303T	Automotive Sensors and Smart Systems	3	0	0	3
21EIE306T	Industrial Internet of Things	3	0	0	3
21EIE307T	Modern Control Techniques	3	0	0	3
21EIE309T	E-Vehicle Technology	3	0	0	3
21EIE310T	Intelligent Systems and Control	3	0	0	3
21EIE312T	Industrial Processes and Control	3	0	0	3
21EIE313T	Deep Learning Techniques	3	0	0	3
21EIE351T	Wireless Sensor Networks	3	0	0	3
21EIE401T	Cyber Security for Industrial Automation	3	0	0	3
21EIE403T	Multisensor and Decision Systems	3	0	0	3
21EIE407T	Machine Vision Systems	3	0	0	3
21EIE411T	Virtual and Augmented Reality	3	0	0	3
21EIE451J	Image Processing for Robotics	2	0	2	3
21EIE452T	Industrial Data Communication Networks	3	0	0	3
21EIE455T	Robot Programming	3	0	0	3
21EIE456T	Machine Learning and Data Analytics	3	0	0	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				**28**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21EIC101J	Sensors and Actuators	3	0	2	4
21EIC205J	Analog Integrated Circuits	3	0	2	4
21EIC206J	Control Systems Design and Analysis	3	0	2	4
21EIC211J	Hydraulics and Pneumatics	3	0	2	4
21EIC212J	Fundamentals of Industrial Robotics	2	0	2	3
21EIC213J	PLC and HMI Programming	3	0	2	4
21EIC301P	Embedded System Design	2	0	4	4
21EIC302J	Process Control	3	0	2	4
21EIC305P	Factory Automation	2	0	4	4
21EIC311T	Power Electronics and Drives	3	0	0	3
21EIC312J	VFD and Servo Programming	2	0	2	3
21EIC313T	Robot Kinematics and Dynamics	3	0	0	3
21EIC411T	Autonomous Mobile Robotics	3	0	0	3
21EIC412J	Robotics for Industrial Automation	2	0	2	3
21CSC206T	Artificial Intelligence	2	1	0	3
	Total Credits				**53**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21EIP302L	Project	0	0	6	3
21EIP303T	MOOC	3	0	0	
21EIP401L	Major Project	0	0	30	15
21EIP402L	Major Project	0	0	20	
21EIP403L	Internship#	0	0	10	
	Total Credits				**19**

3. (f) Programme Articulation Matrix: B.Tech. in Automation and Robotics Engineering

		Program Outcomes (PO)												(PSO)		
Course Code	**Course Name**	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
21EIC101J	*Sensors and Actuators*	*2.6*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*2*	*-*
21EIC205J	*Analog Integrated Circuits*	*3*	*1.7*	*-*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1.6*	*-*
21EIC206J	*Control Systems Design and Analysis*	*2.8*	*-*	*-*	*2*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*2.2*	*-*	*-*
21EIC211J	*Hydraulics and Pneumatics*	*3*	*-*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*2*	*1.3*	*-*
21EIC212T	*Fundamentals of Industrial Robotics*	*3*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*	*1*
21EIS204T	*Industrial Data Communication*	*3*	*1.4*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1.4*	*-*
21EIC213J	*PLC and HMI Programming*	*3*	*-*	*2*	*-*	*3*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1.6*	*-*	*-*
21EIC301P	*Embedded System Design*	*2*	*2*	*3*	*3*	*-*	*-*	*-*	*-*	*3*	*-*	*-*	*-*	*2*	*3*	*-*
21EIC302J	*Process Control*	*2*	*2*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*2.8*	*-*	*-*
21EIC305P	*Factory Automation*	*3*	*-*	*2*	*1*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*	*-*	*-*
21EIC311T	*Power Electronics and Drives*	*3*	*-*	*2*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1.3*	*-*	*-*
21EIC312J	*VFD and Servo Programming*	*3*	*-*	*1*	*-*	*3*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*	*3*	*-*
21EIC313T	*Robot Kinematics and Dynamics*	*3*	*3*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*2*	*-*
21EIC411T	*Autonomous Mobile Robotics*	*3*	*3*	*-*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*	*-*
21EIC412J	*Robotics for Industrial Automation*	*3*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*	*-*
21EIE201T	*Reliability and Safety Engineering*	*2.8*	*-*	*2.2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*
21EIE203T	*Fundamental of MEMS*	*3*	*-*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*2*	*-*
21EIE251T	*Biomedical Instrumentation*	*3*	*2.7*	*2.5*	*2.25*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1*	*-*	*-*
21EIE301T	*Building Automation System*	*3*	*-*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*	*3*
21EIE303T	*Automotive Sensors and Smart Systems*	*3*	*-*	*2.3*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1.5*	*2.5*	*3*
21EIE306T	*Industrial Internet of Things*	*3*	*-*	*-*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*	*-*
21EIE307T	*Modern Control Techniques*	*2*	*-*	*2*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*	*-*	*-*
21EIE309T	*E-Vehicle Technology*	*2*	*-*	*2*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*2*
21EIE310T	*Intelligent Systems and Control*	*3*	*-*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1.8*	*-*	*-*
21EIE312T	*Industrial Processes and Control*	*2.8*	*2*	*2*	*-*	*1*	*-*	*-*	*-*	*-*	*-*	*-*	*2*	*-*	*2*	*-*
21EIE313T	*Deep Learning Techniques*	*2.8*	*-*	*-*	*2.2*	*1*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*
21EIE351T	*Wireless Sensor Networks*	*3*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1*	*-*	*-*
21EIE401T	*Cyber Security for Industrial Automation*	*3*	*-*	*3*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*	*-*	*-*
21EIE403T	*Multisensor and Decision Systems*	*3*	*-*	*-*	*2.2*	*1*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*
21EIE407T	*Machine Vision Systems*	*2.8*	*-*	*3*	*-*	*1*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1*	*-*	*-*
21EIE411T	*Virtual and Augmented Reality*	*2*	*-*	*3*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*2*
21EIE451J	*Image Processing for Robotics*	*2.8*	*-*	*1.6*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*	*3*
21EIE455T	*Robot Programming*	*2*	*-*	*3*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*
21EIE456T	*Machine Learning and Data Analytics*	*3*	*-*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*3*	*-*	*-*
21EIP321L	*Community Connect*	*3*	*2*	*2*	*-*	*3*	*-*	*-*	*3*	*3*	*3*	*-*	*-*	*1.6*	*1*	*1.6*
21EIP322L	*Project*	*3*	*3*	*2*	*2.5*	*3*	*2.7*	*3*	*2*	*3*	*3*	*3*	*2*	*1.4*	*2*	*2*
21EIP323L	*MOOC*	*3*	*2*	*2*	*-*	*-*	*-*	*-*	*-*	*2*	*3*	*-*	*-*	*1.4*	*1*	*1.8*
21EIP401L / 21EIP403L	*Major Project*	*3*	*3*	*2*	*2.5*	*3*	*2.7*	*3*	*2*	*3*	*3*	*3*	*2*	*1.4*	*2*	*2*
21EIP404L	*Semester Internship*	*3*	*2*	*2*	*-*	*-*	*-*	*-*	*-*	*3*	*3*	*3*	*2.2*	*1.6*	*1.2*	*1.8*
	Program Average	*2.74*	*2.24*	*2.33*	*2.12*	*2.1*	*2.7*	*3*	*2.33*	*2.86*	*3*	*3*	*2.04*	*1.93*	*2.19*	*2.35*

3. (g) Implementation Plan: B.Tech. in Automation and Robotics Engineering

Semester - I

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21EIC101J	Sensors and Actuators	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester - III

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21EIC205J	Analog Integrated Circuits	3	0	2	4
21EIC211J	Hydraulics and Pneumatics	3	0	2	4
21EIC212J	Fundamentals of Industrial Robotics	2	0	2	3
21EIS204T	Industrial Data Communication	3	0	0	3
21PDH201T	Social Engineering	2	0	0	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester - IV

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21EIC206J	Control Systems Design and Analysis	3	0	2	4
21EIC213J	PLC and HMI Programming	3	0	2	4
	Professional Elective-I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**21**

Semester - V

Code	Course Title	Hours/ Week			C
		L	T	P	
21EIC301P	Embedded System Design	2	0	4	4
21EIC302J	Process Control	3	0	2	4
21EIC313T	Robot Kinematics and Dynamics	3	0	0	3
21EIC311T	Power Electronics and Drives	3	0	0	3
	Professional Elective – II				3
	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
18PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester - VI

Code	Course Title	Hours/ Week			C
		L	T	P	
21CSS303T	Data Science	2	0	0	2
21EIC305P	Factory Automation	2	0	4	4
21EIC312J	VFD and Servo Programming	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
21EIP302L	Project	0	0	6	3
21EIP303T	MOOC	3	0	0	
O	Open Elective – II				3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**21**

Semester - VII

Code	Course Title	Hours/ Week			C
		L	T	P	
21GNH401T	Behavioral Psychology	2	1	0	3
21EIC411T	Autonomous Mobile Robotics	3	0	0	3
21EIC412J	Robotics for Industrial Automation	2	0	2	3
	Professional Elective-V				3
	Professional Elective-VI				3
	Open Elective-III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week			C
		L	T	P	
21EIP401L	Major Project	0	0	30	15
21EIP402L	Major Project	0	0	20	
21EIP403L	Internship	0	0	10	
	Total Credits				**15**

#Students have to register either 21EIP401L or 21EIP402L and 21EIP403L both in eighth semester

4. B.Tech.in Automobile Engineering

4. (a) Mission of the Department

Mission Stmt – 1	*To impart students with quality education centered on altering global requirements and add values to their career desires*
Mission Stmt – 2	*To enhance the knowledge and skill of students in collaboration with public and private sectors*
Mission Stmt – 3	*To identify and acknowledge economic, social and environmental issues that influences the quality of life in the vicinity and the globe*
Mission Stmt – 4	*To inculcate leadership qualities needed for automotive industries through robust curriculum with international outlook for sustainable future*
Mission Stmt – 5	*To build trust and co-operation at the workplace through effective inter-personal and communication skills*

4. (b) Program Educational Objectives (PEO)

PEO – 1	*Pursue advanced education, research and development, and other creative and innovative efforts in Automobile engineering*
PEO – 2	*Successfully apply analytical techniques, problem-solving skills necessary to adapt to technological changes and for a career in the field of automobile and mechanical engineering*
PEO – 3	*Implement their engineering knowledge acquired from projects, laboratory experimentation, classroom lectures and demonstrations to acknowledge the full range of technical and associated environmental issues*
PEO – 4	*Efficaciously use their communication skills in oral, written, visual and graphic modes within interpersonal, team, and group environments*
PEO – 5	*Retain the intellectual curiosity that motivates lifelong learning making them versatile to the rapidly evolving industrial challenges*

4. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	3	2	2	1	1
PEO – 2	3	2	2	3	1
PEO – 3	3	3	2	2	3
PEO – 4	2	3	3	2	3
PEO – 5	3	2	3	3	2

4. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)														
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
PEO – 1	3	1	2	2	3	1	1	2	2	3	1	3	3	2	3
PEO – 2	3	3	2	3	2	1	1	1	3	2	2	3	2	2	3
PEO – 3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3
PEO – 4	1	2	1	1	2	1	2	3	3	3	2	2	2	2	1
PEO – 5	2	2	2	2	2	3	2	3	3	2	2	2	2	2	2

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Ability to implement the knowledge of the design, manufacture, and maintenance of major subsystems and technologies associated with automobiles for sustainable professional career*
PSO - 2	*Ability to comprehend and communicate effectively within a multidisciplinary working environment in the context of the emerging technologies.*
PSO - 3	*Ability to acquire technical and managerial skill that makes them an employable graduate.*

4. (e) Program Structure: B.Tech. in Automobile Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21AUS101L	Artifact Dissection Lab	0	0	2	1
21DCS201P	Design Thinking and Methodology	1	0	4	3
21MES101T	Engineering Mechanics	3	1	0	4
21CSS303T	Data Science	2	0	0	2
	Total Credits				**22**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21AUP302L	Project	0	0	6	3
21AUP303T	MOOC	3	0	0	
21AUP401L	Major Project	0	0	30	15
21AUP402L	Major Project	0	0	10	
21AUP403L	Internship	0	0	20	
	Total Credits				**19**

Open Elective Courses (O)
(Any 3 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21AUO101T	Hybrid and Electric Vehicles	3	0	0	3
21AUO102T	Renewable Sources of Energy	3	0	0	3
21AUO103T	Special Type of Vehicles	3	0	0	3
21AUO104T	Fuel Cells and Applications	3	0	0	3
21AUO105T	Transport Management	3	0	0	3
21AUO106T	Composite Materials for Automotive Applications	3	0	0	3
21AUO107T	Non-Destructive Testing and Evaluation	3	0	0	3
21AUO108T	Advanced Engine Technology	3	0	0	3
21AUO109T	New Product Development	3	0	0	3
21AUO110T	Automotive Standards and Regulations	3	0	0	3
21AUO111T	Automotive Sciences	3	0	0	3
21AUO112T	Intelligent Vehicle Technology	3	0	0	3
	Total Credits				**9**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21BTB103T	Biology	2	0	0	2
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC206T	Artificial Intelligence	2	1	0	3
21AUC201T	Applied Thermal Engineering	3	0	0	3
21AUC202J	Automotive Engines	2	0	2	3
21AUC203J	Manufacturing Technology for Automotive Engineers	2	0	2	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC202L	Material testing Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics lab	0	0	2	1
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21AUC301T	CAD Analysis for Automotive Engineers	3	0	0	3
21AUC302J	Vehicular Structures and Driveline Systems	2	0	2	3
21AUC301L	Design of Automotive Systems laboratory	0	0	2	1
21AUC303J	Automotive Electrical and Electronics	2	0	2	3
21AUC304J	Finite Element Analysis	3	0	2	4
21AUC401J	Vehicle Dynamics	2	0	2	3
21AUC402J	Vehicle Maintenance	2	0	2	3
	Total Credits				**47**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

Professional Elective Courses (E) (Any 6 Courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
Sub-stream: Manufacturing					
21AUE221T	*Automotive Components Manufacturing*	*3*	*0*	*0*	*3*
21AUE222T	*Welding and Joining Technique*	*3*	*0*	*0*	*3*
21AUE321T	*Automotive Surface Engineering*	*3*	*0*	*0*	*3*
21AUE322T	*Agile Manufacturing*	*3*	*0*	*0*	*3*
21AUE323T	*Manufacturing Systems and Simulation*	*3*	*0*	*0*	*3*
21AUE324T	*Advanced Manufacturing Process*	*3*	*0*	*0*	*3*
21AUE325T	*Computer Integrated Manufacturing*	*3*	*0*	*0*	*3*
21AUE326T	*Process Planning and Cost Estimation*	*3*	*0*	*0*	*3*
21AUE421T	*Automotive Quality Systems*	*3*	*0*	*0*	*3*
21AUE422T	*Industrial Engineering and Operational Research*	*3*	*0*	*0*	*3*
Sub-stream: Engine					
21AUE231T	*Heat Ventilation and Air Conditioning*	*3*	*0*	*0*	*3*
21AUE232T	*Engine Testing and Validation*	*3*	*0*	*0*	*3*
21AUE331T	*Fuel Testing and Standards*	*3*	*0*	*0*	*3*
21AUE332T	*Automotive Exhaust System Development*	*3*	*0*	*0*	*3*
21AUE333T	*Engine Auxiliary Systems*	*3*	*0*	*0*	*3*
21AUE334T	*Design of Automotive Thermal System*	*3*	*0*	*0*	*3*
21AUE335T	*Simulation of I.C engines*	*3*	*0*	*0*	*3*
21AUE431T	*Automotive Emission Formation and Controls*	*3*	*0*	*0*	*3*
21AUE432T	*Alternative Fuels and Energy Systems*	*3*	*0*	*0*	*3*

Professional Elective Courses (E)					
Course Code	Course Title	Hours/ Week L	T	P	C
Sub-stream: Design					
21AUE241T	*Automotive Driveline Design*	*3*	*0*	*0*	*3*
21AUE242T	*Automotive Chassis Component Design*	*3*	*0*	*0*	*3*
21AUE341T	*Vehicle Design Data Characteristics*	*3*	*0*	*0*	*3*
21AUE342T	*Concepts of Engineering Design*	*3*	*0*	*0*	*3*
21AUE343T	*Rapid Prototyping and Tooling*	*3*	*0*	*0*	*3*
21AUE344T	*Modeling and Control of Vibration in Mechanical Systems*	*3*	*0*	*0*	*3*
21AUE441T	*Design for Manufacture*	*3*	*0*	*0*	*3*
21AUE442T	*Geometrical Dimensioning and Tolerance*	*3*	*0*	*0*	*3*
Sub-stream : Vehicular Technologies					
21AUE251T	*Auxiliary Vehicle Systems*	*3*	*0*	*0*	*3*
21AUE252T	*Two and Three Wheeler Technology*	*3*	*0*	*0*	*3*
21AUE351T	*Vehicle Performance and Testing*	*3*	*0*	*0*	*3*
21AUE352T	*Tyre Technology*	*3*	*0*	*0*	*3*
21AUE353T	*Motorsport Technology*	*3*	*0*	*0*	*3*
21AUE354T	*Automotive NVH*	*3*	*0*	*0*	*3*
21AUE355T	*Advanced Vehicle Technology*	*3*	*0*	*0*	*3*
21AUE451T	*Automotive Safety and Ergonomics*	*3*	*0*	*0*	*3*
21AUE452T	*Vehicle Body Engineering and Aerodynamics*	*3*	*0*	*0*	*3*
	Total Credits				***18***

4. (f) Programme Articulation Matrix: B.Tech. in Automobile Engineering

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21AUS101L	Artifact Dissection Lab	3	3										3	2	1	1
21AUC201T	Applied Thermal Engineering	1.2	1.6	0.6				0.4						1.6	1.2	0.6
21AUC202J	Manufacturing Technology for Automotive Engineers	3	3					0.8						3	3	
21AUC203J	Automotive Engines	1.6	0.6	0.2	0.8	0.6		0.8						1.6	0.6	0.2
21AUC301T	CAD Analysis for Automotive Engineers	3	1	2	1	1.8								3	0.6	
21AUC301L	Design of Automotive Systems laboratory	2.6	1.8	2.6	2.4	1.8								2.6	1.8	2.6
21AUC302J	Vehicular Structures and Driveline Systems	3		0.8	0.6			0.4						3		
21AUC303J	Automotive Electrical and Electronics	3	3	1	1	1.8				1	1		1	3	3	1
21AUC304J	Finite Element Analysis	3	3	0.4	2									3	2	
21AUC401J	Vehicle Dynamics	3	3			3								3	2	
21AUC402J	Vehicle Maintenance	0.2		0.4	1.6	2.4										
21AUE221T	Automotive Components Manufacturing	3	2											3		
21AUE222T	Welding and Joining Technique	1.6	0.2	0.4	1.2	0.8						0.6		3		
21AUE321T	Automotive Surface Engineering	1.6	1.6	1.8	1									3	1.2	
21AUE322T	Agile Manufacturing	3	2		2.2									2.6		
21AUE323T	Manufacturing Systems and Simulation	2.4	0.4	0.8	1.6	0.8								3		
21AUE324T	Advanced Manufacturing Process	2.4	0.2	1.2	1.2	0.8								3	0.8	
21AUE325T	Computer Integrated Manufacturing	3	2			1								3		
21AUE326T	Process Planning and Cost Estimation	1.6	1.8	1.6	1									2.4		
21AUE421T	Automotive Quality Systems	1.6	1.6	1.8	1									2		
21AUE422T	Industrial Engineering and Operational Research	3	2.4		2									1.8	2.2	
21AUE231T	Heat ventilation and air conditioning	2.6	0.4	0.6				0.4						3	0.8	
21AUE232T	Engine testing and validation	2.6	0.2	1.4	1.2					0.2		0.6		3	1.6	
21AUE331T	Fuel testing and standards	3	2	1	3	1		3	3	2				3		
21AUE332T	Automotive exhaust system development	3	2.8	1	2			2.4						3		
21AUE333T	Engine auxiliary systems	3	0.6	0.6	1.8									3		
21AUE334T	Design of automotive thermal system	0.4		0.6	0.6	0.4								2.2	0.6	
21AUE335T	Simulation of I.C engines	3	2		2.8	3		1						0.6	2.4	
21AUE431T	Automotive emission formation and controls	1.6		0.4	2.2			1.8						3	1.6	
21AUE432T	Alternative fuels and energy systems	2	1					3						2.6		
21AUE241T	Automotive Driveline Design	1.6	1.8	2.6										3		
21AUE242T	Automotive Chassis Component Design	2.2	1.8	2										3		
21AUE341T	Vehicle Design Data Characteristics	2.8	3	2.8										3		
21AUE342T	Concepts of Engineering Design	2.4	0.4	2.2	1	0.4								3		
21AUE343T	Rapid prototyping and tooling	2.6	1	1.8	1.6									2.4	1	0.5
21AUE344T	Modeling and Control of Vibration in Mechanical Systems	1.2	2.4	1.2	1.2									3		
21AUE441T	Design for Manufacture	2.2		2.2	3									3		
21AUE442T	Geometrical Dimensioning and Tolerance	2	2.5	1.5										1.5	2.25	
21AUE251T	Auxiliary vehicle systems	3	3				3							3	2	
21AUE252T	Two and three wheeler technology	3	0.6	1.8				1.2						3		
21AUE351T	Vehicle performance and testing	0.2		0.4	1	0.6								3		
21AUE352T	Tyre technology	3	1.8	1.2	2.4	0.6								3		
21AUE353T	Motorsport technology	3	1.8	0.6	0.8									3		
21AUE354T	Automotive NVH	3	2.4											3	0.6	1
21AUE355T	Advanced vehicle technology	3	3	0.6	0.4									3		
21AUE451T	Automotive Safety and Ergonomics	3		0.8	0.6			0.4						3		
21AUE452T	Vehicle body Engineering and Aerodynamics	3		0.8	0.6			0.4								
21AUP302L	MOOC	3	2	2							2		2			
21AUP303L	Project	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
21AUP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21AUP402L	Semester Internship (not for Integrated)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	2.4	1.6	1.1	1.1	0.6	0.2	0.5	0.2	0.2	0.2	0.2	0.3	2.6	0.8	0.3

4. (g) Implementation Plan: B.Tech. in Automobile Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21AUS101L	Artifact Dissection Lab	0	0	2	1
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**19**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101T	Engineering Mechanics	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21AUC201T	Applied Thermal Engineering	3	0	0	3
21AUC203J	Manufacturing Technology for Automotive Engineers	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21MEC202L	Material testing Laboratory	0	0	2	1
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21AUC202J	Automotive Engines	2	0	2	3
E	Professional Elective – I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
	Total Credits				**20**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21AUC301T	CAD Analysis for Automotive Engineers	3	0	0	3
21AUC302J	Vehicular Structures and Driveline Systems	2	0	2	3
E	Professional Elective – II				3
O	Open Elective – I				3
21PDM301L	Analytical and Logical Thinking Skills*	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21AUC301L	Design of Automotive Systems laboratory	0	0	2	1
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21AUC303J	Automotive Electrical and Electronics	2	0	2	3
21AUC304J	Finite Element Analysis	3	0	2	4
E	Professional Elective – III				3
E	Professional Elective – IV				3
21AUP302L	Project	0	0	6	3
21AUP303T	MOOC	3	0	0	
O	Open Elective – II				3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**21**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
21AUC401J	Vehicle Dynamics	2	0	2	3
21AUC402J	Vehicle Maintenance	2	0	2	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
O	Open Elective – III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21AUP401L	Major Project	0	0	30	15
21AUP402L	Major Project	0	0	20	
21AUP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21AUP401L or 21AUP402L and 21AUP403L both in eighth semester

5. B.Tech. in Automobile Engineering with Specialization in Automotive Electronics

5. (a) Mission of the Department

Mission Stmt – 1	*To impart students with quality education centered on altering global requirements and add values to their career desires*
Mission Stmt – 2	*To enhance the knowledge and skill of students in collaboration with public and private sectors*
Mission Stmt – 3	*To identify and acknowledge economic, social and environmental issues that influences the quality of life in the vicinity and the globe*
Mission Stmt – 4	*To inculcate leadership qualities needed for automotive industries through robust curriculum with international outlook for sustainable future*
Mission Stmt – 5	*To build trust and co-operation at the workplace through effective inter-personal and communication skills*

5. (b) Program Educational Objectives (PEO)

PEO - 1	*To provide an overall knowledge about the application of electrical and electronics in automotive systems*
PEO - 2	*To make the students understand the use of sensors, actuators, signal conditioners, controls and software for automotive applications*
PEO - 3	*To understand the importance and procedure of fault diagnostics and data logging for automotive field.*
PEO - 4	*To expose the students to advanced requirements in industry like autonomous, inter and intra-vehicular communications protocols, hybrid vehicles technologies, model based system design and associated technologies*
PEO - 5	*To get exposure to the modern automobiles and contributing to the challenges of the society in terms of research and entrepreneurship.*

5. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	3	3	2	2	3
PEO – 2	3	2	2	2	2
PEO – 3	3	3	1	2	1
PEO – 4	2	2	3	3	2
PEO – 5	3	2	3	3	2

5. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)														
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3	1	2	2	3	1	1	2	2	3	1	3	3	2	3
PEO – 2	3	3	2	3	2	1	1	1	3	2	2	3	2	2	3
PEO – 3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3
PEO – 4	3	2	1	3	2	1	2	3	3	3	2	2	2	2	3
PEO – 5	3	2	2	2	2	3	3	3	3	2	2	2	2	2	2

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Students gain knowledge and expertise in the field of electrical and electronics related to automotive systems*
PSO - 2	*Ability to understand recent technological developments in Automotive electronics and develop products to cater the societal and industrial needs*
PSO - 3	*Assess society needs and develop constructive and creative solutions for problems related to Automotive Electronics*

5. (e) Program Structure: B.Tech. in Automobile Engineering with Specialization in Automotive Electronics

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21AUS101L	Artifact Dissection Lab	0	0	2	1
21DCS201P	Design Thinking and Methodology	1	0	4	3
21MES101T	Engineering Mechanics	3	1	0	4
21CSS303T	Data Science	2	0	0	2
	Total Credits				**22**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21AUP302L	Project	0	0	6	3
21AUP303T	MOOC	3	0	0	
21AUP401L	Major Project	0	0	30	15
21AUP402L	Major Project	0	0	10	
21AUP403L	Internship	0	0	20	
	Total Credits				**19**

Open Elective Courses
(Any 3 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21AUO101T	Hybrid and Electric Vehicles	3	0	0	3
21AUO102T	Renewable Sources of Energy	3	0	0	3
21AUO103T	Special Type of Vehicles	3	0	0	3
21AUO104T	Fuel Cells and Applications	3	0	0	3
21AUO105T	Transport Management	3	0	0	3
21AUO106T	Composite Materials for Automotive Applications	3	0	0	3
21AUO107T	Non Destructive Testing and Evaluation	3	0	0	3
21AUO108T	Advanced Engine Technology	3	0	0	3
21AUO109T	New Product Development	3	0	0	3
21AUO110T	Automotive standards and regulations	3	0	0	3
21AUO111T	Automotive Sciences	3	0	0	3
21AUO112T	Intelligent Vehicle Technology	3	0	0	3
	Total Credits				***09***

Professional Elective Courses (E)
(Any 6 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21AUE202T	Sensors Actuators and Signal conditioners	3	0	0	3
21AUE211J	Analog and Digital circuits for Automotive Applications	2	0	2	3
21AUE311T	Principles of Linear Systems and Signals	3	0	0	3
21AUE312T	Automotive Infotronics	3	0	0	3
21AUE313T	Artificial Neural Networks and Fuzzy Logic	3	0	0	3
21AUE314T	CAD and Simulation for Electronics	3	0	0	3
21AUE317J	Automotive control engineering	2	0	2	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21BTB103T	Biology	2	0	0	2
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses I

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC206T	Artificial Intelligence	2	1	0	3
21AUC201T	Applied Thermal Engineering	3	0	0	3
21AUC202J	Automotive Engines	2	0	2	3
21AUC203J	Manufacturing Technology for Automotive Engineers	2	0	2	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC202L	Material testing Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics lab	0	0	2	1
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21AUC301T	CAD Analysis for Automotive Engineers	3	0	0	3
21AUC302J	Vehicular Structures and Driveline Systems	2	0	2	3
21AUC301L	Design of Automotive Systems laboratory	0	0	2	1
21AUC303J	Automotive Electrical and Electronics	2	0	2	3
21AUC305J	Automotive Micro controllers	3	0	2	4
21AUC401J	Vehicle Dynamics	2	0	2	3
21AUC403J	Automotive Fault Diagnosis	2	0	2	3
	Total Credits				**47**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				***3***

Professional Elective Courses (E)

Course Code	Course Title	Hours/ Week L	T	P	C
21AUE411T	Power Electronics for Electric Vehicle Application	3	0	0	3
21AUE412T	State Space Analysis and Digital Control System	3	0	0	3
21AUE413T	Model Based System Design	3	0	0	3
21AUE414J	Modelling and Control of Electric and Hybrid Vehicles	2	0	2	3
21AUE415T	Vehicle Stability and Control Systems	3	0	0	3
21AUE416T	Electronic Engine Management System	3	0	0	3
	Total Credits				**18**

5. (f) Programme Articulation Matrix: B.Tech. in Automobile Engineering with Specialization in Automotive Electronics

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21AUS11L	Artifact Dissection Lab	3	3										3	2	1	1
21AUC21T	Applied Thermal Engineering	1.2	1.6	0.6				0.4						1.6	1.2	0.6
21AUC22J	Manufacturing Technology for Automotive Engineers	3	3					0.8						3	3	
21AUC23J	Automotive Engines	1.6	0.6	0.2	0.8	0.6		0.8						1.6	0.6	0.2
21AUC31T	CAD Analysis for Automotive Engineers	3	1	2	1	1.8								3	0.6	
21AUC31L	Design of Automotive Systems laboratory	2.6	1.8	2.6	2.4	1.8								2.6	1.8	2.6
21AUC32J	Vehicular Structures and Driveline Systems	3		0.8	0.6			0.4						3		
21AUC33J	Automotive Electrical and Electronics	3	3	1	1	1.8				1	1		1	3	3	1
21AUC41J	Vehicle Dynamics	3	3			3								3	2	
21AUC35J	Automotive Micro controllers	3	2.2	0.8	1.2	1.6				1	1		2	2.4	1.2	
21AUC43J	Automotive Fault Diagnosis	3	2	1	1	3							1.2	1.8		
21AUE22T	Sensors Actuators and Signal conditioners	3	3	1.8		1.8							1	2.8	0.2	
21AUE211J	Analog and Digital circuits for Automotive Applications	3	2.6	1		2				1	1		1	2.4	0.4	
21AUE311T	Principles of Linear Systems and Signals	3	3											3		
21AUE312T	Automotive Infotronics	3	2.8			1.8								2.4	0.4	0.4
21AUE313T	Artificial Neural Networks and Fuzzy Logic	3	3											3		
21AUE314T	CAD and Simulation for Electronics	3		2.2										1.2	1.6	
21AUE317J	Automotive control engineering	3	2	2.6										3		
21AUE411T	Power Electronics for Electric Vehicle Application	3	1.8	1.6	0.8									3		2
21AUE412T	State Space Analysis and Digital Control System	3	3	2	2								1	3	1	
21AUE413T	Model Based System Design	3	2.8			1.8								0.6	2.8	0.6
21AUE414J	Modelling and Control of Electric and Hybrid Vehicles	3	2.6	2.6		1.4								3		
21AUE415T	Vehicle Stability and Control Systems	3	3											1.2	1.8	
21AUE416T	Electronic Engine Management System	3	1.2	2		1							1.4	3		
21AUP32L	MOOC	3	2	2							2		2			
21AUP33L	Project	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
21AUP41L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21AUP42L	Semester Internship (not for Integrated)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	2.9	2.3	1.3	0.7	1.2	0.3	0.4	0.3	0.4	0.5	0.3	0.8	2.4	1.2	0.6

5. (g) Implementation Plan: B.Tech. in Automobile Engineering Automobile Engineering with specialization in Automotive Electronics

Semester – I

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21AUS101L	Artifact Dissection Lab	0	0	2	1
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**19**

Semester – II

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101T	Engineering Mechanics	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21AUC201T	Applied Thermal Engineering	3	0	0	3
21AUC203J	Manufacturing Technology for Automotive Engineers	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21LEM201T	Professional Ethics*	1	0	0	0
21PDM201L	Verbal Reasoning*	0	0	2	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21MEC202L	Material testing Laboratory	0	0	2	1
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21AUC202J	Automotive Engines	2	0	2	3
E	Professional Elective – I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills*	0	0	2	0
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
	Total Credits				**20**

Semester – V

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB301T	Probability and Statistics	3	1	0	4
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21AUC301T	CAD Analysis for Automotive Engineers	3	0	0	3
21AUC302J	Vehicular Structures and Driveline Systems	2	0	2	3
E	Professional Elective – II				3
O	Open Elective – I				3
21PDM301L	Analytical and Logical Thinking Skills*	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21AUC301L	Design of Automotive Systems laboratory	0	0	2	1
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week			C
		L	T	P	
21CSS303T	Data Science	2	0	0	2
21AUC303J	Automotive Electrical and Electronics	2	0	2	3
21AUC305J	Automotive Micro Controllers	3	0	2	4
E	Professional Elective – III				3
E	Professional Elective – IV				3
21AUP302L	Project	0	0	6	3
21AUP303T	MOOC	3	0	0	
O	Open Elective – II				3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**21**

Semester – VII

Code	Course Title	Hours/ Week			C
		L	T	P	
21GNH401T	Behavioral Psychology	2	1	0	3
21AUC401J	Vehicle Dynamics	2	0	2	3
21AUC403J	Automotive Fault Diagnosis	2	0	2	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
O	Open Elective – III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week			C
		L	T	P	
21AUP401L	Major Project	0	0	30	15
21AUP402L	Major Project	0	0	20	
21AUP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21AUP401L or 21AUP402L and 21AUP403L both in eighth semester

6. B.Tech.in Automotive Engineering

6. (a) Mission of the Department

Mission Stmt – 1	*To impart students with quality education centered on altering global requirements and add values to their career desires*
Mission Stmt – 2	*To enhance the knowledge and skill of students in collaboration with public and private sectors*
Mission Stmt – 3	*To identify and acknowledge economic, social and environmental issues that influences the quality of life in the vicinity and the globe*
Mission Stmt – 4	*To inculcate leadership qualities needed for automotive industries through robust curriculum with international outlook for sustainable future*
Mission Stmt – 5	*To build trust and co-operation at the workplace through effective inter-personal and communication skills*

6. (b) Program Educational Objectives (PEO)

PEO - 1	*To provide an overall knowledge about the application of electrical and electronics in automotive systems*
PEO - 2	*To make the students understand the use of sensors, actuators, signal conditioners, controls and software for automotive applications*
PEO - 3	*To understand the importance and procedure of fault diagnostics and data logging for automotive field.*
PEO - 4	*To expose the students to advanced requirements in industry like autonomous, inter and intra-vehicular communications protocols, hybrid vehicles technologies, model based system design and associated technologies*
PEO - 5	*To get exposure to the modern automobiles and contributing to the challenges of the society in terms of research and entrepreneurship.*

6. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	*3*	*3*	*2*	*2*	*3*
PEO – 2	*3*	*2*	*2*	*2*	*2*
PEO – 3	*3*	*3*	*1*	*2*	*1*
PEO – 4	*2*	*2*	*3*	*3*	*2*
PEO – 5	*3*	*2*	*3*	*3*	*2*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

6. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)														
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
PEO – 1	*3*	*1*	*2*	*2*	*3*	*1*	*1*	*2*	*2*	*3*	*1*	*3*	*3*	*2*	*3*
PEO – 2	*3*	*3*	*2*	*3*	*2*	*1*	*1*	*1*	*3*	*2*	*2*	*3*	*2*	*2*	*3*
PEO – 3	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*3*	*3*	*3*	*3*
PEO – 4	*1*	*2*	*1*	*1*	*2*	*1*	*2*	*3*	*3*	*3*	*2*	*2*	*2*	*2*	*1*
PEO – 5	*2*	*2*	*2*	*2*	*2*	*3*	*2*	*3*	*3*	*2*	*2*	*2*	*2*	*2*	*2*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Ability to implement the knowledge of the design, manufacture, and maintenance of major subsystems and technologies associated with automobiles for sustainable professional career*
PSO - 2	*Ability to comprehend and communicate effectively within a multidisciplinary working environment in the context of the emerging technologies.*
PSO - 3	*Ability to acquire technical and managerial skill that makes them an employable graduate.*

6. (e) Program Structure: B.Tech. in Automotive Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21AUS101L	Artifact Dissection Lab	0	0	2	1
21DCS201P	Design Thinking and Methodology	1	0	4	3
21MES101T	Engineering Mechanics	3	1	0	4
21CSS303T	Data Science	2	0	0	2
	Total Credits				**22**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21AUP302L	Project	0	0	6	3
21AUP303T	MOOC	3	0	0	
21AUP401L	Major Project	0	0	30	15
21AUP402L	Major Project	0	0	20	
21AUP403L	Internship#	0	0	10	
	Total Credits				**19**

Open Elective Courses (O)
(Any 3 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21AUO101T	Hybrid and Electric Vehicles	3	0	0	3
21AUO102T	Renewable Sources of Energy	3	0	0	3
21AUO103T	Special Type of Vehicles	3	0	0	3
21AUO104T	Fuel Cells and Applications	3	0	0	3
21AUO105T	Transport Management	3	0	0	3
21AUO106T	Composite Materials for Automotive Applications	3	0	0	3
21AUO107T	Non Destructive Testing and evaluation	3	0	0	3
21AUO108T	Advanced engine technology	3	0	0	3
21AUO109T	New Product Development	3	0	0	3
21AUO110T	Automotive standards and regulations	3	0	0	3
21AUO111T	Automotive Sciences	3	0	0	3
21AUO112T	Intelligent Vehicle Technology	3	0	0	3
	Total Credits				**09**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21BTB103T	Biology	2	0	0	2
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses I

Course Code	Course Title	Hours/ Week L	T	P	C
21AUC201T	Applied Thermal Engineering	3	0	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
21AUC202J	Automotive Engines	2	0	2	3
21AUC203J	Manufacturing Technology for Automotive Engineers	2	0	2	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC202L	Material testing Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics lab	0	0	2	1
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21AUC301T	CAD Analysis for Automotive Engineers	3	0	0	3
21AUC302J	Vehicular Structures and Driveline Systems	2	0	2	3
21AUC301L	Design of Automotive Systems laboratory	0	0	2	1
21AUC303J	Automotive Electrical and Electronics	2	0	2	3
21AUC304J	Finite Element Analysis	3	0	2	4
	Total Credits				**41**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

Professional Elective Courses (E) (Any 8 Courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
	Sub-stream: Manufacturing				
21AUE221T	*Automotive Components Manufacturing*	*3*	*0*	*0*	*3*
21AUE222T	*Welding and Joining Technique*	*3*	*0*	*0*	*3*
21AUE321T	*Automotive Surface Engineering*	*3*	*0*	*0*	*3*
21AUE322T	*Agile Manufacturing*	*3*	*0*	*0*	*3*
21AUE323T	*Manufacturing Systems and Simulation*	*3*	*0*	*0*	*3*
21AUE324T	*Advanced Manufacturing Process*	*3*	*0*	*0*	*3*
21AUE325T	*Computer Integrated Manufacturing*	*3*	*0*	*0*	*3*
21AUE326T	*Process Planning and Cost Estimation*	*3*	*0*	*0*	*3*
21AUE421T	*Automotive Quality Systems*	*3*	*0*	*0*	*3*
21AUE422T	*Industrial Engineering and Operational Research*	*3*	*0*	*0*	*3*
	Sub-stream: Engine				
21AUE231T	*Heat Ventilation and Air Conditioning*	*3*	*0*	*0*	*3*
21AUE232T	*Engine Testing and Validation*	*3*	*0*	*0*	*3*
21AUE331T	*Fuel Testing and Standards*	*3*	*0*	*0*	*3*
21AUE332T	*Automotive Exhaust System Development*	*3*	*0*	*0*	*3*
21AUE333T	*Engine Auxiliary Systems*	*3*	*0*	*0*	*3*
21AUE334T	*Design of Automotive Thermal System*	*3*	*0*	*0*	*3*
21AUE335T	*Simulation of I.C Engines*	*3*	*0*	*0*	*3*
21AUE431T	*Automotive Emission Formation and Controls*	*3*	*0*	*0*	*3*
21AUE432T	*Alternative Fuels and Energy Systems*	*3*	*0*	*0*	*3*
	Sub-stream: Design	*3*	*0*	*0*	*3*
21AUE241T	*Automotive Driveline Design*	*3*	*0*	*0*	*3*
21AUE242T	*Automotive Chassis Component Design*	*3*	*0*	*0*	*3*
21AUE341T	*Vehicle Design Data Characteristics*	*3*	*0*	*0*	*3*
21AUE342T	*Concepts of Engineering Design*	*3*	*0*	*0*	*3*
21AUE343T	*Rapid Prototyping and Tooling*	*3*	*0*	*0*	*3*
21AUE344T	*Modeling and Control of Vibration in Mechanical Systems*	*3*	*0*	*0*	*3*
21AUE441T	*Design for Manufacture*	*3*	*0*	*0*	*3*
21AUE442T	*Geometrical Dimensioning & Tolerance*	*3*	*0*	*0*	*3*

Professional Elective Courses (E) (Any 8 Courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
	Sub-stream : Vehicular Technologies				
21AUE251T	*Auxiliary Vehicle Systems*	*3*	*0*	*0*	*3*
21AUE252T	*Two and Three Wheeler Technology*	*3*	*0*	*0*	*3*
21AUE351T	*Vehicle Performance and Testing*	*3*	*0*	*0*	*3*
21AUE352T	*Tyre Technology*	*3*	*0*	*0*	*3*
21AUE353T	*Motorsport Technology*	*3*	*0*	*0*	*3*
21AUE354T	*Automotive NVH*	*3*	*0*	*0*	*3*
21AUE355T	*Advanced Vehicle Technology*	*3*	*0*	*0*	*3*
21AUE451T	*Automotive Safety and Ergonomics*	*3*	*0*	*0*	*3*
21AUE452T	*Vehicle Body Engineering and Aerodynamics*	*3*	*0*	*0*	*3*
	Sub-stream :Electric Vehicle Technology				
21AUE371T	*Vehicle Dynamics and Design*	*3*	*0*	*0*	*3*
21AUE414J	*Modelling and Control of Electric and Hybrid Vehicles*	*2*	*0*	*2*	*3*
21AUE211J	*Analog and Digital Circuits for Automotive Applications*	*3*	*0*	*0*	*3*
21AUE411T	*Power Electronics of Electric Vehicle Applications*	*3*	*0*	*0*	*3*
21AUE202T	*Sensors Actuators and Signal Conditioners*	*3*	*0*	*0*	*3*
21AUE417T	*Machine Learning Approach for Automotive Applications*	*3*	*0*	*0*	*3*
21AUE372T	*Design Approaches in Electric Vehicle Technology*	*3*	*0*	*0*	*3*
21AUE373T	*Engine Design and Development*	*3*	*0*	*0*	*3*
21AUE374T	*Energy Management & Storage Systems*	*3*	*0*	*0*	*3*
21AUE375T	*Alternate Energy for Mobility Application*	*3*	*0*	*0*	*3*
21AUE376T	*Intelligent Transport System*	*3*	*0*	*0*	*3*
21AUE471T	*Vehicle Body and Crash Worthiness*	*3*	*0*	*0*	*3*
21AUE472T	*Noise Vibration and Harshness*	*3*	*0*	*0*	*3*
21AUE473T	*Motor Drives and Control systems*	*3*	*0*	*0*	*3*
21AUE474T	*Automotive Embedded Systems and Communication Protocol*	*3*	*0*	*0*	*3*
21AUE475T	*Autonomous Vehicle Systems*	*3*	*0*	*0*	*3*
21AUE476T	*Energy Storage system for Electric and Hybrid Vehicles*	*3*	*0*	*0*	*3*
	Total Credits				**24**

6. (f) Programme Articulation: B B.Tech. in Automotive Engineering

		Program Outcome (PO)												PSO		
Course Code	Course Name	*Engineering Knowledge*	*Problem Analysis*	*Design/development of solutions*	*Conduct investigations of complex problems*	*Modern Tool Usage*	*The engineer and society*	*Environment & Sustainability*	*Ethics*	*Individual & Team Work*	*Communication*	*Project Mgt. & Finance*	*Life Long Learning*	*PSO-1*	*PSO-2*	*PSO-3*
21AUS101L	Artifact Dissection Lab	3	3										3	2	1	1
21AUC201T	Applied Thermal Engineering	1.2	1.6	0.6				0.4						1.6	1.2	0.6
21AUC202J	Manufacturing Technology for Automotive Engineers	3	3					0.8						3	3	
21AUC203J	Automotive Engines	1.6	0.6	0.2	0.8	0.6		0.8						1.6	0.6	0.2
21AUC301T	CAD Analysis for Automotive Engineers	3	1	2	1	1.8								3	0.6	
21AUC301L	Design of Automotive Systems laboratory	2.6	1.8	2.6	2.4	1.8								2.6	1.8	2.6
21AUC302J	Vehiclular Structures and Driveline Systems	3		0.8	0.6			0.4						3		
21AUC303J	Automotive Electrical and Electronics	3	3	1	1	1.8				1	1		1	3	3	1
21AUC304J	Finite Element Analysis	3	3	0.4	2									3	2	
21AUE221T	Automotive Components Manufacturing	3	2											3		
21AUE222T	Welding and Joining Technique	1.6	0.2	0.4	1.2	0.8						0.6		3		
21AUE321T	Automotive Surface Engineering	1.6	1.6	1.8	1									3	1.2	
21AUE322T	Agile Manufacturing	3	2		2.2									2.6		
21AUE323T	Manufacturing Systems and Simulation	2.4	0.4	0.8	1.6	0.8								3		
21AUE324T	Advanced Manufacturing Process	2.4	0.2	1.2	1.2	0.8								3	0.8	
21AUE325T	Computer Integrated Manufacturing	3	2			1								3		
21AUE326T	Process Planning and Cost Estimation	1.6	1.8	1.6	1									2.4		
21AUE421T	Automotive Quality Systems	1.6	1.6	1.8	1									2		
21AUE422T	Industrial Engineering and Operational Research	3	2.4		2									1.8	2.2	
21AUE231T	Heat ventilation and air conditioning	2.6	0.4	0.6				0.4						3	0.8	
21AUE232T	Engine testing and validation	2.6	0.2	1.4	1.2					0.2		0.6		3	1.6	
21AUE331T	Fuel testing and standards	3	2	1	3	1		3	3	2				3		
21AUE332T	Automotive exhaust system development	3	2.8	1	2			2.4						3		
21AUE333T	Engine auxiliary systems	3	0.6	0.6	1.8									3		
21AUE334T	Design of automotive thermal system	0.4		0.6	0.6	0.4								2.2	0.6	
21AUE335T	Simulation of I.C engines	3	2		2.8	3		1						0.6	2.4	
21AUE431T	Automotive emission formation and controls	1.6		0.4	2.2			1.8						3	1.6	
21AUE432T	Alternative fuels and energy systems	2	1					3						2.6		
21AUE241T	Automotive Driveline Design	1.6	1.8	2.6										3		
21AUE242T	Automotive Chassis Component Design	2.2	1.8	2										3		
21AUE341T	Vehicle Design Data Characteristics	2.8	3	2.8										3		
21AUE342T	Concepts of Engineering Design	2.4	0.4	2.2	1	0.4								3		
21AUE343T	Rapid prototyping and tooling	2.6	1	1.8	1.6									2.4	1	0.5
21AUE344T	Modeling and Control of Vibration in Mechanical Systems	1.2	2.4	1.2	1.2									3		
21AUE441T	Design for Manufacture	2.2		2.2	3									3		
21AUE442T	Geometrical Dimensioning and Tolerance	2	2.5	1.5										1.5	2.25	
21AUE251T	Auxiliary vehicle systems	3	3				3							3	2	
21AUE252T	Two and three wheeler technology	3	0.6	1.8				1.2						3		
21AUE351T	Vehicle performance and testing	0.2		0.4	1	0.6								3		
21AUE352T	Tyre technology	3	1.8	1.2	2.4	0.6								3		
21AUE353T	Motorsport technology	3	1.8	0.6	0.8									3		
21AUE354T	Automotive NVH	3	2.4											3	0.6	1
21AUE355T	Advanced vehicle technology	3	3	0.6	0.4									3		
21AUE451T	Automotive Safety and Ergonomics	3		0.8	0.6			0.4						3		
21AUE452T	Vehicle body Engineering and Aerodynamics	3		0.8	0.6			0.4								
21AUE202T	Sensors Actuators and Signal conditioners	3	3	1.8		1.8							1	2.8	0.2	

21AUE211J	Analog and Digital circuits for Automotive Applications	3	2.6	1		2				1	1		1	2.4	0.4	
21AUE411T	Power Electronics for Electric Vehicle Application	3	1.8	1.6	0.8									3		2
21AUE414J	Modelling and Control of Electric and Hybrid Vehicles	3	2.6	2.6		1.4								3		
21AUE417T	Machine Learning Approaches for Automotive Appliacations	3	1.8	1.6	0.8									3		2
21AUE371T	Vehicle Dynamics and Design	1.2	0.4	1.6	0.6	1.5										
21AUE372T	Design Approaches in Electric Vehicle Technology	1.2	0.4	1.6	0.6	1.5										
21AUE373T	Engine Design & Development	1.2	0.4	1.6	0.6	1.5										
21AUE374T	Energy Management & Storage Systems	1.2	0.4	1.6	0.6	1.5										
21AUE375T	Alternate Energy for Mobility Application	1.2	0.4	1.6	0.6	1.5										
21AUE376T	Intelligent Transport System	1.2	0.4	1.6	0.6	1.5										
21AUE471T	Vehicle Body and Crash Worthiness	1.2	0.4	1.6	0.6	1.5										
21AUE472T	Noise Vibration and Harshness	1.2	0.4	1.6	0.6	1.5										
21AUE473T	Motor Drives and Control systems	1.2	0.4	1.6	0.6	1.5										
21AUE474T	Automotive Embedded Systems	1.2	0.4	1.6	0.6	1.5										
21AUE475T	Autonomous Vehicle Systems	1.2	0.4	1.6	0.6	1.5										
21AUE476T	Energy Storage system for Electric and Hybrid Vehicles	1.2	0.4	1.6	0.6	1.5										
21AUP302T	MOOC	3	2	2							2		2			
21AUP303L	Project	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
21AUP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21AUP402L	Semester Internship (not for Integrated)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		2.2	1.5	1.3	1.2	1.4	3.0	1.2	3.0	1.1	1.0	0.6	1.5	2.7	1.4	1.2

6. (g) Implementation Plan: B.Tech. in Automotive Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21AUS101L	Artifact Dissection Lab	0	0	2	1
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**19**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101T	Engineering Mechanics	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21AUC201T	Applied Thermal Engineering	3	0	0	3
21AUC203J	Manufacturing Technology for Automotive Engineers	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21MEC202L	Material Testing Laboratory	0	0	2	1
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21AUC202J	Automotive Engines	2	0	2	3
E	Professional Elective – I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills*	0	0	2	0
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
	Total Credits				**20**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21AUC301T	CAD Analysis for Automotive Engineers	3	0	0	3
21AUC302J	Vehicular Structures and Driveline Systems	2	0	2	3
E	Professional Elective – II				3
O	Open Elective – I				3
21PDM301L	Analytical and Logical Thinking Skills*	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21AUC301L	Design of Automotive Systems laboratory	0	0	2	1
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21AUC303J	Automotive Electrical and Electronics	2	0	2	3
21AUC304J	Finite Element Analysis	3	0	2	4
E	Professional Elective – III				3
E	Professional Elective – IV				3
21AUP302L	Project	0	0	6	3
21AUP303T	MOOC	3	0	0	
O	Open Elective – II				3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**21**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective – III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21AUP401L	Major Project	0	0	30	15
21AUP402L	Major Project	0	0	20	
21AUP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21AUP401L or 21AUP402L and 21AUP403L both in eighth semester

7. B.Tech.in Automobile Engineering with specialization in Vehicle Testing

7. (a) Mission of the Department

Mission Stmt – 1	*To impart students with quality education centered on altering global requirements and add values to their career desires*
Mission Stmt – 2	*To enhance the knowledge and skill of students in collaboration with public and private sectors*
Mission Stmt – 3	*To identify and acknowledge economic, social and environmental issues that influences the quality of life in the vicinity and the globe*
Mission Stmt – 4	*To inculcate leadership qualities needed for automotive industries through robust curriculum with international outlook for sustainable future*
Mission Stmt – 5	*To build trust and co-operation at the workplace through effective inter-personal and communication skills*

7. (b) Program Educational Objectives (PEO)

PEO - 1	*To provide an overall knowledge about the application of electrical and electronics in automotive systems*
PEO - 2	*To make the students understand the use of sensors, actuators, signal conditioners, controls and software for automotive applications*
PEO - 3	*To understand the importance and procedure of fault diagnostics and data logging for automotive field.*
PEO - 4	*To expose the students to advanced requirements in industry like autonomous, inter and intra-vehicular communications protocols, hybrid vehicles technologies, model based system design and associated technologies*
PEO - 5	*To get exposure to the modern automobiles and contributing to the challenges of the society in terms of research and entrepreneurship.*

7. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	*3*	*3*	*2*	*2*	*3*
PEO – 2	*3*	*2*	*2*	*2*	*2*
PEO – 3	*3*	*3*	*1*	*2*	*1*
PEO – 4	*2*	*2*	*3*	*3*	*2*
PEO – 5	*3*	*2*	*3*	*3*	*2*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

7. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*1*	*2*	*2*	*3*	*1*	*1*	*2*	*2*	*3*	*1*	*3*	*3*	*2*	*3*
PEO – 2	*3*	*3*	*2*	*3*	*2*	*1*	*1*	*1*	*3*	*2*	*2*	*3*	*2*	*2*	*3*
PEO – 3	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*3*	*3*	*3*	*3*
PEO – 4	*3*	*2*	*1*	*3*	*2*	*1*	*2*	*3*	*3*	*3*	*2*	*2*	*2*	*2*	*3*
PEO – 5	*3*	*2*	*2*	*2*	*2*	*3*	*3*	*3*	*3*	*2*	*2*	*2*	*2*	*2*	*2*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Students gain knowledge and expertise in the field of electrical and electronics related to automotive systems*
PSO - 2	*Ability to understand recent technological developments in Automotive electronics and develop products to cater the societal and industrial needs*
PSO - 3	*Assess society needs and develop constructive and creative solutions for problems related to Vehicle Testing.*

7. (e) Program Structure: B.Tech. in Automobile Engineering with specialization in Vehicle Testing

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21AUS101L	Artifact Dissection Lab	0	0	2	1
21DCS201P	Design Thinking and Methodology	1	0	4	3
21MES101T	Engineering Mechanics	3	1	0	4
21CSS303T	Data Science	2	0	0	2
	Total Credits				**22**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21AUP302L	Project	0	0	6	3
21AUP303T	MOOC	3	0	0	
21AUP401L	Major Project	0	0	30	15
21AUP402L	Major Project	0	0	20	
21AUP403L	Internship#	0	0	10	
	Total Credits				**19**

Open Elective Courses
(Any 3 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21AUO101T	Hybrid and Electric Vehicles	3	0	0	3
21AUO102T	Renewable Sources of Energy	3	0	0	3
21AUO103T	Special Type of Vehicles	3	0	0	3
21AUO104T	Fuel Cells and Applications	3	0	0	3
21AUO105T	Transport Management	3	0	0	3
21AUO106T	Composite Materials for Automotive Applications	3	0	0	3
21AUO107T	Non Destructive Testing and evaluation	3	0	0	3
21AUO108T	Advanced engine technology	3	0	0	3
21AUO109T	New Product Development	3	0	0	3
21AUO110T	Automotive standards and regulations	3	0	0	3
21AUO111T	Automotive Sciences	3	0	0	3
21AUO112T	Intelligent Vehicle Technology	3	0	0	3
	Total Credits				***09***

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21BTB103T	Biology	2	0	0	2
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses I

Course Code	Course Title	Hours/ Week L	T	P	C
21AUC201T	Applied Thermal Engineering	3	0	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
21AUC202J	Automotive Engines	2	0	2	3
21AUC203J	Manufacturing Technology for Automotive Engineers	2	0	2	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC202L	Material testing Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics lab	0	0	2	1
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21AUC301T	CAD Analysis for Automotive Engineers	3	0	0	3
21AUC302J	Vehicular Structures and Driveline Systems	2	0	2	3
21AUC301L	Design of Automotive Systems laboratory	0	0	2	1
21AUC303J	Automotive Electrical and Electronics	2	0	2	3
21AUC304J	Finite Element Analysis	3	0	2	4
	Total Credits				41

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				***3***

Professional Elective Courses (E) (Any 8 Courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
	Sub-stream: Manufacturing				
21AUE221T	*Automotive Components Manufacturing*	*3*	*0*	*0*	*3*
21AUE222T	*Welding and Joining Technique*	*3*	*0*	*0*	*3*
21AUE321T	*Automotive Surface Engineering*	*3*	*0*	*0*	*3*
21AUE322T	*Agile Manufacturing*	*3*	*0*	*0*	*3*
21AUE323T	*Manufacturing Systems and Simulation*	*3*	*0*	*0*	*3*
21AUE324T	*Advanced Manufacturing Process*	*3*	*0*	*0*	*3*
21AUE325T	*Computer Integrated Manufacturing*	*3*	*0*	*0*	*3*
21AUE326T	*Process Planning and Cost Estimation*	*3*	*0*	*0*	*3*
21AUE421T	*Automotive Quality Systems*	*3*	*0*	*0*	*3*
21AUE422T	*Industrial Engineering and Operational Research*	*3*	*0*	*0*	*3*
	Sub-stream: Engine				
21AUE231T	*Heat Ventilation and Air Conditioning*	*3*	*0*	*0*	*3*
21AUE232T	*Engine Testing and Validation*	*3*	*0*	*0*	*3*
21AUE331T	*Fuel Testing and Standards*	*3*	*0*	*0*	*3*
21AUE332T	*Automotive Exhaust System Development*	*3*	*0*	*0*	*3*
21AUE333T	*Engine Auxiliary Systems*	*3*	*0*	*0*	*3*
21AUE334T	*Design of Automotive Thermal System*	*3*	*0*	*0*	*3*
21AUE335T	*Simulation of I.C Engines*	*3*	*0*	*0*	*3*
21AUE431T	*Automotive Emission Formation and Controls*	*3*	*0*	*0*	*3*
21AUE432T	*Alternative Fuels and Energy Systems*	*3*	*0*	*0*	*3*
	Sub-stream: Design	*3*	*0*	*0*	*3*
21AUE241T	*Automotive Driveline Design*	*3*	*0*	*0*	*3*
21AUE242T	*Automotive Chassis Component Design*	*3*	*0*	*0*	*3*
21AUE341T	*Vehicle Design Data Characteristics*	*3*	*0*	*0*	*3*
21AUE342T	*Concepts of Engineering Design*	*3*	*0*	*0*	*3*
21AUE343T	*Rapid Prototyping and Tooling*	*3*	*0*	*0*	*3*
21AUE344T	*Modeling and Control of Vibration in Mechanical Systems*	*3*	*0*	*0*	*3*
21AUE441T	*Design for Manufacture*	*3*	*0*	*0*	*3*
21AUE442T	*Geometrical Dimensioning and Tolerance*	*3*	*0*	*0*	*3*

Professional Elective Courses (E) (Any 8 Courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
	Sub-stream : Vehicular Technologies				
21AUE251T	*Auxiliary Vehicle Systems*	*3*	*0*	*0*	*3*
21AUE252T	*Two and Three Wheeler Technology*	*3*	*0*	*0*	*3*
21AUE351T	*Vehicle Performance and Testing*	*3*	*0*	*0*	*3*
21AUE352T	*Tyre Technology*	*3*	*0*	*0*	*3*
21AUE353T	*Motorsport Technology*	*3*	*0*	*0*	*3*
21AUE354T	*Automotive NVH*	*3*	*0*	*0*	*3*
21AUE355T	*Advanced Vehicle Technology*	*3*	*0*	*0*	*3*
21AUE451T	*Automotive Safety and Ergonomics*	*3*	*0*	*0*	*3*
21AUE452T	*Vehicle Body Engineering and Aerodynamics*	*3*	*0*	*0*	*3*
	Sub-stream : Vehicle Testing				
21AUE361T	*Electromagnetic Interference and Compatibility*	*3*	*0*	*0*	*3*
21AUE362T	*Vehicle Crashworthiness and Occupants Safety*	*3*	*0*	*0*	*3*
21AUE461T	*Automotive Component Testing and Certification*	*3*	*0*	*0*	*3*
21AUE462T	*Vehicular Vibration and Vehicle Dynamics*	*3*	*0*	*0*	*3*
21AUE463T	*Advanced Power Train Technology*	*3*	*0*	*0*	*3*
21AUE464T	*Electric Vehicle Technology and Testing*	*3*	*0*	*0*	*3*
	Total Credits				**24**

7. (f) Programme Articulation: B.Tech. in Automobile Engineering with specialization in Vehicle Testing

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of	Modern Tool	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long	PSO-1	PSO-2	PSO-3
21AUS11L	Artifact Dissection Lab	3	3										3	2	1	1
21AUC21T	Applied Thermal Engineering	1.2	1.6	0.6				0.4						1.6	1.2	0.6
21AUC22J	Manufacturing Technology for Automotive Engineers	3	3					0.8						3	3	
21AUC23J	Automotive Engines	1.6	0.6	0.2	0.8	0.6		0.8						1.6	0.6	0.2
21AUC31T	CAD Analysis for Automotive Engineers	3	1	2	1	1.8								3	0.6	
21AUC31L	Design of Automotive Systems laboratory	2.6	1.8	2.6	2.4	1.8								2.6	1.8	2.6
21AUC32J	Vehicular Structures and Driveline Systems	3		0.8	0.6			0.4						3		
21AUC33J	Automotive Electrical and Electronics	3	3	1	1	1.8				1	1		1	3	3	1
21AUC34J	Finite Element Analysis	3	3	0.4	2									3	2	
21AUC41J	Vehicle Dynamics	3	3			3								3	2	
21AUC42J	Vehicle Maintenance	0.2		0.4	1.6	2.4										
21AUE221T	Automotive Components Manufacturing	3	2											3		
21AUE222T	Welding and Joining Technique	1.6	0.2	0.4	1.2	0.8						0.6		3		
21AUE321T	Automotive Surface Engineering	1.6	1.6	1.8	1									3	1.2	
21AUE322T	Agile Manufacturing	3	2		2.2									2.6		
21AUE323T	Manufacturing Systems and Simulation	2.4	0.4	0.8	1.6	0.8								3		
21AUE324T	Advanced Manufacturing Process	2.4	0.2	1.2	1.2	0.8								3	0.8	
21AUE325T	Computer Integrated Manufacturing	3	2			1								3		
21AUE326T	Process Planning and Cost Estimation	1.6	1.8	1.6	1									2.4		
21AUE421T	Automotive Quality Systems	1.6	1.6	1.8	1									2		
21AUE422T	Industrial Engineering and Operational Research	3	2.4		2									1.8	2.2	
21AUE231T	Heat ventilation and air conditioning	2.6	0.4	0.6				0.4						3	0.8	
21AUE232T	Engine testing and validation	2.6	0.2	1.4	1.2					0.2		0.6		3	1.6	
21AUE331T	Fuel testing and standards	3	2	1	3	1		3	3	2				3		
21AUE332T	Automotive exhaust system development	3	2.8	1	2			2.4						3		
21AUE333T	Engine auxiliary systems	3	0.6	0.6	1.8									3		
21AUE334T	Design of automotive thermal system	0.4		0.6	0.6	0.4								2.2	0.6	
21AUE335T	Simulation of I.C engines	3	2		2.8	3		1						0.6	2.4	
21AUE431T	Automotive emission formation and controls	1.6		0.4	2.2			1.8						3	1.6	
21AUE432T	Alternative fuels and energy systems	2	1					3						2.6		
21AUE241T	Automotive Driveline Design	1.6	1.8	2.6										3		
21AUE242T	Automotive Chassis Component Design	2.2	1.8	2										3		
21AUE341T	Vehicle Design Data Characteristics	2.8	3	2.8										3		
21AUE342T	Concepts of Engineering Design	2.4	0.4	2.2	1	0.4								3		
21AUE343T	Rapid prototyping and tooling	2.6	1	1.8	1.6									2.4	1	0.5
21AUE344T	Modeling and Control of Vibration in Mechanical Systems	1.2	2.4	1.2	1.2									3		
21AUE441T	Design for Manufacture	2.2		2.2	3									3		
21AUE442T	Geometrical Dimensioning and Tolerance	2	2.5	1.5										1.5	2.25	
21AUE251T	Auxiliary vehicle systems	3	3				3							3	2	
21AUE252T	Two and three wheeler technology	3	0.6	1.8				1.2						3		
21AUE351T	Vehicle performance and testing	0.2		0.4	1	0.6								3		
21AUE352T	Tyre technology	3	1.8	1.2	2.4	0.6								3		
21AUE353T	Motorsport technology	3	1.8	0.6	0.8									3		
21AUE354T	Automotive NVH	3	2.4											3	0.6	1
21AUE355T	Advanced vehicle technology	3	3	0.6	0.4									3		
21AUE451T	Automotive Safety and Ergonomics	3		0.8	0.6			0.4						3		
21AUE452T	Vehicle body Engineering and Aerodynamics	3		0.8	0.6			0.4								
21AUP32L	MOOC	3	2	2							2		2			
21AUP33L	Project	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
21AUP41L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21AUP42L	Semester Internship (not for Integrated)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21AUE361T	Electromagnetic Interference and Compatibility	2.4	1.2	3	1.4	0.6								1.8	0.6	0.6
21AUE362T	Vehicle Crashworthiness and Occupants Safety	2.4	1.2	3										2.8	0.6	0.2
21AUE461T	Automotive Component Testing and Certification	2.4	1.8	3	0.8	0.6								2.4	0.4	0.8
21AUE462T	Vehicular Vibration and Vehicle Dynamics	2.4	1.8	3	0.8	0.6								3	0.4	0.8
21AUE463T	Advanced Power Train Technology	2.4	1.8	3	0.8	0.6								3		
21AUE464T	Electric Vehicle Technology and Testing	2.4	1.8	3	0.8	0.6								3	1.4	
	Program Average	2.4	1.6	1.3	1.1	0.6	0.2	0.4	0.2	0.2	0.2	0.2	0.3	2.6	0.8	0.3

7. (g) Implementation Plan: B.Tech. in Automobile Engineering with specialization in Vehicle Testing

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21AUS101L	Artifact Dissection Lab	0	0	2	1
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**19**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101T	Engineering Mechanics	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21AUC201T	Applied Thermal Engineering	3	0	0	3
21AUC203J	Manufacturing Technology for Automotive Engineers	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21LEM201T	Professional Ethics*	1	0	0	0
21PDM201L	Verbal Reasoning*	0	0	2	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21MEC202L	Material testing Laboratory	0	0	2	1
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21AUC202J	Automotive Engines	2	0	2	3
E	Professional Elective – I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills*	0	0	2	0
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
	Total Credits				**20**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21AUC301T	CAD Analysis for Automotive Engineers	3	0	0	3
21AUC302J	Vehicular Structures and Driveline Systems	2	0	2	3
E	Professional Elective – II				3
O	Open Elective – I	3	0	0	3
21PDM301L	Analytical and Logical Thinking Skills*	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21AUC301L	Design of Automotive Systems laboratory	0	0	2	1
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21AUC303J	Automotive Electrical and Electronics	2	0	2	3
21AUC304J	Finite Element Analysis	3	0	2	4
E	Professional Elective – III	3	0	0	3
E	Professional Elective – IV	3	0	0	3
21AUP302L	Project	0	0	6	3
21AUP303T	MOOC	3	0	0	
O	Open Elective – II	3	0	0	3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**21**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V	3	0	0	3
E	Professional Elective – VI	3	0	0	3
E	Professional Elective – VII	3	0	0	3
E	Professional Elective – VIII	3	0	0	3
O	Open Elective – III	3	0	0	3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21AUP401L	Major Project	0	0	30	15
21AUP402L	Major Project	0	0	20	
21AUP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21AUP401L or 21AUP402L and 21AUP403L both in eighth semester

8. B.Tech. in Biotechnology

8. (a) Mission of the Department

Mission Stmt – 1	*To adopt effective teaching methods to improve the learning process and impart knowledge of biology and technology.*
Mission Stmt – 2	*To provide hands-on training and technical skills to transform students into technocrats and facilitate research and higher education in the fields of biotechnology.*
Mission Stmt – 3	*To pursue and promote cutting-edge research in selected fields of biotechnology*

8. (b) Program Educational Objectives (PEO)

PEO – 1	*To develop graduates with enhanced technical acumen, aptitude, and professional skills in Biotechnology*
PEO – 2	*To develop the ability amongst the students to apply modern bioengineering techniques in industry and research.*
PEO – 3	*To prepare students for a successful career in research and development in Biotechnology*

8. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*3*	*3*	*3*
PEO – 2	*2*	*3*	*3*
PEO – 3	*3*	*3*	*3*

H – High Correlation, M – Medium Correlation, L – Low Correlation

8. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*	*2*	*3*	*2*	*2*	*2*	*2*	*3*	*2*	*2*	*2*	*3*	*3*	*3*
PEO – 2	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*2*	*2*	*2*	*3*	*3*	*3*	*3*	*3*
PEO – 3	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*2*	*3*	*2*	*3*	*3*	*3*	*3*	*3*

H – High Correlation, M – Medium Correlation, L – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Apply basic knowledge of biological processes to solve problems in the applied fields of biotechnology.*
PSO - 2	*Apply biotechnological skills to provide cost-effective and sustainable solutions in Industries*
PSO - 3	*Ability to integrate biological knowledge and concepts with the entrepreneurial perspectives of biotechnology.*

8. (e) Program Structure: B.Tech. in Biotechnology

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CHS251T	Basic Chemical Engineering	3	0	0	3
21CHS252J	Chemical Engineering Principles	3	0	2	4
21CSS303T	Data Science	1	1	0	2
	Total Credits				**24**

Professional Elective Courses
(Any 5 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
	Sub-stream: Medical Biotechnology				
21BTE201T	Developmental Biology	3	0	0	3
21BTE301T	Diseases Models and Mechanism	3	0	0	3
21BTE302T	Metabolic Disorders	3	0	0	3
21BTE401T	Cellular & Molecular Neuroscience	3	0	0	3
21BTE402T	Cancer Biology and Therapeutics	3	0	0	3
21BTE403T	Physiology of Stress and its Management	3	0	0	3
	Sub-stream: Pharmaceutical Biotechnology				
21BTE202T	Pharmaceutical Biotechnology	3	0	0	3
21BTE303T	Computational Molecular Biology	3	0	0	3
21BTE304T	Computer aided Drug Designing	3	0	0	3
21BTE404T	Marine Biotechnology	3	0	0	3
21BTE405T	Vaccine Biotechnology	3	0	0	3
21BTE406T	Molecular Basis of Drug action	3	0	0	3
	Sub-stream: Plant and Food Biotechnology				
21BTE203T	Plant Hormones and Signaling	3	0	0	3
21BTE305T	Epigenetics in Plants	3	0	0	3
21BTE306T	Pathogenesis-Related Proteins In Plants	3	0	0	3
21BTE407T	Food Science and Nutrition	3	0	0	3
21BTE408T	Therapeutic Compounds from Plants	3	0	0	3
21BTE409T	Food safety and quality Management	3	0	0	3
	Sub-stream: Bioprocess Technology				
21BTE204T	Enzyme Engineering and Technology	3	0	0	3
21BTE307T	Membrane Separation Technology	3	0	0	3
21BTE308T	Industrial Fermentation Engineering	3	0	0	3
21BTE410T	Bioreactor Design	3	0	0	3
21BTE411T	Bioprocess Modelling and Simulation	3	0	0	3
21BTE412T	Bioprocess Plant Design	3	0	0	3
	Sub-stream: Environmental Biotechnology				
21BTE205T	Environmental Biotechnology	3	0	0	3
21BTE309T	Industrial Waste Management	3	0	0	3
21BTE310T	Bioenergy	3	0	0	3
21BTE413T	Metabolic Engineering of Microorganism for Environment and Energy	3	0	0	3
21BTE414T	Microbial degradation and Bioremediation Technology	3	0	0	3
21BTE415T	Environmental Biosensors	3	0	0	3
	Total Credits				**15**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB303T	Bio-Statistics for Biotechnologists	3	1	0	4
21BTB105T	Cell Biology	2	0	0	2
	Total Credits				**24**

Professional Core Courses I

Course Code	Course Title	Hours/ Week L	T	P	C
21BTC101T	Biochemistry	3	0	0	3
21BTC201L	Biochemistry Laboratory	0	0	4	2
21BTC202T	Microbiology	3	0	0	3
21BTC203L	Cell and Microbiology Laboratory	0	0	4	2
21BTC204T	Bioprocess Principles	3	0	0	3
21BTC205L	Bioprocess Principles Laboratory	0	0	4	2
21BTC206T	Genetics and Cytogenetics	3	0	0	3
21BTC207T	Molecular Biology	3	0	0	3
21BTC208L	Molecular Biology Laboratory	0	0	4	2
21BTC209T	Bioprocess Engineering	3	0	0	3
21BTC210L	Bioprocess Engineering Laboratory	0	0	4	2
21CSC206T	Artificial Intelligence	3	0	0	3
21BTC301J	Gene Manipulation and Genomics	3	0	2	4
21BTC302J	Immunology	3	0	2	4
21BTC303T	Protein Engineering	3	0	0	3
21BTC304T	Animal Biotechnology	3	0	0	3
21BTC305L	Animal Biotechnology Laboratory	0	0	4	2
21BTC306T	Plant Biotechnology	3	0	0	3
21BTC401L	Plant Biotechnology Laboratory	0	0	4	2
21BTC402J	Bio Separation Technology	3	0	2	4
	Total Credits				**56**

Open Elective Courses (O)
(Any 3 Courses)

Code	Course Title	L	T	P	C
21BTO101T	Human Health and Diseases	3	0	0	3
21BTO105T	Animal Models for Research	3	0	0	3
21BTO106T	Waste to Wealth to Wheels	3	0	0	3
21BTO107T	Fundamental Neurobiology	3	0	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21BTP302L	Project	0	0	6	3
21BTP303T	MOOC	3	0	0	
21BTP401L	Major Project	0	0	30	15
21BTP402L	Major Project	0	0	20	
21BTP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skill and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21LEM101L	Physical and Mental health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
21BTM191T	Bioethics and IPR	1	0	0	0
	Total Credits				**3**

8. (f) Programme Articulation: B. Tech.in Biotechnology

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
21BTB105T	Cell Biology	2	3	3	3	2	-	-	-	-	-	-	-	-	2.6	3
21BTC101T	Biochemistry	3	2.5	3	3	3	-	-	-	-	-		-	2	2.7	-
21BTC201L	Biochemistry Laboratory	3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
21BTC202T	Microbiology	2.6	2	2.2	2	2	-	-	-	-	-	-	-	2.6	-	-
21BTC203L	Cell and Molecular Biology Laboratory	-	3	3	3	-	-	-	-	-	-	-	-	-	3	3
21BTC204T	Bioprocess Principles	2	2.5	1.5	1.8	2	-	-	-	-	-	-	-	2	2	1.5
21BTC205L	Bioprocess Principles Laboratory	2.2	2.5	1.5	1.8	2	-	-	-	-	-	-	-	2	2	1.5
21BTC206T	Genetics and Cytogenetics	2.6	2.4	2.5	2.2	-	-	-	-	-	-	-	-	2.6	-	-
21BTC207T	Molecular Biology	3	2.3	2	1	-	-	-	-	-	-	-	-	2.6	2.8	-
21BTC208L	Molecular Biology Laboratory	3	2.8	2.3	-	-	-	-	-	-	-	-	-	2.6	2.8	-
21BTC209T	Bioprocess Engineering	2.4	1.5	2.2	1.8	3	-	-	-	-	-	-	-	1.5	2	2
21BTC210L	Bioprocess Engineering Laboratory	2.6	2.8	1.5	-	3	-	-	-	-	-	-	-	2	2	-
21BTC301J	Gene manipulation and Genomics	2.7	-	2.8	-	-	2.5	-	2	-	-	-	-	-	2	3
21BTC302J	Immunology	-	-	2	2.5	2.5	1	-	-	-	-	-	-	1.5	-	2.5
21BTC303T	Protein engineering	2	2	-	2	3	-	-	-	-	-	-	-	-	3	3
21BTC304T	Animal Biotechnology	3	3	2.7	2.5	-	-	-	-	-	-	-	-	3	3	3
21BTC305L	Animal biotechnology Laboratory	-	2.5	3	2.7	2	-	-	-	-	-	-	-	2	3	3
21BTC306T	Plant Biotechnology	3	2	2.7	-	3	-	3	-	-	-	-	-	-	2.8	3
21BTC401L	Plant Biotechnology Laboratory	2.8	2.3	2.5	3	2	-	-	-	-	-	-	-	2.7	3	-
21BTC402J	Bio separation Technology	1.5	2.4	1.6	-	-	-	-	-	-	-	-	-	1.5	2	1.4
21BTM191T	Bioethics and IPR	-	2.4	-	-	-	-	-	3	-	-	-	-	-	-	-
21BTE201T	Developmental Biology	2.	2.6	3	-	-	-	-	-	-	-	-	-	2.8	-	2.4
21BTE301T	Diseases Models and Mechanism	2.5	2.6	2.2	3	-	-	-	-	-	-	-	-	2.6	-	3
21BTE302T	Metabolic Disorders	-	2.4	2.3	2.3	-	-	-	-	--	--	-	-	2.6	-	3
21BTE401T	Cellular & Molecular Neuroscience	2.6	2.4	2.7	-	3	-	-	-	-	-	-	-	3	-	2.6
21BTE402T	Cancer Biology and Therapeutics	-	2	2	3	2	-	3	2	-	-	-	-	-	2	2
21BTE403T	Physiology of Stress and its Management	2.6	2.4	2	2.2	-	-	-	-	-	-	-	-	2.6	-	2.6
21BTE202T	Pharmaceutical Biotechnology	-	3	3	2	2.5	-	2	2	-	-	-	-	2	2.3	2
21BTE303T	Computational Molecular Biology	2.2	2	-	2	3	-	-	-	-	-	-	-	-	2	3
21BTE304T	Computer aided Drug Designing	-	3	3	2.5	3	2	-	-	-	-	-	-	-	3	2.6
21BTE404T	Marine Biotechnology	-	2	2	2.8	2	-	-	-	-	-	-	-	2	2	2
21BTE405T	Vaccine Biotechnology	3	3	3	3	-	-	-	2	-	-	-	2	3	3	3
21BTE406T	Molecular Basis of Drug action	-	2	2	2	2.3	-	-	-	-	-	-	-	2	2	-
21BTE203T	Plant Hormones and Signaling	3	2.8	2.6	3	-	-	-	-	-					3	3
21BTE305T	Epigenetics in Plants	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
21BTE306T	Pathogenesis-Related Proteins In Plants	2.6	2.4	2.5	2.2	-	-	-	-	-	-	-	-	2.6	-	2.5
21BTE407T	Food Science and Nutrition	3	2.5	3	-	-	-	-	-	-	-	-	-	2.3	2	-
21BTE408T	Therapeutic Compounds from Plants	2.8	2.8	2.8	2.8	2.8	-	-	-	-	-	-	-	3	3	-
21BTE409T	Food safety and quality Management	2	2.8	2.7	2.5	2	2.5	-	2	-	-	-	-	2.3	2	-
21BTE204T	Enzyme Engineering and Technology	2.2	2.3	2	2	2	-	-	-	-	-	-	-	2	2	2
21BTE307T	Membrane Separation Technology	2.8	3	3	2.5	-	-	-	-	-	-	-	-	2.2	2.3	2.3
21BTE308T	Industrial Fermentation Engineering	2	2	2	-	-	-	-	-	-	-	-	-	3	-	2.5
21BTE410T	Bioreactor Design	2	2.5	2.5	2	-	-	-	-	-	-	-	-	2	2	2
21BTE411T	Bioprocess Modelling and Simulation	2	2	2.6	-	-	-	-	-	-	-	-	-	3	2	2
21BTE412T	Bioprocess Plant Design	2	3	2.6	2	2	-	-	-	-	-	-	-	2	2	2
21BTE205T	Environmental Biotechnology	2	2.3	2.3	2	-	-	2.6	-	-	-	-	-	2	2	3
21BTE309T	Industrial Waste Management	3	2.5	2.7	2	2	2	2	2	-	-	-	-	2.3	2.5	2.3
21BTE310T	Bioenergy	3	2.5	2.7	2	2	2	2	-	-	-	-	-	2.3	2.5	2.3
21BTE413T	Metabolic Engineering of Microorganism for Environment and Energy	2	2.3	2.3	2	-	-	2.6	-	-	-	-	-	2	2	3
21BTE414T	Microbial degradation and Bioremediation Technology	2.7	2.5	2.6	2	2	2	2	-	-	-	-	-	2.3	2.5	2.3
21BTE415T	Environmental Biosensors	3	2.7	2	2.5	2	-	3	-	-	-	-	-	2.3	2.5	2
21BTP302L	MOOC	3	2	2	-	-	-	-	-	-	2	-	2	2	2	-
21BTP303L	Project	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
21BTP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21BTP402L	Industrial Projects	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	**2.6**	**2.5**	**2.5**	**2.4**	**2.5**	**2.2**	**2.5**	**2.4**	**3.0**	**2.8**	**3.0**	**2.6**	**2.4**	**2.5**	**2.5**

8. (g) Implementation Plan: B. Tech.in Biotechnology

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB105T	Cell Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTC101T	Biochemistry	3	0	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21CHS251T	Basic Chemical Engineering	3	0	0	3
21PDH201T	Social Engineering	2	0	0	2
21BTC202L	Biochemistry Laboratory	0	0	4	2
21BTC202T	Microbiology	3	0	0	3
21BTC103J	Cell and Microbiology Laboratory	0	0	4	2
21BTC204T	Bioprocess Principles	3	0	0	3
21BTC205L	Bioprocess Principles Laboratory	0	0	4	2
21BTC206T	Genetics and Cytogenetics	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21CHS252J	Chemical Engineering Principles	3	0	2	4
21CSC206T	Artificial Intelligence	3	0	0	3
21BTC207T	Molecular Biology	3	0	0	3
21BTC208L	Molecular Biology Laboratory	0	0	4	2
21BTC209T	Bioprocess Engineering	3	0	0	3
21BTC210L	Bioprocess Engineering Laboratory	0	0	4	2
E	Professional Elective – I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB303T	Bio-Statistics for Biotechnologists	3	1	0	4
21BTC301J	Gene Manipulation and Genomics	3	0	2	4
21BTC302J	Immunology	3	0	2	4
21BTC303T	Protein Engineering	3	0	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**22**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	1	1	0	2
21BTC304T	Animal Biotechnology	3	0	0	3
21BTC305L	Animal Biotechnology Laboratory	0	0	4	2
21BTC306T	Plant Biotechnology	3	0	0	3
E	Professional Elective – III				3
O	Open Elective – II				3
21BTP302L	Project	0	0	6	3
21BTP303T	MOOCS	3	0	0	
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21PDM302L	Employability Skills and Practices	0	0	2	0
	Total Credits				**19**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21BTC401L	Plant Biotechnology Laboratory	0	0	4	2
21BTC301J	Bio Separation Technology	3	0	2	4
E	Professional Elective – IV				3
E	Professional Elective – V				3
O	Open Elective – III				3
21GNH401T	Behavioral Psychology	2	1	0	3
21BTM191T	Bioethics and IPR	1	0	0	0
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21BTP401L	Major Project	0	0	30	15
21BTP402L	Major Project	0	0	20	
21BTP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21BTP401L or 21BTP402L and 21BTP403L both in eighth semester

9. B.Tech. in Biotechnology with Specialization in Computational Biology

9. (a) Mission of the Department

Mission Stmt – 1	*To adopt effective teaching methods to improve the learning process and impart knowledge of biology and technology.*
Mission Stmt – 2	*To provide hands-on training and technical skills to transform students into technocrats and facilitate research and higher education in the fields of biotechnology.*
Mission Stmt – 3	*To pursue and promote cutting-edge research in selected fields of biotechnology.*

9. (b) Program Educational Objectives (PEO)

PEO – 1	*To augment the inter-disciplinary thinking skills and develop skilled professionals in Computational Biology.*
PEO – 2	*To apply modern algorithms and solve complex biological problems by developing Bioinformatics methods and applications.*
PEO – 3	*To prepare students as advanced professionals in Computational Biology who can demonstrate its wider applications in human health, agriculture and industrial biotechnology research.*

9. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*3*	*3*	*3*
PEO – 2	*2*	*3*	*3*
PEO – 3	*3*	*3*	*3*

H – High Correlation, M – Medium Correlation, L – Low Correlation

9. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*	*3*	*3*	*3*	*2*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
PEO – 2	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
PEO – 3	*3*	*3*	*3*	*3*	*3*	*2*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*

H – High Correlation, M – Medium Correlation, L – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Acquire inter disciplinary knowledge in biotechnology and computational biology*
PSO - 2	*Utilize the methods in computer sciences to develop bioinformatics applications for biological problem solving*
PSO - 3	*Promote highly skilled computational biologists and apply it for wider applications in the sciences and medicine*

9. (e) Program Structure: B.Tech. in Biotechnology with Specialization in Computational Biology

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CHS251T	Basic Chemical Engineering	3	0	0	3
21CHS252J	Chemical Engineering Principles	3	0	2	4
21CSS303T	Data Science	1	1	0	2
	Total Credits				**24**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skill and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional knowledge	1	0	0	0
21LEM101L	Physical and Mental health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
21BTM191T	Bioethics and IPR	1	0	0	0
	Total Credits				**0**

Professional Elective Courses (E)
(Any 5 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21BTE208T	Sequence Analysis and Molecular Phylogeny	3	0	0	3
21BTE319T	Advanced Genomics	3	0	0	3
21BTE320T	Algorithms in Computational Biology	3	0	0	3
21BTE321T	Python for Bioinformatics	3	0	0	3
21BTE322T	Data Sciences in Biology	3	0	0	3
21BTE425T	R Programming for Biologists	3	0	0	3
21BTE426T	Systems Biology- Modeling and Simulation	3	0	0	3
21BTE427T	Computational Approaches in Drug Discovery	3	0	0	3
21BTE428T	Machine Learning in Biological Sciences	3	0	0	3
	Total Credits				**15**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB303T	Bio-Statistics for Biotechnologists	3	1	0	4
21BTB105T	Cell Biology	2	0	0	2
	Total Credits				**24**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21BTC101T	Biochemistry	3	0	0	3
21BTC201L	Biochemistry Laboratory	0	0	4	2
21BTC202T	Microbiology	3	0	0	3
21BTC203L	Cell and Microbiology Laboratory	0	0	4	2
21BTC204T	Bioprocess Principles	3	0	0	3
21BTC205L	Bioprocess Principles Laboratory	0	0	4	2
21BTC206T	Genetics and Cytogenetics	3	0	0	3
21BTC207T	Molecular Biology	3	0	0	3
21BTC208L	Molecular Biology Laboratory	0	0	4	2
21BTC209T	Bioprocess Engineering	3	0	0	3
21BTC210L	Bioprocess Engineering Laboratory	0	0	4	2
21CSC206T	Artificial Intelligence	3	0	0	3
21BTC301J	Gene Manipulation and Genomics	3	0	2	4
21BTC302J	Immunology	3	0	2	4
21BTC303T	Protein Engineering	3	0	0	3
21BTC304T	Animal Biotechnology	3	0	0	3
21BTC305L	Animal Biotechnology Laboratory	0	0	4	2
21BTC306T	Plant Biotechnology	3	0	0	3
21BTC401L	Plant Biotechnology Laboratory	0	0	4	2
21BTC402J	Bio Separation Technology	3	0	2	4
	Total Credits				**56**

Open Elective Courses (O)
(Any 3 Courses)

Code	Course Title	L	T	P	C
21GEO101T	Behavioral Biology	3	0	0	3
21GEO102T	Microbes and Society	3	0	0	3
21GEO103T	Biofertilizers- An Entrepreneurial Perspective	3	0	0	3
21GEO104T	Computational Genomics	3	0	0	3
21GEO105T	Biology for Everyday life	3	0	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21BTP302L	Project	0	0	6	3
21BTP303T	MOOC	3	0	0	
21BTP401L	Major Project	0	0	30	15
21BTP402L	Major Project	0	0	20	
21BTP403L	Internship	0	0	10	
	Total Credits				**19**

9. (f) Program Articulation: B.Tech. in Biotechnology with Specialization in Computational Biology

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
21BTB105T	Cell Biology	2	3	3	3	2	-	-	-	-	-	-	-	-	2.67	3
21BTC101T	Biochemistry	3	2	-	3	-	-	-	-	-	-	-	-	3	2	-
21BTC201L	Biochemistry Laboratory	3	2	-	3	-	-	-	-	-	-	-	-	3	2	-
21BTC202T	Microbiology	2.5	2	2.25	2.67	3	-	2	2	-	-	-	-	1.83	-	2
21BTC203L	Cell and Molecular Biology Laboratory	2.5	2	2.25	2.67	3	-	2	2	-	-	-	-	1.83	-	2
21BTC204T	Bioprocess Principles	2.5	2.67	2.25	2	2	-	-	-	-	-	-	-	2.67	1.75	-
21BTC205L	Bioprocess Principles Laboratory	2.5	2.67	2.25	2	2	-	-	-	-	-	-	-	2.67	1.75	-
21BTC206T	Genetics and Cytogenetics	2.67	2.5	2.2	2	-	-	-	-	-	-	-	-	-	2.5	2.5
21BTC207T	Molecular Biology	3	2.75	2.4	-	-	-	-	-	-	-	-	-	-	2.67	2.83
21BTC208L	Molecular Biology Laboratory	3	2.75	2.4	-	-	-	-	-	-	-	-	-	-	2.67	2.83
21BTC209T	Bioprocess Engineering	-	3	1.75	2.25	2	-	-	-	-	-	-	-	2	2	1
21BTC210L	Bioprocess Engineering Laboratory	-	3	1.75	2.25	2	-	-	-	-	-	-	-	2	2	1
21BTC301J	Gene manipulation and Genomics	2.67	2.67	2.5	2.33	2.75	-	-	2	-	-	-	-	-	2.83	2.83
21BTC302J	Immunology	-	-	2	2.6	2.33	1	-	-	-	-	-	-	1.67	-	2
21BTC303T	Protein engineering	1.5	2	3	2	3	-	-	-	-	-	-	-	-	3	3
21BTC304T	Animal Biotechnology	3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
21BTC305L	Animal biotechnology Laboratory	3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
21BTC306T	Plant Biotechnology	3	2.6	3	3	3	-	-	-	-	-	-	-	2.5	2	2.75
21BTC401L	Plant Biotechnology Laboratory	3	2.6	3	3	3	-	-	-	-	-	-	-	2.5	2	2.75
21BTC402J	Bio separation Technology	3	2.33	2.5	1	-	-	-	-	-	-	-	-	-	2.5	2.67
21BTM191T	Bioethics and IPR	1.83	2.33	-	-	-	-	2.67	3	-	-	-	-	2.67	-	3
21BTE208T	Sequence Analysis and Molecular Phylogeny	2.2	3	-	2.25	2.67	-	-	-	-	-	-	2	2	2	2
21BTE319T	Advanced Genomics	2.33	2.25	2	2	2	2.5	-	-	-	-	-	-	2	-	2.5
21BTE320T	Algorithms in Computational Biology	3	2.8	2.5	2	-	-	-	-	-	-	-	-	2	2	2
21BTE321T	Python for Bioinformatics	2.2	2.25	2.25	2.25	-	-	-	-	-	-	-	2	-	-	2.2
21BTE322T	Data Sciences in Biology	3	2.5	2	2.5	3	-	-	-	-	-	-	-	2	-	2
21BTE425T	R Programming for Biologists	2.33	2.6	2	2	2.6	-	-	-	-	-	-	2	2	2.33	2.25
21BTE426T	Systems Biology – Modeling and Simulation	3	2.8	2.4	2.5	-	-	-	-	-	-	-	-	-	-	2
21BTE427T	Computational Approaches in Drug Discovery	2	2	1.67	-	1.5	-	-	-	-	-	-	2	-	-	1.8
21BTE428T	Machine Learning in Biological Sciences	2	2	2	2	2	-	-	-	-	-	-	-	-	-	2
21GNP301L	Community Connect	3	2	2	-	-	-	-	-	-	2	-	2	2	2	-
21BTP302L	MOOC	3	2	2	-	-	-	-	-	-	2	-	2	2	2	-
21BTP303L	Project	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
21BTP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21BTP402L	Industrial Projects	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	2.65	2.53	2.40	2.46	2.52	2.30	2.45	2.57	3.00	2.60	3.00	2.33	2.33	2.39	2.41

9. (g) Implementation Plan: B.Tech. in Biotechnology with Specialization in Computational Biology

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB105T	Cell Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTC101T	Biochemistry	3	0	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21CHS251T	Basic Chemical Engineering	3	0	0	3
21PDH201T	Social Engineering	2	0	0	2
21BTC202L	Biochemistry Laboratory	0	0	4	2
21BTC202T	Microbiology	3	0	0	3
21BTC103J	Cell and Microbiology Laboratory	0	0	4	2
21BTC204T	Bioprocess Principles	3	0	0	3
21BTC205L	Bioprocess Principles Laboratory	0	0	4	2
21BTC206T	Genetics and Cytogenetics	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21CHS252J	Chemical Engineering Principles	3	0	2	4
21CSC206T	Artificial Intelligence	3	0	0	3
21BTC207T	Molecular Biology	3	0	0	3
21BTC208L	Molecular Biology Laboratory	0	0	4	2
21BTC209T	Bioprocess Engineering	3	0	0	3
21BTC210L	Bioprocess Engineering Laboratory	0	0	4	2
E	Professional Elective – I	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB303T	Bio-Statistics for Biotechnologists	3	1	0	4
21BTC301J	Gene Manipulation and Genomics	3	0	2	4
21BTC302J	Immunology	3	0	2	4
21BTC303T	Protein Engineering	3	0	0	3
E	Professional Elective – II	3	0	0	3
O	Open Elective – I	3	0	0	3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**22**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	1	1	0	2
21BTC304T	Animal Biotechnology	3	0	0	3
21BTC305L	Animal Biotechnology Laboratory	0	0	4	2
21BTC306T	Plant Biotechnology	3	0	0	3
E	Professional Elective – III	3	0	0	3
O	Open Elective – II	3	0	0	3
21BTP302L	Project	0	0	6	3
21BTP303T	MOOC	3	0	0	
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21PDM302L	Employability Skills and Practices	0	0	2	0
	Total Credits				**19**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21BTC401L	Plant Biotechnology Laboratory	0	0	4	2
21BTC301J	Bio Separation Technology	3	0	2	4
E	Professional Elective – IV	3	0	0	3
E	Professional Elective – V	3	0	0	3
O	Open Elective – III	3	0	0	3
21GNH401T	Behavioral Psychology	2	1	0	3
21BTM191T	Bioethics and IPR	1	0	0	0
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21BTP401L	Major Project	0	0	30	15
21BTP402L	Major Project	0	0	20	
21BTP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21BTP401L or 21BTP402L and 21BTP403L both in eighth semester

10. B.Tech. in Biotechnology with Specialization in Regenerative Medicine

10. (a) Mission of the Department

Mission Stmt – 1	*To adopt effective teaching methods to improve the learning process and impart knowledge of biology and technology.*
Mission Stmt – 2	*To provide hands-on training and technical skills to transform students into technocrats and facilitate research and higher education in the fields of biotechnology.*
Mission Stmt – 3	*To pursue and promote cutting-edge research in selected fields of biotechnology*

10. (b) Program Educational Objectives (PEO)

PEO – 1	*To develop graduates with enhanced technical and professional skills in Tissue Engineering*
PEO – 2	*To develop the ability amongst the students to apply modern bioengineering techniques in solve complex engineering solutions in Regenerative Medicine*
PEO – 3	*To prepare students to demonstrate the applications of biotechnological principles through research related to regeneration and transplants for societal and industrial importance*

10. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*3*	*3*	*3*
PEO – 2	*3*	*3*	*3*
PEO – 3	*3*	*3*	*3*

H – High Correlation, M – Medium Correlation, L – Low Correlation

10. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*	*2*	*3*	*2*	*2*	*2*	*2*	*3*	*2*	*2*	*2*	*3*	*3*	*3*
PEO – 2	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*2*	*2*	*2*	*3*	*3*	*3*	*3*	*3*
PEO – 3	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*2*	*3*	*2*	*3*	*3*	*3*	*3*	*3*

H – High Correlation, M – Medium Correlation, L – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Integrate engineering principles for pursuing excellence in applied fields of Tissue Engineering*
PSO - 2	*Acquire knowledge and problem-solving skills in tissue engineering and stem cell research, critical in sustaining life processes for better health.*
PSO - 3	*Ability to apply biological knowledge from the perspective of engineers for development of industrial products in tissue regeneration*

10. (e) Program Structure: B.Tech. in Biotechnology with Specialization in Regenerative Medicine

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CHS251T	Basic Chemical Engineering	3	0	0	3
21CHS252J	Chemical Engineering Principles	3	0	2	4
21CSS303T	Data Science	1	1	0	2
	Total Credits				**24**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skill and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21LEM101L	Physical and Mental health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
21BTM191T	Bioethics and IPR	1	0	0	0
	Total Credits				**3**

Professional Elective Courses I
(Any 5 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21BTE206T	Molecular Cell Biology	3	0	0	3
21BTE311T	Cell Communication and Signaling	3	0	0	3
21BTE312T	Stem Cell Technology	3	0	0	3
21BTE313T	Biomaterials in Tissue Engineering	3	0	0	3
21BTE314T	Nanotechnology in Regenerative Medicine	3	0	0	3
21BTE416T	Tissue Engineering for Regenerative Medicine	3	0	0	3
21BTE417T	Bioreactors in Tissue Engineering	3	0	0	3
21BTE418T	Developmental Biology in Tissue Engineering	3	0	0	3
21BTE419T	Advanced Immunology and Vascular Tissue Engineering	3	0	0	3
	Total Credits				15

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB303T	Bio-Statistics for Biotechnologists	3	1	0	4
21BTB105T	Cell Biology	2	0	0	2
	Total Credits				**24**

Professional Core Courses I

Course Code	Course Title	Hours/ Week L	T	P	C
21BTC101T	Biochemistry	3	0	0	3
21BTC201L	Biochemistry Laboratory	0	0	4	2
21BTC202T	Microbiology	3	0	0	3
21BTC203L	Cell and Microbiology Laboratory	0	0	4	2
21BTC204T	Bioprocess Principles	3	0	0	3
21BTC205L	Bioprocess Principles Laboratory	0	0	4	2
21BTC206T	Genetics and Cytogenetics	3	0	0	3
21BTC207T	Molecular Biology	3	0	0	3
21BTC208L	Molecular Biology Laboratory	0	0	4	2
21BTC209T	Bioprocess Engineering	3	0	0	3
21BTC210L	Bioprocess Engineering Laboratory	0	0	4	2
21CSC206T	Artificial Intelligence	3	0	0	3
21BTC301J	Gene Manipulation and Genomics	3	0	2	4
21BTC302J	Immunology	3	0	2	4
21BTC303T	Protein Engineering	3	0	0	3
21BTC304T	Animal Biotechnology	3	0	0	3
21BTC305L	Animal Biotechnology Laboratory	0	0	4	2
21BTC306T	Plant Biotechnology	3	0	0	3
21BTC401L	Plant Biotechnology Laboratory	0	0	4	2
21BTC402J	Bio Separation Technology	3	0	2	4
	Total Credits				**56**

Open Elective Courses (O)
(Any 3 Courses)

Code	Course Title	L	T	P	C
21BTO101T	Human Health and Diseases	3	0	0	3
21BTO 105T	Animal Models for Research	3	0	0	3
21BTO106T	Waste to Wealth to Wheels	3	0	0	3
21BTO107T	Fundamental Neurobiology	3	0	0	3
	Total Credits				9

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21BTP302L	Project	0	0	6	3
21BTP303T	MOOC	3	0	0	
21BTP401L	Major Project	0	0	30	15
21BTP402L	Major Project	0	0	20	
21BTP403L	Internship	0	0	10	
	Total Credits				**19**

10. (f) Program Articulation: B.Tech. in Biotechnology with Specialization in Regenerative Medicine

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
21BTB105T	Cell Biology	2	3	3	3	2	-	-	-	-	-	-	-	-	2.6	3
21BTC101T	Biochemistry	3	2.5	3	3	3	-	-	-	-	-		-	2	2.7	-
21BTC201L	Biochemistry Laboratory	3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
21BTC202T	Microbiology	2.6	2	2.2	2	2	-	-	-	-	-	-	-	2.6	-	-
21BTC203L	Cell and Molecular Biology Laboratory	-	3	3	3	-	-	-	-	-	-	-	-	-	3	3
21BTC204T	Bioprocess Principles	2	2.5	1.5	1.8	2	-	-	-	-	-	-	-	2	2	1.5
21BTC205L	Bioprocess Principles Laboratory	2.2	2.5	1.5	1.8	2	-	-	-	-	-	-	-	2	2	1.5
21BTC206T	Genetics and Cytogenetics	2.6	2.4	2.5	2.2	-	-	-	-	-	-	-	-	2.6	-	-
21BTC207T	Molecular Biology	3	2.3	2	1	-	-	-	-	-	-	-	-	2.6	2.8	-
21BTC208L	Molecular Biology Laboratory	3	2.8	2.3	-	-	-	-	-	-	-	-	-	2.6	2.8	-
21BTC209T	Bioprocess Engineering	2.4	1.5	2.2	1.8	3	-	-	-	-	-	-	-	1.5	2	2
21BTC210L	Bioprocess Engineering Laboratory	2.6	2.8	1.5	-	3	-	-	-	-	-	-	-	2	2	-
21BTC301J	Gene manipulation and Genomics	2.7	-	2.8	-	-	2.5	-	2	-	-	-	-	-	2	3
21BTC302J	Immunology	-	-	2	2.5	2.5	1	-	-	-	-	-	-	1.5	-	2.5
21BTC303T	Protein engineering	2	2	-	2	3	-	-	-	-	-	-	-	-	3	3
21BTC304T	Animal Biotechnology	3	3	2.7	2.5	-	-	-	-	-	-	-	-	3	3	3
21BTC305L	Animal biotechnology Laboratory	-	2.5	3	2.7	2	-	-	-	-	-	-	-	2	3	3
21BTC306T	Plant Biotechnology	3	2	2.7	-	3	-	3	-	-	-	-	-	-	2.8	3
21BTC401L	Plant Biotechnology Laboratory	2.8	2.3	2.5	3	2	-	-	-	-	-	-	-	2.7	3	-
21BTC402J	Bio separation Technology	1.5	2.4	1.6	-	-	-	-	-	-	-	-	-	1.5	2	1.4
21BTM191T	Bioethics and IPR	-	2.4	-	-	-	-	-	3	-	-	-	-	-	-	-
21BTE201T	Molecular Cell Biology	2.8	2.2	2.3	2.4	-	-	-	--	-	-	-	-	2.6	-	-
21BTE301T	Cell Communication and Signaling	2.8	2.2	2.3	2.4	-	-	-	-	--	-	-	-	2.6	-	-
21BTE302T	Stem Cell Technology	-	-	-	2.4	-	-	-	3	-	-	-	-	2	3	-
21BTE401T	Biomaterials in Tissue Engineering	2	-	2	2	-	-	-	2.6	-	-	-	-	2	3	-
21BTE402T	Nanotechnology in Regenerative Medicine	3	2.5	3	2.2	-	-	-	-	-	-	-	-	2.6	-	-
21BTE403T	Tissue Engineering for Regenerative Medicine	2.6	2.4	2.8	2	-	-	-	-	-	-	-	-	-	2.4	2.3
21BTE202T	Bioreactors in Tissue Engineering	2.8	2.2	2.3	2.4	-	-	-	-	-	-	-	-	2.6	-	-
21BTE303T	Developmental Biology in Tissue Engineering	-	-	--	2.4	-	-	-	-	-	-	-	-	-	-	2.3
21BTE304T	Advanced Immunology and Vascular Tissue Engineering	2.2	2.8	-	2	2	-	-	-	-	-	-	-	2	2.8	2
21BTP302L	MOOC	3	2	2	-	-	-	-	-	-	2	-	2	2	2	-
21BTP303L	Project	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
21BTP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21BTP402L	Industrial Projects	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	**2.6**	**2.5**	**2.4**	**2.4**	**2.5**	**2.3**	**2.8**	**2.8**	**3.0**	**2.8**	**3.0**	**2.8**	**2.3**	**2.6**	**2.6**

10. (g) Implementation Plan: B.Tech. in Biotechnology with Specialization in Regenerative Medicine

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB105T	Cell Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTC101T	Biochemistry	3	0	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21CHS251T	Basic Chemical Engineering	3	0	0	3
21PDH201T	Social Engineering	2	0	0	2
21BTC202L	Biochemistry Laboratory	0	0	4	2
21BTC202T	Microbiology	3	0	0	3
21BTC103J	Cell and Microbiology Laboratory	0	0	4	2
21BTC204T	Bioprocess Principles	3	0	0	3
21BTC205L	Bioprocess Principles Laboratory	0	0	4	2
21BTC206T	Genetics and Cytogenetics	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21CHS252J	Chemical Engineering Principles	3	0	2	4
21CSC206T	Artificial Intelligence	3	0	0	3
21BTC207T	Molecular Biology	3	0	0	3
21BTC208L	Molecular Biology Laboratory	0	0	4	2
21BTC209T	Bioprocess Engineering	3	0	0	3
21BTC210L	Bioprocess Engineering Laboratory	0	0	4	2
E	Professional Elective – I	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB303T	Bio-Statistics for Biotechnologists	3	1	0	4
21BTC301J	Gene Manipulation and Genomics	3	0	2	4
21BTC302J	Immunology	3	0	2	4
21BTC303T	Protein Engineering	3	0	0	3
E	Professional Elective – II	3	0	0	3
O	Open Elective – I	3	0	0	3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**22**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	1	1	0	2
21BTC304T	Animal Biotechnology	3	0	0	3
21BTC305L	Animal Biotechnology Laboratory	0	0	4	2
21BTC306T	Plant Biotechnology	3	0	0	3
E	Professional Elective – III	3	0	0	3
O	Open Elective – II	3	0	0	3
21BTP302L	Project	0	0	6	3
21BTP303T	MOOCS	3	0	0	
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21PDM302L	Employability Skills and Practices	0	0	2	0
	Total Credits				**19**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21BTC401L	Plant Biotechnology Laboratory	0	0	4	2
21BTC301J	Bio Separation Technology	3	0	2	4
E	Professional Elective – IV	3	0	0	3
E	Professional Elective – V	3	0	0	3
O	Open Elective – III	3	0	0	3
21GNH401T	Behavioral Psychology	2	0	1	3
21BTM191T	Bioethics and IPR	1	0	0	0
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21BTP401L	Major Project	0	0	30	15
21BTP402L	Major Project	0	0	20	
21BTP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21BTP401L or 21BTP402L and 21BTP403L both in eighth semester

11. B.Tech. in Biotechnology with Specialization in Genetic Engineering

11. (a)Mission of the Department

Mission Stmt – 1	*To adopt effective teaching methods to improve the learning process and impart knowledge of biology and technology.*
Mission Stmt – 2	*To provide hands-on training and technical skills to transform students into technocrats and facilitate research and higher education in the fields of biotechnology.*
Mission Stmt – 3	*To pursue and promote cutting-edge research in selected fields of biotechnology*

11. (b) Program Educational Objectives (PEO)

PEO – 1	*To acquire adequate knowledge and expertise in genetic engineering for higher education and research*
PEO – 2	*To identify, analyze, and learn strategies to solve genetic engineering problems*
PEO – 3	*To advance professionally as genetic engineers, who can contribute to betterment of society and be involved in life-long learning*

11. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*3*	*3*	*3*
PEO – 2	*2*	*3*	*3*
PEO – 3	*3*	*3*	*3*

H – High Correlation, M – Medium Correlation, L – Low Correlation

11. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*	*3*	*3*	*3*	*2*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
PEO – 2	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
PEO – 3	*3*	*3*	*3*	*3*	*3*	*2*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*

H – High Correlation, M – Medium Correlation, L – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Gain knowledge on different approaches utilized in genetic engineering*
PSO - 2	*Ability to solve clinical, industrial and agricultural problems in genetic Engineering*
PSO - 3	*Emerge as professionals who can develop new strategies in the genetic engineering research for the benefit of society*

11. (e) Program Structure: B.Tech. in Biotechnology with Specialization in Genetic Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CHS251T	Basic Chemical Engineering	3	0	0	3
21CHS252J	Chemical Engineering Principles	3	0	2	4
21CSS303T	Data Science	1	1	0	2
	Total Credits				**24**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skill and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional knowledge	1	0	0	0
21LEM101L	Physical and Mental health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
21BTM191T	Bioethics and IPR	1	0	0	0
	Total Credits				**0**

Professional Elective Courses (E)
(Any 5 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21BTE207T	Human Genetics	3	0	0	3
21BTE315T	Metabolic Engineering of microbes	3	0	0	3
21BTE316T	Genetic Engineering for Crop Improvement	3	0	0	3
21BTE317T	Molecular biology of Infectious diseases	3	0	0	3
21BTE318T	Molecular Diagnostics	3	0	0	3
21BTE420T	Gene therapy	3	0	0	3
21BTE421T	Functional genomics	3	0	0	3
21BTE422T	Genome editing	3	0	0	3
21BTE423T	Genes & Animal Development	3	0	0	3
21BTE424T	Genetics of Cancer	3	0	0	3
	Total Credits				**15**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB303T	Bio-Statistics for Biotechnologists	3	1	0	4
21BTB105T	Cell Biology	2	0	0	2
	Total Credits				**24**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21BTC101T	Biochemistry	3	0	0	3
21BTC201L	Biochemistry Laboratory	0	0	4	2
21BTC202T	Microbiology	3	0	0	3
21BTC203L	Cell and Microbiology Laboratory	0	0	4	2
21BTC204T	Bioprocess Principles	3	0	0	3
21BTC205L	Bioprocess Principles Laboratory	0	0	4	2
21BTC206T	Genetics and Cytogenetics	3	0	0	3
21BTC207T	Molecular Biology	3	0	0	3
21BTC208L	Molecular Biology Laboratory	0	0	4	2
21BTC209T	Bioprocess Engineering	3	0	0	3
21BTC210L	Bioprocess Engineering Laboratory	0	0	4	2
21CSC206T	Artificial Intelligence	3	0	0	3
21BTC301J	Gene Manipulation and Genomics	3	0	2	4
21BTC302J	Immunology	3	0	2	4
21BTC303T	Protein Engineering	3	0	0	3
21BTC304T	Animal Biotechnology	3	0	0	3
21BTC305L	Animal Biotechnology Laboratory	0	0	4	2
21BTC306T	Plant Biotechnology	3	0	0	3
21BTC401L	Plant Biotechnology Laboratory	0	0	4	2
21BTC402J	Bio Separation Technology	3	0	2	4
	Total Credits				**56**

Open Elective Courses (O)
(Any 3 Courses)

Code	Course Title	L	T	P	C
21GEO101T	Behavioral Biology	3	0	0	3
21GEO102T	Microbes and Society	3	0	0	3
21GEO103T	Biofertilizers- An Entrepreneurial Perspective	3	0	0	3
21GEO104T	Computational Genomics	3	0	0	3
21GEO105T	Biology for Everyday life	3	0	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21BTP302L	Project	0	0	6	3
21BTP303T	MOOC	3	0	0	
21BTP401L	Major Project	0	0	30	15
21BTP402L	Major Project	0	0	20	
21BTP403L	Internship	0	0	10	
	Total Credits				**19**

11. (f) Program Articulation: B.Tech. in Biotechnology with Specialization in Genetic Engineering

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
21BTB105T	Cell Biology	2	3	3	3	2	-	-	-	-	-	-	-	-	2.6	3
21BTC101T	Biochemistry	3	2.5	3	3	3	-	-	-	-	-		-	2	2.7	-
21BTC201L	Biochemistry Laboratory	3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
21BTC202T	Microbiology	2.6	2	2.2	2	2	-	-	-	-	-	-	-	2.6	-	-
21BTC203L	Cell and Molecular Biology Laboratory	-	3	3	3	-	-	-	-	-	-	-	-	-	3	3
21BTC204T	Bioprocess Principles	2	2.5	1.5	1.8	2	-	-	-	-	-	-	-	2	2	1.5
21BTC205L	Bioprocess Principles Laboratory	2.2	2.5	1.5	1.8	2	-	-	-	-	-	-	-	2	2	1.5
21BTC206T	Genetics and Cytogenetics	2.6	2.4	2.5	2.2	-	-	-	-	-	-	-	-	2.6	-	-
21BTC207T	Molecular Biology	3	2.3	2	1	-	-	-	-	-	-	-	-	2.6	2.8	-
21BTC208L	Molecular Biology Laboratory	3	2.8	2.3	-	-	-	-	-	-	-	-	-	2.6	2.8	-
21BTC209T	Bioprocess Engineering	2.4	1.5	2.2	1.8	3	-	-	-	-	-	-	-	1.5	2	2
21BTC210L	Bioprocess Engineering Laboratory	2.6	2.8	1.5	-	3	-	-	-	-	-	-	-	2	2	-
21BTC301J	Gene manipulation and Genomics	2.7	-	2.8	-	-	2.5	-	2	-	-	-	-	-	2	3
21BTC302J	Immunology	-	-	2	2.5	2.5	1	-	-	-	-	-	-	1.5	-	2.5
21BTC303T	Protein engineering	2	2	-	2	3	-	-	-	-	-	-	-	-	3	3
21BTC304T	Animal Biotechnology	3	3	2.7	2.5	-	-	-	-	-	-	-	-	3	3	3
21BTC305L	Animal biotechnology Laboratory	-	2.5	3	2.7	2	-	-	-	-	-	-	-	2	3	3
21BTC306T	Plant Biotechnology	3	2	2.7	-	3	-	3	-	-	-	-	-	-	2.8	3
21BTC401L	Plant Biotechnology Laboratory	2.8	2.3	2.5	3	2	-	-	-	-	-	-	-	2.7	3	-
21BTC402J	Bio separation Technology	1.5	2.4	1.6	-	-	-	-	-	-	-	-	-	1.5	2	1.4
21BTM191T	Bioethics and IPR	-	2.4	-	-	-	-	-	3	-	-	-	-	-	-	-
21BTE207T	Human Genetics	2	2	2	2.7	2	-	-	-	-	-	-	-	1.5	2	2
21BTE315T	Metabolic Engineering of microbes	-	2	2.7	2	-	-	-	-	-	-	-	-	2	2.4	-
21BTE316T	Genetic Engineering for Crop Improvement	-	2	3	-	-	-	-	-	-	-	-	2	2	3	-
21BTE317T	Molecular biology of Infectious diseases	-	2	2.3	2	-	-	-	-	-	-	-	-	2	2.4	-
21BTE318T	Molecular Diagnostics	2	2.6	-	2.4	2.4	-	-	-	-	-	-	2.5	-	2.6	2.4
21BTE420T	Gene therapy	2.7	-	2	2.3	2	-	-	2.6	-	-	-	2	2	1	2
21BTE421T	Functional genomics	2.2	2.6	-	2	2	-	-	-	-	-	-	-	2	2.8	2
21BTE422T	Genome Editing	2	2	2.3	2	2.3	2	2	3	-	-	-	-	2	3	-
21BTE423T	Genes and Animal Development	2.6	3	2	2	-	-	-	-	-		-	-	2	2.8	2
21BTE424T	Genetics of Cancer	-	-	2.5	2	2	-	2.7	2.5	2	-	2	2.7	-	-	2
21BTP302L	MOOC	3	2	2	-	-	-	-	-	-	2	-	2	2	2	-
21BTP303L	Project	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
21BTP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21BTP402L	Industrial Projects	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	**2.5**	**2.5**	**2.4**	**2.4**	**2.4**	**2.3**	**2.6**	**2.8**	**2.8**	**3.0**	**2.8**	**2.6**	**2.2**	**2.6**	**2.5**

11. (g) Implementation Plan: B.Tech. in Biotechnology with Specialization in Genetic Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB105T	Cell Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTC101T	Biochemistry	3	0	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21CHS251T	Basic Chemical Engineering	3	0	0	3
21PDH201T	Social Engineering	2	0	0	2
21BTC202L	Biochemistry Laboratory	0	0	4	2
21BTC202T	Microbiology	3	0	0	3
21BTC103J	Cell and Microbiology Laboratory	0	0	4	2
21BTC204T	Bioprocess Principles	3	0	0	3
21BTC205L	Bioprocess Principles Laboratory	0	0	4	2
21BTC206T	Genetics and Cytogenetics	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21CHS252J	Chemical Engineering Principles	3	0	2	4
21CSC206T	Artificial Intelligence	3	0	0	3
21BTC207T	Molecular Biology	3	0	0	3
21BTC208L	Molecular Biology Laboratory	0	0	4	2
21BTC209T	Bioprocess Engineering	3	0	0	3
21BTC210L	Bioprocess Engineering Laboratory	0	0	4	2
E	Professional Elective – I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB303T	Bio-Statistics for Biotechnologists	3	1	0	4
21BTC301J	Gene Manipulation and Genomics	3	0	2	4
21BTC302J	Immunology	3	0	2	4
21BTC303T	Protein Engineering	3	0	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**22**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	1	1	0	2
21BTC304T	Animal Biotechnology	3	0	0	3
21BTC305L	Animal Biotechnology Laboratory	0	0	4	2
21BTC306T	Plant Biotechnology	3	0	0	3
E	Professional Elective – III				3
O	Open Elective – II				3
21BTP302L	Project	0	0	6	3
21BTP303T	MOOC	3	0	0	
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21PDM302L	Employability Skills and Practices	0	0	2	0
	Total Credits				**19**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21BTC401L	Plant Biotechnology Laboratory	0	0	4	2
21BTC301J	Bio Separation Technology	3	0	2	4
E	Professional Elective – IV				3
E	Professional Elective – V				3
O	Open Elective – III				3
21GNH401T	Behavioral Psychology	2	1	0	3
21BTM191T	Bioethics and IPR	1	0	0	0
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21BTP401L	Major Project	0	0	30	15
21BTP402L	Major Project	0	0	20	
21BTP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21BTP401L or 21BTP402L and 21BTP403L both in eighth semester

12. B.Tech in Biomedical Engineering

12. (a) Mission of the Department

Mission Stmt – 1	*Build on a strong foundation in Basic science and Engineering and educate the students in diverse filed of Biomedical Engineering*
Mission Stmt – 2	*Work towards state of art Biomedical Engineering research and development through an interdisciplinary curriculum.*
Mission Stmt – 3	*Apply knowledge about design in development of enabling technologies for improvement of human health*

12. (b) Program Educational Objectives (PEO)

PEO – 1	*Develop real world biomedical devices and prototype models and test with multi-disciplinary approach.*
PEO – 2	*Design technologically enabled equipments that open up new areas of medical research.*
PEO – 3	*To impose innovative ideas for commercialization of developed products.*
PEO – 4	*Lead and work in a team with varied expertise and meet the changing needs of the profession through life long learning.*
PEO – 5	*To promote entrepreneurship skills in creating jobs in health care domain.*

12. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt – 1	Mission Stmt – 2	Mission Stmt – 3
PEO – 1	3	2	3
PEO – 2	3	3	2
PEO – 3	3	2	3
PEO – 4	3	3	2
PEO – 5	3	3	2

12. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3	3	3	3	2	3	3	2	3	2	3	2	3	3	3
PEO – 2	3	2	3	3	3	2	2	2	3	2	3	3	3	3	3
PEO – 3	3	3	3	3	2	3	3	3	2	3	3	2	2	3	3
PEO – 4	2	3	3	3	2	2	2	2	3	2	3	2	3	2	3
PEO – 5	3	2	2	3	2	2	2	2	2	2	2	3	3	2	2

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Ability to apply engineering design to offer health care solutions with consideration of safety, welfare, social, cultural and environmental factors*
PSO - 2	*Ability to model and analyze biological systems with ethical and professional responsibilities in Engineering situations.*
PSO - 3	*Ability to initiate cross disciplinary and industry collaborative research.*

12. (e) Program Structure: B.Tech. in Biomedical Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PYS202T	Medical Physics	3	0	0	3
21CSS303T	Data science	1	1	0	2
	Total Credits				**20**

Professional Elective Courses (E)
(Any 6 Courses)

Course Code	Course Title	Hours/Week L	T	P	C
21BME261T	Biophotonics and Bioimaging	3	0	0	3
21BME262T	Home Medicare Technology	3	0	0	3
21BME263T	Biomedical Laser Instruments	3	0	0	3
21BME264T	Artificial Organs and Tissue engineering	3	0	0	3
21BME265T	Biomedical Nano Technology	3	0	0	3
21BME266T	Biometrics	3	0	0	3
21BME361T	BioMEMS	3	0	0	3
21BME362T	Human Electrophysiology	3	0	0	3
21BME363T	Biomedical device design Fundamentals	3	0	0	3
21BME364T	Innovation, Translation and Entrepreneurship	3	0	0	3
21BME365T	Hospital Management system	3	0	0	3
21BME366T	Trouble shooting of Medical Devices	3	0	0	3
21BME367T	Quality Assurance and regulatory aspects for medical devices	3	0	0	3
21BME368T	Neuroengineering	3	0	0	3
21BME369T	IoT and Telehealth Technology	3	0	0	3
21BME370T	Micro fluidics	3	0	0	3
21BME371T	Medical Ethics and Intellectual Property Rights	3	0	0	3
21BME372T	Virtual Instrumentation for Biomedical Engineers	3	0	0	3
21BME373T	Health Care Data Analytics	3	0	0	3
21BME461T	Biomedical Informatics	3	0	0	3
21BME462T	Physiological Modeling	3	0	0	3
21BME463T	Biomimetics	3	0	0	3
21BME464T	Neural Networks and Genetic Algorithms	3	0	0	3
21BME465T	Wearable Systems and Mobile Health Care	3	0	0	3
21BME466T	Artificial Intelligence in Health Care	3	0	0	3
21BME467T	Bio inspired Robotics	3	0	0	3
21BME468T	Computational Tools in Bioengineering and Biomedicine	3	0	0	3
21BME469T	Neuro Rehabilitation and Human Machine Interface	3	0	0	3
21BME470T	Assistive and Augmentative Technologies	3	0	0	3
21BME471T	Machine Learning and Deep learning techniques in medicine	3	0	0	3
21BME472T	Virtual Reality in Health Care	3	0	0	3
	Total Credits				**18**

Mandatory Courses (M)

Course Code	Course Title	Hours/Week L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21PDM102L	General Aptitude	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0

Basic Science Courses (B)

Course Code	Course Title	Hours/Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB104T	Biology -Human Physiology and Anatomy	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/Week L	T	P	C
21BMC101J	Biomedical Sensors	2	0	2	3
21BMC202T	Biomedical Signals and Systems	3	0	0	3
21BMC203J	Electric and Electronic Circuits	3	0	2	4
21BMC204J	Digital Logic for Medical Systems	2	0	2	3
21BMC205J	Integrated Circuit Design for Bioinstrumentation	2	0	2	3
21BMC206J	Biomedical Instrumentation	3	0	2	4
21BMC207J	Biomaterials and Tissue Interaction	2	0	2	3
21BMC301J	Biomedical Signal Processing	3	0	2	4
21BMC302J	Microcontrollers and its Application in Medicine	3	0	2	4
21BMC303T	Principles of Medical Imaging	3	0	0	3
21BMC304J	Medical Image Processing	2	0	2	3
21BMC305T	Biocontrol Systems	3	0	0	3
21BMC401J	Biomechanics	2	0	2	3
21BMC402J	Biomedical Equipments for Clinical Applications	2	0	2	3
21CSC206T	Artificial Intelligence	2	1	0	3
	Total Credits				**49**

Open Elective Courses (O) *(Any 3 Courses)*

Course Code	Course Title	Hours/Week L	T	P	C
21BMO121T	Fundamentals of Biomedical Engineering	3	0	0	3
21BMO122T	Health Information Systems	3	0	0	3
21BMO123T	Basics of Medical Imaging	3	0	0	3
21BMO124T	Rehabilitation Engineering	3	0	0	3
21BMO125T	Quality control for biomedical devices	3	0	0	3
21BMO126T	Biomechanics of Human Movement	3	0	0	3
21BMO127T	Digital healthcare Technology	3	0	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21BMP303T	MOOC	3	0	0	3
21BMP302L	Project	0	0	6	
21BMP401L	Major Project	0	0	30	15
21BMP402L	Major Project	0	0	20	
21BMP403L	Internship	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Course Code	Course Title	Hours/Week L	T	P	C
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS	0	0	2	0
21GNM103L	NCC	0	0	2	0
21GNM104L	NSO	0	0	2	0
	Total Credits				**3**

12. (f) Program Articulation: B.Tech. in Biomedical Engineering

Course Code	Course Name	Program Outcomes (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
21BMC101J	Biomedical sensors	1	1	1	1	-	-	-	-	-	-	-	-	1	1	1
21BMC202T	Biomedical signals and systems	2	1	1	1	-	-	-	-	-	-	-	-	1	1	2
21BMC203J	Electric and Electronic circuits	3	1	1	1	-	-	-	-	-	-	1	-	2	1	-
21BMC204J	Digital logic for Medical systems	1	2	1	1	1	-	-	-	-	-	-	1	1	1	1
21BMC205J	Integrated circuit Design for Bioinstrumentation	1	1	1	1	1	-	-	-	-	-	-	1	1	1	1
21BMC206J	Biomedical Instrumentation	2	1	-	1	2	1	-	-	-	-	-	-	1	1	1
21BMC207J	Biomaterials and Tissue Interaction	1	-	-	-	-	-	-	2	-	-	-	-	1	1	1
21BMC301J	Biomedical signal processing	2	1	1	1	1	-	-	-	-	-	-	-	1	-	1
21BMC302J	Microcontrollers and its application in medicine	2	-	1	-	1	-	-	-	-	-	-	-	1	-	1
21BMC303T	Principles of medical imaging	1	1	-	1	1	-	-	-	-	-	-	-	1	1	-
21BMC304J	Medical image processing	3	1	1	1	2	-	-	-	-	-	-	-	1	-	1
21BMC305T	Biocontrol systems	2	1	-	2	-	-	-	-	-	-	-	-	1	1	1
21BMC401J	Biomechanics	2	1	-	1	1	-	-	-	-	-	-	-	1	1	1
21BMC402J	Biomedical equipments for clinical applications	2	1	1	-	-	-	-	-	1	-	-	1	1	1	-
21BME261T	Biophotonics and Bioimaging	1	-	1	2	-	-	-	-	-	-	-	-	1	1	-
21BME262T	Home Medicare Technology	2	-	1	-	-	-	-	-	-	-	-	-	1	-	1
21BME263T	Biomedical Laser Instruments	1	-	2	1	-	-	-	-	-	-	-	-	1	1	-
21BME264T	Artificial Organs and Tissue engineering	2	-	1	-	-	-	-	1	-	-	-	1	1	1	1
21BME265T	Biomedical Nano Technology	2	-	-	-	-	-	-	-	-	-	-	1	1	1	1
21BME266T	Biometrics	2	-	1	1	-	-	-	-	1	-	-	-	1	1	1
21BME361T	BioMEMS	1	-	1	1	2	-	-	-	-	-	-	-	1	1	-
21BME362T	Human Electrophysiology	1	1	1	2	1	-	-	-	-	-	-	-	1	1	1
21BME363T	Biomedical device design Fundamentals	2	-	-	1	-	-	-	-	-	-	-	1	1	1	1
21BME364T	Innovation, Translation and Entrepreneurship	1	1	1	1	1	-	1	-	1	-	-	-	1	-	1
21BME365T	Hospital Management system	2	-	-	-	-	-	-	-	-	-	-	1	1	-	1
21BME366T	Trouble shooting of Medical Devices	2	1	1	1	-	-	-	-	-	-	-	-	1	1	-
21BME367T	Quality Assurance and regulatory aspects for medical devices	1	1	1	1	1	-	1	1	-	-	1	1	1	1	-
21BME368T	Neuroengineering	2	-	-	1	1	-	-	-	-	-	-	-	1	1	1
21BME369T	IOT and Telehealth Technology	3	1	2	1	-	-	-	-	-	-	-	-	2	-	-
21BME370T	Micro fluidics	2	1	1	2	1	-	-	-	-	-	-	1	1	1	-
21BME371T	Medical Ethics and Intellectual property rights	1	-	-	-	-	2	-	1	-	-	-	1	1	1	1
21BME372T	Virtual Instrumentation for Biomedical Engineers	3	1	1	1	-	-	-	-	-	-	-	-	2	2	1
21BME373T	Health care data analytics	3	2	1	2	1	2	2	2	1	1	2	2	1	2	2
21BME461T	Biomedical Informatics	1	-	1	1	1	1	-	-	-	-	-	-	1	1	1
21BME462T	Physiological Modeling	1	2	1	-	-	-	-	-	-	-	-	-	2	-	-
21BME463T	Biomimetics	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
21BME464T	Neural Networks and Genetic Algorithms	2	1	1	-	-	-	-	-	-	-	-	1	1	1	-
21BME465T	Wearable systems and mobile health care	1	1	1	1	1	1	-	-	-	-	-	-	1	1	1
21BME466T	Artificial Intelligence in Health care	1	-	1	1	1	-	-	-	-	-	-	-	1	-	1
21BME467T	Bio inspired Robotics	2	1	1	-	1	-	-	-	-	-	-	1	1	1	-
21BME468T	Computational tools in Bioengineering and Biomedicine	2	-	-	1	-	-	-	-	-	-	-	2	1	1	1
21BME469T	Neuro rehabilitation and Human machine interface	3	-	2	2	-	-	-	-	-	-	-	1	1	1	-
21BME470T	Assistive and Augmentative Technologies	1	1	1	-	1	-	1	-	-	-	-	1	1	1	1
21BME471T	Machine learning and Deep learning techniques in medicine	1	1	1	1	1	-	-	-	-	-	-	1	1	1	-
21BME472T	Virtual Reality in Health care	3	1	1	2	-	-	-	-	-	-	-	-	2	1	-
21BMO121T	Fundamentals of Biomedical Engineering	2	-	1	-	-	-	-	-	-	-	-	-	1	1	-
21BMO122T	Health Information Systems	1	1	1	-	1	-	-	1	-	-	-	1	1	-	1
21BMO123T	Basics of Medical Imaging	1	1	-	1	-	1	-	-	-	-	-	-	1	-	-
21BMO124T	Rehabilitation Engineering	1	1	1	1	1	1	-	-	-	-	-	-	1	1	1
21BMO125T	Quality control for biomedical devices	-	1	-	1	-	-	-	-	-	-	2	-	1	1	-
21BMO126T	Biomechanics of Human Movement	1	1	1	-	-	-	-	-	1	-	-	1	-	-	-
21BMO127T	Digital healthcare Technology	1	-	1	-	-	-	-	-	-	-	1	-	1	1	-
	Program Average	1.6	1.1	1.1	1.2	1.1	1.3	1.1	1.2	1.1	1.1	1.4	1.1	1.1	1.1	1.1

12. (g) Implementation Plan: B.Tech. in Biomedical Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21BMC101J	Biomedical Sensors	2	0	2	3
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**21**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB104T	Biology-Human Physiology and Anatomy	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**22**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21BMC202T	Biomedical Signals and Systems	3	0	0	3
21BMC203J	Electric and Electronic Circuits	3	0	2	4
21BMC204J	Digital Logic for Medical Systems	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21PYS202T	Medical Physics	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**22**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical Methods	3	1	0	4
21CSE206T	Artificial Intelligence	2	1	0	3
21BMC205J	Integrated Circuit Design for Bioinstrumentation	2	0	2	3
21BMC206J	Biomedical Instrumentation	3	0	2	4
21BMC207J	Biomaterials and Tissue Interaction	2	0	2	3
E	Professional Elective – I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21BMC301J	Biomedical Signal Processing	3	0	2	4
21BMC302J	Microcontrollers and its Application in Medicine	3	0	2	4
21BMC303T	Principles of Medical Imaging	3	0	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**22**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	1	1	0	2
21BMC304J	Medical Image Processing	2	0	2	3
21BMC305T	Biocontrol Systems	3	0	0	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
21BMP303T	MOOC	3	0	0	3
21BMP302L	Project	0	0	6	
O	Open Elective – II				3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	0	2	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
21BMC401J	Biomechanics	2	0	2	3
21BMC402J	Biomedical Equipments for Clinical Applications	2	0	2	3
O	Open Elective – III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21BMP401L	Major Project	0	0	30	15
21BMP402L	Major Project	0	0	20	
21BMP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21BMP401L or 21BMP402L and 21BMP403L both in eighth semester

13. B.Tech in Biomedical Engineering with Specialization in Machine Intelligence

13. (a) Mission of the Department

Mission Stmt – 1	*Build on a strong foundation in Basic science and Engineering and educate the students in diverse filed of Biomedical Engineering*
Mission Stmt – 2	*Work towards state of art Biomedical Engineering research and development through an interdisciplinary curriculum.*
Mission Stmt – 3	*Apply knowledge about design in development of enabling technologies for improvement of human health*

13. (b) Program Educational Objectives (PEO)

PEO – 1	*Develop real world biomedical devices and prototype models and test with multi-disciplinary approach.*
PEO – 2	*Design technologically enabled equipments that open up new areas of medical research.*
PEO – 3	*To impose innovative ideas for commercialization of developed products.*
PEO – 4	*Lead and work in a team with varied expertise and meet the changing needs of the profession through life long learning.*
PEO – 5	*To promote entrepreneurship skills in creating jobs in health care domain.*

13. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt – 1	Mission Stmt – 2	Mission Stmt – 3
PEO – 1	3	2	3
PEO – 2	3	3	2
PEO – 3	3	2	3
PEO – 4	3	3	2
PEO – 5	3	3	2

13. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3	3	3	3	2	3	3	2	3	2	3	2	3	3	3
PEO – 2	3	2	3	3	3	2	2	2	3	2	3	3	3	3	3
PEO – 3	3	3	3	3	2	3	3	3	2	3	3	2	2	3	3
PEO – 4	2	3	3	3	2	2	2	2	3	2	3	2	3	2	3
PEO – 5	3	2	2	3	2	2	2	2	2	2	2	3	3	2	2

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Ability to apply engineering design to offer health care solutions with consideration of safety, welfare, social, cultural and environmental factors*
PSO - 2	*Ability to model and analyze biological systems with ethical and professional responsibilities in Engineering situations.*
PSO - 3	*Ability to initiate cross disciplinary and industry collaborative research.*

13. (e) Program Structure: B.Tech. in Biomedical Engineering with Specialization in Machine Intelligence

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PYS202T	Medical Physics	3	0	0	3
21CSS303T	Data science	1	1	0	2
	Total Credits				**20**

Professional Elective Courses (E)
(Any 6 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21BME271T	AI and Machine learning for Healthcare	3	0	0	3
21BME272T	Statistics and Data Science	3	0	0	3
21BME273T	Artificial Neural Networks and Pattern Recognition	3	0	0	3
21BME274T	IoT and Smart Sensors	3	0	0	3
21BME275T	Telehealth Care Informatics	3	0	0	3
21BME276T	Natural Language Processing for Healthcare Applications	3	0	0	3
21BME381T	Deep Learning Techniques in Medicine	3	0	0	3
21BME382T	Computer Vision and Image Processing	3	0	0	3
21BME383T	Robotics and Smart Technologies	3	0	0	3
21BME384T	Brain Computer Interface	3	0	0	3
21BME481T	Biomimetics and Bio-inspired Design	3	0	0	3
21BME482T	Biomechanical Modeling and Simulation	3	0	0	3
	Total Credits				**18**

Mandatory Courses (M)

Course Code	Course Title	Hours/ Week L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21PDM102L	General Aptitude	0	0	2	0
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS	0	0	2	0
21GNM103L	NCC	0	0	2	0
21GNM104L	NSO	0	0	2	0
	Total Credits				3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB104T	Biology -Human Physiology and Anatomy	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21BMC101J	Biomedical Sensors	2	0	2	3
21BMC202T	Biomedical Signals and Systems	3	0	0	3
21BMC203J	Electric and Electronic Circuits	3	0	2	4
21BMC204J	Digital Logic for Medical Systems	2	0	2	3
21BMC205J	Integrated Circuit Design for Bioinstrumentation	2	0	2	3
21BMC206J	Biomedical Instrumentation	3	0	2	4
21BMC207J	Biomaterials and Tissue Interaction	2	0	2	3
21BMC301J	Biomedical Signal Processing	3	0	2	4
21BMC302J	Microcontrollers and its Application in Medicine	3	0	2	4
21BMC303T	Principles of Medical Imaging	3	0	0	3
21BMC304J	Medical Image Processing	2	0	2	3
21BMC305T	Biocontrol Systems	3	0	0	3
21BMC401J	Biomechanics	2	0	2	3
21BMC402J	Biomedical Equipments for Clinical Applications	2	0	2	3
21CSC206T	Artificial Intelligence	2	1	0	3
	Total Credits				**49**

Open Elective Courses (O) *(Any 3 Courses)*

Course Code	Course Title	Hours/ Week L	T	P	C
21BMO121T	Fundamentals of Biomedical Engineering	3	0	0	3
21BMO122T	Health Information Systems	3	0	0	3
21BMO123T	Basics of Medical Imaging	3	0	0	3
21BMO124T	Rehabilitation Engineering	3	0	0	3
21BMO125T	Quality Control for Biomedical Devices	3	0	0	3
21BMO126T	Biomechanics of Human Movement	3	0	0	3
21BMO127T	Digital Healthcare Technology	3	0	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21BMP303T	MOOC	3	0	0	3
21BMP302L	Project	0	0	6	
21BMP401L	Major Project	0	0	30	15
21BMP402L	Major Project	0	0	20	
21BMP403L	Internship	0	0	10	
	Total Credits				**19**

13. (f) Program Articulation: B.Tech. in Biomedical Engineering with Specialization in Machine Intelligence

Course Code	Course Name	Program Learning Outcomes (PLO)														
		Graduate Attributes												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
21BMC101J	Biomedical sensors	1	1	1	1	-	-	-	-	-	-	-	-	1	1	1
21BMC202T	Biomedical signals and systems	2	1	1	1	-	-	-	-	-	-	-	-	1	1	2
21BMC203J	Electric and Electronic circuits	3	1	1	1	-	-	-	-	-	-	1	-	2	1	-
21BMC204J	Digital logic for Medical systems	1	2	1	1	1	-	-	-	-	-	-	1	1	1	1
21BMC205J	Integrated circuit Design for Bioinstrumentation	1	1	1	1	1	-	-	-	-	-	-	1	1	1	1
21BMC206J	Biomedical Instrumentation	2	1	-	1	2	1	-	-	-	-	-	-	1	1	1
21BMC207J	Biomaterials and Tissue Interaction	1	-	-	-	-	-	-	2	-	-	-	-	1	1	1
21BMC301J	Biomedical signal processing	2	1	1	1	1	-	-	-	-	-	-	-	1	-	1
21BMC302J	Microcontrollers and its application in medicine	2	-	1	-	1	-	-	-	-	-	-	-	1	-	1
21BMC303T	Principles of medical imaging	1	1	-	1	1	-	-	-	-	-	-	-	1	1	-
21BMC304J	Medical image processing	3	1	1	1	2	-	-	-	-	-	-	-	1	-	1
21BMC305T	Biocontrol systems	2	1	-	2	-	-	-	-	-	-	-	-	1	1	1
21BMC401J	Biomechanics	2	1	-	1	1	-	-	-	-	-	-	-	1	1	1
21BMC402J	Biomedical equipments for clinical applications	2	1	1	-	-	-	-	-	1	-	-	1	1	1	-
21BME271T	AI and Machine learning for healthcare															
21BME272T	Statistics and Data science															
21BME273T	Artificial Neural Networks and Pattern Recognition															
21BME274T	IOT and Smart Sensors															
21BME275T	Telehealth care Informatics															
21BME276T	Natural language processing for healthcare applications															
21BME381T	Deep learning Techniques in Medicine															
21BME382T	Computer vision and Image Processing															
21BME383T	Robotics and Smart Technologies															
21BME384T	Brain computer Interface															
21BME481T	Biomimetics and Bio-inspired Design															
21BME482T	Biomechanical modeling and Simulation															
21BMO121T	Fundamentals of Biomedical Engineering	2	-	1	-	-	-	-	-	-	-	-	-	1	1	-
21BMO122T	Health Information Systems	1	1	1	-	1	-	-	1	-	-	-	1	1	-	1
21BMO123T	Basics of Medical Imaging	1	1	-	1	-	1	-	-	-	-	-	-	1	-	-
21BMO124T	Rehabilitation Engineering	1	1	1	1	1	1	-	-	-	-	-	-	1	1	1
21BMO125T	Quality control for biomedical devices	-	1	-	1	-	-	-	-	-	-	2	-	1	1	-
21BMO126T	Biomechanics of Human Movement	1	1	1	-	-	-	-	-	1	-	-	1	-	-	-
21BMO127T	Digital healthcare Technology	1	-	1	-	-	-	-	-	-	-	1	-	1	1	-
	Program Average															

13. (g) Implementation Plan: B.Tech. in Biomedical Engineering with Specialization in Machine Intelligence

Semester – I

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21BMC101J	Biomedical Sensors	2	0	2	3
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**21**

Semester – II

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB104T	Biology-Human Physiology and Anatomy	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**22**

Semester – III

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21BMC202T	Biomedical Signals and Systems	3	0	0	3
21BMC203J	Electric and Electronic Circuits	3	0	2	4
21BMC204J	Digital Logic for Medical Systems	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21PYS202T	Medical Physics	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**22**

Semester – IV

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB202T	Numerical Methods	3	1	0	4
21CSE206T	Artificial Intelligence	2	1	0	3
21BMC205J	Integrated Circuit Design for Bioinstrumentation	2	0	2	3
21BMC206J	Biomedical Instrumentation	3	0	2	4
21BMC207J	Biomaterials and Tissue Interaction	2	0	2	3
E	Professional Elective – I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB301T	Probability and Statistics	3	1	0	4
21BMC301J	Biomedical Signal Processing	3	0	2	4
21BMC302J	Microcontrollers and its Application in Medicine	3	0	2	4
21BMC303T	Principles of Medical Imaging	3	0	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**22**

Semester – VI

Code	Course Title	Hours/ Week			C
		L	T	P	
21CSS303T	Data Science	1	1	0	2
21BMC304J	Medical Image Processing	2	0	2	3
21BMC305T	Biocontrol Systems	3	0	0	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
21BMP303T	MOOC	3	0	0	3
21BMP302L	Project	0	0	6	
O	Open Elective – II				3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week			C
		L	T	P	
21GNH401T	Behavioral Psychology	2	0	2	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
21BMC401J	Biomechanics	2	0	2	3
21BMC402J	Biomedical Equipments for Clinical Applications	2	0	2	3
O	Open Elective – III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week			C
		L	T	P	
21BMP401L	Major Project	0	0	30	15
21BMP402L	Major Project	0	0	20	
21BMP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21BMP401L or 21BMP402L and 21BMP403L both in eighth semester

14. B.Tech. in Chemical Engineering

14. (a) Mission of the Department

Mission Stmt – 1	*To facilitate high quality education, well grounded in the fundamental and applied areas of engineering necessary for learners to contribute effectively to chemical and allied industries*
Mission Stmt – 2	*To educate, prepare, inspire and mentor learners with the technical and professional skill-set necessary to excel as professionals, grow in their careers and contribute to chemical engineering science and technology*
Mission Stmt – 3	*To inculcate social-responsibility in learners and train them to contribute effectively to science and society*

14. (b) Program Educational Objectives (PEO)

PEO – 1	*Utilizing their strong fundamental knowledge from the program be able to solve technical problems and contribute to chemical and allied industries*
PEO – 2	*Pursuing higher studies and/or continuously upgrading their skill-sets with technological advances leading to personal and professional growth and successful careers*
PEO – 3	*Establishing themselves with successful careers in industry, academia and/or as entrepreneurs that will enable them to address social, economic and environmental challenges and contribute to science and society*

14. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	3	2	1
PEO – 2	2	3	1
PEO – 3	2	1	3

14. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3	3	3	3	2				2	2	2		3	3	2
PEO – 2	3	3	3	3	2		2	2				2	3	2	2
PEO – 3	2	2	2	2		3	2	2	3	3	3	2	3	2	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Ability to understand and differentiate processes*
PSO - 2	*Apply the fundamentals to perform computations related to synthesis, design and analysis of chemical processes*
PSO - 3	*Analyze the process plants from Energy, Environment and Safety related aspects*

14. (e) Program Structure: B.Tech. in Chemical Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CHS201T	Introduction to Chemical Engineering	3	0	0	3
21CHS303J	Computational Methods in Chemical Engineering	2	0	2	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**23**

Professional Elective Courses (E) (Any 6 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CHE351T	Renewable Energy Engineering	3	0	0	3
21CHE352T	Introduction to Biochemical Principles	3	0	0	3
21CHE353T	Energy Engineering and Technology	3	0	0	3
21CHE354T	Polymer Technology	3	0	0	3
21CHE355T	Industrial Pollution Prevention and Control	3	0	0	3
21CHE356T	Enzyme Engineering	3	0	0	3
21CHE357T	Fertilizer Technology	3	0	0	3
21CHE358T	Petroleum Technology	3	0	0	3
21CHE359T	Principles of Membrane Separation	3	0	0	3
21CHE360T	Safety & Hazard Analysis in Process Industries	3	0	0	3
21CHE361T	Fundamentals of Desalination	3	0	0	3
21CHE362T	Air Pollution Control Engineering	3	0	0	3
21CHE363T	Waste Water Treatment	3	0	0	3
21CHE364T	Chemical Process Optimization	3	0	0	3
21CHE365T	Equilibrium Stage Operations	3	0	0	3
21CHE366T	Computational Fluid Dynamics	3	0	0	3
21CHE367T	Biochemical Process Design	3	0	0	3
21CHE368T	Micro Chemical Systems	3	0	0	3
21CHE369T	Electrochemical Engineering	3	0	0	3
21CHE370T	Petrochemical Technology	3	0	0	3
21CHE371T	Food Technology	3	0	0	3
21CHE372T	Introduction to Process Plant Simulation	3	0	0	3
	Total Credits				**18**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CHP302L	Project	0	0	6	3
21CHP303T	MOOC	3	0	0	
21CHP401L	Major Project	0	0	30	15
21CHP402L	Major Project	0	0	20	
21CHP403L	Internship#	0	0	10	
	Total Credits				**19**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
	Total Credits				**28**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CHC101J	Physical and Analytical Chemistry	2	0	2	3
21CHC202T	Chemical Process Calculations	3	1	0	4
21CHC203J	Mechanical Operations	2	0	2	3
21CHC204J	Chemical Engineering Fluid Mechanics	2	0	2	3
21CHC205J	Heat Transfer	3	0	2	4
21CHC206T	Chemical Process Technology	3	0	0	3
21CHC301T	Chemical Engineering Thermodynamics	3	1	0	4
21CHC302J	Mass Transfer Applications	3	0	2	4
21CHC304J	Chemical Reaction Engineering	3	0	2	4
21CHC305J	Process Dynamics, Control and Instrumentation	2	0	2	3
21CHC306T	Transport Phenomena	3	0	0	3
21CHC307J	Process Modeling and Simulation	2	0	2	3
21CHC401J	Process Equipment Design and Drawing	2	0	2	3
21CHC402T	Process Economics and Project Management	3	0	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
	Total Credits				**50**

Open Elective Courses (O)

Course Code	Course Title	Hours/ Week L	T	P	C
21CHO101T	Sustainable Energy Engineering	3	0	0	3
21CHO102T	Petroleum Engineering	3	0	0	3
21CHO103T	Fundamentals of Chemical Engineering	3	0	0	3
21CHO104T	Process Plant Safety	3	0	0	3
21CHO105T	Pollution Abatement	3	0	0	3
	Total Credits				**09**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

14. (f) Program Articulation Matrix: B.Tech. in Chemical Engineering

Course Code	Course Name	Program Outcomes (PO)												PSO		
		Graduate Attributes														
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CHC101J	Physical and Analytical Chemistry	3	2	1	3	3	-	-	-	-	-	-	-	2	2	-
21CHS201T	Introduction to Chemical Engineering	3	3	2	-	2	-	-	-	-	-	-	-	-	-	-
21CHC202T	Chemical Process Calculations	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
21CHC203J	Mechanical operations	3	2	2	3	-	-	-	-	-	-	-	-	3	2	-
21CHC204J	Chemical Engineering Fluid Mechanics	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
21CHC205J	Heat Transfer	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
21CHC206T	Chemical Process Technology	3	-	-	-	-	-	-	-	-	-	-	-	3	2	-
21CHC301T	Chemical Engineering Thermodynamics	3	3	-	-	-	-	-	-	-	-	-	-	2	3	-
21CHC302J	Mass Transfer Applications	2	3	3	-	-	-	-	-	-	-	-	-	3	3	-
21CHS303J	Computational Methods in Chemical Engineering	3	2	1	-	2	-	-	-	-	-	-	-	2	2	-
21CHC304J	Chemical Reaction Engineering	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
21CHC305J	Process Dynamics, Control and Instrumentation	3	3	2	3	3	-	-	-	-	-	-	-	3	3	-
21CHC306T	Transport Phenomena	-	3	-	3	-	-	-	-	-	-	-	-	3	-	-
21CHC307J	Process Modeling and Simulation	3	2	-	-	2	-	-	-	-	-	-	-	3	2	-
21CHC401J	Process Equipment Design and Drawing	-	3	3	3	2	-	-	-	-	-	-	-	3	-	-
21CHC402T	Process Economics and Project Management	-	3	-	2	-	3	-	2	2	-	3	2	3	-	-
21CHE351T	Renewable Energy Engineering	3	-	2	-	-	-	3	-	-	-	-	-	1	-	1
21CHE352T	Introduction to Biochemical Principles	3	3	2	3	-	-	2	-	-	-	-	-	2	3	3
21CHE353T	Energy Engineering and Technology	3	-	2	-	-	-	3	-	-	-	-	-	1	-	3
21CHE354T	Polymer Technology	3	1	3	-	-	-	-	-	-	-	-	1	2	2	-
21CHE355T	Industrial Pollution Prevention and Control	2	3	3	-	-	-	3	2	-	-	-	3	-	1	3
21CHE356T	Enzyme Engineering	3	3	2	-	-	-	2	-	-	-	-	-	2	2	-
21CHE357T	Fertilizer Technology	3	3	2	3	-	-	2	-	-	-	-	-	2	2	-
21CHE358T	Petroleum Technology	2	-	3	-	-	-	2	-	-	-	-	-	2	3	2
21CHE359T	Principles of Membrane Separation	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
21CHE360T	Safety & Hazard Analysis In Process Industries	2	3	3	-	-	-	-	-	-	-	-	3	-	2	3
21CHE361T	Fundamentals of Desalination	2	3	2	-	-	2	3	-	-	-	-	-	3	-	1
21CHE362T	Air Pollution Control Engineering	3	2	3	-	2	-	3	-	-	-	-	1	-	-	3
21CHE363T	Water Treatment Technology	1	3	3	-	-	-	3	-	-	-	-	3	1	-	3
21CHE364T	Chemical Process Optimization	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
21CHE365T	Equilibrium Stage Operations	-	3	3	-	-	-	-	-	-	-	-	-	3	-	-
21CHE366T	Computational Fluid Dynamics	-	3	-	3	3	-	-	-	-	-	-	-	-	2	-
21CHE367T	Biochemical Process Design	1	1	2	2	2	-	2	-	-	-	-	-	3	3	3
21CHE368T	Microfluidics and Lab-on-a-chip Technology	3	2	3	-	2	-	-	-	-	-	-	-	3	3	-
21CHE369T	Electrochemical Engineering	3	2	3	3	-	-	-	-	-	-	-	-	3	3	-
21CHE370T	Petrochemical Technology	2	-	3	-	-	-	-	-	-	-	-	-	2	3	-
21CHE371T	Food Technology	3	3	2	3	-	-	2	-	-	-	-	-	3	2	-
21CHE372T	Introduction to Process Plant Simulation	3	3	-	-	3	-	-	-	-	-	-	-	2	2	-
21CHP302L	MOOC	-	-	-	2	-	2	-	-	-	3	-	2	-	-	-
21CHP303L	Project	3	2	3	2	2	2	1	2	2	3	3	2	-	-	-
21CHP401L	Major Project	3	2	3	2	2	2	1	2	2	3	3	2	-	-	-
21CHP403L	Major Project with Internship (Project component)	3	2	2	2	2	3	1	2	2	3	3	2	-	-	-
21CHP404L	Major Project with Internship (Internship component)	2	2	2	2	2	2	1	2	2	2	2	2	-	-	-

14. (g) Implementation Plan: B.Tech. in Chemical Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21CHC101J	Physical and Analytical Chemistry	2	0	2	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21CHC202T	Chemical Process Calculations	3	1	0	4
21CHC203J	Mechanical Operations	2	0	2	3
21CHC204J	Chemical Engineering Fluid Mechanics	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21CHS201T	Introduction to Chemical Engineering	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**22**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CHC205J	Heat Transfer	3	0	2	4
21CHC206T	Chemical Process Technology	3	0	0	3
E	Professional Elective – I	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**20**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21CHC301T	Chemical Engineering Thermodynamics	3	1	0	4
21CHC302J	Mass Transfer Applications	3	0	2	4
21CHS303J	Computational Methods in Chemical Engineering	2	0	2	3
21CHC304J	Chemical Reaction Engineering	3	0	2	4
O	Open Elective – I	3	0	0	3
E	Professional Elective – II	3	0	0	3
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**22**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CHC305J	Process Dynamics, Control and Instrumentation	2	0	2	3
21CHC306T	Transport Phenomena	3	0	0	3
21CHC307J	Process Modeling and Simulation	2	0	2	3
E	Professional Elective – III	3	0	0	3
E	Professional Elective – IV	3	0	0	3
21CHP303T	MOOC	3	0	0	3
21CHP302L	Project	0	0	6	
O	Open Elective – II	3	0	0	3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**23**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
21CHC401J	Process Equipment Design and Drawing	2	0	2	3
21CHC402T	Process Economics and Project Management	3	0	0	3
E	Professional Elective – V	3	0	0	3
E	Professional Elective – VI	3	0	0	3
O	Open Elective – III	3	0	0	3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CHP401L	Major Project	0	0	30	15
21CHP402L	Major Project	0	0	20	
21CHP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CHP401L or 21CHP402L and 21CHP403L both in eighth semester

15. B.Tech.in Civil Engineering

15. (a) Mission of the Department

Mission Stmt – 1	*To move up through international alliances and collaborative initiatives in civil engineering to achieve global excellence*
Mission Stmt – 2	*To accomplish a process to advance knowledge in a rigorous research environment related to civil engineering and allied disciplines*
Mission Stmt – 3	*To attract and build people in a rewarding and inspiring environment by fostering freedom, empowerment, creativity and innovation.*

15. (b) Program Educational Objectives (PEO)

PEO - 1	*Graduates will pursue higher studies in civil engineering, management and other related fields*
PEO - 2	*Graduates will perform as professional engineers in the fields of civil engineering*
PEO - 3	*Graduates will perform in diverse fields and gradually move into teamwork and leadership positions.*
PEO - 4	*Graduates will contribute to the development of the profession, nation and society*

15. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*3*	*3*	*2*
PEO – 2	*3*	*2*	*3*
PEO – 3	*3*	*2*	*3*
PEO – 4	*3*	*2*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

15. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*	*3*	*3*	*3*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	3	3	3
PEO – 2	*3*	*3*	*3*	*3*	*3*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	3	3	3
PEO – 3	*1*	*1*	*1*	*1*	*2*	*2*	*1*	*3*	*3*	*3*	*3*	*3*	3	2	3
PEO – 4	*1*	*1*	*1*	*1*	*1*	*3*	*3*	*3*	*2*	*2*	*2*	*3*	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Graduates apply the knowledge of mathematical and physical sciences to solve problems in structural engineering, construction engineering management, geotechnical engineering, water resources engineering, environmental engineering and transportation engineering*
PSO - 2	*Graduates are capable of handling and applying modern engineering tools, software, Remote Sensing and GIS for solving civil engineering related problems*
PSO - 3	*Graduates are capable of working in teams in laboratory and industrial environment and carrying out major design projects*

15. (e) Program Structure: B.Tech. in Civil Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioural Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES102L	Engineering Graphics and Design	0	0	4	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CES201T	Mechanics of Structures	3	0	0	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**20**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

Open Elective Courses (O)
Any 3 Courses

Course Code	Course Title	Hours/ Week L	T	P	C
21CEO301T	Maintenance and Rehabilitation of Structures	3	0	0	3
21CEO302T	Disaster Resistant Structures	3	0	0	3
21CEO303T	Smart City and Infrastructure	3	0	0	3
21CEO304T	Real Estate Management	3	0	0	3
21CEO305T	Project Management	3	0	0	3
21CEO306T	Environmental Impact Assessment	3	0	0	3
21CEO307T	Municipal Solid Waste Management	3	0	0	3
21CEO308T	Disaster Mitigation and Management	3	0	0	3
21CEO309T	Water Pollution and its Management	3	0	0	3
21CEO310T	Global Warming and Climate Change	3	0	0	3
21CEO311T	Indoor and Ambient Air Quality Management	3	0	0	3
21CEO312T	Intelligent Transportation Systems	3	0	0	3
21CEO313T	Traffic Management Systems	3	0	0	3
21CEO314T	Traffic flow Modeling and Simulation Techniques	3	0	0	3
21CEO315T	Viscoelasticity	3	0	0	3
21CEO316T	Soil Sciences	3	0	0	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21PYB104J	Physics : Mechanics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21CEB201J	Applied Geology	3	0	2	4
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CEC101T	Building Materials in the Built Environment	3	0	0	3
21CEC201T	Hydro Mechanics and Hydraulic Engineering	3	0	0	3
21CEC201L	Fluid Mechanics and Machinery Lab	0	0	2	1
21CEC202T	Engineering Surveying	3	0	0	3
21CEC202L	Surveying Lab	0	0	2	1
21CEC203T	Environmental Engineering and Design	3	0	0	3
21CEC203L	Environmental Engineering Laboratory	0	0	2	1
21CSC206T	Artificial Intelligence	2	1	0	3
21CEC204T	Structural Engineering Design-I	3	0	0	3
21CEC204L	Concrete Technology and Strength of Materials Laboratory	0	0	2	1
21CEC205T	Geomechanics	3	0	0	3
21CEC205L	Geomechanics Laboratory	0	0	2	1
21CEC206T	Irrigation and Water Resources Engineering	3	0	0	3
21CEC207T	Concrete Technology and Special Concrete	3	0	0	3
21CEC301T	Structural Analysis	3	0	0	3
21CEC301L	Computer-Aided Civil Engineering Laboratory	0	0	2	1
21CEC302T	Structural Engineering Design-II	2	1	0	3
21CEC303T	Transportation Engineering	3	0	0	3
21CEC303L	Transportation Engineering Laboratory	0	0	2	1
21CEC304T	Construction Engineering and Management	3	0	0	3
	Total Credits				**46**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CEP302L	Project	0	0	6	3
21CEP303T	MOOC	3	0	0	
21CEP401L	Major Project	0	0	30	15
21CEP402L	Major Project	0	0	20	
21CEP403L	Internship#	0	0	10	
	Total Credits				**19**

Open Elective Courses (O)
Any 3 Courses

Course Code	Course Title	Hours/ Week L	T	P	C
21CEO317J	Rural Development and Technology	2	0	2	3
21CEO318T	Floods and Flood Management	3	0	0	3
21CEO319T	Climate Change and Water Resources Management	3	0	0	3
21CEO320T	Principles of Satellite Remote Sensing	3	0	0	3
21CEO321T	Spatial Information System	3	0	0	3
21CEO322T	Remote sensing and GIS applications in Engineering	3	0	0	3
21CEO323T	Spatial technology in Engineering	3	0	0	3
21CEO324T	GIS and Spatial Analysis	3	0	0	3
21CEO325T	Web GIS	3	0	0	3
21CEO401T	Building Materials	3	0	0	3
21CEO402T	Introduction to Environmental Studies	3	0	0	3
21CEO403T	Integrated Waste Management	3	0	0	3
21CEO404T	Principles of Sustainable Development	3	0	0	3
21CEO405T	Road Safety and Audit	3	0	0	3
21CEO406T	Transportation Systems	3	0	0	3
21CEO407T	Rheology of Complex Materials	3	0	0	3
21CEO408T	Water Conservation and Management	3	0	0	3

Open Elective Courses (O) Any 3 Course					
Course Code	Course Title	Hours/ Week L	T	P	C
21CEO409T	*Water Quantity and Quality*	*3*	*0*	*0*	*3*
21CEO410T	*Remote Sensing Surveying*	*3*	*0*	*0*	*3*
21CEO411T	*Introduction to GIS and data*	*3*	*0*	*0*	*3*
21CEO412T	*Web and Mobile GIS*	*3*	*0*	*0*	*3*
21CEO413T	*Digital Mapping*	*3*	*0*	*0*	*3*
	Total Credits				**09**

Professional Elective Courses (E) Any 7 Courses					
Course Code	*Course Title*	*Hours/ Week L*	*T*	*P*	*C*
	Professional Elective – 1				
21CEE301T	Foundation Engineering and Design	3	0	0	3
21CEE302T	Geotechnical Design	3	0	0	3
21CEE303T	Ground Improvement Techniques	3	0	0	3
21CEE304T	Foundation on Expansive Soil	3	0	0	3
	Professional Elective – 2				
21CEE305T	Solid and Hazardous Waste Management	3	0	0	3
21CEE306T	Air and Noise Pollution Control	3	0	0	3
21CEE307T	Environmental Impact Assessment and Life Cycle Analysis	3	0	0	3
	Professional Elective – 3				
21CEE308T	Pavement analysis and design	3	0	0	3
21CEE309T	Railway, Airport and Harbour Engineering	3	0	0	3
21CEE310T	Traffic Engineering	3	0	0	3
21CEE311T	Pavement Construction Technology	3	0	0	3
21CEE312T	Computer Application in Highway Engineering	3	0	0	3
	Professional Elective – 4				
21CEE401T	Advanced Pre-stressed Concrete	3	0	0	3
21CEE402T	Earthquake Resistant Design of Structures	3	0	0	3
21CEE403T	Design of Steel Concrete Composite Structures	3	0	0	3

Professional Elective Courses (E) Any 7 Courses					
Course Code	*Course Title*	*Hours/ Week L*	*T*	*P*	*C*
	Professional Elective – 5				
21CEE404T	Surface Hydrology	3	0	0	3
21CEE405T	Groundwater Engineering	3	0	0	3
21CEE406T	Design of Hydraulic Structures and Irrigation Engineering	3	0	0	3
21CEE407T	Advance Hydraulic Engineering and Design	3	0	0	3
	Professional Elective – 6				
21CEE408T	Fundamentals of Remote Sensing and GIS	3	0	0	3
21CEE409T	GIS and its Techniques	3	0	0	3
	Professional Elective – 7				
21CEE410T	Construction Equipment and Automation	3	0	0	3
21CEE411T	Contracts Management	3	0	0	3
21CEE412T	Repairs and Rehabilitation techniques	3	0	0	3
21CEE413T	Sustainable Construction Methods	3	0	0	3
21CEE414T	BIM in Construction Management	3	0	0	3
21CEE415T	Modern Civil Engineering Economics	3	0	0	3
	Total Credits				**21**

15(f) Program Articulation: B.Tech in Civil Engineering

SUBJECT CODE	COURSE NAME	Program Learning Outcome (PLO)													
		Graduate Attributes											PSO		
		Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment &	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO1	PSO2	PSO3
21CEB201J	Applied Geology	2.6						2.6						3		3
21CES201T	Mechanics of Structures	3	3		3									3		
21CEC101T	Building Materials in the Built Environment	3				2	2.5	3						3		
21CEC201T	Hydro Mechanics and Hydraulic Engineering	3	3											3		
21CEC201L	Fluid Mechanics and Machinery Lab	3	3							3				3		3
21CEC202T	Engineering Surveying	3	3			3								3		
21CEC202L	Surveying Lab	3	3			3							3	3	3	3
21CEC203T	Environmental Engineering and Design	3		3	2		2	3						3		
21CEC203L	Environmental Engineering Laboratory	3	2					3						3		3
21CEC204T	Structural Engineering Design-I	3	2					3						3		
21CEC204L	Concrete Technology and Strength of Materials Laboratory	2.8	3							3			3	3		3
21CEC205T	Geomechanics	3	3	2										3		
21CEC205L	Geomechanics Laboratory	3	3							3				3		3
21CEC206T	Irrigation and Water Resources Engineering	3	3	2	2									3		
21CEC207T	Concrete Technology and Special Concrete	3	2.2	3			2	3					2	3		
21CEC301T	Structural Analysis	2.8	3		2									3	3	
21CEC301L	Computer-Aided Civil Engineering Laboratory	2.8	2		2.8	2.8				3			3	3	3	3
21CEC302T	Structural Engineering Design-II	3	3	3									3	3		
21CEC303T	Transportation Engineering	2.8	3	2.8	2.8									3		
21CEC303L	Transportation Engineering Laboratory	3	2							3				3	3	3
21CEC304T	Construction Engineering and Management	3	3									3		3		3
21CEE301T	Foundation Engineering and Design	3	2.8	2.5												
21CEE302T	Geotechnical Design	3	3	3										3		
21CEE303T	Ground Improvement Techniques	3	2.2		2									3		
21CEE304T	Foundation on Expansive Soil	3	2.3	2.5										3		
21CEE305T	Solid and Hazardous Waste Management	3				2	2	3						3		
21CEE306T	Air and Noise Pollution Control	2.8					2	2.8						3		
21CEE307T	Environmental Impact Assessment and Life Cycle Analysis	3					2	3	2			2		3		
21CEE308T	Pavement analysis and design	3	2.6	2.5	2.5	3								3		
21CEE309T	Railway, Airport and Harbour Engineering	3	2.8	2.6	2.6									3		
21CEE310T	Traffic Engineering	3	2.4	2.75	2.75		2							3		
21CEE311T	Pavement Construction Technology	2.8	3						2					3		
21CEE312T	Computer Application in Highway Engineering	3	2	3	3	3								3	3	
21CEE401T	Advanced Pre-stressed Concrete	3	3	3	2									3		
21CEE402T	Earthquake Resistant Design of Structures	3	3	3	2	3	3	2.5	2				2	3		
21CEE403T	Design of Steel Concrete Composite Structures	3	2.8	2.8	2.8								3	3		
21CEE404T	Surface Hydrology	3	3			3							3	3		
21CEE405T	Groundwater Engineering	3	3											3		
21CEE406T	Design of Hydraulic Structures and Irrigation Engineering	3	3	3	3									3		
21CEE407T	Advance Hydraulic Engineering and Design	3	3	3	3									3		
21CEE408T	Fundamentals of Remote Sensing and GIS	3				3								3	3	
21CEE409T	GIS and its Techniques	3				2.4		3						3	3	
21CEE410T	Construction Equipment and Automation	3	2.8		1.8	2		3	2	2.8	2.8	3	2.4	3		
21CEE411T	Contracts Management	3	2.6				2.2		3	2.6	2	1.2	2	3		
21CEE412T	Repairs and Rehabilitation Techniques	3	2	2		3							2	3		
21CEE413T	Sustainable Construction Methods	3						3				3	2	3		
21CEE414T	BIM in Construction Management	3				2.3						2.4		3	3	
21CEE415T	Modern Civil Engineering Economics	3				2	2.5	3						3		
21CEP302L	Project (compulsory for exit option at 6th semester)	3	2	2	3	3	3	1	3	3	3	3	3	3	3	3
21CEP303L	MOOC	3	2	2	3	3	3	1	3	3	3	3	3	3	3	3
21CEP401L	Major Project	3	2	2	3	3	3	1	3	3	3	3	3	3	3	3
21CEP402L	Semester Internship	3	2	2	3	3	3	1	3	3	3	3	3	3	3	3

15. (g) Implementation Plan: B.Tech. in Civil Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB104J	Physics : Mechanics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21CEC101T	Building Materials in the Built Environment	3	0	0	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21CEC201T	Hydro Mechanics and Hydraulic Engineering	3	0	0	3
21CEC201L	Fluid Mechanics and Machinery Lab	0	0	2	1
21CEC202T	Engineering Surveying	3	0	0	3
21CEC202L	Surveying Lab	0	0	2	1
21CEC203T	Environmental Engineering and Design	3	0	0	3
21CEC203L	Environmental Engineering Laboratory	0	0	2	1
21PDH201T	Social Engineering	2	0	0	2
21CES201T	Mechanics of Structures	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21CEB201J	Applied Geology	3	0	2	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CEC204T	Structural Engineering Design-I	3	0	0	3
21CEC204L	Concrete Technology and Strength of Materials Laboratory	0	0	2	1
21CEC205T	Geomechanics	3	0	0	3
21CEC205L	Geomechanics Laboratory	0	0	2	1
21CEC206T	Irrigation and Water Resources Engineering	3	0	0	3
21CEC207T	Concrete Technology and Special Concrete	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**24**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21CEC301T	Structural Analysis	3	0	0	3
21CEC301L	Computer-Aided Civil Engineering Laboratory	0	0	2	1
21CEC302T	Structural Engineering Design-II	2	1	0	3
21CEC303T	Transportation Engineering	3	0	0	3
21CEC303L	Transportation Engineering Laboratory	0	0	2	1
E-1	Professional Elective – I				3
O	Open Elective – I				3
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**22**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CEC304T	Construction Engineering and Management	3	0	0	3
E-2	Professional Elective – II				3
E-3	Professional Elective – III				3
21CEP302L	Project	0	0	6	3
21CEP303T	MOOC	3	0	0	
O	Open Elective – II				3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**17**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E-4	Professional Elective – IV				3
E-5	Professional Elective – V				3
E-6	Professional Elective – VI				3
E-7	Professional Elective – VII				3
O	Open Elective – III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CEP401L	Major Project	0	0	30	15
21CEP402L	Major Project	0	0	20	
21CEP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CEP401L or 21CEP402L and 21CEP403L both in eighth semester

16. B.Tech.in Civil Engineering with Computer Applications

16. (a) Mission of the Department

Mission Stmt – 1	*To move up through international alliances and collaborative initiatives in civil engineering to achieve global excellence*
Mission Stmt – 2	*To accomplish a process to advance knowledge in a rigorous research environment related to civil engineering and allied disciplines*
Mission Stmt – 3	*To attract and build people in a rewarding and inspiring environment by fostering freedom, empowerment, creativity and innovation.*

16. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will pursue higher studies in civil engineering, management and other related fields*
PEO – 2	*Graduates will perform as professional engineers and contribute to civil engineering informatics*
PEO – 3	*Graduates will perform in diverse fields and gradually move into teamwork and leadership positions.*
PEO – 4	*Graduates will contribute to the development of the profession, nation and society*

16. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*3*	*3*	*2*
PEO – 2	*3*	*2*	*3*
PEO – 3	*3*	*2*	*3*
PEO – 4	*3*	*2*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

16. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*	*3*	*3*	*3*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	3	3	3
PEO – 2	*3*	*3*	*3*	*3*	*3*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	3	3	3
PEO – 3	*1*	*1*	*1*	*1*	*2*	*2*	*1*	*3*	*3*	*3*	*3*	*3*	3	2	3
PEO – 4	*1*	*1*	*1*	*1*	*1*	*3*	*3*	*3*	*2*	*2*	*2*	*3*	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Graduates apply the knowledge of mathematical and physical sciences to solve problems in various civil engineering domains*
PSO - 2	*Graduates are capable of handling and applying various software tools for solving problems in various civil engineering fields*
PSO - 3	*Graduates are capable of working in teams in laboratory and industrial environments to carry out major civil engineering projects*

16. (e) Program Structure: B.Tech. in Civil Engineering with Computer Applications

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioural Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES102L	Engineering Graphics and Design	0	0	4	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CES201T	Mechanics of Structures	3	0	0	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**20**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CEP302L	Project	0	0	6	3
21CEP303T	MOOC	3	0	0	
21CEP401L	Major Project	0	0	30	15
21CEP402L	Major Project	0	0	20	
21CEP403L	Internship#	0	0	10	
	Total Credits				**19**

Open Elective Courses (O)
Any 3 Courses

Course Code	Course Title	Hours/ Week L	T	P	C
21CEO301T	Maintenance and Rehabilitation of Structures	3	0	0	3
21CEO302T	Disaster Resistant Structures	3	0	0	3
21CEO303T	Smart City and Infrastructure	3	0	0	3
21CEO304T	Real Estate Management	3	0	0	3
21CEO305T	Project Management	3	0	0	3
21CEO306T	Environmental Impact Assessment	3	0	0	3
21CEO307T	Municipal Solid Waste Management	3	0	0	3
21CEO308T	Disaster Mitigation and Management	3	0	0	3
21CEO309T	Water Pollution and its Management	3	0	0	3
21CEO310T	Global Warming and Climate Change	3	0	0	3
21CEO311T	Indoor and Ambient Air Quality Management	3	0	0	3
21CEO312T	Intelligent Transportation Systems	3	0	0	3
21CEO313T	Traffic Management Systems	3	0	0	3
21CEO314T	Traffic flow Modeling and Simulation Techniques	3	0	0	3
21CEO315T	Viscoelasticity	3	0	0	3
21CEO316T	Soil Sciences	3	0	0	3
21CEO317J	Rural Development and Technology	2	0	2	3
21CEO318T	Floods and Flood Management	3	0	0	3
21CEO319T	Climate Change and Water Resources Management	3	0	0	3
21CEO320T	Principles of Satellite Remote Sensing	3	0	0	3
21CEO321T	Spatial Information System	3	0	0	3
21CEO322T	Remote sensing and GIS applications in Engineering	3	0	0	3
21CEO323T	Spatial technology in Engineering	3	0	0	3
21CEO324T	GIS and Spatial Analysis	3	0	0	3
21CEO325T	Web GIS	3	0	0	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21PYB104J	Physics : Mechanics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21CEB201J	Applied Geology	3	0	2	4
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses I

Course Code	Course Title	Hours/ Week L	T	P	C
21CEC101T	Building Materials in the Built Environment	3	0	0	3
21CEC201T	Hydro Mechanics and Hydraulic Engineering	3	0	0	3
21CEC201L	Fluid Mechanics and Machinery Lab	0	0	2	1
21CEC202T	Engineering Surveying	3	0	0	3
21CEC202L	Surveying Lab	0	0	2	1
21CEC203T	Environmental Engineering and Design	3	0	0	3
21CEC203L	Environmental Engineering Laboratory	0	0	2	1
21CSC206T	Artificial Intelligence	2	1	0	3
21CEC204T	Structural Engineering Design-I	3	0	0	3
21CEC204L	Concrete Technology and Strength of Materials Laboratory	0	0	2	1
21CEC205T	Geomechanics	3	0	0	3
21CEC205L	Geomechanics Laboratory	0	0	2	1
21CEC206T	Irrigation and Water Resources Engineering	3	0	0	3
21CEC207T	Concrete Technology and Special Concrete	3	0	0	3
21CEC301T	Structural Analysis	3	0	0	3
21CEC301L	Computer-Aided Civil Engineering Laboratory	0	0	2	1
21CEC302T	Structural Engineering Design-II	2	1	0	3
21CEC303T	Transportation Engineering	3	0	0	3
21CEC303L	Transportation Engineering Laboratory	0	0	2	1
21CEC304T	Construction Engineering and Management	3	0	0	3
	Total Credits				**46**

Open Elective Courses (O)
Any 3 Course

Course Code	Course Title	Hours/ Week L	T	P	C
21CEO401T	Building Materials	3	0	0	3
21CEO402T	Introduction to Environmental Studies	3	0	0	3
21CEO403T	Integrated Waste Management	3	0	0	3
21CEO404T	Principles of Sustainable Development	3	0	0	3
21CEO405T	Road Safety and Audit	3	0	0	3
21CEO406T	Transportation Systems	3	0	0	3
21CEO407T	Rheology of Complex materials	3	0	0	3
21CEO408T	Water Conservation and Management	3	0	0	3
21CEO409T	Water Quantity and Quality	3	0	0	3
21CEO410T	Remote Sensing Surveying	3	0	0	3
21CEO411T	Introduction to GIS and data	3	0	0	3
21CEO412T	Web and Mobile GIS	3	0	0	3
21CEO413T	Digital Mapping	3	0	0	3
	Total Credits				**03**

Mandatory Courses (M)					
Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				3

Professional Elective Courses (E) Any 7 Courses					
Course Code	Course Title	Hours/ Week L	T	P	C
	Professional Elective - 1				
21CEE313J	Computer Aided Geotechnical Investigations	2	0	2	3
21CEE314J	Computer Application in Geotechnical Engineering	2	0	2	3
	Professional Elective - 2				
21CEE315J	Computer Application in Environmental Engineering	2	0	2	3
21CEE316J	Computer Application in Environmental Impact Assessment	2	0	2	3
	Professional Elective - 3				
21CEE317J	Computer Application in Pavement Design	2	0	2	3
21CEE318J	Computer application in Transportation Engineering	2	0	2	3
	Professional Elective - 4				
21CEE416J	Computer Application in Structural Engineering	2	0	2	3
21CEE417J	Computer Application in Earthquake Resistant Structure	2	0	2	3

Professional Elective Courses (E) Any 7 Courses					
Course Code	Course Title	Hours/ Week L	T	P	C
	Professional Elective - 5				
21CEE418J	Computer Application in Surface Hydrology	2	0	2	3
21CEE419J	Computer Application in Water Resources Engineering	2	0	2	3
	Professional Elective - 6				
21CEE420J	Remote Sensing Application in Civil Engineering	2	0	2	3
21CEE421J	GIS Application in Civil Engineering	2	0	2	3
	Professional Elective - 7				
21CEE422J	Building Information Modeling	2	0	2	3
21CEE423J	Computer Application in Construction Engineering and Management	2	0	2	3
	Total Credits				21

16. (f) Program Articulation: B.Tech in Civil Engineering with Computer Applications

COURSE CODE	COURSE NAME	Program Learning Outcome (PLO)													
		Graduate Attributes											PSO		
		Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design,	Modern Tool Usage	Society & Culture	Environment &	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO1	PSO2	PSO3
21CEB201J	Applied Geology	2.6						2.6						3		3
21CES201T	Mechanics of Structures	3	3		3									3		
21CEC101T	Building Materials in the Built Environment	3				2	2.5	3						3		
21CEC201T	Hydro Mechanics and Hydraulic Engineering	3	3											3		
21CEC201L	Fluid Mechanics and Machinery Lab	3	3							3				3		3
21CEC202T	Engineering Surveying	3	3			3								3		
21CEC202L	Surveying Lab	3	3			3							3	3	3	3
21CEC203T	Environmental Engineering and Design	3		3	2		2	3						3		
21CEC203L	Environmental Engineering Laboratory	3	2					3						3		3
21CEC204T	Structural Engineering Design-I	3	2					3						3		
21CEC204L	Concrete Technology and Strength of Materials Laboratory	2.8	3							3			3	3		3
21CEC205T	Geomechanics	3	3	2										3		
21CEC205L	Geomechanics Laboratory	3	3							3				3		3
21CEC206T	Irrigation and Water Resources Engineering	3	3	2	2									3		
21CEC207T	Concrete Technology and Special Concrete	3	2.2	3			2	3					2	3		
21CEC301T	Structural Analysis	2.8	3		2									3	3	
21CEC301L	Computer-Aided Civil Engineering Laboratory	2.8	2		2.8	2.8				3			3	3	3	3
21CEC302T	Structural Engineering Design-II	3	3	3									3	3		
21CEC303T	Transportation Engineering	2.8	3	2.8	2.8									3		
21CEC303L	Transportation Engineering Laboratory	3	2							3				3	3	3
21CEC304T	Construction Engineering and Management	3	3									3		3		3
21CEE313J	Computer Aided Geotechnical Investigations	3	3			3								3	3	3
21CEE314J	Computer Application in Geotechnical Engineering	3	3		2	3								3	3	3
21CEE315J	Computer Application in Environmental Engineering	3	2			3								3	3	3
21CEE316J	Computer Application in Environmental Impact Assessment	3				2	2	3						3	3	3
21CEE317J	Computer Application in Pavement Design	3	3	3	3	3								3	3	3
21CEE318J	Computer Application in Transportation Engineering	3	3	3	3	3								3	3	3
21CEE416J	Computer Application in Structural Engineering	3	3		2					3				3	3	3
21CEE418J	Computer Application in Surface Hydrology	3	3			3							3	3	3	3
21CEE419J	Computer Application in Water Resources Engineering	3	3			3							3	3	3	3
21CEE420J	Remote Sensing Application in Civil Engineering	3		3	3	3					3		3	3	3	3
21CEE421J	GIS Application in Civil Engineering	3				3				3				3	3	3
21CEE422J	Building Information Modeling	3		2.4		2.33						2.4		3	3	3
21CEE423J	Computer Application in Construction Engineering and Management	2	3									2	3	3	3	3
21CEE417J	Computer Application in Earthquake Resistant Structure	3	3	3	2	3	3	2.5	2				2	3	3	3
21CEP302L	Project (compulsory for exit option at 6th semester)	3	2	2	3	3	3	1	3	3	3	3	3	3	3	3
21CEP303L	MOOC	3	2	2	3	3	3	1	3	3	3	3	3	3	3	3
21CEP401L	Major Project	3	2	2	3	3	3	1	3	3	3	3	3	3	3	3
21CEP402L	Semester Internship	3	2	2	3	3	3	1	3	3	3	3	3	3	3	3

16. (g) Implementation Plan: B.Tech. in Civil Engineering with Computer Applications

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB104J	Physics : Mechanics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21CEC101T	Building Materials in the Built Environment	3	0	0	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21CEC201T	Hydro Mechanics and Hydraulic Engineering	3	0	0	3
21CEC201L	Fluid Mechanics and Machinery Lab	0	0	2	1
21CEC202T	Engineering Surveying	3	0	0	3
21CEC202L	Surveying Lab	0	0	2	1
21CEC203T	Environmental Engineering and Design	3	0	0	3
21CEC203L	Environmental Engineering Laboratory	0	0	2	1
21PDH201T	Social Engineering	2	0	0	2
21CES201T	Mechanics of Structures	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21CEB201J	Applied Geology	3	0	2	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CEC204T	Structural Engineering Design-I	3	0	0	3
21CEC204L	Concrete Technology and Strength of Materials Laboratory	0	0	2	1
21CEC205T	Geomechanics	3	0	0	3
21CEC205L	Geomechanics Laboratory	0	0	2	1
21CEC206T	Irrigation and Water Resources Engineering	3	0	0	3
21CEC207T	Concrete Technology and Special Concrete	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**24**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21CEC301T	Structural Analysis	3	0	0	3
21CEC301L	Computer-Aided Civil Engineering Laboratory	0	0	2	1
21CEC302T	Structural Engineering Design-II	2	1	0	3
21CEC303T	Transportation Engineering	3	0	0	3
21CEC303L	Transportation Engineering Laboratory	0	0	2	1
E-1	Professional Elective – I				3
O	Open Elective – I				3
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**22**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CEC304T	Construction Engineering and Management	3	0	0	3
E-2	Professional Elective – II				3
E-3	Professional Elective – III				3
21CEP302L	Project	0	0	6	3
21CEP303T	MOOC	3	0	0	
O	Open Elective – II				3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**17**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioural Psychology	2	1	0	3
E-4	Professional Elective – IV				3
E-5	Professional Elective – V				3
E-6	Professional Elective – VI				3
E-7	Professional Elective – VII				3
O	Open Elective – III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CEP401L	Major Project	0	0	30	15
21CEP402L	Major Project	0	0	20	
21CEP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CEP401L or 21CEP402L and 21CEP403L both in eighth semester

17. B.Tech.in Computer Science and Engineering

17. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt – 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	*To produce successful Computer Science and Engineering graduates with personal and professional responsibilities and commitment to lifelong learning*

17. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO – 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO – 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO – 5	*Graduates will possess the additional skills in core computer science discipline with knowledge of Hardware, Software, Programming and Logic & Reasoning.*

17. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	***3***				*1*
PEO – 2			*2*		
PEO – 3		*3*	*3*		
PEO – 4				*2*	*3*
PEO – 5				*3*	

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

17. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)											PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*				*3*	*3*	*2*
PEO – 2		*2*	*2*		*3*		*3*	*2*					*2*	*3*	*3*
PEO – 3		*3*	*3*	*2*						*2*		*3*	*3*	*3*	*3*
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*	*3*	*3*	*2*
PEO - 5						*3*			*3*	*3*	*3*	*3*	*3*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*To identify and use appropriate upcoming technologies and implement software solutions.*

17. (e) Program Structure: B.Tech. in Computer Science and Engineering

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB204T	Probability and Queueing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
21CSC305P	Machine Learning	2	1	0	3
	Total Credits				**42**

5. Professional Elective Courses (E)
(Any 8 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE251T	Digital Image Processing	2	1	0	3
21CSE252T	Biometrics	2	1	0	3
21CSE253T	Internet of Things	2	1	0	3
21CSE254T	Bio Inspired Computing	2	1	0	3
21CSE255T	Computer Graphics and Animation	2	1	0	3
21CSE351T	Computational Logic	2	1	0	3
21CSE352T	Neuro Fuzzy and Genetic Programming	2	1	0	3
21CSE353T	Augmented, Virtual and Mixed Reality	2	1	0	3
21CSE354T	Full Stack Web Development	2	1	0	3
21CSE355T	Data Mining and Analytics	2	1	0	3
21CSE356T	Natural Language Processing	2	1	0	3
21CSE357T	Distributed Computing	2	1	0	3
21CSE358T	Network Security Cryptography and	2	1	0	3
21CSE359T	Information Storage and Management	2	1	0	3
21CSE360T	High Performance Computing	2	1	0	3
21CSE361T	Database Security and Privacy	2	1	0	3
21CSE362T	Cloud Computing	2	1	0	3
21CSE399T	Advanced Mobile Communications	3	0	0	3
21CSE451T	Pattern Recognition Techniques	2	1	0	3
21CSE452T	Semantic Web	2	1	0	3
21CSE453T	Speech Recognition	2	1	0	3
21CSE454T	Computer Vision	2	1	0	3
21CSE455T	Social Network Analysis	2	1	0	3
21CSE456T	Software Defined Networks	2	1	0	3
21CSE457T	Service Oriented Architecture	2	1	0	3
21CSE458T	Wireless and Mobile Communication	2	1	0	3
21CSE459T	Wireless Sensor Networks	2	1	0	3
21CSE460T	Network Protocols and Algorithms	2	1	0	3
	Total Credits				**24**

3. Open Elective Courses (O) (Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

17. (f) Programme Articulation: B.Tech. in Computer Science and Engineering

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC304J	Compiler Design	3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC305P	Machine Learning	-	3	-	3	-	-	-	-	-	-	-	-	-	1	3
21CSE251T	Digital Image Processing	3	2	2	3	-	-	-	-	-	-	-	-	2	3	-
21CSE252T	Biometrics	3	-	1	2	-	-	-	-	2	-	-	-	-	1	-
21CSE253T	Internet of Things	1	2	1	3	1	2	-	-	-	-	-	-	-	-	2
21CSE254T	Bio Inspired Computing	2	2	2	2	-	-	-	-	-	-	-	-	-	3	2
21CSE255T	Computer Graphics and Animation	3	2	3	-	2	-	-	-	-	-	-	-	-	3	2
21CSE351T	Computational Logic	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
21CSE352T	Neuro Fuzzy and Genetic Programming	2	3	-	-	3	-	-	-	-	-	-	-	-	2	-
21CSE353T	Augmented, Virtual and Mixed Reality	3	-	3	-	2	-	-	2	-	-	-	-	-	-	2
21CSE354T	Full Stack Web Development	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-
21CSE355T	Data Mining and Analytics	1	2	-	-	3	-	-	-	-	-	-	-	2	-	-
21CSE356T	Natural Language Processing	3	3	2	3	3	-	-	-	-	-	-	-	2	-	-
21CSE357T	Distributed Computing	-	-	2	2	2	-	-	-	-	-	-	-	2	-	-
21CSE358T	Network Security and Cryptography	2	3	2	-	2	-	-	-	-	-	-	-	2	-	-
21CSE359T	Information Storage and Management	-	3	3	-	1	-	-	-	-	-	-	-	1	2	-
21CSE360T	High Performance Computing	1	1	1	1	2	-	-	-	-	-	-	-	-	3	-
21CSE361T	Database Security and Privacy	3	2	2	2	1	-	-	-	-	-	-	2	1	-	-
21CSE362T	Cloud Computing	2	1	1	1	2	-	-	-	-	-	-	-	2	-	-
21CSE451T	Pattern Recognition Techniques	3	2	2	-	2	-	-	-	-	-	-	-	1	2	2
21CSE452T	Semantic Web	2	2	3	2	2	-	-	-	-	-	-	-	-	3	-
21CSE453T	Speech Recognition	2	2	2	2	-	-	-	-	-	-	-	-	-	3	-
21CSE454T	Computer Vision	2	2	1	1	1	-	-	-	-	-	-	-	3	-	2
21CSE455T	Social Network Analysis	2	3	2	3	3	-	-	-	-	-	-	-	-	2	2
21CSE456T	Software Defined Networks	1	1	1	3	1	2	-	-	-	-	-	-	2	-	
21CSE457T	Service Oriented Architecture	2	1	2	-	-	-	-	-	-	-	-	-	2-	-	-
21CSE458T	Wireless and Mobile Communication	1	2	2	-	-	-	-	-	-	-	-	-	1	-	-
21CSE459T	Wireless Sensor Networks	1	2	2	-	-	-	-	-	-	-	-	-	1	-	-
21CSE460T	Network Protocols and Algorithms	1	2	1	-	-	-	-	-	-	-	-	-	1	-	-
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

17. (g) Implementation Plan: B.Tech. in Computer Science and Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM101L	Professional Skills and Practices	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CYM101T	Environmental Science*	1	0	0	0
21PDM102L	General Aptitude*	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**21**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	**3**
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC305P	Machine Learning	2	1	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				21

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

18. B.Tech. in Computer Science and Engineering with Specialization in Artificial Intelligence and Machine Learning

18. (a) Mission of the Department

Mission Stmt– 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt– 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt– 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt– 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt– 5	*To mould the students to be technically competent through innovation and to inculcate the leader skills, professional ethics, environment protection and societal concerns with life-long learning.*

18. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO – 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO – 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO – 5	*Graduates will have the ability to explore research areas and produce outstanding contribution in various areas of Systems Engineering*

18. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	*3*				*1*
PEO – 2			*2*		
PEO – 3		*3*	*3*		
PEO – 4				*2*	*3*
PEO – 5			*3*	*3*	*3*

18. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*	*3*			*3*		
PEO – 2		*2*	*2*		*3*		*3*	*2*							*3*
PEO – 3		*3*	*3*	*2*						*2*		*3*		*3*	
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*			*3*
PEO - 5		*3*	*3*		*3*				*3*		*3*	*3*		*2*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*Ability to utilize Artificial Intelligence and Machine learning principles to design and develop cutting edge solutions for meeting the current demand of the industry.*

18. (e) Program Structure: B.Tech. in Computer Science and Engineering with Specialization in Artificial Intelligence and Machine Learning

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB204T	Probability and Queueing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
21CSC305P	Machine Learning	2	1	0	3
21CSC401J	Deep Learning Techniques	3	0	2	4
21CSC402P	Report Writing	2	0	0	2
	Total Credits				**48**

5. Professional Elective Courses (E)
(Any 6 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE271T	Programming in Java	2	1	0	3
21CSE251T	Digital Image Processing	3	0	0	3
21CSE272T	Genetic algorithm and its applications	3	0	0	3
21CSE291T	Introduction to Cognitive Neuroscience	3	0	0	3
21CSE311P	Robot Programming	2	1	0	3
21CSE312P	Software Engineering in Artificial Intelligence	2	1	0	3
21CSE313P	Accelerated Data science	2	1	0	3
21CSE326T	Artificial Neural Networks	3	0	0	3
21CSE355T	Data Mining and Analytics	3	0	0	3
21CSE356T	Natural Language Processing	2	1	0	3
21CSE371T	Advanced Algorithms	3	0	0	3
21CSE323T	Marketing Analytics	2	1	0	3
21CSE375T	Computational Neuroscience	3	0	0	3
21CSE376T	Nature Inspired Computing Techniques	3	0	0	3
21CSE377T	Information Retrieval	3	0	0	3
21CSE396T	Design Principles of Smart Space Management	3	0	0	3
21CSE397T	Philosophy of Cognitive Science	3	0	0	3
21CSE398T	Logic and Knowledge Representation	3	0	0	3
21CSE421T	Business Intelligence and Analytics	2	1	0	3
21CSE451T	Pattern Recognition Techniques	2	1	0	3
21CSE454T	Computer Vision	2	1	0	3
21CSE411T	Artificial Intelligence in Genomics and Disease Prediction	3	0	0	3
21CSE412T	Machine learning in Drug Discovery	3	0	0	3
21CSE414T	IoT concepts and applications	3	0	0	3
21CSE415T	Fuzzy Logic and its applications	3	0	0	3
21CSE416T	Robotics: Computational Motion Planning	3	0	0	3
21CSE417T	Reinforcement Learning Techniques	2	1	0	3
21CSE418T	Cyber Physical systems	3	0	0	3
	Total Credits				**18**

3. Open Elective Courses (O) (Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	
21CSP402L	Major Project	0	0	20	15
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

18. (f) Programme Articulation: B.Tech. in Computer Science and Engineering with Specialization in Artificial Intelligence and Machine Learning

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC304J	Compiler Design	3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC305P	Machine Learning	-	3	-	3	-	-	-	-	-	-	-	-	-	1	3
]21CSE251T	Digital Image Processing	3	2	2	3	-	-	-	-	-	-	-	-	2	3	-
21CSE271T	Programming in Java	3	2	1	2	-	-	-	-	-	-	-	1	3	2	-
21CSE272T	Genetic Algorithm and its applications	1	2	3	-	-	-	-	-	-	-	-		3	1	-
21CSE291T	Introduction to Cognitive Neuroscience	1	3	2	2	-	-	-	-	-	-	-	1	3	2	-
21CSE311P	Robot Programming	2	2	-	3	-	-	-	-	-	-	-	-	2	-	3
21CSE312P	Software Engineering in Artificial Intelligence	-	3	3	-	3	-	-	-	-	-	-	-	2	2	3
21CSE313P	Accelerated Data Science	1	2	-	3	-	-	-	-	-	-	-	-	1	-	2
21CSE323T	Marketing Analytics	-	-	-	-	-	-	-	3	-	3	-	-	2	2	1
21CSE326T	Artificial Neural Networks	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
21CSE355T	Data Mining and Analytics	1	2	-	-	3	-	-	-	-	-	-	-	2	-	-
21CSE356T	Natural Language Processing	3	3	2	3	3	-	-	-	-	-	-	-	2	-	-
21CSE371T	Advanced Algorithms	-	2	-	2	-	-	-	-	-	-	-	-	1	-	2
21CSE375T	Computational Neuroscience	3	1	-	-	-	-	-	-	-	-	-	-	-	2	3
21CSE376T	Nature Inspired Computing Techniques	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
21CSE377T	Information retrieval	2	3	3	-	-	-	-	-	-	-	-	-	-	-	2
21CSE396T	Design Principles of Smart Space Management	3	2	2	-	-	-	-	-	-	-	-	-	1	2	3
21CSE397T	Philosophy of Cognitive science	-	3	-	3	-	-	-	-	-	-	-	-	1		3
21CSE398T	Logic and Knowledge representation	-	2	-	3	-	-	-	-	-	-	-	-	2		3
21CSE417T	Reinforcement Learning Techniques	3	3	-	3	-	-	-	-	-	-	-	-			3
21CSE418T	Cyber Physical Systems	3	3	2	-	-	-	-	-	-	-	-	-	2		3
21CSE421T	Business Intelligence and Analytics								3		3			2	2	2
21CSE451T	Pattern Recognition Techniques	3	2	2	-	2	-	-	-	-	-	-	-	1	2	2
21CSE454T	Computer Vision	2	2	1	1	1	-	-	-	-	-	-	-	3	-	2
21CSE411T	Artificial Intelligence in genomics and disease prediction	3	3	2	-	-	-	-	-	-	-	-	-	3	-	3
21CSE412T	Machine learning in Drug Discovery	3	2	3	-	-	-	-	-	-	-	-	-	-	-	3
21CSE414T	IoT Concepts and applications	2	3	3	-	-	-	-	-	-	-	-	1	1	-	3
21CSE415T	Fuzzy Logic and its applications	3	2	3	-	-	-	-	-	-	-	-	-	1	2	3
21CSE416T	Robotics: Computational Motion Planning	3	3	2	-	-	-	-	-	-	-	-	-	1	2	3
21CSC401J	Deep Learning Techniques	-	3	-	2	-	-	-	-	3	-	-	2	-	-	3
21CSC402P	Report Writing	-	2	-	3	-	-	-	3	-	-	-	-	-	-	2
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average															

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

18. (g) Implementation Plan: B.Tech. in Computer Science and Engineering with Specialization in Artificial Intelligence and Machine Learning

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**21**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC305P	Machine Learning	2	1	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
.	**Total Credits**				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
21CSC401J	Deep Learning Techniques	3	0	2	4
21CSC402P	Report Writing	2	0	0	2
O	Open Elective –III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

19. B.Tech. in Computer Science and Engineering with Specialization in Big Data Analytics

19. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt – 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	*To produce successful Big Data Analytics graduates with personal and professional responsibilities and commitment to lifelong learning*

19. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to demonstrate their knowledge in technical/managerial roles with right skills and aptitude in software industries and R&D sectors*
PEO – 2	*Graduates will possess the proficiencies and additional skills in core computer science and engineering discipline in par with industry requirements.*
PEO – 3	*Graduates will be able to successfully pursue higher education in reputed institutions and also extend their research career.*
PEO – 4	*Graduates will be self-empowered solution providers and entrepreneurs in Computer Science and Engineering*
PEO – 5	*Graduates will possess the ability to adapt, contribute and innovate new technologies and systems in the key domains of Big Data Analytics*

19. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	3				1
PEO – 2			2		
PEO – 3		3	3		
PEO – 4				2	3
PEO – 5		3	3	2	3

19. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3			1		2		3	2	3			3	3	3
PEO – 2		2	2		3		3	2					3	3	3
PEO – 3		3	3	2						2		3	3	3	3
PEO – 4		2	3			3	2		2		2	2	3	3	3
PEO - 5	3				3	3		2		3	3	3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills for real life problems.*
PSO - 3	*Ability to understand the requirements, gather a large amount of data, analyze, utilize the tools to extract insights to increase the productivity and efficiency of the business along with better visual representations.*

19. (e) Program Structure: B.Tech. in Computer Science and Engineering with Specialization in Big Data Analytics

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MAB301T	Probability and Statistics	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS202T	Fundamentals of Data Science	3	2	0	5
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS301T	Full Stack Development	1	1	0	2
	Total Credits				**22**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC206P	Advanced Object Oriented Programming	2	1	0	3
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
21CSC307P	Machine Learning for Data Analytics	2	1	0	3
	Total Credits				**41**

5. Professional Elective Courses (E)
(Any 8 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE222T	Big Data Tools and Techniques	3	0	0	3
21CSE224T	Computer Architecture	3	0	0	3
21CSE253T	Internet of Things	2	1	0	3
21CSE251T	Digital Image Processing	2	1	0	3
21CSE321T	Data Warehousing and Data Mining	2	1	0	3
21CSE322T	Multivariate Techniques for Data Analytics	2	1	0	3
21CSE323T	Marketing Analytics	2	1	0	3
21CSE356T	Natural Language Processing	2	1	0	3
21CSE359T	Information Storage Management	2	1	0	3
21CSE325T	Applied Social Network Analysis	2	1	0	3
21CSE326T	Artificial Neural Networks	2	1	0	3
21CSE327T	Cloud Computing for Data Analytics	2	1	0	3
21CSE373T	Streaming Analytics	2	1	0	3
21CSE421T	Business Intelligence and Analytics	2	1	0	3
21CSE422T	Convolutional Neural Networks	2	1	0	3
21CSE423T	Big Data Visualization	2	1	0	3
21CSE424T	Deep Learning for Data Analytics	2	1	0	3
21CSE425T	Advanced Machine Learning	2	1	0	3
21CSE426T	Financial Machine Learning	2	1	0	3
21CSE427T	Augmented and Virtual Reality	2	1	0	3
21CSE428T	Healthcare Analytics	2	1	0	3
21CSE429T	Data Science for Internet of Things	2	1	0	3
21CSE430T	Automatic Speech Recognition	2	1	0	3
21CSE447T	Robotics: Computational Motion Planning	2	1	0	3
21CSE448T	Bio-inspired Computing and Fuzzy Logic	2	1	0	3
21CSE449T	Risk Analytics	2	1	0	3
	Total Credits				**24**

3. Open Elective Courses (O)
(Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO355T	Machine Learning for All	3	0	0	3
21CSO356T	Convolutional Neural Networks Foundation	3	0	0	3
21CSO357T	Data Visualization Basics	2	1	0	3
21CSO451T	Deep Learning Foundation	3	0	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

19. (f) Programme Articulation: B.Tech. in Computer Science and Engineering with Specialization in Big Data Analytics

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21LEH102T	Chinese										3		3			
21LEH103T	French										3		3			
21LEH104T	German										3		3			
21LEH105T	Japanese										3		3			
21LEH106T	Korean										3		3			
21LEH107T	Spanish										3		3			
21GNH101J	Philosophy of Engineering	3	2	3	3	3	2	3	2	3	3		3			
21MAB101T	Calculus and Linear Algebra	3	3													
21CYB101J	Chemistry	3	3	3	2	3										
21BTB102T	Introduction to Computational Biology	3	3	2	1	3										
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21MES101L	Basic Civil and Mechanical Workshop	3				1		3					2			
21PDM101L	Professional Skills and Practices									3	3		3			
21GNM101L	Physical and Mental Health using Yoga	3	2	2	3	3	3	3	3	3	3		3			
21GNM102L	NSS						3	3		3						
21GNM103L	NCC						3		3	3						
21LEH101T	Communicative English									2	3					
21MAB102T	Advanced Calculus and Complex Analysis	3	3													
21PYB102J	Semiconductor Physics and Computational Methods	3	3	3												
21MES102L	Engineering Graphics and Design	2				3					3		2			
21EES101T	Electrical and Electronics Engineering	3	2													
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CYM101T	Environmental Science	3	3					3		3						
21PDM102L	General Aptitude		3							3	3		3			
21LEM101T	Constitution of India						3						3			
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSS202T	Fundamentals of Data Science															
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC206P	Advanced Object Oriented Programming		2													
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC307P	Machine Learning for Data Analytics													2	2	2
21CSS301T	Full Stack Development													2	1	2
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC304J	Compiler Design	3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
21CSE224T	Computer Architecture	3	2	1												
21CSE222T	Big Data Tools and Techniques					1								1		
21CSE253T	Internet of Things	2	2	1	3	1	2									
21CSE251T	Digital Image Processing	3	2	2	3	-	-	-	-	-	-	-	-	2	3	-
21CSE321T	Data Warehousing and Data Mining													2	2	
21CSE322T	Multivariate Techniques for Data Analytics													2	2	2
21CSE323T	Marketing Analytics								3		3			2	2	1
21CSE356T	Natural Language Processing	3	3	2	3	3	-	-	-	-	-	-	-	2	-	-
21CSE359T	Information Storage Management	-	3	3	-	1	-	-	-	-	-	-	-	1	2	-
21CSE373T	Streaming Analytics	2	2		2	2										
21CSE325T	Applied Social Network Analysis													2	2	2
21CSE326T	Artificial Neural Networks													2	2	2
21CSE327T	Cloud Computing for Data Analytics													1	2	2
21CSE421T	Business Intelligence and Analytics								3		3			2	2	2
21CSE422T	Convolutional Neural Networks													2	2	2
21CSE423T	Big Data Visualization										3			2	2	2
21CSE424T	Deep Learning for Data Analytics													2	2	2
21CSE425T	Advanced Machine Learning													2	2	2
21CSE426T	Financial Machine Learning													2	2	2
21CSE427T	Augmented and Virtual Reality													2	2	2

21CSE428T	*Healthcare Analytics*													2	1	2
21CSE429T	*Data Science for Internet of Things*													2	2	2
21CSE430T	*Automatic Speech Recognition*													2	2	2
21CSE447T	*Robotics: Computational Motion Planning*													2	2	2
21CSE448T	*Bio-inspired Computing and Fuzzy Logic*													2	1	2
21CSE449T	*Risk Analytics*													1	2	2
21CSO355T	*Machine Learning for All*													2	2	
21CSO356T	*Convolutional Neural Networks Foundation*													2	2	2
21CSO357T	*Data Visualization Basics*													1	2	
21CSO451T	*Deep Learning Foundation*													2	2	
21CSS303T	*Data Science*													1	1	
21CSP302L	*Project*	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	*MOOC*	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	*Major Project*	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	*Internship*	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Programme Average															

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

19. (g) Implementation Plan: B.Tech. in Computer Science and Engineering with Specialization in Big Data Analytics

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM101L	Professional Skills and Practices	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CYM101T	Environmental Science*	1	0	0	0
21PDM102L	General Aptitude*	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**21**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS202T	Fundamentals of Data Science	3	2	0	5
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC206P	Advanced Object Oriented Programming	2	1	0	3
21LEM201T	Professional Ethics*	1	0	0	0
21PDM201L	Verbal Reasoning*	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC307P	Machine Learning for Data Analytics	2	1	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS301T	Full Stack Development	1	1	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

20. B.Tech. in Computer Science and Engineering with Specialization in Blockchain Technology

20. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt – 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	*To produce successful Computer Science and Engineering with specialization of block chain technology graduates with personal and professional responsibilities and commitment to lifelong learning*

20. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO – 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO – 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO – 5	*Graduates will possess the additional skills in Etherium, hyper ledger, business models and smart contracts*

20. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	***3***				
PEO – 2			*2*		
PEO – 3		*3*	*3*		
PEO – 4				*2*	
PEO – 5					*3*

20. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*	*3*			*3*		
PEO – 2		*2*	*2*		*3*		*3*	*2*						*2*	
PEO – 3		*3*	*3*	*2*						*2*		*3*		*2*	*3*
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*		*2*	*3*
PEO - 5	*2*			*3*	*3*	*2*									*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real-life problems.*
PSO - 3	*To understand the concepts, technology and tools used in blockchain for implementing solutions to real-world problems.*

20. (e) Program Structure: B.Tech. in Computer Science and Engineering with Specialization in Blockchain Technology

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MAB204T	Probability and Queueing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

4. Professional Core Courses ©

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
21CSC305T	Blockchain using Cryptography	3	0	0	3
	Total Credits				**42**

5. Professional Elective Courses I
(Any 8 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE231T	Fundamentals of Blockchain	3	0	0	3
21CSE232T	IoT and Blockchain	3	0	0	3
21CSE233T	Distributed Systems and Applications	3	0	0	3
21CSE234T	Principles of Cryptography	3	0	0	3
21CSE331T	Cryptocurrencies and Blockchain Technology	3	0	0	3
21CSE332T	Fundamentals of Ethereum	3	0	0	3
21CSE333T	AI and Blockchain	3	0	0	3
21CSE334T	Container Management	3	0	0	3
21CSE335T	Advanced Cryptography	3	0	0	3
21CSE336T	Cloud Computing with Blockchain	3	0	0	3
21CSE337T	Web3 Development	3	0	0	3
21CSE338T	Trust based computing	3	0	0	3
21CSE431T	Building Private Blockchain	3	0	0	3
21CSE432T	Blockchain Technology with Hyperledger	3	0	0	3
21CSE433T	Blockchain Business Models	3	0	0	3
21CSE434T	Distributed Ledger Technology	3	0	0	3
21CSE435T	Smart Contracts and Application Development	3	0	0	3
21CSE436T	Bitcoin Essentials and Use Cases	3	0	0	3
21CSE437T	Decentralized Applications on Blockchain	3	0	0	3
21CSE438T	Web Security	3	0	0	3
	Total Credits				**24**

3. Open Elective Courses (O) (Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

20. (f) Articulation: B.Tech. in Computer Science and Engineering with Specialization in Blockchain Technology

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC304J	Compiler Design	3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC305T	Blockchain using Cryptography	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
21CSE231T	Fundamentals of Blockchain	3	3	-	-	2	-	-	2	-	-	-	-	-	-	-
21CSE232T	IoT and Blockchain	3	3	2	2	1	-	-	-	-	-	-	-	-	-	-
21CSE233T	Distributed Systems and Applications	2	1	2	-		-	-	-	-	-	-	-	-	-	3
21CSE234T	Principles of Cryptography	3	3	-	-	3	-	-	2	-	-	-	-	-	-	--
21CSE331T	Cryptocurrencies and Blockchain Technology	2	2	2		3	-	-	-	-	-	-	-	-	-	-
21CSE332T	Fundamentals of Ethereum	2	1	2	1	1	-	-	-	-	-	-	-	-	-	-
21CSE333T	AI and Blockchain	2	2	2	-	2	-	-	-	-	-	-	-	-	-	-
21CSE334T	Container Management	-	2	-	-	2	-	-	-	-	-	-	-	-	-	-
21CSE335T	Advanced Cryptography	-	3	2	1	2	-	-	-	-	-	-	-	-	-	-
21CSE336T	Cloud Computing with Blockchain	1	2	3	-		-	-	-	-	-	-	-	-	-	3
21CSE337T	Web3 Development	2	1	3	-	2	-	-	-	-	-	-	-	-	-	1
21CSE338T	Trust based Computing	3	3	-	2		-	-	-	-	-	-	-	2	-	-
21CSE431T	Building Private Blockchain	-	2	0	-	2	-	-	-	-	-	-	-	1	-	-
21CSE432T	Blockchain Technology with Hyperledger	3	3	2	-	3	-	-	-	-	-	-	-	1	-	-
21CSE433T	Blockchain Business Models	3	3	-	2		1	-	-	-	2	-	-	2	-	-
21CSE434T	Distributed Ledger Technology	3	3	-	-	2	-	-	-	-	-	-	-	2	-	-
21CSE435T	Smart Contracts and Application Development	2	2	2	2		-	-	-	-	-	-	-		-	-
21CSE436T	Bitcoin Essentials and Use Cases	1	3	-	-	2	-	-	-	-	-	-	-		-	-
21CSE437T	Decentralized Applications on Blockchain	3	3	2		2	-	-	-	-	-	-	-	2	-	-
21CSE438T	Web security	3	3	3	3	3	-	2	2	-	2	-	-	-	-	-
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

20. (g) Implementation Plan: B.Tech. in Computer Science and Engineering with Specialization in Blockchain Technology

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM101L	Professional Skills and Practices	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CYM101T	Environmental Science*	1	0	0	0
21PDM102L	General Aptitude*	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**21**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC305T	Blockchain using Cryptography	3	0	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

21. B.Tech. in Computer Science and Engineering with Specialization in Cloud Computing

21. (a) Mission of the Department

Mission Stmt– 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt– 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt– 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt– 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt– 5	*To produce successful Computer Science and Engineering graduates with personal and professional responsibilities and commitment to lifelong learning*

21. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO – 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO – 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO – 5	*Graduates will possess the additional skills in Computer Science and Engineering with Cloud computing discipline knowledge of computing, networking, and intelligent storage system.*

21. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	*3*				*1*
PEO – 2			*2*		
PEO – 3		*3*	*3*		
PEO – 4				*2*	*3*
PEO – 5				*3*	

21. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*	*3*			*2*	*2*	*2*
PEO – 2		*2*	*2*		*3*		*3*	*2*					*2*	*2*	*2*
PEO – 3		*3*	*3*	*2*						*2*		*3*	*2*	*3*	*2*
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*	*3*	*3*	*3*
PEO - 5						*3*			*3*	*3*	*3*	*3*	*3*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*Ability to Develop an application and integrate in Cloud Computing Platform*

21. (e) Program Structure: B.Tech. in Computer Science and Engineering with Specialization in Cloud Computing

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21MAB204T	Probability and Queueing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC316J	Cloud Architecture and Protocols	2	0	2	3
21CSC314P	Big Data Essentials	2	1	0	3
	Total Credits				**42**

5. Professional Elective Courses (E)
(Any 8 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE261T	Fundamentals of Cloud Computing	2	1	0	3
21CSE262T	Communication Systems Engineering	2	1	0	3
21CSE253T	Internet of Things	2	1	0	3
21CSE263T	Digital Communication Systems	2	1	0	3
21CSE329T	Service Oriented Architecture and Microservices	2	1	0	3
21CSE330T	Cloud Architecture	2	1	0	3
21CSE363T	Cloud Services Solution Architect	2	1	0	3
21CSE364T	Data Centric Networking and System Design	2	1	0	3
21CSE354T	Full Stack Web Development	2	1	0	3
21CSE355T	Data Mining and Analytics	2	1	0	3
21CSE356T	Natural Language Processing	2	1	0	3
21CSE357T	Distributed Computing	2	1	0	3
21CSE358T	Network Security and Cryptography	2	1	0	3
21CSE359T	Information Storage and Management	2	1	0	3
21CSE360T	High Performance Computing	2	1	0	3
21CSE461T	Cloud Security	2	1	0	3
21CSE463T	Cloud Strategy Planning and Management	2	1	0	3
21CSE464T	Fog Computing Analytics	2	1	0	3
21CSE465T	Cloud Application Development	2	1	0	3
21CSE466T	Network Design and Management	2	1	0	3
21CSE455T	Social Network Analysis	2	1	0	3
21CSE456T	Software Defined Networks	2	1	0	3
21CSE454T	Computer Vision	2	1	0	3
21CSE458T	Wireless and Mobile Communication	2	1	0	3
21CSE459T	Wireless Sensor Networks	2	1	0	3
21CSE460T	Network Protocols and Algorithms	2	1	0	3
	Total Credits				**24**

3. Open Elective Courses (O) (Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

21. (f) Programme Articulation: B.Tech. in Computer Science and Engineering with Specialization in Cloud Computing

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC316J	Cloud Architecture and Protocols	3	2	-	-	3	-	-	-	-	-	-	-	2	-	3
21CSC314P	Big Data Essentials	2	-	-	3	3	-	-	-	-	-	-	-		-	3
21CSE261T	Fundamentals of Cloud Computing	3	2	-	2	2	-	-	-	-	-	-	-	3	-	3
21CSE262T	Communication Systems Engineering	3	-	-	3	-	-	-	-	-	-	-	-	3	-	
21CSE253T	Internet of Things	1	2	1	3	1	2	-	-	-	-	-	-	-	-	2
21CSE263T	Digital Communication Systems	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-
21CSE329T	Service Oriented Architecture and Microservices	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
21CSE330T	Cloud Architecture	3	-	-	2	-	-	-	-	-	-	-	-	-	-	3
21CSE363T	Cloud Services Solution Architect	2	3	-	3	-	-	-	-	-	-	-	-	-	-	3
21CSE364T	Data Centric Networking and System Design	-	2	-	3	-	-	-	-	-	-	-	-	-	-	3
21CSE354T	Full Stack Web Development	-	2	2	-	2		-	-	-	-	-	-	3		2
21CSE355T	Data Mining and Analytics	1	2	-	-	3	-	-	-	-	-	-	-	2	-	-
21CSE356T	Natural Language Processing	3	3	2	3	3	-	-	-	-	-	-	-	2	-	-
21CSE357T	Distributed Computing	-	-	2	2	2	-	-	-	-	-	-	-	2	-	-
21CSE358T	Network Security and Cryptography	2	3	2	-	2	-	-	-	-	-	-	-	2	-	-
21CSE359T	Information Storage and Management	-	3	3	-	1	-	-	-	-	-	-	-	1	2	-
21CSE360T	High Performance Computing	1	1	1	1	2	-	-	-	-	-	-	-	-	3	-
21CSE461T	Cloud Security	3	2	3	-	-	-	-	-	-	-	-	-	-	-	3
21CSE463T	Cloud Strategy Planning and Management	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
21CSE464T	Fog Computing Analytics	3	-	-	-	3	-	-	-	-	-	-	-	-	-	3
21CSE465T	Cloud Application Development	3	-	3	-	2	-	-	-	-	-	-	-	-	-	3
21CSE466T	Network Design and Management	2	3	-	3		-	-	-	-	-	-	-	2		
21CSE455T	Social Network Analysis	2	3	2	3	3	-	-	-	-	-	-	-	-	2	2
21CSE456T	Software Defined Networks	1	1	1	3	1	2	-	-	-	-	-	-	2	-	
21CSE454T	Computer Vision	2	2	1	1	1	-	-	-	-	-	-	-	3	-	2
21CSE458T	Wireless and Mobile Communication	1	2	2	-	-	-	-	-	-	-	-	-	1	-	-
21CSE459T	Wireless Sensor Networks	1	2	2	-	-	-	-	-	-	-	-	-	1	-	-
21CSE460T	Network Protocols and Algorithms	1	2	1	-	-	-	-	-	-	-	-	-	1	-	-
21GNP301L	Community Connect	-	-	-	-	-	-	-	-	3	-	-	3	-	-	-
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2		2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP403L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP404L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

21. (g) Implementation Plan: B.Tech. in Computer Science and Engineering with Specialization in Cloud Computing

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM101L	Professional Skills and Practices	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CYM101T	Environmental Science*	1	0	0	0
21PDM102L	General Aptitude*	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**21**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC314P	Big Data Essentials	2	1	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC316J	Cloud Architecture and Protocols	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

22. B.Tech. in Computer Science and Engineering with Specialization in Computer Networking

22. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams*
Mission Stmt – 4	*To instill societal , safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	To *Identify and address the Knowledge, Professional Skills, Professional Aptitude in the field of Networking*

22. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO – 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO – 4	*Graduates will possess skills to design and maintain computer and communication systems.*
PEO – 5	*Graduates will have the ability to develop tools incorporating the skills acquired in computer networking and its related domains*

22. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	*3*				*1*
PEO – 2			*2*		
PEO – 3		*3*	*3*		
PEO – 4				*2*	*3*
PEO – 5				*3*	

22. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*	*3*					*2*
PEO – 2		*2*	*2*		*3*		*3*	*2*					*2*		
PEO – 3		*3*	*3*	*2*						*2*		*3*		*2*	
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*		*2*	
PEO - 5						*3*			*3*	*3*	*3*	*3*			*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*To identify and utilize hardware and software to develop network infrastructure for communications.*

22. (e) Program Structure: B.Tech. in Computer Science and Engineering with Specialization in Computer Networking

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21MAB204T	Probability and Queueing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC311J	Wireless Networks	2	0	2	3
21CSC312J	Mobile Adhoc Networks	2	0	2	3
	Total Credits				**42**

5. Professional Elective Courses (E)
(Any 8 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE253T	Internet of Things	2	1	0	3
21CSE273T	Distributed Operating Systems	2	1	0	3
21CSE274T	Pervasive Computing	2	1	0	3
21CSE347T	Network Protocols and Programming	2	1	0	3
21CSE348T	Network Routing Algorithms	2	1	0	3
21CSE349T	Optical Networks	2	1	0	3
21CSE350T	Principles of Cloud Computing	2	1	0	3
21CSE357T	Distributed Computing	2	1	0	3
21CSE360T	High Performance Computing	2	1	0	3
21CSE364T	Data Centric Networking and System Design	2	1	0	3
21CSE456T	Software Defined Networks	2	1	0	3
21CSE457T	Service Oriented Architecture	2	1	0	3
21CSE458T	Wireless and Mobile Communication	2	1	0	3
21CSE459T	Wireless Sensor Networks	2	1	0	3
21CSE466T	Network Design and Management	2	1	0	3
21CSE450T	Network Security	2	1	0	3
	Total Credits				**24**

3. Open Elective Courses (O) (Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

22. (f) Programme Articulation: B.Tech. in Computer Science and Engineering with Specialization in Computer Networking

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC311J	Wireless Networks	3		2				1								3
21CSC312J	Mobile Adhoc Networks	3								2						3
21CSE253T	Internet of Things	1	2	1	3	1	2	-	-	-	-	-	-	-	-	2
21CSE273T	Distributed Operating Systems	2		3		3								2		2
21CSE274T	Pervasive Computing	3													2	
21CSE347T	Network Protocols and Programming			3		3					2					3
21CSE348T	Network Routing Algorithms			3		3					2					3
21CSE349T	Optical Networks					3								3		
21CSE350T	Principles of Cloud Computing	3			2	2								3		
21CSE357T	Distributed Computing	-	-	2	2	2	-	-	-	-	-	-	-	2	-	-
21CSE360T	High Performance Computing	1	1	1	1	2	-	-	-	-	-	-	-	-	3	-
21CSC364T	Data Centric Networking and System Design		2		3									3		
21CSE456T	Software Defined Networks	1	1	1	3	1	2	-	-	-	-	-	-	2	-	
21CSE457T	Service Oriented Architecture	2	1	2	-	-	-	-	-	-	-	-	-	2-	-	-
21CSE458T	Wireless and Mobile Communication	1	2	2	-	-	-	-	-	-	-	-	-	1	-	-
21CSE459T	Wireless Sensor Networks	1	2	2	-	-	-	-	-	-	-	-	-	1	-	-
21CSE466T	Network Design and Management	2	3		3									2		
21CSE450T	Network Security		2			3			1							3
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

22. (g) Implementation Plan: B.Tech. in Computer Science and Engineering with Specialization in Computer Networking

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM101L	Professional Skills and Practices	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CYM101T	Environmental Science	1	0	0	0
21PDM102L	General Aptitude	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**21**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC311J	Wireless Networks	2	1	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC312J	Mobile Adhoc Networks	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

23. B.Tech. in Computer Science and Engineering with Specialization in Cybersecurity

23. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt – 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	To *Identify and address the Knowledge, Professional Skills, Professional Aptitude in the field of Cyber security*

23. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO – 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO – 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO – 5	Graduates will be able to obtain *Job orientations / proficiencies / skills* in the field of cyber security and digital forensics.

23. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	*3*				*1*
PEO – 2			*2*		
PEO – 3		*3*	*3*		
PEO – 4				*2*	*3*
PEO – 5				*3*	

23. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*	*3*					*2*
PEO – 2		*2*	*2*		*3*		*3*	*2*					*2*		
PEO – 3		*3*	*3*	*2*						*2*		*3*		*2*	
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*		*2*	
PEO - 5						*3*			*3*	*3*	*3*	*3*			*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*To identify and utilize cyber security principles to create secure infrastructure*

23. (e) Program Structure: B.Tech. in Computer Science and Engineering with Specialization in Cybersecurity

1. Humanities & Social Sciences including Management Courses (H)					
Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)					
Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21MAB204T	Probability and Queueing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

3. Engineering Science Courses (S)					
Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

4. Professional Core Courses (C)					
Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC310J	Malware Analysis	2	0	2	3
21CSC308T	Security Risk Management Principles	3	0	0	3
	Total Credits				**42**

5. Professional Elective Courses (E) (Any 8 Elective Courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
21CSE229J	Check point System Administration	2	0	2	3
21CSE281T	Cryptography and Network Security	2	1	0	3
21CSE282T	Information Security	3	0	0	3
21CSE283T	Cyber Law	2	1	0	3
21CSE381T	Forensics And Incident Response	2	1	0	3
21CSE382T	Security Management	2	1	0	3
21CSE383T	Security Governance, Risk and compliance	2	1	0	3
21CSE384J	Security Audit and Risk Assessment	2	0	2	3
21CSE385J	Advanced Malware Analysis	2	0	2	3
21CSE386J	Penetration Testing and Vulnerability Assessment	2	0	2	3
21CSE387J	Hacker Techniques, Tools, and Incident Handling	2	0	2	3
21CSE399J	Comprehensive Linux for All	2	0	2	3
21CSE485T	Database Security	2	1	0	3
21CSE486T	Operation System Security	2	1	0	3
21CSE487T	Cyberwarfare	2	1	0	3
21CSE488T	Hacker Mind: Profiling the IT Criminal	2	1	0	3
21CSE489T	Mobile and Wireless Security	2	1	0	3
21CSE490J	Windows and Linux Internals	2	0	2	3
21CSE491T	Cyber Crime and Digital Forensics	2	1	0	3
21CSE492T	Cyber Crimes and Cyber Security	2	1	0	3
	Total Credits				**24**

3. Open Elective Courses (O) (Any 3 courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
21CSO270T	Cyber Security	2	1	0	3
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)					
Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)					
Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

23. (f) Programme Articulation: B.Tech. in Computer Science and Engineering with Specialization in Cybersecurity

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC310J	Malware Analysis		2					2			3		3			3
21CSC308T	Security Risk Management Principles		3									2				3
21CSC504J	Android Malware Analysis							2			3					3
21CSC308T	Security Risk Management Principles		3										2			3
21CSE281T	Cryptography and Network Security	2	2													3
21CSE282T	Information Security			2					2							3
21CSE283T	Cyber Law					2		2								3
21CSE229J	Check Point System Administration		1	2	3	2										3
21CSE381T	Forensics And Incident Response			2					2							3
21CSE382T	Security Management			2		2										3
21CSE383T	Security Governance, Risk and compliance	2	2		2											3
21CSE384J	Security Audit and Risk Assessment		2	2					2							3
21CSE385J	Advanced Malware Analysis		2	2		2										3
21CSE386J	Penetration Testing and Vulnerability Assessment		2	2		2										3
21CSE387J	Hacker Techniques, Tools, and Incident Handling		2			2										3
21CSE399J	Comprehensive Linux for All	3		2	2	3										
21CSE485T	Database Security		2			2			2		2					3
21CSE486T	Operation System Security	2		3		3										3
21CSE487T	Cyberwarfare			2					2							3
21CSE488T	Hacker Mind: Profiling the IT Criminal			2		2						3				3
21CSE489T	Mobile and Wireless Security	2		3		3										3
21CSE490J	Windows and Linux Internals			2					2							3
21CSE491T	Cyber Crime and Digital Forensics	2		3		3										3
21CSE492T	Cyber Crimes and Cyber Security		2	2					2							3
21CSE531T	Cyber Security Operations		2					2			3		3			3
21CSE532T	Network Management and Protocols		3			3						3				3
21CSE533T	Firewalls and Access Controls							2			3					3
21CSE534T	Network Programming and Management		3										2			3
21CSE535T	Network Intrusions and Computer Forensics	2	2													3
21CSE536T	Mobile Forensics			2					2							3
21CSE537T	Digital Forensics					2		2								3
21CSE538T	Security Scripting and Analysis			2					2							3
21CSE539T	Principles of Secure Coding Principles			2		2										3
21CSE540T	Android Security and Design Internals	2	2		2											3
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

23. (g) Implementation Plan: B.Tech. in Computer Science and Engineering with Specialization in Cybersecurity

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM101L	Professional Skills and Practices	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CYM101T	Environmental Science*	1	0	0	0
21PDM102L	General Aptitude*	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				21

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				***23***

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC308T	Security Risk Management Principles	3	0	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC310J	Malware Analysis	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

24. B.Tech. in Computer Science and Engineering with Specialization in Data Science

24. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt – 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	*To produce successful Data Science graduates with personal and professional responsibilities and commitment to lifelong learning*

24. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to demonstrate their knowledge in technical/managerial roles with right skills and aptitude in software industries and R&D sectors*
PEO – 2	*Graduates will possess the proficiencies and additional skills in core computer science and engineering discipline in par with industry requirements.*
PEO – 3	*Graduates will be able to successfully pursue higher education in reputed institutions and also extend their research career.*
PEO – 4	*Graduates will be self-empowered solution providers and entrepreneurs in Computer Science and Engineering*
PEO – 5	*Graduates will possess the ability to adapt, contribute and innovate new technologies and systems in the key domains of Data Science*

24. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	3				1
PEO – 2			2		
PEO – 3		3	3		
PEO – 4				2	3
PEO – 5		3	3	2	3

24. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3			1		2		3	2	3			3	3	3
PEO – 2		2	2		3		3	2					3	3	3
PEO – 3		3	3	2						2		3	3	3	3
PEO – 4		2	3			3	2		2		2	2	3	3	3
PEO - 5	3				3	3		2		3	3	3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyse, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills for real life problems.*
PSO - 3	*Ability to understand the requirements, gather a large amount of data, analyze, utilize the tools to extract insights to increase the productivity and efficiency of the business along with better visual representations.*

24. (e) Program Structure: B.Tech. in Computer Science and Engineering with Specialization in Data Science

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic civil and Mechanical Engineering	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS202T	Fundamentals of Data Science	3	2	0	5
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS301T	Full Stack Development	1	1	0	2
	Total Credits				**22**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC206P	Advanced Object Oriented Programming	2	1	0	3
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
21CSC307P	Machine Learning for Data Analytics	2	1	0	3
	Total Credits				**41**

5. Professional Elective Courses (E) (Any 8 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE222T	Big Data Tools and Techniques	3	0	0	3
21CSE224T	Computer Architecture	3	0	0	3
21CSE253T	Internet of Things	2	1	0	3
21CSE251T	Digital Image Processing	2	1	0	3
21CSE321T	Data Warehousing and Data Mining	2	1	0	3
21CSE322T	Multivariate Techniques for Data Analytics	2	1	0	3
21CSE323T	Marketing Analytics	2	1	0	3
21CSE356T	Natural Language Processing	2	1	0	3
21CSE359T	Information Storage Management	2	1	0	3
21CSE325T	Applied Social Network Analysis	2	1	0	3
21CSE326T	Artificial Neural Networks	2	1	0	3
21CSE327T	Cloud Computing for Data Analytics	2	1	0	3
21CSE373T	Streaming Analytics	2	1	0	3
21CSE421T	Business Intelligence and Analytics	2	1	0	3
21CSE422T	Convolutional Neural Networks	2	1	0	3
21CSE423T	Big Data Visualization	2	1	0	3
21CSE424T	Deep Learning for Data Analytics	2	1	0	3
21CSE425T	Advanced Machine Learning	2	1	0	3
21CSE426T	Financial Machine Learning	2	1	0	3
21CSE427T	Augmented and Virtual Reality	2	1	0	3
21CSE428T	Healthcare Analytics	2	1	0	3
21CSE429T	Data Science for Internet of Things	2	1	0	3
21CSE430T	Automatic Speech Recognition	2	1	0	3
21CSE447T	Robotics: Computational Motion Planning	2	1	0	3
21CSE448T	Bio-inspired Computing and Fuzzy Logic	2	1	0	3
21CSE449T	Risk Analytics	2	1	0	3
	Total Credits				***24***

3. Open Elective Courses (O) (Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

24. (f) Programme Articulation: B.Tech. in Computer Science and Engineering with Specialization in Data Science

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21LEH102T	Chinese										3		3			
21LEH103T	French										3		3			
21LEH104T	German										3		3			
21LEH105T	Japanese										3		3			
21LEH106T	Korean										3		3			
21LEH107T	Spanish										3		3			
21GNH101J	Philosophy of Engineering	3	2	3	3	3	2	3	2	3	3		3			
21MAB101T	Calculus and Linear Algebra	3	3													
21CYB101J	Chemistry	3	3	3	2	3										
21BTB102T	Introduction to Computational Biology	3	3	2	1	3										
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21MES101L	Basic Civil and Mechanical Workshop	3				1		3					2			
21PDM101L	Professional Skills and Practices									3	3		3			
21GNM101L	Physical and Mental Health using Yoga	3	2	2	3	3	3	3	3	3	3		3			
21GNM102L	NSS						3	3		3						
21GNM103L	NCC						3		3	3						
21LEH101T	Communicative English									2	3					
21MAB102T	Advanced Calculus and Complex Analysis	3	3													
21PYB102J	Semiconductor Physics and Computational Methods	3	3	3												
21MES102L	Engineering Graphics and Design	2				3					3		2			
21EES101T	Electrical and Electronics Engineering	3	2													
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CYM101T	Environmental Science	3	3					3		3						
21PDM102L	General Aptitude		3							3	3		3			
21LEM101T	Constitution of India						3						3			
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSS202T	Fundamentals of Data Science		2											1	1	
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC206P	Advanced Object Oriented Programming		2													
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC307P	Machine Learning for Data Analytics													2	2	2
21CSS301T	Full Stack Development													2	1	2
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC304J	Compiler Design	3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
21CSE224T	Computer Architecture	3	2	1												
21CSE222T	Big Data Tools and Techniques					1								1		
21CSE253T	Internet of Things	1	2	1	3	1	2	-	-	-	-	-	-	-	-	2
21CSE251T	Digital Image Processing	3	2	2	3	-	-	-	-	-	-	-	-	2	3	-
21CSE321T	Data Warehousing and Data Mining													2	2	
21CSE322T	Multivariate Techniques for Data Analytics													2	2	2
21CSE323T	Marketing Analytics								3		3			2	2	1
21CSE356T	Natural Language Processing	3	3	2	3	3	-	-	-	-	-	-	-	2	-	-
21CSE359T	Information Storage Management	-	3	3	-	1	-	-	-	-	-	-	-	1	2	-
21CSE373T	Streaming Analytics	2	2		2	2										
21CSE325T	Applied Social Network Analysis													2	2	2
21CSE326T	Artificial Neural Networks													2	2	2
21CSE327T	Cloud Computing for Data Analytics													1	2	2
21CSE421T	Business Intelligence and Analytics								3		3			2	2	2
21CSE422T	Convolutional Neural Networks													2	2	2
21CSE423T	Big Data Visualization										3			2	2	2
21CSE424T	Deep Learning for Data Analytics													2	2	2
21CSE425T	Advanced Machine Learning													2	2	2
21CSE426T	Financial Machine Learning													2	2	2
21CSE427T	Augmented and Virtual Reality													2	2	2

21CSE428T	*Healthcare Analytics*													2	1	2
21CSE429T	*Data Science for Internet of Things*													2	2	2
21CSE430T	*Automatic Speech Recognition*													2	2	2
21CSE447T	*Robotics: Computational Motion Planning*													2	2	2
21CSE448T	*Bio-inspired Computing and Fuzzy Logic*													2	1	2
21CSE449T	*Risk Analytics*													1	2	2
21CSO355T	*Machine Learning for All*													2	2	
21CSO356T	*Convolutional Neural Networks Foundation*													2	2	
21CSO357T	*Data Visualization Basics*													2	2	
21CSO451T	*Deep Learning Foundation*													2	2	
21CSS303T	*Data Science*													1	1	
21CSP302L	*Project*	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	*MOOC*	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	*Major Project*	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	*Internship*	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Programme Average	3	3	2	2	2	3	3	3	3	3	2	3	2	2	2

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

24. (g) Implementation Plan: B.Tech. in Computer Science and Engineering with Specialization in Data Science

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM101L	Professional Skills and Practices	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CYM101T	Environmental Science*	1	0	0	0
21PDM102L	General Aptitude*	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**21**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSS202T	Fundamentals of Data Science	3	2	0	5
21CSC202J	Operating Systems	3	0	2	4
21CSC206P	Advanced Object Oriented Programming	2	1	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC307P	Machine Learning for Data Analytics	2	1	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS301T	Full Stack Development	1	1	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

25. B.Tech. in Computer Science and Engineering with Specialization in Gaming Technology

25. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt – 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	*Game Technology creates and supports game-based education that empowers the students for life-long learners to achieve academic, social, emotional and personal success.*

25. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO – 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO – 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO – 5	*Graduates will be educated with Game Programming and adopt emerging technology with Gaming Industry*

25. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	*3*				
PEO – 2			*2*		
PEO – 3		*3*	*3*		
PEO – 4				*2*	
PEO – 5					*3*

25. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*	*3*			*3*	*3*	*2*
PEO – 2		*2*	*2*		*3*		*3*	*2*					*2*	*3*	*3*
PEO – 3		*3*	*3*	*2*						*2*		*3*	*3*	*3*	*3*
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*	*3*	*3*	*2*
PEO - 5			*2*		*3*				*3*		*2*	*3*	*3*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*To Identify and apply Emerging Technologies in the Gaming Industry.*

25. (e) Program Structure: B.Tech. in Computer Science and Engineering with Specialization in Gaming Technology

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB204T	Probability and Queueing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Engineering Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC306J	Software Engineering Perspectives in Computer Game Development	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
21CSC307T	Deep Learning in Gaming and Application	2	1	0	3
	Total Credits				**42**

5. Professional Elective Courses (E)
(Any 8 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE235T	Game Design, Prototyping and Development	3	0	0	3
21CSE236T	GPU Programming	3	0	0	3
21CSE237T	Art Creation for Games	2	1	0	3
21CSE238T	Storytelling for Marketing	2	1	0	3
21CSE339T	Game Artificial Intelligence	3	0	0	3
21CSE340T	Analytics and Decision Making	2	1	0	3
21CSE341T	Computer Graphics	3	0	0	3
21CSE342T	Gaming Studio for Business	2	1	0	3
21CSE343T	Web Services Development for Games	3	0	0	3
21CSE344T	3D Game Development with Unity	2	1	0	3
21CSE345T	Game Systems Integration	3	0	0	3
21CSE346T	Design Art and Theory	3	0	0	3
21CSE439T	Virtual Reality and Augmented Reality	2	1	0	3
21CSE440T	Computer Animation and Simulation	3	0	0	3
21CSE441T	Mobile Game Development	2	1	0	3
21CSE442T	Game Monetization Techniques	2	1	0	3
21CSE443T	Game Production and Publishing	2	1	0	3
21CSE444T	Applied Gamification	3	0	0	3
21CSE445T	Metaverse Fundamentals	3	0	0	3
21CSE446T	Digital Marketing and Publishing	3	0	0	3
	Total Credits				**24**

3. Open Elective Courses (O) (Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	
21CSP402L	Major Project	0	0	20	15
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

25. (f) Programme Articulation: B.Tech. in Computer Science and Engineering with Specialization in Gaming Technology

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC304J	Compiler Design	3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC307T	Deep Learning in Gaming and Application	3	2	3	3	3									2	2
21CSE235T	Game Design, Prototyping and Development		3	3	2						2					
21CSE236T	GPU Programming	1	2	3		2										
21CSE237T	Art Creation for Games	3	2	2		2	2							2	2	2
21CSE238T	Storytelling for Marketing	2		2	2						2			2	2	
21CSE339T	Game Artificial Intelligence	3	2	3		3								2	2	3
21CSE340T	Analytics and Decision Making	2	2	2		3	2							2	2	
21CSE341T	Computer Graphics	3	2											2		2
21CSE342T	Gaming Studio for Business	2	2	3	3	2		2		2						
21CSE343T	Web services development for Games		2			2										
21CSE344T	3D Game Development with Unity	2	2	3	2	3								2	2	
21CSE345T	Game Systems Integration	2	2	3	2	3										
21CSE346T	Design art and theory	3	2													
21CSE439T	Virtual Reality and Augmented Reality	3	3	2	2	3								2		2
21CSE440T	Computer Animation and Simulation	2	2	2	2											
21CSE441T	Mobile Game Development	3	2											2		2
21CSE442T	Game Monetization Techniques	3	3	2	3											2
21CSE443T	Game Production and Publishing	3	2	3	2	3									2	2
21CSE444T	Applied Gamification	2	3	2	1											2
21CSE445T	Metaverse Fundamentals	2	2	3	2	3	2									
21CSE446T	Digital marketing and Publishing	2		3	2		2			3	3					
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

25. (g) Implementation Plan: B.Tech. in Computer Science and Engineering with Specialization in Gaming Technology

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM101L	Professional Skills and Practices	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CYM101T	Environmental Science*	1	0	0	0
21PDM102L	General Aptitude*	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**21**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC307T	Deep Learning in Gaming and Application	2	1	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC306J	Software Engineering Perspectives in Computer Game Development	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

26. B.Tech. in Computer Science and Engineering with Specialization in Information Technology/B.Tech. in Information Technology

26. (a) Mission of the Department

Mission Stmt - 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt - 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt - 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt - 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt - 5	*To produce successful Computer Science and Engineering graduates with personal and professional responsibilities and commitment to lifelong learning*

26. (b) Program Educational Objectives (PEO)

PEO - 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO - 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO - 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO - 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO - 5	*Graduates will possess the additional skills in core computer science discipline with knowledge of Hardware, Software , Programming , Logic & Reasoning.*

26. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	*3*				*1*
PEO – 2			*2*		
PEO – 3		*3*	*3*		
PEO – 4				*2*	*3*
PEO – 5					*3*

26. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*	*3*					
PEO – 2		*2*	*2*		*3*		*3*	*2*					*2*		
PEO – 3		*3*	*3*	*2*						*2*		*3*		*2*	*2*
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*		*2*	
PEO - 5	*2*	*3*				*2*		*3*	*3*	*3*					*2*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*To become socially responsible technocrats by incorporating ethical principles in developing intelligent applications related to algorithms, networking, web design, cloud computing, IoT and data Analytics that are capable to adapt emerging technological changes.*

26. (e) Program Structure: B.Tech. in Computer Science and Engineering with Specialization in Information Technology

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21MAB204T	Probability and Queuing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic civil and Mechanical Engineering Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC317J	Information Retrieval Techniques	2	0	2	3
21CSC314P	Big Data Essentials	2	1	0	3
	Total Credits				**42**

5. Professional Elective Courses (E)
(Any 8 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE251T	Digital Image Processing	2	1	0	3
21CSE254T	Bio Inspired Computing	2	1	0	3
21CSE267T	Statistics for Machine Learning	2	1	0	3
21CSE281T	Cryptography and Network Security	2	1	0	3
21CSE351T	Computational Logic	2	1	0	3
21CSE352T	Neuro Fuzzy and Genetic Programming	2	1	0	3
21CSE355T	Data Mining and Analytics	2	1	0	3
21CSE356T	Natural Language Processing	2	1	0	3
21CSE359T	Information Storage and Management	2	1	0	3
21CSE361T	Database Security and Privacy	2	1	0	3
21CSE354T	Full Stack Web Development	2	1	0	3
21CSE362T	Cloud Computing	2	1	0	3
21CSE310J	Quantum Computation	2	0	2	3
21CSE373T	Streaming Analytics	2	1	0	3
21CSE451T	Pattern Recognition Techniques	2	1	0	3
21CSE454T	Computer Vision	2	1	0	3
21CSE456T	Software Defined Networks	2	1	0	3
21CSE457T	Service Oriented Architecture	2	1	0	3
21CSE460T	Network Protocols and Algorithms	2	1	0	3
21CSE475T	Applied Graph Theory	2	1	0	3
21CSE476T	Logical Deduction and Nonverbal Reasoning	2	1	0	3
21CSE477T	Cloud Native Architecture for Modern Platforms	2	1	0	3
21CSE479T	Fault Tolerant Systems	2	1	0	3
21CSE480T	Image and Video Processing	2	1	0	3
	Total Credits				**24**

3. Open Elective Courses (O) (Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

26. (f) Programme Articulation: B.Tech. in Computer Science and Engineering with Specialization in Information Technology

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC317J	Information Retrieval Techniques	3	2	3	3									2	2	3
21CSE267T	Statistics for Machine Learning	3	3		2									3	2	3
21CSE251T	Digital Image Processing	3	2	2	3	-	-	-	-	-	-	-	-	2	3	-
21CSE254T	Bio Inspired Computing	2	2	2	2	-	-	-	-	-	-	-	-	-	3	2
21CSE351T	Computational Logic	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
21CSE352T	Neuro Fuzzy and Genetic Programming	2	3	-	-	3	-	-	-	-	-	-	-	-	2	-
21CSE354T	Full Stack Web Development	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-
21CSE358T	Network Security and Cryptography	2	3	2	-	2	-	-	-	-	-	-	-	2	-	-
21CSE359T	Information Storage and Management	-	3	3	-	1	-	-	-	-	-	-	-	1	2	-
21CSE361T	Database Security and Privacy	3	2	2	2	1	-	-	-	-	-	-	2	1	-	-
21CSE362T	Cloud Computing	2	1	1	1	2	-	-	-	-	-	-	-	2	-	-
21CSE373T	Streaming Analytics	2	2		2	2								2	3	3
21CSE451T	Pattern Recognition Techniques	3	2	2	-	2	-	-	-	-	-	-	-	1	2	2
21CSE454T	Computer Vision	2	2	1	1	1	-	-	-	-	-	-	-	3	-	2
21CSE456T	Software Defined Networks	1	1	1	3	1	2	-	-	-	-	-	-	2	-	
21CSE457T	Service Oriented Architecture	2	1	2	-	-	-	-	-	-	-	-	-	2-	-	-
21CSE460T	Network Protocols and Algorithms	1	2	1	-	-	-	-	-	-	-	-	-	1	-	-
21CSE475T	Applied Graph Theory	2	3	3	3									2	3	
21CSE476T	Logical Deduction and Non Verbal Reasoning	3	2		3								2		2	
21CSE477T	Cloud Native Architecture for Modern Platforms	2	3	3	3	2									2	3
21CSE479T	Fault tolerant Systems	2	3		3									3		3
21CSE480T	Image and Video Processing	3	2	2	3									3	3	3
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

26. (g) Implementation Plan: B.Tech. in Computer Science and Engineering with Specialization in Information Technology

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM101L	Professional Skills and Practices	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CYM101T	Environmental Science*	1	0	0	0
21PDM102L	General Aptitude*	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**21**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC314P	Big Data Essentials	2	1	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC306J	Software Engineering Perspectives in Computer Game Development	2	0	2	3
21CSC317J	Information Retrieval Techniques	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

27. B.Tech. in Computer Science and Engineering with Specialization in Internet of Things

27. (a) Mission of the Department

Mission Stmt - 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt - 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt - 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt - 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt - 5	*To produce successful skilled IoT engineers to emerge as independent entrepreneurs and future leaders.*

27. (b) Program Educational Objectives (PEO)

PEO - 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO - 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO - 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO - 4	*Graduates will be ethically, eco-friendly and socially responsible solution providers in Computer Science and other engineering disciplines.*
PEO - 5	*Graduates will be able to demonstrate their leadership abilities with IoT skills while addressing various social issues in an industrial, entrepreneurial, and research setting.*

27. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	*3*				*1*
PEO – 2		*3*	*1*		
PEO – 3	*3*		*3*		
PEO – 4		*2*		*3*	
PEO – 5				*3*	*3*

27. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*	*3*					
PEO – 2		*2*	*2*		*3*		*3*	*2*					*2*		
PEO – 3		*3*	*3*	*2*						*2*		*3*		*2*	
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*		*2*	*3*
PEO - 5						*3*			*3*	*3*	*3*	*3*			*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*To utilize cutting-edge techniques in IoT concepts for societal needs with promoting lifelong learning & research for a forward-thinking profession.*

27. (e) Program Structure: B.Tech. in Computer Science and Engineering with Specialization in Internet of Things

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21MAB204T	Probability and Queuing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic civil and Mechanical Engineering workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC315J	Fog Computing	2	0	2	3
21CSC313J	Cloud Computing for IOT	2	0	2	3
	Total Credits				**42**

5. Professional Elective Courses (E)
(Any 8 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE264T	Introduction to IoT: Sensors, Actuators and Microcontrollers	2	1	0	3
21CSE265T	Introduction to Embedded Programming and Embedded OS	3	0	0	3
21CSE266T	IoT Architecture and Protocols	2	1	0	3
21CSE365T	Machine Learning for IoT	2	1	0	3
21CSE366T	Introduction to Cloud Application Development for IoT	2	1	0	3
21CSE367T	IoT Forensics	2	1	0	3
21CSE368J	Network Programming for IoT	2	0	2	3
21CSE369J	Introduction to Security of Internet of Things and Cyber-Physical Systems	2	0	2	3
21CSE370J	Data Visualization for IoT	2	0	2	3
21CSE371J	IoT Techniques, Tools and its application	2	0	2	3
21CSE467T	Advanced Database Systems	2	1	0	3
21CSE468T	Edge Computing	2	1	0	3
21CSE469T	Energy Management for IoT devices	2	1	0	3
21CSE470T	Applied Software Techniques in IoT Engineering	2	1	0	3
21CSE471T	Fundamentals of Cyber security	2	1	0	3
21CSE472J	Full Stack Development for IoT	2	0	2	3
21CSE473T	Deep Learning for IoT	2	1	0	3
21CSE474T	IoT Privacy	2	1	0	3
	Total Credits				**24**

3. Open Elective Courses (O) (Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

27. (f) Programme Articulation: B.Tech. in Computer Science and Engineering with Specialization in Internet of Things

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC315J	Fog Computing			3	2	2									2	3
21CSC313J	Cloud Computing for IoT		2			3									3	3
21CSE264T	Introduction to IoT: Sensors, Actuators and Microcontrollers			3	2									2	2	
21CSE265T	Introduction to Embedded Programming and Embedded OS			3	2									3	3	
21CSE266T	IoT Architecture and Protocols		3	3										2	2	
21CSE365T	Machine Learning for IoT		2			3									3	3
21CSE366T	Introduction to Cloud Application Development for IoT			3	2										3	3
21CSE367T	IoT Forensics		3	3										2	2	
21CSE368J	Network Programming for IoT			2		3									3	3
21CSE369J	Introduction to Security of Internet of Things and Cyber-Physical Systems			3	2										3	3
21CSE370J	Data Visualization for IoT		3	3	2	2								2	2	
21CSE371J	IoT Techniques, Tools and its application			2		3									3	3
21CSE467T	Advanced Database Systems			2	3									2	3	
21CSE468T	Edge Computing			3	2									3	3	
21CSE469T	Energy Management for IoT devices		3		2									2	3	
21CSE470T	Applied Software Techniques in IoT Engineering			2	3									2	3	
21CSE471T	Fundamentals of Cyber security			3	2										3	2
21CSE472J	Full Stack Development for IoT			3		2									3	3
21CSE473T	Deep Learning for IoT		3			3									3	3
21CSE474T	IoT Privacy			3					2						3	2
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

27. (g) Implementation Plan: B.Tech. in Computer Science and Engineering with Specialization in Internet of Things

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				21

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC313J	Cloud Computing for IoT	2	0	2	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC306J	Software Engineering Perspectives in Computer Game Development	2	0	2	3
21CSC315J	Fog Computing	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

28. B.Tech.in Computer Science and Engineering with Specialization in Software Engineering

28. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt – 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	*To thrive students with profound technical knowledge, problem solving, and leadership skills essential to generate novel software technologies to empower individuals, organizations, and the society.*

28. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO – 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO – 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO – 5	*Graduates will be equipped with knowledge in the field of software engineering including scientific principles, analysis techniques, design methodologies, build and maintain secured software system to meet the demands and challenges of the growing software industry*

28. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	*3*				*1*
PEO – 2			*2*		
PEO – 3		*3*	*3*		
PEO – 4				*2*	*3*
PEO – 5				*3*	*3*

28. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3			1		2		3	2	3					2
PEO – 2		2	2		3		3	2					2		
PEO – 3		3	3	2						2		3		2	
PEO – 4		2	3			3	2		2		2	2		2	
PEO - 5			3			3			3	3	3	3			3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*To design and develop solutions by following standard software engineering principles and implement by using suitable programming languages and platforms*

28. (e) Program Structure: B.Tech. in Computer Science and Engineering with Specialization in Software Engineering

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB204T	Probability and Queueing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
21CSC309J	Software Architecture and Design	2	0	2	3
21CSC403T	Software Measurements and Metrics	3	0	0	3
21CSC404T	Software Verification and Validation	3	0	0	3
	Total Credits				**48**

5. Professional Elective Courses (E)
(Any 8 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE271T	Programming in Java	2	1	0	3
21CSE275T	Requirements Engineering	3	0	0	3
21CSE276T	Software Quality Management	3	0	0	3
21CSE277T	Software Process	3	0	0	3
21CSE312P	Software Engineering in Artificial Intelligence	2	1	0	3
21CSE326T	Artificial Neural Networks	3	0	0	3
21CSE355T	Data Mining and Analytics	2	1	0	3
21CSE391P	User Interface Design	2	1	0	3
21CSE392P	Visual Programming	2	1	0	3
21CSE393P	Machine Learning Techniques	2	1	0	3
21CSE391T	Object Oriented Software Engineering	3	0	0	3
21CSE392T	Python for Software Engineering	3	0	0	3
21CSE393T	Analysis of Software Artifacts	3	0	0	3
21CSE396T	Design Principles of Smart Space Management	3	0	0	3
21CSE421T	Business Intelligence and Analytics	2	1	0	3
21CSE493T	Software Security	3	0	0	3
21CSE457T	Service Oriented Architecture	3	0	0	3
21CSE495T	Artificial Intelligence in Agile Systems	3	0	0	3
21CSE496T	Deep Learning	3	0	0	3
21CSE497T	Gaming and Virtual Reality	3	0	0	3
21CSE498T	Smartphone Computing and its Applications	3	0	0	3
	Total Credits				**18**

6. Open Elective Courses (O)
(Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**9**

7. Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

8. Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

28. (f) Programme Articulation: B.Tech. in Computer Science and Engineering with Specialization in Software Engineering

		Program Outcome (PO)												PSO		
Course Code	**Course Name**	*Engineering Knowledge*	*Problem Analysis*	*Design/development of solutions*	*Conduct investigations of complex problems*	*Modern Tool Usage*	*The engineer and society*	*Environment & Sustainability*	*Ethics*	*Individual & Team Work*	*Communication*	*Project Mgt. & Finance*	*Life Long Learning*	*PSO-1*	*PSO-2*	*PSO-3*
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC304J	Compiler Design	3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC309J	Software Architecture and Design	2	3	-	3	3	-	-	-	-	-	-	-	-	2	3
21CSC403T	Software Measurements and Metrics	3	3	2	-	3	-	-	-	-	-	2	-	2	-	3
21CSC404T	Software Verification and Validation	3	3	-	-	3	-	-	-	-	-	-	-	-	2	3
21CSE275T	Requirements Engineering	3	3	-	3	1	-	-	-	1	-	-	-	-	1	3
21CSE276T	Software Quality Management	3	2	2	-	-	-	-	-	-	-	-	-	-	2	3
21CSE277T	Software Process	3	-	-	2	-	-	-	-	2	-	-	-	-	2	3
21CSE271T	Programming in Java	3	2	1	2	-	-	-	-	-	-	-	1	3	2	-
21CSE391P	User Interface Design	-	-	3	-	2	-	-	-	2	-	3	-	-	2	3
21CSE392P	Visual Programming	-	-	3	-	2	-	-	-	2	-	3	-	-	2	3
21CSE393P	Machine Learning Techniques	-	3	-	-	3	-	-	-	2	-	3	-	-	3	2
21CSE312P	Software Engineering in Artificial Intelligence	-	3	3	-	3	-	-	-	-	-	-	-	2	2	3
21CSE391T	Object Oriented Software Engineering	3	3	3	-		-	-	-	-	-	-	-		2	3
21CSE392T	Python for Software Engineering	1	-	3	3	3	-	-	-	-	-	2	-	-	2	3
21CSE393T	Analysis of Software Artifacts	-	3	-	2	2	-	-	-	-	-	-	-	-	1	3
21CSE326T	Artificial Neural Networks	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
21CSE355T	Data Mining and Analytics	1	2	-	-	3	-	-	-	-	-	-	-	2	-	-
21CSE396T	Design Principles of Smart Space Management	3	2	2	-	-	-	-	-	-	-	-	-	1	2	3
21CSE421T	Business Intelligence and Analytics								3		3			2	2	2
21CSE493T	Software Security	-	3	3	3		-	-	-	-	-	-	-		1	3
21CSE457T	Service Oriented Architecture	2	1	2	-	-	-	-	-	-	-	-	-	2-	-	-
21CSE495T	Artificial Intelligence in Agile Systems	3	3	2	-	-	-	-	-	-	-	-	-	1	2	3
21CSE496T	Deep Learning	3	2	3	-	3	-	-	-	-	-	-	-	1	3	2
21CSE497T	Gaming and Virtual Reality	3	-	3	-	2	-	-	-	-	-	-	1	-	3	2
21CSE498T	Smart Phone Computing and its Applications	3	-	-	2	3	-	2	-	-	-	-	-	-	2	2
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303L	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

28. (g) Implementation Plan: B.Tech. in Computer Science and Engineering with Specialization in Software Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**22**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				21

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC309J	Software Architecture and Design	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
21CSC403T	Software Measurements and Metrics	3	0	0	3
21CSC404T	Software Verification and Validation	3	0	0	3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

29. B.Tech.in Computer Science and Business Systems

29. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt – 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	*To provide a platform to adapt and work with innovative tools and techniques related to the business decision making process.*

29. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical / managerial roles by thorough understanding of contemporary technologies*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions where information technology businesses are a priority*
PEO – 3	*Graduates will be able to apply technology abstraction and common business principles*
PEO – 4	*Graduates will be able to demonstrate innovation abilities.*
PEO – 5	*Graduates will be able to demonstrate ethics and responsibility and have accumulated life values*

29. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	*3*				
PEO – 2		*2*	*2*		
PEO – 3	*1*		*3*		*3*
PEO – 4		*3*			*2*
PEO – 5				*3*	*3*

29. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*				*3*						*2*			*2*	
PEO – 2		*2*	*2*		*3*		*3*	*2*					*2*		
PEO – 3						*3*					*3*	*2*			*3*
PEO – 4				*3*						*3*	*3*				
PEO - 5					*3*			*3*	*2*			*2*			

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyse, design, and develop computing solutions by applying fundamental concepts of computer science and engineering*
PSO - 2	*Ability to create innovative Software for business and service orientations*
PSO - 3	*Ability to demonstrate personal, organizational and entrepreneurship skills through critical thinking, engage themselves in life-long learning by following innovations in business, science & technology.*

29. (e) Program Structure: B.Tech. in Computer Science and Business Systems

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
21MGH101T	Fundamentals of Economics	3	0	0	3
21MGH102T	Fundamentals of Management.	3	0	0	3
21MGH103T	Basics of Accounting and Costing	2	1	0	3
21MGH201T	Human Resource Management.	2	0	0	2
21MGH202T	Financial Management	2	0	0	2
21MGH203J	Market Research	2	0	2	3
21MGH301T	Introduction to Innovation, IP Management and Entrepreneurship.	3	0	0	3
21MGH302T	Business Strategy	3	0	0	3
21MGH303P	IT project Management	2	1	0	3
21MGH401T	Entrepreneurship and Family Business Management	3	0	0	3
21MGH402T	Services Science and Service Operations Management	3	0	0	3
	Total Learning Credits				**44**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB210T	Statistical Modeling	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
	Total Learning Credits				**21**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Learning Credits				**17**

4. Professional Core Courses(C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
	Total Learning Credits				**35**

3. Open Elective Courses (O) (Any 1 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Learning Credits				**3**

5. Professional Elective Courses (E)
(Any 7 Elective Courses)

Course Code	Course Title	Hours/ week L	T	P	C
21CSE251T	Digital Image Processing	2	1	0	3
21CSE253T	Internet of Things	2	1	0	3
21CSE221T	Python Programming for Data Analytics	2	1	0	3
21CSE269T	Java Programming	2	1	0	3
21CSE282T	Information Security	3	0	0	3
21CSE314T	Computational Statistics	2	1	0	3
21CSE315T	Conversational Systems	2	1	0	3
21CSE316T	Cognitive Science and Analytics	3	0	0	3
21CSE317T	Behavioral Economics	2	1	0	3
21CSE318T	Computational Finance and Modeling	2	1	0	3
21CSE319T	Advance Finance	2	1	0	3
21CSE352T	Neuro Fuzzy and Genetic Programming	2	1	0	3
21CSE353T	Augmented, Virtual and Mixed Reality	2	1	0	3
21CSE354T	Full Stack Web Development	2	1	0	3
21CSE355T	Data Mining and Analytics	2	1	0	3
21CSE356T	Natural Language Processing	2	1	0	3
21CSE357T	Distributed Computing	2	1	0	3
21CSE358T	Network Security and Cryptography	2	1	0	3
21CSE359T	Information Storage and Management	2	1	0	3
21CSE362T	Cloud Computing	2	1	0	3
21CSE374T	Machine Learning for Enterprise	2	1	0	3
21CSE421T	Business Intelligence and Analytics	2	1	0	3
21CSE424T	Deep Learning for Data Analytics	2	1	0	3
21CSE451T	Pattern Recognition Techniques	2	1	0	3
21CSE453T	Speech Recognition	2	1	0	3
21CSE456T	Software Defined Networks	2	1	0	3
21CSE458T	Wireless and Mobile Communication	2	1	0	3
21CSE459T	Wireless Sensor Networks	2	1	0	3
21CSE481T	Information Visualization	2	1	0	3
21CSE483T	Robotics and Embedded Systems	3	0	0	3
21CSE484T	Enterprise Systems	3	0	0	3
21CSE419T	Usability Design of Software Applications	3	0	0	3
21CSE420T	IT Workshop using Scilab	2	1	0	3
	Total Learning Credits				**21**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

29. (f) Programme Articulation: B.Tech. in Computer Science and Business Systems

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21MGH101T	Fundamentals of Economics	2	3	2	3	2	-	2	2	2	2	2	-	-	-	-
21MGH102T	Fundamentals of Management	2	2	3	2	2	3	2	-	2	2	2	2	-	2	2
21MGH103T	Basics of Accounting and Costing	2	3	2	3	3	2	3	2	2	3	3	3	-	2	1
21MGH201T	Human Resource Management	-	3	3	-	2	1	-	3	-	-	3	2	-	-	3
21MGH202T	Financial Management	-	3	-	3	-	-	-	1	2		3	3	-	2	3
21MGH203J	Market Research	-	-	-	-	2	2	--	2	2	2	-	1	-	2	3
21MGH301T	Introduction to Innovation, IP Management and Entrepreneurship	3	3	2	2	3	2	1	1	2	2	3	2	-	2	2
21MGH302T	Business Strategy	2	2	2	-	-	3	2	2	2	1	3	2	-	-	2
21MGH303P	IT project Management	-	2	-	3	-	-	-	3	-	-	3	-	-	-	2
21MGH401T	Entrepreneurship and Family Business Management	2	2	3	-	-	-	-	1	2	2	2	-	-	2	3
21MGH402T	Services Science and Service Operations Management	3	3	2	2	-	1	-	1	-	1	1	-	-	-	2
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC304J	Compiler Design	3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSE251T	Digital Image Processing	3	3	3	3	-	-	-	-	-	-	-	-	2	3	-
21CSE253T	Internet of Things	2	3	1	3	1	2	-	-	-	-	-	-	-	-	-
21CSE221T	Python Programming for Data Analytics		3			3							2			
21CSE269T	Java Programming	2	1	2	1	-	-	-	-	-	3	-	-	2	-	-
21CSE282T	Information Security			2					2							
21CSE314T	Computational Statistics	2	3	2	3	1	-	-	-	-	-	-	-	1	1	-
21CSE315T	Conversational Systems	3	3	2	1	-	-	-	-	-	-	-	-	-	-	-
21CSE316T	Cognitive Science and Analytics	2	3	3	-	-	-	-	-	-	-	-	-	1	-	-
21CSE317T	Behavioral Economics	-	2	-	2	1	2	1	2	2	2	2	-	-	2	2
21CSE318T	Computational Finance and Modeling	1	2	3	2	2	-	3	-	2	-	2	2	-	-	3
21CSE319T	Advance Finance	2	3	3	2	3	-	1	2	2	-	3	-	-	-	1
21CSE352T	Neuro Fuzzy and Genetic Programming	3	3	-	-	3	-	-	-	-	-	-	-	-	2	-
21CSE353T	Augmented, Virtual and Mixed Reality	3	-	3	-	2	-	-	2	-	-	-	-	-	-	2
21CSE354T	Full Stack Web Development	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-
21CSE355T	Data Mining and Analytics	1	2	-	-	3	-	-	-	-	-	-	-	-	-	-
21CSE356T	Natural Language Processing	3	3	2	3	3	-	-	-	-	-	-	-	2	-	-
21CSE357T	Distributed Computing	-	-	3	3	3	-	-	-	-	-	-	-	2	-	-
21CSE358T	Network Security and Cryptography	2	3	3	-	2	-	-	-	-	-	-	-	-	-	-
21CSE359T	Information Storage and Management	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-
21CSE362T	Cloud Computing Technologies	2		3		3										
21CSE374T	Machine Learning for Enterprise	3	1	3	1	-	-	-	-	-	-	-	-	1	1	-
21CSE419T	Usability Design of Software Applications	3	2	-	-	-	-	-	-	-	-	-	-	2	2	-
21CSE420T	IT Workshop using Scilab	3	2	-	-	-	2	3	-	1	-	-	-	2	3	-
21CSE421T	Business Intelligence and Analytics													2	2	2
21CSE424T	Deep Learning for Data Analytics													2	2	2
21CSE451T	Pattern Recognition Techniques	3	2	2	-	2	-	-	-	-	-	-	-	-	2	2
21CSE453T	Speech Recognition	3	2	3	2	-	-	-	-	-	-	-	-	-	3	-
21CSE456T	Software Defined Networks	2	3	1	3	1	2	-	-	-	-	-	-	-	-	
21CSE458T	Wireless and Mobile Communication	1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
21CSE459T	Wireless Sensor Networks	1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
21CSE481T	Information Visualization	2	3	-	-	-	-	-	-	-	-	-	-	2	1	-
21CSE483T	Robotics and Embedded Systems	3	3	3	2	1	-	-	3	1	-	-	-	2	3	-
21CSE484T	Enterprise Systems	3	-	2	2	3	1	1	-	-	-	-	2	2	2	-
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

21CSP303T	*MOOC*	2	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
21CSP401L	*Major Project*	3	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
21CSP402L	*Semester Internship*	3	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
	Program Average	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*

29. (g) Implementation Plan: B.Tech. in Computer Science and Business Systems

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MGH101T	Fundamentals of Economics	3	0	0	3
21MGH102T	Fundamentals of Management	3	0	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21PDM101L	Professional Skills and Practices	0	0	2	0
21CYM101T	Environmental Science*	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
	Total Learning Credits				**21**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21MGH103T	Basics of Accounting and Costing	2	1	0	3
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB301T	Probability and Statistics	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Learning Credits				**20**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MGH201T	Human Resource Management.	2	0	0	2
21MGH202T	Financial Management.	2	0	0	2
21MAB210T	Statistical Modeling	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21PDH201T	Social Engineering	2	0	0	2
21MGH203J	Market Research	2	0	2	3
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**26**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MGH301T	Introduction to Innovation, IP Management and Entrepreneurship.	3	0	0	3
21MGH302T	Business Strategy	3	0	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**20**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21MGH303P	IT project Management	2	1	0	3
21CSS303T	Data Science	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
21MGH401T	Entrepreneurship and Family Business Management	3	0	0	3
21MGH402T	Services Science and Service Operations Management	3	0	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester

30. B.Tech.in Electronics and Communication Engineering

30. (a) Mission of the Department

Mission Stmt – 1	*Build an educational process that is well suited to local needs as well as satisfies the national and international accreditation requirements.*
Mission Stmt – 2	*Attract the qualified professionals and retain them by building an environment that fosters work freedom and empowerment.*
Mission Stmt – 3	*With the right talent pool, create knowledge and disseminate, get involved in collaborative research with reputed universities and produce competent graduands.*

30. (b) Program Educational Objectives (PEO)

PEO – 1	*Apply the acquired knowledge and skills in solving real-world engineering problems, considering national/global and societal issues such as health, environment, and safety.*
PEO – 2	*Create technologically innovative products that are economically viable and socially relevant.*
PEO – 3	*Develop an attitude toward pursuing knowledge and advanced education for sustained career advancement to adapt to emerging fields.*
PEO – 4	*Demonstrate leadership qualities and effective communication skills to work in a team of enterprising people in a multidisciplinary and multicultural environment with strong adherence to professional ethics.*

30. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*1*	*2*	*3*
PEO – 2	*3*	*3*	*3*
PEO – 3	*2*	*1*	*3*
PEO – 4	*3*	*3*	*3*

30. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*	-	-	-	*3*	*3*	*2*	-	-	-	-	*3*	-	-
PEO – 2	-	-	*3*	*3*	*3*	*3*	-	-	*2*	-	*3*	-	-	*3*	-
PEO – 3	-	-	-	*3*	*3*	-	*2*	*2*	-	*2*	-	*3*	-	*2*	*3*
PEO – 4	-	-	-	-	-	-	-	*3*	*3*	*3*	*3*	-	-	-	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	***Problem-Solving Skills:*** *Should be able to associate the learning from the courses related to Microelectronics, Signal processing, Microcomputers, Embedded and Communication Systems to arrive at solutions to real world problems.*
PSO - 2	***Professional Skills:*** *Should have the capability to develop competence in using electronic modern design tools (both software and hardware) for the design and analysis of complex electronic systems in furtherance to research activities.*
PSO - 3	***Successful Career and Entrepreneurship****: Should be able to understand the need for new skills to accommodate the rapidly changing industry research pattern in this field to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an entrepreneur.*

30. (e) Program Structure: B.Tech. in Electronics and Communication Engineering

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

5. Professional Elective Courses (E)
(Any 6 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
	Sub-Stream: Electronic System Engineering				
21ECE201J	Python and Scientific Python	2	0	2	3
21ECE202T	Micro- and Nano-Fabrication Technologies	3	0	0	3
21ECE203J	Smart Sensors and Devices for Agriculture	2	0	2	3
21ECE204T	Optoelectronics	3	0	0	3
21ECE205T	Flexible Electronics	3	0	0	3
21ECE212T	Control Systems: Theory and Applications	3	0	0	3
21ECE301T	Nanoscale Electronic Devices	3	0	0	3
21ECE302J	Real Time Operating Systems	2	0	2	3
21ECE303T	MEMS Technologies	3	0	0	3
21ECE304T	Cyber Physical System Framework	3	0	0	3
21ECE305J	Machine Learning Algorithms	2	0	2	3
21ECE401T	Advanced Digital System Design	3	0	0	3
21ECE402T	Semiconductor Device Modeling	3	0	0	3
21ECE403T	Microwave Integrated Circuits	3	0	0	3
21ECE404T	Terahertz Devices and Applications	3	0	0	3
	Sub-Stream: Communication System Engineering				
21ECE220T	Wireless and Optical Sensors	3	0	0	3
21ECE221T	Radar And Navigational Aids	3	0	0	3
21ECE222T	Adhoc and Sensor Networks	3	0	0	3
21ECE223T	Satellite Communication and Broadcasting	3	0	0	3
21ECE224T	Cryptography and Network Security	3	0	0	3
21ECE225T	Optical Systems and Networks	3	0	0	3
21ECE320T	Software Defined Networks	3	0	0	3
21ECE321T	RF and Microwave Semiconductor Devices	3	0	0	3
21ECE322T	Data analytics using R	3	0	0	3
21ECE323T	Cyber Security	3	0	0	3
21ECE324T	Advanced Mobile Communication Systems	3	0	0	3
21ECE420T	Information Theory and Coding	3	0	0	3
21ECE421T	Wireless Communication Networks	3	0	0	3
	Sub-Stream: Signal Processing				
21ECE240T	Wavelets and Signal Processing	3	0	0	3
21ECE241J	Audio and Speech Processing	2	0	2	3
21ECE242J	Pattern Recognition and Neural Networks	2	0	2	3
21ECE340J	Digital Image and Video Processing	2	0	2	3
21ECE341J	DSP System Design	2	0	2	3
21ECE440T	Adaptive Signal Processing	3	0	0	3
21ECE441T	Machine Perception with Cognition	3	0	0	3
21ECE442T	Multimedia Compression Techniques	3	0	0	3
	Total Credits				**18**

8. Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				**32**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECC101J	Electronic System and PCB Design	2	0	2	3
21ECC201T	Solid State Devices	3	0	0	3
21ECC202T	Analog and Linear Electronic Circuits	3	0	0	3
21ECC203T	Digital Logic Design	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC205T	Electromagnetic Theory and Interference	3	0	0	3
21ECC211L	Devices and Digital IC Lab	0	0	4	2
21ECC222L	Analog and Linear Electronic Circuits Lab	0	0	4	2
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques	3	1	0	4
21ECC302T	Analog and Digital Communication	3	0	0	3
21ECC303T	VLSI Design and Technology	3	0	0	3
21ECC304T	Microwave and Optical Communication	3	0	0	3
21ECC311L	VLSI Design Lab	0	0	4	2
21ECC322L	Communication Lab	0	0	4	2
21ECC401T	Wireless Communication and Antenna Systems	3	0	0	3
21ECC402P	Computer Communication and Network Security	2	1	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
	Total Credits				**48**

3. Open Elective Courses (O) (Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECO101T	Short-Range Wireless Communication	3	0	0	3
21ECO102J	Electronic Circuits and Systems	2	0	2	3
21ECO103T	Modern Wireless Communication Systems	3	0	0	3
21ECO104J	PCB Design and Manufacturing	2	0	2	3
21ECO105T	Fiber Optics and Optoelectronics	3	0	0	3
21ECO106J	Embedded System Design using Arduino	2	0	2	3
21ECO107J	Embedded System Design using Raspberry Pi	2	0	2	3
21ECO108J	3D Printing Hardware and Software	2	0	2	3
	Total Credits				**9**

7. Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21ECP302L	Project	0	0	6	3
21ECP303T	MOOC	3	0	0	
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship#	0	0	10	
	Total Credits				**19**

8. Mandatory Courses (M)

Code	Course Title	L	T	P	C
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

30. (f) Programme Articulation: B.Tech. in Electronics and Communication Engineering

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21ECC101J	Electronic System and PCB Design	3	2.5	2.67		3						2		2.8	2.5	
21ECC201T	Solid State Devices	3	2										1	1		
21ECC203T	Digital logic Design	3	2	2		3								3		
21ECC205T	Electromagnetic Theory and Interference	2.4	2.6													
21ECC211L	Devices and Digital IC Lab	3	2			1								1		
21ECC202T	Analog and Linear Electronic Circuits	2	2	3												3
21ECC204T	Signal Processing	2	2.2	3	3											2.2
21ECC222L	Analog and Linear Electronic Circuits Lab	2		2		3										
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques		3	3		3								2.67		
21ECC303T	VLSI Design and Technology		2.4	2.25										2	2	
21ECC311L	VLSI Design Lab	3	3			1								1		
21ECC302T	Analog and Digital Communication	3	2.5	3		3							2	2.5	3	2.5
21ECC304T	Microwave and Optical Communication	2.8	2	2	3									3	2	
21ECC322L	Communication Lab	2		2.5	3						3			3	2	
21ECC401T	Wireless Communication and Antenna Systems	3	2.3										2			3
21ECC402P	Computer Communication and Network Security	2.67	3	2												3
21ECE201J	Python and Scientific Python		2.67	3	2	3				3				3		2.67
21ECE202T	Micro- and Nano-Fabrication Technologies	3		2	2									3		2
21ECE203J	Smart Sensors and Devices for Agriculture	3		2		2		3					2	2		2
21ECE204T	Optoelectronics	2.8	2.67	2.67	2.67											2.4
21ECE205T	Flexible Electronics	3	3										3			
21ECE212T	Control Systems: Theory and Applications	3	2.75											1		
21ECE301T	Nanoscale Electronic Devices	3	2.5			2.5								2		2.5
21ECE302J	Real Time Operating Systems	3	3	3		2								2		
21ECE303T	MEMS Technologies	2.2	2	3										2	2.75	
21ECE304T	Cyber Physical System Framework	3	2.2	3		3				3						
21ECE305J	Machine Learning Algorithms	3	1.3		3	1.8								1.4		
21ECE401T	Advanced Digital System Design	3	2	2.2		3								1		1
21ECE402T	Semiconductor Device Modeling	3	2	3												2
21ECE403T	Microwave Integrated Circuits	3	2	1.67												2
21ECE404T	Terahertz Devices and Applications	3	2.75	2	2			2						2.3	2	3
21ECE220T	Wireless and Optical Sensors	3	1	1.5												2
21ECE221T	Radar And Navigational Aids	2.8	2	3										2.3	2	
21ECE222T	Adhoc and Sensor Networks	3		2	3		3						2	1.5	2.3	
21ECE223T	Satellite Communication and Broadcasting	2.5	2	2.5										2.3	2	3
21ECE224T	Cryptography and Network Security	2.6	3	2												
21ECE225T	Optical Systems and Networks	3	2	2.5	2.5					3						3
21ECE320T	Software Defined Networks	3												2.3	2	1
21ECE321T	RF and Microwave Semiconductor Devices	3	1.8	1.5										2		1
21ECE322T	Data analytics using R		3	3		2								3		3
21ECE323T	Cyber Security		3	3										3		
21ECE324T	Advanced Mobile Communication Systems	3	2	2	2.5					3			3		2	
21ECE420T	Information Theory and Coding		3	3											2	
21ECE421T	Wireless Communication Networks	3	2.75	2	2			2						2.3	2	3
21ECE240T	Wavelets and Signal Processing	2	2	2.25	1									1		2
21ECE241J	Audio and Speech Processing	3	2	2		3	1									2
21ECE242J	Pattern Recognition and Neural Networks	1.5	1	2.3	3	3									2	2.5
21ECE340J	Digital Image and Video Processing	2.6	2.3	2.3	3									2.6	2.5	1
21ECE341J	DSP System Design	1	2.25	3	2.5											2
21ECE440T	Adaptive Signal Processing	3	2.2	2.75										2	1.5	1
21ECE441T	Machine Perception with Cognition	2.6	2	3	3									2	3	
21ECE442T	Multimedia Compression Techniques	3	2	2.3										1	1	2
	Program Average	2.73	2.30	2.45	2.54	2.49	2.00	2.33		3	3	2.00	2.14	2.09	2.13	2.21

30. (g) Implementation Plan: B.Tech. in Electronics and Communication Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21ECC101J	Electronic System and PCB Design	2	0	2	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21PDH201T	Social Engineering	2	0	0	2
21CSS201T	Computer Organization and Architecture	3	1	0	4
21ECC201T	Solid State Devices	3	0	0	3
21ECC203T	Digital Logic Design	3	0	0	3
21ECC205T	Electromagnetic Theory and Interference	3	0	0	3
21ECC211L	Devices and Digital IC Lab	0	0	4	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB203T	Probability and Stochastic Process	3	1	0	4
21ECC202T	Analog and Linear Electronic Circuits	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC222L	Analog and Linear Electronic Circuits Lab	0	0	4	2
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**21**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques	3	1	0	4
21ECC303T	VLSI Design and Technology	3	0	0	3
21ECC311L	VLSI Design Lab	0	0	4	2
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**20**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21ECC302T	Analog and Digital Communication	3	0	0	3
21ECC304T	Microwave and Optical Communication	3	0	0	3
21ECC322L	Communication Lab	0	0	4	2
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21ECP302L	Project	0	0	6	3
21ECP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**22**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
21ECC401T	Wireless Communication and Antenna Systems	3	0	0	3
21ECC402P	Computer Communication and Network Security	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21ECP401L or 21ECP402L and 21ECP403L both in eighth semester

31. B.Tech.in Electronics and Communication Engineering with specialization in Cyber Physical System

31. (a) Mission of the Department

Mission Stmt – 1	*Build an educational process that is well suited to local needs as well as satisfies the national and international accreditation requirements.*
Mission Stmt – 2	*Attract the qualified professionals and retain them by building an environment that fosters work freedom and empowerment.*
Mission Stmt – 3	*With the right talent pool, create knowledge and disseminate, get involved in collaborative research with reputed universities and produce competent graduands.*

31. (b) Program Educational Objectives (PEO)

PEO – 1	*Apply the acquired knowledge and skills in solving real-world engineering problems, considering national/global and societal issues such as health, environment, and safety.*
PEO – 2	*Design Intelligent systems, which are economically feasible and socially relevant for smart control and computing.*
PEO – 3	*Develop an attitude toward pursuing knowledge and advanced education for sustained career advancement to adapt to emerging fields.*
PEO – 4	*Demonstrate leadership qualities and effective communication skills to work in a team of enterprising people in a multidisciplinary and multicultural environment with strong adherence to professional ethics.*

31. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*1*	*2*	*3*
PEO – 2	*3*	*3*	*3*
PEO – 3	*2*	*1*	*3*
PEO – 4	*3*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

31. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*				*3*	*3*	*2*					*3*	-	-
PEO – 2			*3*	*3*	*3*	*3*			*2*		*3*		-	*3*	-
PEO – 3				*3*	*3*		*2*	*2*		*2*		*3*	-	*2*	*3*
PEO – 4								*3*	*3*	*3*	*3*		-	-	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	**Problem solving skills**: *Should be able to understand and explain cyber-physical system component architectures and their implementation in a wide range of domains such as transportation, defense, energy and industrial automation, health and biomedical, agricultural and critical infrastructure.*
PSO - 2	**Professional skills:** *Should be able to analyze existing cyber-physical systems and to evaluate the security of cyber-physical systems according to industry recognized security frameworks and present findings and recommendations.*
PSO - 3	***Successful Career and Entrepreneurship***: *Should be able to explain how the interdisciplinary fields such as Information Technology, Electrical & Computer Engineering, Mechanical Engineering, and Cybersecurity relate to cyber-physical systems.*

31. (e) Program Structure: B.Tech. in Electronics and Communication Engineering w/s in Cyber Physical System

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

List of Professional Elective Courses (E)
Any 6 Courses

Course Code	Course Title	Hours/ Week L	T	P	C
21ECE250J	Sensors and Actuators for Cyber Physical System	2	0	2	3
21ECE251T	Embedded and Implanted Devices for Cyber Physical System	3	0	0	3
21ECE304T	Cyber Physical System Framework	3	0	0	3
21ECE323T	Cyber Security	3	0	0	3
21ECE252J	Cyber Physical Control System	2	0	2	3
21ECE350T	Real Time Cyber Physical System	3	0	0	3
21ECE351T	Unsupervised Intelligence in Cyber Physical System	3	0	0	3
21ECE352T	High Performance Computing for Cyber Physical System	3	0	0	3
21ECE450T	Design of Cyber Physical System	3	0	0	3
21ECE451T	Cyber Physical Interface and Automation	3	0	0	3
21ECE452T	Cloud and Distributed Systems for Cyber Physical System	3	0	0	3
21ECE453T	Mobile Cyber Physical System	3	0	0	3
	Total Credits				**18**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB203T	Probability and Stochastic Process	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECC101J	Electronic System and PCB Design	2	0	2	3
21ECC201T	Solid State Devices	3	0	0	3
21ECC202T	Analog and Linear Electronic Circuits	3	0	0	3
21ECC203T	Digital Logic Design	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC205T	Electromagnetic Theory and Interference	3	0	0	3
21ECC211L	Devices and Digital IC Lab	0	0	4	2
21ECC222L	Analog and Linear Electronic Circuits Lab	0	0	4	2
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques	3	1	0	4
21ECC302T	Analog and Digital Communication	3	0	0	3
21ECC303T	VLSI Design and Technology	3	0	0	3
21ECC304T	Microwave and Optical Communication	3	0	0	3
21ECC311L	VLSI Design Lab	0	0	4	2
21ECC322L	Communication Lab	0	0	4	2
21ECC401T	Wireless Communication and Antenna Systems	3	0	0	3
21ECC402P	Computer Communication and Network Security	2	1	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
	Total Credits				**48**

Open Elective Courses (O) (Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECO101T	Short-Range Wireless Communication	3	0	0	3
21ECO102J	Electronic Circuits and Systems	2	0	2	3
21ECO103T	Modern Wireless Communication Systems	3	0	0	3
21ECO104J	PCB Design and Manufacturing	2	0	2	3
21ECO105T	Fiber Optics and Optoelectronics	3	0	0	3
21ECO106J	Embedded System Design using Arduino	2	0	2	3
21ECO107J	Embedded System Design using Raspberry Pi	2	0	2	3
21ECO108J	3D Printing Hardware and Software	2	0	2	3
	Total Credits				**9**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21ECP302L	Project	0	0	6	3
21ECP303T	MOOC	3	0	0	
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship#	0	0	10	
	Total Credits				**19**

31. (f) Programme Articulation: B.Tech. in Electronics and Communication Engineering w/s in Cyber Physical System

		Program Outcome (PO)												PSO		
Course Code	**Course Name**	*Engineering Knowledge*	*Problem Analysis*	*Design/development of solutions*	*Conduct investigations of complex problems*	*Modern Tool Usage*	*The engineer and society*	*Environment & Sustainability*	*Ethics*	*Individual & Team Work*	*Communication*	*Project Mgt. & Finance*	*Life Long Learning*	*PSO-1*	*PSO-2*	*PSO-3*
21ECC101J	*Electronic System and PCB Design*	3	2.5	2.67	-	3	-	-	-	-	-	2	-	2.8	2.5	-
21ECC201T	*Solid State Devices*	3	2	-	-	-	-	-	-	-	-	-	1	1	-	-
21ECC203T	*Digital Logic Design*	3	2	2	-	3	-	-	-	-	-	-	-	3	-	-
21ECC205T	*Electromagnetic Theory and Interference*	2.4	2.6	-	-		-	-	-	-	-	-	-	-	-	-
21ECC211L	*Devices and Digital IC Lab*	3	2	-	-	1	-	-	-	-	-	-		1	-	-
21ECC202T	*Analog and Linear Electronic Circuits*	2	2	3	-	-	-	-	-	-	-	-	-	-	-	3
21ECC204T	*Signal Processing*	2	2.2	3	3	-	-	-	-	-	-	-	-	-	-	2.2
21ECC222L	*Analog and Linear Electronic Circuits Lab*	2	-	2	-	3	-	-	-	-	-	-	-	-	-	-
21ECC301P	*Microprocessor, Microcontroller and Interfacing Techniques*	-	3	3	-	3	-	-	-	-	-	-	-	2.67	-	-
21ECC303T	*VLSI Design and Technology*	-	2.4	2.25	-		-	-	-	-	-	-	-	2	2	-
21ECC311L	*VLSI Design Lab*	3	3	-	-	1	-	-	-	-	-	-	-	1	-	-
21ECC302T	*Analog and Digital Communication*	3	2.5	3	-	3	-	-	-	-	-	-	2	2.5	3	2.5
21ECC304T	*Microwave and Optical Communication*	2.8	2	2	3	-	-	-	-	-	-	-	-	3	2	-
21ECC322L	*Communication Lab*	2	-	2.5	3	-	-	-	-	-	3	-	-	3	2	-
21ECC401T	*Wireless Communication and Antenna Systems*	3	2.3	-	-	-	-	-	-	-	-	-	2	-	-	3
21ECC402P	*Computer Communication and Network Security*	2.67	3	2	-	-	-	-	-	-	-	-	-	-	-	3
21ECE250J	*Sensors and Actuators for Cyber Physical System*	3	2.5	3	3	3	-	2	-	-	-	-	2	3	3	2
21ECE251T	*Embedded and Implanted Devices for Cyber Physical System*	1	2	3	-	2	-	-	-	1	2	-	2	-	-	3
21ECE304T	*Cyber Physical System Framework*	3	2.2	3	-	3	-	-	-	3	-	-	-	-	-	-
21ECE323T	*Cyber Security*	-	3	3	-	-	-	-	-	-	-	-	-	3	-	-
21ECE252J	*Cyber Physical Control System*	3	2.67	2	-	-	-	-	-	-	-	-	-	-	-	-
21ECE350T	*Real Time Cyber Physical System*	-	-	3	-	-	-	3	-	-	-	-	2	-	3	-
21ECE351T	*Unsupervised Intelligence in Cyber Physical System*	3	2	3	-	3	-	-	-	-	-	-	-	-	-	-
21ECE352T	*High Performance Computing for Cyber Physical System*	3	2	3	-	1.67	-	-	-	-	-	-	-	-	-	-
21ECE450T	*Design of Cyber Physical System*	3	2.33	3	3	3	-	-	-	-	-	-	-	3	3	2
21ECE451T	*Cyber Physical Interface and Automation*	2	3	2	-	1	-	-	-	1.6	1	-	3	-	-	-
21ECE452T	*Cloud and Distributed Systems for Cyber Physical System*	2	3	2.6	-	-	2	-	-	-	-	2	-	-	-	-
21ECE453T	*Mobile Cyber Physical System*	2.2	2	3	-	-	-	-	-	-	-	-	-	-	-	-
	Program Average	2.59	2.41	2.65	3.00	2.41	2.00	2.50	-	1.87	2.00	2.00	2.00	2.38	2.56	2.59

31. (g) Implementation Plan: B.Tech. in Electronics and Communication Engineering w/s in Cyber Physical System

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21ECC101J	Electronic System and PCB Design	2	0	2	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21PDH201T	Social Engineering	2	0	0	2
21CSS201T	Computer Organization and Architecture	3	1	0	4
21ECC201T	Solid State Devices	3	0	0	3
21ECC203T	Digital Logic Design	3	0	0	3
21ECC205T	Electromagnetic Theory and Interference	3	0	0	3
21ECC211L	Devices and Digital IC Lab	0	0	4	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB203T	Probability and Stochastic Process	3	1	0	4
21ECC202T	Analog and Linear Electronic Circuits	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC222L	Analog and Linear Electronic Circuits Lab	0	0	4	2
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**21**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques	3	1	0	4
21ECC303T	VLSI Design and Technology	3	0	0	3
21ECC311L	VLSI Design Lab	0	0	4	2
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**20**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21ECC302T	Analog and Digital Communication	3	0	0	3
21ECC304T	Microwave and Optical Communication	3	0	0	3
21ECC322L	Communication Lab	0	0	4	2
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21ECP302L	Project	0	0	6	3
21ECP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**22**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
21ECC401T	Wireless Communication and Antenna Systems	3	0	0	3
21ECC402P	Computer Communication and Network Security	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21ECP401L or 21ECP402L and 21ECP403L both in eighth semester

32. B.Tech.in Electronics and Communication Engineering with specialization in Data Science

32. (a) Mission of the Department

Mission Stmt – 1	*Build an educational process that is well suited to local needs as well as satisfies the national and international accreditation requirements.*
Mission Stmt – 2	*Attract the qualified professionals and retain them by building an environment that fosters work freedom and empowerment.*
Mission Stmt – 3	*With the right talent pool, create knowledge and disseminate, get involved in collaborative research with reputed universities and produce competent graduands.*

32. (b) Program Educational Objectives (PEO)

PEO – 1	*Apply the acquired knowledge and skills in solving real-world engineering problems, considering national/global and societal issues such as health, environment, and safety.*
PEO – 2	*Design data analytics model for optimized solutions, which are economically feasible and socially relevant.*
PEO – 3	*Develop an attitude toward pursuing knowledge and advanced education for sustained career advancement to adapt to emerging fields.*
PEO – 4	*Demonstrate leadership qualities and effective communication skills to work in a team of enterprising people in a multidisciplinary and multicultural environment with strong adherence to professional ethics.*

32. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*1*	*2*	*3*
PEO – 2	*3*	*3*	*3*
PEO – 3	*2*	*1*	*3*
PEO – 4	*3*	*3*	*3*

32. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*				*3*	*3*	*2*					*3*	-	-
PEO – 2			*3*	*3*	*3*	*3*			*2*		*3*		-	*3*	-
PEO – 3				*3*	*3*		*2*	*2*		*2*		*3*	-	*2*	*3*
PEO – 4								*3*	*3*	*3*	*3*		-	-	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	***Problem Solving Skills**: Should be able to identify and deploy data science and engineering components and provide efficient solutions in solving real-world problems in medicine, science, industry, and numerous other fields.*
PSO - 2	***Professional Skills**: Should be able to develop new tools and methods in data collection, integration, cleansing, and representation for real-time data processing.*
PSO - 3	**Successful Career and Entrepreneurship**: *Create technologically innovative products, Interpret / analyze multi-disciplinary data and propose optimal solution through data analytics.*

32. (e) Program Structure: B.Tech. in Electronics and Communication Engineering w/s in Data Science

Humanities & Social Sciences including Management Courses (H)					
Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

3. Engineering Science Courses (S)					
Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

Professional Elective Courses (E) (Any 6 Elective Courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
21ECE270T	Statistics for Data Science	3	0	0	3
21ECE271T	Regression and Multivariate Data Analysis	3	0	0	3
21ECE272T	Data Analytics Using SAS	3	0	0	3
21ECE273T	Python for Data Sciences	3	0	0	3
21ECE274T	Machine learning for data analytics	3	0	0	3
21ECE275T	Tableau for Business Intelligence	3	0	0	3
21ECE322T	Data analytics using R	3	0	0	3
21ECE370T	Block chain in Data Analytics	3	0	0	3
21ECE371T	Database Design and Management	3	0	0	3
21ECE372T	Deep Learning for Data Analytics	3	0	0	3
21ECE373T	Julia For Data Science	3	0	0	3
21ECE374T	Data Pattern and Visualization	3	0	0	3
21ECE375T	Data Science for Communication Networks	3	0	0	3
21ECE376T	Business data analytics	3	0	0	3
21ECE377T	Big Data Analytics Strategies for the Smart Grid	3	0	0	3
21ECE470T	Cloud and Distributed Computing for data analytics	3	0	0	3
21ECE471T	Data Mining Techniques	3	0	0	3
21ECE472T	Social Media Data Analytics	3	0	0	3
21ECE473T	Data Science for IoT Engineers: A Systems Analytics Approach Media Analytics	3	0	0	3
21ECE474T	Big Data Analytics Tools	3	0	0	3
21ECE475T	Tools for Real-time Data Processing and Analytics	3	0	0	3
21ECE476T	Data Analytics with Spark Using Python	3	0	0	3
21ECE477T	Big Data and Health Care Analytics	3	0	0	3
	Total Credits				***18***

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)					
Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21ECP302L	Project	0	0	6	3
21ECP303T	MOOC	3	0	0	
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship#	0	0	10	
	Total Credits				**19**

Basic Science Courses (B)					
Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB203T	Probability and Stochastic Process	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				**32**

Professional Core Courses (C)					
Course Code	Course Title	Hours/ Week L	T	P	C
21ECC101J	Electronic System and PCB Design	2	0	2	3
21ECC201T	Solid State Devices	3	0	0	3
21ECC202T	Analog and Linear Electronic Circuits	3	0	0	3
21ECC203T	Digital Logic Design	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC205T	Electromagnetic Theory and Interference	3	0	0	3
21ECC211L	Devices and Digital IC Lab	0	0	4	2
21ECC222L	Analog and Linear Electronic Circuits Lab	0	0	4	2
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques	3	1	0	4
21ECC302T	Analog and Digital Communication	3	0	0	3
21ECC303T	VLSI Design and Technology	3	0	0	3
21ECC304T	Microwave and Optical Communication	3	0	0	3
21ECC311L	VLSI Design Lab	0	0	4	2
21ECC322L	Communication Lab	0	0	4	2
21ECC401T	Wireless Communication and Antenna Systems	3	0	0	3
21ECC402P	Computer Communication and Network Security	2	1	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
	Total Credits				**48**

Open Elective Courses (O) (Any 3 courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
21ECO101T	Short-Range Wireless Communication	3	0	0	3
21ECO102J	Electronic Circuits and Systems	2	0	2	3
21ECO103T	Modern Wireless Communication Systems	3	0	0	3
21ECO104J	PCB Design and Manufacturing	2	0	2	3
21ECO105T	Fiber Optics and Optoelectronics	3	0	0	3
21ECO106J	Embedded System Design using Arduino	2	0	2	3
21ECO107J	Embedded System Design using Raspberry Pi	2	0	2	3
21ECO108J	3D Printing Hardware and Software	2	0	2	3
	Total Credits				**9**

Mandatory Courses (M)					
Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

32. (f) Programme Articulation: B.Tech. in Electronics and Communication Engineering w/s in Data Science

Course Code	Course Name	Program Outcomes (PO)												PSO		
		Graduate Attributes														
		Engineering Knowledge	*Problem Analysis*	*Design/development of solutions*	*Conduct investigations of complex problems*	*Modern Tool Usage*	*The engineer and society*	*Environment & Sustainability*	*Ethics*	*Individual & Team Work*	*Communication*	*Project Mgt. & Finance*	*Life Long Learning*	*PSO 1*	*PSO 2*	*PSO 3*
21ECC101J	*Electronic System and PCB Design*	2	-	3	2	3	-	-	-	-	-	-	-	-	-	-
21ECC201T	*Solid State Devices*	3	3	-	-	3	-	-	-	3	2	-	2	1	1	-
21ECC202T	*Analog and Linear Electronic Circuits*	3	2	3	-	-	-	-	-	-	-	-	-	1	-	2
21ECC203T	*Digital Logic Design*	3	2	3	-	3	-	-	-	-	-	-	-	1	-	2
21ECC204T	*Signal Processing*	3	2	3	-	-	-	-	-	-	-	-	-	2	1	3
21ECC205T	*Electromagnetic Theory and Interference*	2	3	-	-	-	-	-	-	-	-	-	1	-	-	2
21ECC211L	*Devices and Digital IC Lab*	3	2	3	-	3	-	-	-	-	-	-	-	1	-	2
21ECC222L	*Analog and Linear Electronic Circuits Lab*	3	2	3	-	-	-	-	-	-	-	-	-	1	-	2
21ECC301P	*Microprocessor, Microcontroller and Interfacing Techniques*	-	2	3	-	3	-	-	-	-	-	-	2	1	-	2
21ECC302T	*Analog and Digital Communication*	3	2	3	3	2	-	-	-	-	-	-	-	2	2	3
21ECC303T	*VLSI Design and Technology*	3	2	3	-	3	-	-	-	-	-	-	-	2	-	2
21ECC304T	*Microwave and Optical Communication*	3	3	3	2	3	-	-	-	-	-	-	-	2	-	2
21ECC311L	*VLSI Design Lab*	3	2	3	-	3	-	-	-	-	-	-	-	2	-	2
21ECC322L	*Communication Lab*	3	2	3	3	2	-	-	-	-	-	-	-	2	2	3
21ECC401T	*Wireless Communication and Antenna Systems*	3	3	3	3	-	2	2	-	-	-	-	2	2	-	3
21ECC402P	*Computer Communication and Network Security*	-	-	2	-	1	1	2	-	-	-	-	2	-	-	3
21ECE270T	*Statistics for Data Science*	1	3	-	-	3	-	-	-	-	-	-	-	3	2	-
21ECE271T	*Regression and Multivariate Data Analysis*	2	3	-	3	3	-	-	-	-	-	-	-	3	2	-
21ECE272T	*Data Analytics Using SAS*	1	2	-	-	3	-	-	-	-	-	-	-	3	2	-
21ECE273T	*Python for Data Sciences*	2	1	-	-	3	-	-	-	-	-	-	-	2	3	-
21ECE274T	*Machine learning for data analytics*	3	3	-	2	3	-	-	-	-	-	-	-	2	3	-
21ECE275T	*Tableau for Business Intelligence*	1	2	-	-	3	-	-	-	-	-	-	-	1	3	-
21ECE322T	*Data analytics using R*	2	2	-	-	3	-	-	-	-	-	-	-	1	3	-
21ECE370T	*Block chain in Data Analytics*	3	1	-	-	3	-	-	-	-	-	-	-	-	3	-
21ECE371T	*Database Design and Management*	3		2	-	3	-	-	-	-	-	-	-	-	3	-
21ECE372T	*Deep Learning for Data Analytics*	3	3	-	2	3	-	-	-	-	-	-	-	2	3	-
21ECE373T	*Julia For Data Science*	2	2	-	-	3	-	-	-	-	-	-	-	1	3	-
21ECE374T	*Data Pattern and Visualization*	2	3	-	-	3	-	-	-	-	-	-	-	2	3	-
21ECE375T	*Data Science for Communication Networks*	3	2	-	-	3	-	-	-	-	-	-	-	2	3	-
21ECE376T	*Business data analytics*	2	2	-	-	3	-	-	-	-	-	-	-	3	3	-
21ECE377T	*Big Data Analytics Strategies for the Smart Grid*	3	2	-	2	3	-	-	-	-	-	-	-	2	2	-
21ECE470T	*Cloud and Distributed Computing for data analytics*	2	-	2	-	3	-	-	-	-	-	-	-	-	3	-
21ECE471T	*Data Mining Techniques*	2	2	-	-	3	-	-	-	-	-	-	-	2	3	-
21ECE472T	*Social Media Data Analytics*	1	3	-	-	3	1	-	-	-	-	-	-	2	1	-
21ECE473T	*Data Science for IoT Engineers: A Systems Analytics Approach Media Analytics*	3	2	-	1	3	-	-	-	-	-	-	-	2	2	-
21ECE474T	*Big Data analytics tools*	*2*	-	-	*3*	*3*	-	-	-	-	-	-	-	*2*	*3*	-
21ECE475T	*Tools for Real-time Data Processing and Analytics*	*2*	-	-	*2*	*3*	-	-	-	-	-	-	-	-	*3*	-
21ECE476T	*Data Analytics with Spark Using Python*	*3*	-	-	*2*	*3*	-	-	-	-	-	-	-	*2*	*3*	-
21ECE477T	*Big Data and Health care Analytics*	*3*	-	-	*2*	*3*	-	-	-	-	-	-	-	*1*	*3*	-
	Program Average	*2.47*	*2.26*	*2.81*	*2.29*	*2.88*	*2*	*2*	-	*3*	*2*	-	*1.8*	*1.81*	*2.52*	*2.36*

32. (g) Implementation Plan: B.Tech. in Electronics and Communication Engineering w/s in Data Science

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21ECC101J	Electronic System and PCB Design	2	0	2	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21PDH201T	Social Engineering	2	0	0	2
21CSS201T	Computer Organization and Architecture	3	1	0	4
21ECC201T	Solid State Devices	3	0	0	3
21ECC203T	Digital Logic Design	3	0	0	3
21ECC205T	Electromagnetic Theory and Interference	3	0	0	3
21ECC211L	Devices and Digital IC Lab	0	0	4	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB203T	Probability and Stochastic Process	3	1	0	4
21ECC202T	Analog and Linear Electronic Circuits	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC222L	Analog and Linear Electronic Circuits Lab	0	0	4	2
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**21**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques	3	1	0	4
21ECC303T	VLSI Design and Technology	3	0	0	3
21ECC311L	VLSI Design Lab	0	0	4	2
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**20**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21ECC302T	Analog and Digital Communication	3	0	0	3
21ECC304T	Microwave and Optical Communication	3	0	0	3
21ECC322L	Communication Lab	0	0	4	2
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21ECP302L	Project	0	0	6	3
21ECP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**22**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
21ECC401T	Wireless Communication and Antenna Systems	3	0	0	3
21ECC402P	Computer Communication and Network Security	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21ECP401L or 21ECP402L and 21ECP403L both in eighth semester

33.B.Tech.in Electronics and Computer Engineering

33. (a) Mission of the Department

Mission Stmt – 1	*Build an educational process that is well suited to local needs as well as satisfies the national and international accreditation requirements.*
Mission Stmt – 2	*Attract the qualified professionals and retain them by building an environment that fosters work freedom and empowerment.*
Mission Stmt – 3	*With the right talent pool, create knowledge and disseminate, get involved in collaborative research with reputed universities and produce competent graduands.*

33. (b) Program Educational Objectives (PEO)

PEO – 1	*Apply the acquired knowledge and skills in solving real-world engineering problems, considering national/global and societal issues such as health, environment, and safety.*
PEO – 2	*Devise novel computer-based embedded solutions/ products which are economically feasible and socially relevant.*
PEO – 3	*Develop an attitude toward pursuing knowledge and advanced education for sustained career advancement to adapt to emerging fields.*
PEO – 4	*Demonstrate leadership qualities and effective communication skills to work in a team of enterprising people in a multidisciplinary and multicultural environment with strong adherence to professional ethics.*

33. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*1*	*2*	*3*
PEO – 2	*3*	*3*	*3*
PEO – 3	*2*	*1*	*3*
PEO – 4	*3*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

33. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3	3	-	-	-	3	3	2	-	-	-	-	3	-	-
PEO – 2	-	-	3	3	3	3	-	-	2	-	3	-	-	3	-
PEO – 3	-	-	-	3	3	-	2	2	-	2	-	3	-	2	3
PEO – 4	-	-	-	-	-	-	-	3	3	3	3	-	-	-	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	***Problem-Solving Skills:*** *Apply the concepts of electronics, signal processing, embedded systems and programming using latest hardware and software tools to design, develop and implement application-oriented computing systems.*
PSO - 2	***Professional Skills:*** *Demonstrate analytical and managerial skills to arrive at cost effective and optimum solutions either independently or as a team.*
PSO - 3	***Successful Career and Entrepreneurship:*** *Carry out their professional responsibilities in an ethical manner giving due consideration to societal and environmental well-being.*

33. (e) Program Structure: B.Tech. in Electronics and Computer Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

Professional Elective Courses (E)
(Any 6 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
	Sub-Stream: Electronics Engineering				
21ECE210P	IoT System Design	2	1	0	3
21ECE211T	Electromagnetics and Antenna Theory	3	0	0	3
21ECE212T	Control Systems: Theory and Applications	3	0	0	3
21ECE220T	Wireless and Optical Sensors	3	0	0	3
21ECE310J	Applied Digital Signal Processing	2	0	2	3
21ECE311T	Digital Communication Systems	3	0	0	3
21ECE421T	Wireless Communication Networks	3	0	0	3
21ECE410T	ASIC Design	3	0	0	3
21ECE411T	Embedded Linux	3	0	0	3
21ECE412T	Algorithms for Cryptography	3	0	0	3
	Sub-Stream: Computer Engineering				
21ECE231T	Principles of Cloud Computing	3	0	0	3
21ECE232T	Data Analysis and Visualization	3	0	0	3
21ECE305J	Machine Learning Algorithms	2	0	2	3
21ECE330T	Full Stack Development	3	0	0	3
21ECE331T	Data Mining and Analytics	3	0	0	3
21ECE332J	Multi-Core Architecture and Programming	2	0	2	3
21ECE333T	Hardware Software Co-Design	3	0	0	3
21ECE304T	Cyber Physical System Framework	3	0	0	3
21ECE430T	Introduction to Virtual Computing	3	0	0	3
21ECE431T	Mobile Computing	3	0	0	3
21ECE432T	Quantum Computing	3	0	0	3
21ECE433T	Deep Learning	3	0	0	3
21ECE434T	Web of Things	3	0	0	3
	Total Credits				**18**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21ECP302L	Project	0	0	6	3
21ECP303T	MOOC	3	0	0	
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship#	0	0	10	
	Total Credits				**19**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECC112J	Systems Programming	3	0	2	4
21ECC212T	Data Structures and Algorithms	3	0	0	3
21ECC213J	Analog Devices and Circuits	3	0	2	4
21ECC203T	Digital Logic Design	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC215J	Object Oriented Design and Programming	3	0	2	4
21ECC233L	Data Structures Lab	0	0	4	2
21ECC312T	Hardware Interfacing and Networking	3	0	0	3
21ECC313P	Embedded Microcontrollers	3	1	0	4
21ECC314J	Embedded Hardware and Operating systems	2	0	2	3
21ECC315T	Database Management Systems	3	0	0	3
21ECC317T	Data Communication and PLC	3	0	0	3
21ECC412J	Programming with Python	2	0	2	3
21ECC413T	FPGA based Embedded Systems	3	0	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
	Total Credits				**48**

Open Elective Courses (O)
(Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECO101T	Short-Range Wireless Communication	3	0	0	3
21ECO102J	Electronic Circuits and Systems	2	0	2	3
21ECO103T	Modern Wireless Communication Systems	3	0	0	3
21ECO104J	PCB Design and Manufacturing	2	0	2	3
21ECO105T	Fiber Optics and Optoelectronics	3	0	0	3
21ECO106J	Embedded System Design using Arduino	2	0	2	3
21ECO107J	Embedded System Design using Raspberry Pi	2	0	2	3
21ECO108J	3D Printing Hardware and Software	2	0	2	3
	Total Credits				**9**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

33. (f) Program Articulation: B.Tech. in Electronics and Computer Engineering

		Program Outcome (PO)												PSO		
Course Code	**Course Name**	*Engineering Knowledge*	*Problem Analysis*	*Design/development of solutions*	*Conduct investigations of complex problems*	*Modern Tool Usage*	*The engineer and society*	*Environment & Sustainability*	*Ethics*	*Individual & Team Work*	*Communication*	*Project Mgt. & Finance*	*Life Long Learning*	*PSO-1*	*PSO-2*	*PSO-3*
21ECC112J	*Systems Programming*	2	2	3	2	3	-	-	-	-	-	-	-	2	-	-
21ECC203T	*Digital logic Design*	3	2	2	-	3	-	-	-	-	-	-	-	3	-	-
21ECC204T	*Signal Processing*	2	2.2	3	3	-	-	-	-	-	-	-	-	-	-	2.2
21ECC212T	*Data Structures and Algorithms*	1	2.4	2.6	-	-	-	-	-	-	-	-	-	2.3	2	3
21ECC213J	*Analog Devices and Circuits*	3	2	3	-	-	-	-	-	-	-	-	2	2	2	2
21ECC215J	*Object Oriented Design and Programming*	-	3	2.25	2	2.7	-	-	-	-	-	-	-	3	2.5	-
21ECC233L	*Data Structures Lab*	-	1	2		3	-	-	-	-	-	-	-	2.3	2	3
21ECC312T	*Hardware Interfacing and Networking*	3	2	2.5	2	-	-	-	-	-	-	-	-	1	-	-
21ECC313P	*Embedded Microcontrollers*	-	-	3	3	2	-	-	-	-	-	-	-	3	3	-
21ECC314J	*Embedded Hardware and Operating Systems*	3	-	-	2	2	-	-	-	-	-	-	-	3	-	-
21ECC315T	*Data Base Management Systems*	2.4	2.2	2	-	3	-	-	-	-	-	-	-	3	2	-
21ECC317T	*Data Communication and PLC*	2	2.3	2	3	3	-	-	-	-	-	-	-	2	-	2
21ECC412J	*Programming with Python*	-	3	3	2.5	3	-	-	-	3	-	-	-	2	-	2.7
21ECC413T	*FPGA based Embedded Systems*	2.3	-	3	-	2.6	-	-	-	-	-	-	-	2.7	-	-
21ECE210P	*IOT System Design*	3	-	2	2	1.7	-	-	-	-	-	-	2.5	2.7	-	2
21ECE211T	*Electromagnetics and Antenna Theory*	2.6	2.4	-	-	-	-	-	-	-	-	-	-	2	-	-
21ECE212T	*Control Systems: Theory and Applications*	3	2.75	2	1	-	-	-	-	-	-	-	-	3	-	-
21ECE220T	*Wireless and Optical Sensors*	3	1	1.5	-	-	-	-	-	-	-	-	-	-	-	2
21ECE231T	*Principles of Cloud Computing*	3	2.25	-	2	2	-	-	-	-	-	-	-	3	2	-
21ECE232T	*Data Analysis and Visualization*	3	2.75	-	3	3	2	-	-	-	2.5	-	3	3	2.75	-
21ECE310J	*Applied Digital Signal Processing*	2.7	2.3	2.3	3	-	-	-	-	-	-	-	-	-	-	2
21ECE311T	*Digital Communication Systems*	2.5	2	2.5	-	-	-	-	-	-	-	-	-	2.3	2	3
21ECE330T	*Full Stack Development*	3	-	2	-	-	-	-	-	-	-	-	-	3	-	-
21ECE331T	*Data Mining and Analytics*	3	1.7	3	-	2	-	-	-	-	-	-	-	2.5	-	1
21ECE332J	*Multi-core Architecture and Programming*	3	2.7	2	-	-	-	-	-	-	-	-	-	2	-	-
21ECE333T	*Hardware software Co-Design*	3	2	3	-	-	-	-	-	-	-	-	2	2	-	-
21ECE411T	*Embedded Linux*	3		3	3	3	-	-	-	-	-	-	-	3	-	-
21ECE412T	*Algorithms for Cryptography*	2.5	3	2	-	-	-	-	-	-	-	-	-	2	2.3	-
21ECE430T	*Introduction to Virtual Computing*	3	2	2	-	-	1.5	-	-	-	-	-	2	-	1	-
21ECE431T	*Mobile Computing*	3	3	1.5	-	3	2	-	-	3	-	-	-	-	-	-
21ECE432T	*Quantum Computing*	3	2	3	1.5	2	-	-	-	-	-	-	1	-	-	-
21ECE433T	*Deep Learning*	3	2	3	3	3	-	-	-	-	-	-	3	2	-	3
21ECE434T	*Web of Things*	3	2	-	-	2.3	3	3	-	-	-	-	-	3	-	-
21ECE305J	*Machine Learning Algorithms*	3	1.3	-	3	1.8	-	-	-	-	-	-	-	1.4	-	-
21ECE304T	*Cyber Physical System Framework*	3	2.2	3		3				3						
21ECE410T	*ASIC Design*	3	2.67	2.67	2	2	-	-	-	2	-	-	-	3	-	1.5
	Program Average	2.8	2.2	2.5	2.4	2.6	2.1	3.0		2.8	2.5		2.2	2.5	2.1	2.3

33. (g) Implementation Plan: B.Tech. in Electronics and Computer Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21ECC112J	Systems Programming	3	0	2	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21PDH201T	Social Engineering	2	0	0	2
21CSS201T	Computer Organization and Architecture	3	1	0	4
21ECC213J	Analog Devices and Circuits	3	0	2	4
21ECC203T	Digital Logic Design	3	0	0	3
21ECC215J	Object Oriented Design and Programming	3	0	2	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21ECC212T	Data Structures and Algorithms	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC233L	Data Structures Lab	0	0	4	2
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**21**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21ECC313P	Embedded Microcontrollers	3	2	0	4
21ECC315T	Database Management Systems	3	0	0	3
21ECC317T	Data Communication and PLC	3	0	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21ECC312T	Hardware Interfacing and Networking	3	0	0	3
21ECC314J	Embedded Hardware and Operating systems	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21ECP302L	Project	0	0	6	3
21ECP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
21ECC412J	Programming with Python	2	0	2	3
21ECC413T	FPGA based Embedded Systems	3	0	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
O	Open Elective –III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21ECP401L or 21ECP402L and 21ECP403L both in eighth semester

34. B.Tech.in Electronics Engineering (VLSI Design and Technology)

34. (a) Mission of the Department

Mission Stmt – 1	*Build an educational process that is well suited to local needs as well as satisfies the national and international accreditation requirements.*
Mission Stmt – 2	*Attract the qualified professionals and retain them by building an environment that fosters work freedom and empowerment.*
Mission Stmt – 3	*With the right talent pool, create knowledge and disseminate, get involved in collaborative research with reputed universities and produce competent graduands.*

34. (b) Program Educational Objectives (PEO)

PEO – 1	*Apply the acquired knowledge and skills in solving real-world engineering problems, considering national/global and societal issues such as health, environment, and safety.*
PEO – 2	*Design VLSI systems, which are economically feasible and socially relevant for promoting sustainable semiconductor and electronics eco-system.*
PEO – 3	*Develop an attitude toward pursuing knowledge and advanced education for sustained career advancement to adapt to emerging fields.*
PEO – 4	*Demonstrate leadership qualities and effective communication skills to work in a team of enterprising people in a multidisciplinary and multicultural environment with strong adherence to professional ethics.*

34. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*1*	*2*	*3*
PEO – 2	*3*	*3*	*3*
PEO – 3	*2*	*1*	*3*
PEO – 4	*3*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

34. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*				*3*	*3*	*2*					*3*	*3*	
PEO – 2			*3*	*3*	*3*	*3*			*2*		*3*		*3*		
PEO – 3				*3*	*3*		*2*	*2*		*2*		*3*			*3*
PEO – 4								*3*	*3*	*3*	*3*				*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	***Problem Solving Skills**: Contribute to the Indian/global semiconductor and electronics ecosystem with innovative approaches to design, manufacture, and test integrated systems.*
PSO - 2	***Professional Skills**: Apply knowledge of complete design flow from specification to silicon in areas of both digital and analog VLSI Design*
PSO - 3	***Successful Career and Entrepreneurship**: Promote inter-disciplinary work in semiconductor physics, computer science, and electrical engineering to create exciting new systems with greatly increased functionalities.*

34. (e) Program Structure: B.Tech. in Electronics Engineering (VLSI Design and Technology)

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

Professional Elective Courses (E)
(Any 6 Elective Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECE201J	Python and Scientific Python	2	0	2	3
21ECE260T	Industrial Electronics	3	0	0	3
21ECE261T	Measurements and Instrumentation	3	0	0	3
21ECE262T	Low Power Sensors Technology	3	0	0	3
21ECE263T	Micro, Nano Electromechanical devices	3	0	0	3
21ECE204T	Optoelectronics	3	0	0	3
21ECE205T	Flexible Electronics	3	0	0	3
21ECE301T	Nanoscale Electronic Devices	3	0	0	3
21ECE361T	Consumer Electronics and Trouble shooting	3	0	0	3
21ECE362T	Quality and Reliability Engineering	3	0	0	3
21ECE363T	Electronic Packaging	3	0	0	3
21ECE364T	Digital Signal Processors Architectures and Applications	3	0	0	3
21ECE365T	Design Verification of VLSI circuits	3	0	0	3
21ECE460T	Emerging Processor based System Design	3	0	0	3
21ECE461T	Semiconductor Memory Design	3	0	0	3
21ECE462T	Machine Learning and Artificial Intelligence for Electronics Design	3	0	0	3
21ECE463T	Scripting Language for Electronic Design Automation	3	0	0	3
21ECE464T	Statistical Analysis and Optimization for VLSI	3	0	0	3
21ECE465T	Device and Process Modelling	3	0	0	3
21ECE466T	Low Power Circuit Design	3	0	0	3
21ECE467T	High speed IC Design	3	0	0	3
21ECE468T	System and Network on Chip	3	0	0	3
21ECE404T	Terahertz Devices and Applications	3	0	0	3
	Total Credits				**18**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21ECP302L	Project	0	0	6	3
21ECP303T	MOOC	3	0	0	
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship#	0	0	10	
	Total Credits				**19**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECC101J	Electronic System and PCB Design	2	0	2	3
21ECC201T	Solid State Devices	3	0	0	3
21ECC202T	Analog and Linear Electronic Circuits	3	0	0	3
21ECC203T	Digital Logic Design	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC205T	Electromagnetic Theory and Interference	3	0	0	3
21ECC211L	Devices and Digital IC Lab	0	0	4	2
21ECC222L	Analog and Linear Electronic Circuits Lab	0	0	4	2
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques	3	1	0	4
21ECC305T	Digital Logic Synthesis using HDL	3	0	0	3
21ECC303T	VLSI Design and Technology	3	0	0	3
21ECC306T	CMOS Analog and Mixed Signal IC Design	3	0	0	3
21ECC311L	VLSI Design Lab	0	0	4	2
21ECC333L	CMOS Analog and Digital VLSI Lab	0	0	4	2
21ECC403T	RF Integrated Circuits and systems	3	0	0	3
21ECC404T	Physical Design and Automation	2	1	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
	Total Credits				**48**

Open Elective Courses (O)
(Any 3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECO101T	Short-Range Wireless Communication	3	0	0	3
21ECO102J	Electronic Circuits and Systems	2	0	2	3
21ECO103T	Modern Wireless Communication Systems	3	0	0	3
21ECO104J	PCB Design and Manufacturing	2	0	2	3
21ECO105T	Fiber Optics and Optoelectronics	3	0	0	3
21ECO106J	Embedded System Design using Arduino	2	0	2	3
21ECO107J	Embedded System Design using Raspberry Pi	2	0	2	3
21ECO108J	3D Printing Hardware and Software	2	0	2	3
	Total Credits				**9**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

34. (f) Programme Articulation: B.Tech. in Electronics Engineering (VLSI Design and Technology)

		Program Outcome (PO)												PSO		
Course Code	**Course Name**	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21ECC305T	Digital Logic Synthesis using HDL	2.66	2.4	2	3		-	-	-	-	-	-	-	2.8	-	-
21ECC306T	CMOS Analog and Mixed Signal IC Design	1	2	3	2.5	-	2	-	-	-	-	-	2	-	-	-
21ECC403T	RF Integrated Circuits and Systems	2	2	3	-	-	-	-	-	-	-	-	-	-	-	3
21ECC404T	Physical Design and Automation	2.5	2.5	-	2	-	-	-	-	-	-	-	-	2.75	2	
21ECC333L	CMOS Analog and Digital VLSI Lab	-	2.25	3	-	3	-	-	-	-	-	-	2	-	-	2
21ECE260T	Industrial Electronics	2.75	2	2	3	-	-	-	-	-	-	-		1.66	2	-
21ECE261T	Measurements and Instrumentation	3	2	2	2	-	-	-	-	-	-	-	2	1	-	-
21ECE262T	Low Power Sensors Technology	2.2	-	3	-	-	-	-	-	-	-	-	-	2.66	-	-
21ECE361T	Consumer Electronics and Troubleshooting	2.75	2	2	3	-	-	-	-	-	-	-	-	1.66	2.5	-
21ECE364T	Digital Signal Processors Architectures and Applications	2.2	-	3	-	-	-	-	-	-	-	-	-	2	2	-
21ECE363T	Electronic Packaging	3	2	-	-	-	-	-	-	-	-	-	2.33	2.25	-	-
21ECE366T	Digital Signal Processors, Architectures and Applications	2.2	-	3	-	-	-	-	-	-	-	-		2	2	-
21ECE367T	Design Verification of VLSI Circuits	2.75	2.25	1.5	-	2	-	-	-	-	-	-	-	3	-	-
21ECE460T	Emerging Processor based System Design	-	2	2.4	1.66	1.5	-	-	-	-	-	-	-	-	2	2
21ECE461T	Semiconductor Memory Design	2.8	2	-	-	-	-	-	-	-	-	-	-	1.8	-	-
21ECE462T	Machine Learning and Artificial Intelligence for Electronics Design	1.5	2	2	3	3	-	-	-	-	-	-	2.5	3	3	-
21ECE463T	Scripting Language for Electronic Design Automation	-	2	3	2.66	2	-	-	-	-	-	-	-	-	-	2
21ECE464T	Statistical Analysis and Optimization for VLSI	1	2	3	2.5		-	-	-	-	-	-	-	-	-	1.8
21ECE466T	Low Power Circuit Design	3	3	2.8	1.66	3	-	-	-	-	-	-	-	3	-	-
21ECE467T	High speed IC Design	2.2	2.8	-	-	-	-	-	-	-	-	-	-	2	2	-
21ECE468T	System and Network on Chip		2.5	3	2	2	-	-	-	-	-	-	-	3	-	2
21ECC101J	Electronic System and PCB Design	3	2.5	2.67	-	3	-	-	-	-	-	2	-	2.8	2.5	-
21ECC201T	Solid State Devices	3	2	-	-	-	-	-	-	-	-	-	1	1	-	-
21ECC203T	Digital logic Design	3	2	2	-	3	-	-	-	-	-	-	-	3	-	-
21ECC205T	Electromagnetic Theory and Interference	2.4	2.6	-	-		-	-	-	-	-	-	-		-	-
21ECC211L	Devices and Digital IC Lab	3	2	-	-	1	-	-	-	-	-	-	-	1	-	-
21ECC202T	Analog and Linear Electronic Circuits	2	2	3	-	-	-	-	-	-	-	-	-	-	-	3
21ECC204T	Signal Processing	2	2.2	3	3	-	-	-	-	-	-	-	-	-	-	2.2
21ECC222L	Analog and Linear Electronic Circuits Lab	2	-	2	-	3	-	-	-	-	-	-	-	-	-	-
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques	-	3	3	-	3	-	-	-	-	-	-	-	2.67		-
21ECC303T	VLSI Design and Technology	-	2.4	2.25	-		-	-	-	-	-	-	-	2	2	-
21ECC311L	VLSI Design Lab	3	3		-	1	-	-	-	-	-	-	-	1		-
21ECE263T	Micro, Nano Electromechanical devices	2.4	2	2.75	-		-	-	-	-	-	-	-	3	2.67	3
21ECE204T	Optoelectronics	2.8	2.67	2.67	2.67		-	-	-	-	-	-	-	-	-	2.4
21ECE205T	Flexible Electronics	3	3	-	-		-	-	-	-	-	-	3	-	-	
21ECE301T	Nanoscale Electronic Devices	3	2.5	-	-	2.5	-	-	-	-	-	-	-	2	-	2.5
21ECE362T	Quality and Reliability Engineering	3	1.5	2	-		-	-	-	-	-	-	-		-	2
21ECE365T	Design Verification of VLSI circuits	2.75	2.25	1.5	-	2	-	-	-	-	-	-	-	3	-	-
21ECE460T	Emerging Processor based System Design	-	2	2.4	1.66	1.5	-	-	-	-	-	-	-		2	2
21ECE461T	Semiconductor Memory Design	2.8	2	-	-	-	-	-	-	-	-	-	-	1.8	-	-
21ECE465T	Device and Process Modelling	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-
21ECE404T	Terahertz Devices and Applications	3	2.75	2	2	-	-	2	-	-	-	-	-	2.3	2	3
21ECE201J	Python and Scientific Python	-	2.67	3	2	3	-	-	-	3	-	-	-	3	-	2.67
	Program Average	2.53	2.30	2.51	2.37	2.32	2.00	2.00	-	3.00	-	2.00	2.23	2.28	2.21	2.37

34. (g) Implementation Plan: B.Tech. in Electronics Engineering (VLSI Design and Technology)

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21ECC101J	Electronic System and PCB Design	2	0	2	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21PDH201T	Social Engineering	2	0	0	2
21CSS201T	Computer Organization and Architecture	3	1	0	4
21ECC201T	Solid State Devices	3	0	0	3
21ECC203T	Digital Logic Design	3	0	0	3
21ECC205T	Electromagnetic Theory and Interference	3	0	0	3
21ECC211L	Devices and Digital IC Lab	0	0	4	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB203T	Probability and Stochastic Process	3	1	0	4
21ECC202T	Analog and Linear Electronic Circuits	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC222L	Analog and Linear Electronic Circuits Lab	0	0	4	2
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective-I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**21**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques	3	1	0	4
21ECC303T	VLSI Design and Technology	3	0	0	3
21ECC311L	VLSI Design Lab	0	0	4	2
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**20**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21ECC305T	Digital Logic Synthesis using HDL	3	0	0	3
21ECC306T	CMOS Analog and Mixed Signal IC Design	3	0	0	3
21ECC333L	CMOS Analog and Digital VLSI Lab	0	0	4	2
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21ECP301L	Project	0	0	6	3
21ECP302L	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**22**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
21ECC403T	RF Integrated Circuits and Systems	3	0	0	3
21ECC404T	Physical Design and Automation	3	0	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
O	Open Elective – III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21ECP401L or 21ECP402L and 21ECP403L both in eighth semester

35. B.Tech.in Electrical and Electronics Engineering

35. (a) Mission of the Department

Mission Stmt – 1	*To educate the student to become better practicing engineers to meet global excellence.*
Mission Stmt – 2	*To provide better environment through latest developments in electrical engineering involving problem solving, design, practice and training.*
Mission Stmt – 3	*To motivate the graduates to become a good leader, designer and researcher through industry-oriented trainings with social and ethical responsibilities.*

35. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates are in a position to apply their knowledge acquired in Mathematics, Basic Sciences and Electrical and Electronics Engineering courses, to the solution of complex problems encountered in the modern Engineering practice.*
PEO – 2	*Graduates learn and adapt themselves to the constantly evolving technology by pursuing higher studies.*
PEO – 3	*Graduates are better employable and achieve success in their chosen areas of Electrical and Electronics Engineering and related fields.*
PEO – 4	*Graduates are good leaders and managers by effectively communicating at both technical and interpersonal levels.*

35. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*3*	*2*	*1*
PEO – 2	*2*	*3*	*1*
PEO – 3	*2*	*2*	*1*
PEO – 4	*1*	*1*	*3*

35. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*	*3*	*1*	-	-	*1*	-	-	-	-	-	*3*	-	-
PEO – 2	-	-	-	*3*	*3*	-	*2*	-	-	-	-	*3*	-	*3*	-
PEO – 3	-	*3*	*3*	-	*2*	*3*	-	*3*	*2*	-	*2*	-	*2*	*2*	-
PEO – 4	-	-	-	-	-	-	-	-	*3*	*3*	*3*	-	-	-	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Apply principles of engineering and practical skills to design, develop and validate real time electrical systems.*
PSO - 2	*Ability to learn and adapt the evolving technological changes through multidisciplinary activities.*
PSO - 3	*Gain knowledge on professional values and ethics for sustainable development in the energy sector.*

35. (e) Program Structure: B.Tech. in Electrical and Electronics Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21ASS101T	Applied Engineering Mechanics	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**20**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21EEP302L	Project	0	0	6	3
21EEP303T	MOOC	3	0	0	
21EEP401L	Major Project	0	0	30	15
21EEP402L	Major Project	0	0	20	
21EEP403L	Internship#	0	0	10	
	Total Credits				**19**

Open Elective Courses (O) (3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21EEO301T	E-mobility	3	0	0	3
21EEO302T	Wearable Technology	3	0	0	3
21EEO303T	E-waste Management	3	0	0	3
21EEO304T	Energy Efficient Practices	3	0	0	3
21EEO305T	Surveillance Technology	3	0	0	3
21EEO306T	Sustainable Development Practices	3	0	0	3
21EEO307T	Clean and Green Energy	3	0	0	3
21EEO308T	Smart Cities and Communities	3	0	0	3
21EEO309T	Electrical Trading	3	0	0	3
21EEO310T	Unmanned Aerial Vehicle	3	0	0	3
	Total Credits				**9**

8. Professional Elective Courses (E) (Any 7 Elective)

Course Code	Course Title	Hours/ Week L	T	P	C
	Sub-stream: Intelligent Energy and Power Systems				
21EEE301T	Modelling and Control of Sustainable Energy Systems	3	0	0	3
21EEE302T	Power Quality	3	0	0	3
21EEE303J	Real Time Edge Computing in Energy Systems	2	0	2	3
21EEE401T	Smart Grid Operation and Planning	3	0	0	3
21EEE402T	AI in Smart Buildings and Electric Vehicles	3	0	0	3
21EEE403T	High Voltage Engineering	3	0	0	3
21EEE404T	Data Analytics and Cybersecurity for Energy Systems	3	0	0	3
	Sub-stream: Power Electronics and Drives				
21EEE304T	HVDC Systems	3	0	0	3
21EEE305T	Design of Electrical Apparatus	3	0	0	3
21EEE306T	Special Electrical Machines	3	0	0	3
21EEE405L	Software tools for Power Electronics	1	0	4	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB209T	Transforms and Computational Techniques	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				**32**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21EEC101J	Electric Circuits	2	0	2	3
21EEC201J	Analog Electronics	3	0	2	4
21EEC202T	Electromagnetic Theory	2	1	0	3
21EEC203J	Electrical Machines - I	2	0	2	3
21EEC204J	Digital System Design	3	0	2	4
21EEC205J	Electrical Machines - II	2	0	2	3
21CSC206T	Artificial Intelligence	2	1	0	3
21EEC206J	Control Systems	2	0	2	3
21EEC207J	Sensors and Instruments	2	0	2	3
21EEC301J	Power Electronics	3	0	2	4
21EEC302T	Digital Signal Processing	2	1	0	3
21EEC303T	Power System - I	2	1	0	3
21EEC304J	Power System - II	3	0	2	4
21EEC305P	Microcontroller	1	0	4	3
	Total Credits				**46**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

8. Professional Elective Courses (E) (Any 7 Elective)

Course Code	(Any 7 Elective) Title	Hours/ Week L	T	P	C
	Sub-stream: Control and Automation				
21EEE322J	Programmable Logic Controllers	2	0	2	3
21EEE323T	Advanced Control System	3	0	0	3
21EEE324T	Smart Sensor Systems	3	0	0	3
21EEE325T	Fundamentals of Robotics	3	0	0	3
21EEE326T	Computer Vision System	3	0	0	3
21EEE425P	Industrial IoT and Automation	1	0	4	3
21EEE426T	Nonlinear Control Systems	3	0	0	3
21EEE427T	Digital Control Systems	3	0	0	3
21EEE428T	Industrial Robotics	3	0	0	3
21EEE429T	Real Time Embedded System	3	0	0	3
	Sub-stream: Sustainable Development	3	0	0	3
21EEE327T	Sustainable Development Goals and Policies	3	0	0	3
21EEE328T	Electricity Policy and Safety Measures	3	0	0	3
21EEE329T	Work and Employability for a Sustainable Future	3	0	0	3

21EEE406T	Power Electronics for Renewable Energy Systems	3	0	0	3
21EEE407T	Advanced Power Semiconductor Devices	3	0	0	3
21EEE408T	MEMS Technology	3	0	0	3
	8. Professional Elective Courses (E) (Any 7 Elective)				
	Sub-stream: Electric Mobility				
21EEE307T	Electric Vehicle Technology	3	0	0	3
21EEE308T	Automotive Electronics	3	0	0	3
21EEE309T	Energy Storage systems	3	0	0	3
21EEE409T	Automotive Systems Engineering	3	0	0	3
21EEE410T	Autonomous and Connected Vehicles	3	0	0	3
21EEE411T	Intelligent Transport Systems	3	0	0	3
21EEE412T	Techno-economic Analysis of Electric Vehicles	3	0	0	3
21EEE413J	Electric Vehicles Power Train Modelling and Simulation	2	0	2	3
	Sub-stream: Electronic System Design				
21EEE310T	Advanced Digital System Design	3	0	0	3
21EEE311T	FPGA Architecture and Programming	3	0	0	3
21EEE312T	Advanced Electronic Devices	3	0	0	3
21EEE313T	Photonics	3	0	0	3
21EEE314T	Optics for Engineers	3	0	0	3
21EEE414J	Industrial Electronics	2	0	2	3
21EEE415T	VLSI Circuits and Design	3	0	0	3
21EEE416T	Medical Electronics	3	0	0	3
21EEE417T	Principles of Digital Communications	3	0	0	3
21EEE418T	Device Modelling	3	0	0	3
	Sub-stream: Intelligent Learning and Computing Techniques				
21EEE315T	Programming for Engineers with C++	3	0	0	3
21EEE316T	Computer Organization and Architecture	3	0	0	3
21EEE317T	Computer Networks	3	0	0	3
21EEE318J	Introduction to Python Programming	2	0	2	3
21EEE319T	Fundamentals of Computational Intelligence	3	0	0	3
21EEE320T	Nature Inspired Computing Techniques	3	0	0	3
21EEE321T	Fundamentals of Internet of Things	3	0	0	3
21EEE419P	Fundamentals of Virtual Reality and Augmented Reality	1	0	4	3
21EEE420J	Big Data Tools for Visualization and Analytics	2	0	2	3
21EEE421J	Statistical Machine Learning Techniques	2	0	2	3
21EEE422T	Deep Learning Algorithms	3	0	0	3
21EEE423T	Edge Computing Technologies	3	0	0	3
21EEE424T	Fundamentals of Block Chain Technology	3	0	0	3

21EEE330T	Natural Resources for Sustainable Development	3	0	0	3
	8. Professional Elective Courses (E) (Any 7 Elective)				
21EEE331T	Environmental Security and Sustaining Peace	3	0	0	3
21EEE332T	Sustainable Challenges in Cities	3	0	0	3
21EEE333T	Climate Change and Socio-Economic Systems	3	0	0	3
21EEE430T	Governance in Infrastructure	3	0	0	3
21EEE431T	Responsible Consumption and Production	3	0	0	3
21EEE432T	Sustainable Industrial Revolution	3	0	0	3
21EEE433T	Impact Measurement and Management for the Sustainable Development Goals	3	0	0	3
21EEE434T	Energy Conservation and Efficiency	3	0	0	3
21EEE435T	Energy Auditing	3	0	0	3
	Total Credits				21

35. (f) Programme Articulation Matrix: B.Tech. in Electrical and Electronics Engineering

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. &	Life Long Learning	PSO-1	PSO-2	PSO-3
21EES101T	Electrical and Electronics Engineering	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
21EEC101J	Electric Circuits	3	3	-	-	-	-	-	-	2	-	-	-	1.6	-	-
21EEC201J	Analog Electronics	3	-	3	-	2	-	-	-	2	2	-	-	3	2	-
21EEC202T	Electromagnetic Theory	3	3	-	-	-	-	-	-	-	2	-	-	1	-	-
21EEC203J	Electrical Machines - I	3	2	-	-	-	-	-	-	-	-	-	-	1.5	-	-
21EEC204J	Digital System Design	3	-	3	-	2	-	-	-	-	2	-	-	3	-	-
21EEC205J	Electrical Machines - II	3	2.75	-	-	-	-	-	-	-	-	-	-	1.5	-	-
21EEC206J	Control Systems	3	-	2.5	2.5	2.75	-	-	-	-	-	-	-	2	2	-
21EEC207J	Sensors and Instruments	2.8	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21EEC301J	Power Electronics	3	2.67	2.33	-	2	-	-	-	2	-	-	-	2.33	-	-
21EEC302T	Digital Signal Processing	2.5	2.5	-	-	-	-	-	-	-	-	-	-	1	-	-
21EEC303T	Power System - I	2.6	3	-	-	-	-	-	-	-	-	-	-	2.5	-	-
21EEC304J	Power System - II	3	3	-	-	3	-	2	2	-	-	-	-	3	-	2
21EEC305P	Microcontroller	3	3	3	3	3	3	3	3	3	3	3	2	3	3	1
21EEE301T	Modelling and Control of Sustainable Energy Systems	3	-	-	-	-	-	2	-	-	-	-	-	-	-	3
21EEE302T	Power Quality	3	-	-	-	-	-	-	1	1	-	-	-	-	-	2
21EEE303J	Real Time Edge Computing in Energy Systems	2.8	-	-	-	2	-	-	-	-	-	-	2	-	2	-
21EEE304T	HVDC Systems	3	-	2	-	-	-	-	-	-	-	-	-	-	2	-
21EEE305T	Design of Electrical Apparatus	3	3	2	-	2	-	-	-	-	-	-	-	2	-	-
21EEE306T	Special Electrical Machines	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
21EEE307T	Electric Vehicle Technology	3	-	-	3	2.6	-	-	-	-	-	-	-	1.67	2	2
21EEE308T	Automotive Electronics	2.8	3	-	-	-	-	-	-	-	-	-	-	1	-	1
21EEE309T	Energy Storage systems	3	2	-	-	-	-	2	-	-	-	-	-	-	-	2.2
21EEE310T	Advanced Digital System Design	3	-	2	-	-	-	-	-	-	-	-	-	2	-	-
21EEE311T	FPGA Architecture and Programming	3	-	2	-	-	-	-	-	-	-	-	-	2	-	-
21EEE312T	Advanced Electronic Devices	3	1	-	-	-	-	-	-	-	-	-	-	2	-	-
21EEE313T	Photonics	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
21EEE314T	Optics for Engineers	3	-	2	-	-	-	-	-	-	-	-	-	-	2	-
21EEE315T	Programming for Engineers with C++	3	1.8	-	-	-	-	-	-	-	-	-	-	-	1	-
21EEE316T	Computer Organization and Architecture	3	1.6	-	-	-	-	-	-	-	-	-	-	-	1	-
21EEE317T	Computer Networks	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
21EEE318J	Introduction to Python Programming	2	2	-	-	-	-	-	-	-	-	-	-	-	2	-
21EEE319T	Fundamentals of Computational Intelligence	3	2	-	-	1	-	-	-	-	-	-	-	-	2	-
21EEE320T	Nature Inspired Computing Techniques	3	1	-	-	-	-	-	-	-	-	-	-	1	-	-
21EEE321T	Fundamentals of Internet of Things	2.6	-	1.67	-	-	-	-	-	3	-	-	-	3	-	-
21EEE322J	Programmable Logic Controllers	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
21EEE323T	Advanced Control System	3	2	2	-	-	-	-	-	-	-	-	-	2	2	-
21EEE324T	Smart Sensor Systems	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
21EEE325T	Fundamentals of Robotics	2.8	-	-	-	-	-	-	-	-	-	-	-	2.4	-	-
21EEE326T	Computer Vision System	3	1.75	-	-	2	-	-	-	-	-	-	-	1	-	-
21EEE327T	Sustainable Development Goals and Policies	2	-	-	-	-	3	3	2	-	-	-	-	-	-	2
21EEE328T	Electricity Policy and Safety Measures	2.33	-	-	-	-	2	2	3	2	-	-	2.33	-	-	3
21EEE329T	Work and Employability for a Sustainable future	2	-	-	-	-	-	3	-	-	-	-	2	-	-	2
21EEE330T	Natural Resources for Sustainable Development	3	-	-	-	-	-	3	-	-	-	-	2	-	-	2
21EEE331T	Environmental Security and Sustaining Peace	2	-	-	-	-	1	3	2	3	3	-	3	-	-	2
21EEE332T	Sustainable Challenges in Cities	2.8	-	-	-	-	2	2	-	-	-	-	-	-	-	2
21EEE333T	Climate Change and Socio-Economic Systems	2.6	-	-	-	-	2.8	2.6	2.5	-	-	-	1.5	-	-	1.6
21EEE401T	Smart Grid Operation and Planning	3	-	-	-	-	-	1.5	2	-	-	-	1.5	-	-	2.4
21EEE402T	AI in Smart Buildings and Electric Vehicles	3	2	-	-	2	-	-		-	-	-	-	3	-	-
21EEE403T	High Voltage Engineering	3	3	-	-		-	-		-	-	-	-	-	-	2
21EEE404T	Data Analytics and Cybersecurity for Energy Systems	2.8	-	-	-	2	-	-	2	-	-	-	2	-	2	-
21EEE405L	Software tools for Power Electronics	3	-	3	-	3	-	-	-	-	-	-	-	2	-	-

21EEE406T	Power Electronics for Renewable Energy Systems	2	2	2	-	2	-	-	-	-	-	-	-	2	-	-
21EEE407T	Advanced Power Semiconductor Devices	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
21EEE408T	MEMS Technology	3	-	-	-	2.25	-	-	-	2	2	-	-	-	1	-
21EEE409T	Automotive Systems Engineering	3	2	-	-	1	-	-	-	-	-	-	-	1	-	-
21EEE410T	Autonomous and Connected Vehicles	2.8	-	-	3	-	-	-	-	-	-	-	-	-	2	
21EEE411T	Intelligent Transport Systems	3	-	2	2	2	1	1	-	-	-	-	-	2	2	1
21EEE412T	Techno-economic Analysis of Electric Vehicles	3	-	-	-	-	-	2	-	-	-	-	-	-	2	-
21EEE413J	Electric Vehicles Power Train Modelling and Simulation	3	-	-	3	2.6	-	-	-	-	-	-	-	-	2	
21EEE414J	Industrial Electronics	2.8	-	-	-	3	-	-	-	-	-	-	-	3	-	-
21EEE415T	VLSI Circuits and Design	3	1	-	-	-	-	-	-	-	-	-	-	2	-	-
21EEE416T	Medical Electronics	3	-	-	-	-	-	-	-	-	-	-	-	-	2	-
21EEE417T	Principles of Digital Communications	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
21EEE418T	Device Modelling	3	1	-	-	1	-	-	-	-	-	-	-	1	-	-
21EEE419P	Fundamentals of Virtual Reality and Augmented Reality	3	2.67	3	3	2.67	3	3	3	3	3	3	2	3	3	1
21EEE420J	Big Data Tools for Visualization and Analytics	3	2	-	-	2	-	-	-	-	-	-	-	-	1.5	-
21EEE421J	Statistical Machine Learning Techniques	3	-	-	1.67	2.67	-	-	-	-	-	-	-	-	2	-
21EEE422T	Deep Learning Algorithms	3	1.33	-	-	-	-	-	-	-	-	-	-	-	2	-
21EEE423T	Edge Computing Technologies	3	-	-	-	-	-	-	-	-	-	-	-	-	2	-
21EEE424T	Fundamentals of Block Chain Technology	2	-	2	-	1	-	-	2	-	-	-	-	-	2	-
21EEE425P	Industrial IoT and Automation	3	3	3	3	3	3	3	3	3	3	3	2	3	3	1
21EEE426T	Nonlinear Control Systems	2.8	2.8	2	-	1	-	-	-	-	-	-	-	3	2	-
21EEE427T	Digital Control Systems	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
21EEE428T	Industrial Robotics	2.8	2	-	-	-	-	-	-	-	-	-	-	2	-	-
21EEE429T	Real Time Embedded System	3	-	-	-	2	-	-	-	-	-	-	-	1	-	-
21EEE430T	Governance in Infrastructure	2	-	-	-	-	-	3	-	-	-	-	2	-	-	2
21EEE431T	Responsible Consumption and Production	2	-	-	-	-	-	3	-	1	-	-	3	-	-	1
21EEE432T	Sustainable Industrial Revolution	3	-	-	-	-	-	3	-	2	-	-	2	-	-	2
21EEE433T	Impact Measurement and Management for the Sustainable Development Goals	1.8	-	-	-	-	-	3	-	2	-	-	2.4	-	-	2
21EEE434T	Energy Conservation and Efficiency	3	3	-	-	-	-	3	-	-	-	3	-	-	2	2
21EEE435T	Energy Auditing	2.67	-	-	-	-	2	-	2	-	2	-	-	-	-	2

35. (g) Implementation Plan: B.Tech. in Electrical and Electronics Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21EEC101J	Electric Circuits	2	0	2	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB209T	Transforms and Computational Techniques	3	1	0	4
21PDH201T	Social Engineering	2	0	0	2
21ASS101T	Applied Engineering Mechanics	3	0	0	3
21EEC201J	Analog Electronics	3	0	2	4
21EEC202T	Electromagnetic Theory	2	1	0	3
21EEC203J	Electrical Machines - I	2	0	2	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**22**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21EEC204J	Digital System Design	3	0	2	4
21EEC205J	Electrical Machines - II	2	0	2	3
21CSC206T	Artificial Intelligence	2	1	0	3
21EEC206J	Control Systems	2	0	2	3
21EEC207J	Sensors and Instruments	2	0	2	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21EEC301J	Power Electronics	3	0	2	4
21EEC302T	Digital Signal Processing	2	1	0	3
21EEC303T	Power System - I	2	1	0	3
E	Professional Elective – I				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21EEC304J	Power System - II	3	0	2	4
21EEC305P	Microcontroller	1	0	4	3
E	Professional Elective – II				3
E	Professional Elective – III				3
O	Open Elective – II				3
21EEP302L	Project	0	0	6	3
21EEP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**21**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – IV				3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
O	Open Elective – III	3	0	0	3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21EEP401L	Major Project	0	0	30	15
21EEP402L	Major Project	0	0	20	
21EEP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21EEP401L or 21EEP402L and 21EEP403L both in eighth semester

36. B.Tech.in Electric Vehicle Technology

36. (a) Mission of the Department

Mission Stmt – 1	*To educate the student to become better practicing engineers to meet global excellence.*
Mission Stmt – 2	*To provide better environment through latest developments in electrical engineering involving problem solving, design, practice and training.*
Mission Stmt – 3	*To motivate the graduates to become a good leader, designer and researcher through industry-oriented trainings with social and ethical responsibilities.*

36. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates have the competence to proficiently apply their acquired knowledge in mathematics, basic sciences and professional courses to effectively address the complex challenges encountered in the real world.*
PEO – 2	*Graduates are equipped with necessary skills to continuously learn and adapt themselves to the ever-changing technology.*
PEO – 3	*Graduates are better employable and achieve success in the field of electric vehicle technology.*
PEO – 4	*Graduates will demonstrate strong communication skills, adeptness in collaborative teamwork and a deep appreciation for lifelong learning.*

36. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	*3*	*2*	*1*
PEO – 2	*2*	*3*	*1*
PEO – 3	*2*	*2*	*1*
PEO – 4	*1*	*1*	*3*

36. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*	*3*	*1*	-	-	*1*	-	-	-	-	-	*3*	-	-
PEO – 2	-	-	-	*3*	*3*	-	*2*	-	-	-	-	*3*	-	*3*	-
PEO – 3	-	*3*	*3*	-	*2*	*3*	-	*3*	*2*	-	*2*	-	*2*	*2*	-
PEO – 4	-	-	-	-	-	-	-	-	*3*	*3*	*3*	-	-	-	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Apply principles of engineering and practical skills to design, develop and validate real time electric vehicle system*
PSO - 2	*Ability to gain knowledge and adapt to the constantly evolving technological advancements through engaging in multidisciplinary activities.*
PSO - 3	*Acquire knowledge of professional values and ethics for promoting sustainable development in the field of electric vehicle technology.*

36. (e) Program Structure: B.Tech. in Electric Vehicle Technology

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101T	Engineering Mechanics	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21EVP302L	Project	0	0	6	3
21EVP303T	MOOC	3	0	0	
21EVP401L	Major Project	0	0	30	15
21EVP402L	Major Project	0	0	20	
21EVP403L	Internship#	0	0	10	
	Total Credits				**19**

Open Elective Courses (O) (3 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21EEO301T	E-mobility	3	0	0	3
21EEO302T	Wearable Technology	3	0	0	3
21EEO303T	E-waste Management	3	0	0	3
21EEO304T	Energy Efficient Practices	3	0	0	3
21EEO305T	Surveillance Technology	3	0	0	3
21EEO306T	Sustainable Development Practices	3	0	0	3
21EEO307T	Clean and Green Energy	3	0	0	3
21EEO308T	Smart Cities and Communities	3	0	0	3
21EEO309T	Electrical Trading	3	0	0	3
21EEO310T	Unmanned Aerial Vehicle	3	0	0	3
	Total Credits				**9**

8. Professional Elective Courses (E) (Any 8 Elective)

Course Code	Course Title	Hours/ Week L	T	P	C
21EVE301T	Advanced Energy Sources	3	0	0	3
21EVE302J	Vehicle Electronic Systems	2	0	2	3
21EVE303T	Battery Technologies	3	0	0	3
21EVE304T	Techno-economic Analysis of Electric Vehicles	3	0	0	3
21EVE305T	Automotive Materials and Manufacturing Processes	3	0	0	3
21EVE306T	Battery Management Systems	3	0	0	3
21EVE307T	Advanced Power Electronics	3	0	0	3
21EVE308J	Electric Vehicle Powertrain	2	0	2	3
21EVE309J	Energy Storage Systems for Electric Vehicle	2	0	2	3
21EVE401T	Fuel Cell Electric Vehicles and Hydrogen Technology	3	0	0	3
21EVE402T	Electric Vehicles Thermal Design and Management	3	0	0	3
21EVE403T	Vehicle Troubleshooting and Maintenance	3	0	0	3
21EVE404T	EV Product Development Processes	3	0	0	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB209T	Transforms and Computational Techniques	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				**28**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC206T	Artificial Intelligence	2	1	0	3
21EVC201J	Electromechanical Energy Conversion	2	0	2	3
21EVC202J	Analog and Digital Electronics	3	0	2	4
21EVC203T	Vehicular Sensor Actuators and Controls	3	0	0	3
21EVC204T	Automotive Engineering Systems	3	0	0	3
21EVC205J	Power Electronics	2	0	2	3
21EVC206T	Electric Vehicle Architecture	3	0	0	3
21EVC207T	Embedded System and Communication Protocols	3	0	0	3
21EVC208J	Electric Vehicle Design	3	0	2	4
21EVC301J	Kinematics and Dynamics of Automobile	3	0	2	4
21EVC302J	Electrical Drives and Control	2	0	2	3
21EVC303T	Electric Vehicle Charging Technology	3	0	0	3
21EVC304J	Autonomous and Connected Vehicles	3	0	2	4
21EVC305J	Vehicle Integration and Testing	2	0	2	3
	Total Credits				**46**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

8. Professional Elective Courses (E) (Any 8 Elective)

Course Code	Course Title	Hours/ Week L	T	P	C
21EVE405T	Trends in Vehicle Styling and Ergonomics	3	0	0	3
21EVE406T	EV Regulations and Policy Framework	3	0	0	3
21EVE407T	e-Mobility Ecosystem and Deployment Practices	3	0	0	3
21EVE408J	Electric Vehicles Testing and Certification	1	0	4	3
21EVE409T	Automotive Interfaces, Fault Diagnostics and Security	3	0	0	3
21EVE410T	Industrial Automation and IoT	3	0	0	3
21EVE411T	Machine Vision	3	0	0	3
21EVE412T	Machine Design and Mechanics	3	0	0	3
21EVE413T	Hyperloop Technology	3	0	0	3
21EVE414T	Power systems and Microgrid	3	0	0	3
21EVE415T	Electric Vehicle Safety and Practices	3	0	0	3
	Total Credits				**24**

36. (f) Implementation Plan: B.Tech. in Electric Vehicle Technology

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21MES101T	Engineering Mechanics	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB209T	Transforms and Computational Techniques	3	1	0	4
21PDH201T	Social Engineering	2	0	0	2
21EVC201J	Electromechanical Energy Conversion	2	0	2	3
21EVC202J	Analog and Digital Electronics	3	0	2	4
21EVC203T	Vehicular Sensor Actuators and Controls	3	0	0	3
21EVC204T	Automotive Engineering Systems	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**22**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21EVC205J	Power Electronics	2	0	2	3
21EVC206T	Electric Vehicle Architecture	3	0	0	3
21EVC207T	Embedded System and Communication Protocols	3	0	0	3
21EVC208J	Electric Vehicle Design	3	0	2	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21EVC301J	Kinematics and Dynamics of Automobile	3	0	2	4
21EVC302J	Electrical Drives and Control	2	0	2	3
21EVC303T	Electric Vehicle Charging Technology	3	0	0	3
E	Professional Elective – I				3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**20**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21EVC304J	Autonomous and Connected Vehicles	3	0	2	4
21EVC305J	Vehicle Integration and Testing	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21EVP302L	Project	0	0	6	3
21EVP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**21**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective – III	3	0	0	3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21EVP401L	Major Project	0	0	30	15
21EVP402L	Major Project	0	0	20	
21EVP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21EVP401L or 21EVP402L and 21EVP403L both in eighth semester

37. B.Tech. in Electronics and Instrumentation Engineering

37. (a) Mission of the Department

Mission Stmt – 1	*To have a scholarly and professional environment to make long lasting contributions for the advancement of knowledge.*
Mission Stmt – 2	*To foster research and development for the benefit of global community.*
Mission Stmt – 3	*To have an innovative, dynamic, flexible devising academic program and structure.*

37. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to take up career in optimization and automation of industrial process control with environment protection and safety concern.*
PEO – 2	*Graduates will be able to solve technical problems to serve the society in a responsible and ethical manner.*
PEO – 3	*Graduates will be able to serve the end users with cutting edge technologies to meet industry standards*
PEO – 4	*Graduates will be able to achieve broad and in depth knowledge of Instrumentation to practice and pursue higher studies*
PEO – 5	*Graduates will be able to work as a team on multidisciplinary projects and excel in their career*

37. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3
PEO – 1	3	2	3
PEO – 2	3	2	3
PEO – 3	2	3	2
PEO – 4	2	3	3
PEO – 5	2	3	3

37. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3	2	3	-	3	2	3	2	2	2	2	3	3	2	3
PEO – 2	3	3	2	3	2	3	2	3	2	2	-	-	2	2	3
PEO – 3	3	3	2	2	3	-	-	3	-	3	3	-	3	2	3
PEO – 4	3	2	3	2	-	-	-	2	-	2	-	3	2	3	2
PEO – 5	3	3	3	3	-	2	-	2	3	3	3	3	2	3	2

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Model and perform analysis of any given system and to design a suitable control methodology based on the specifications for an enhanced process results.*
PSO - 2	*Apply the knowledge gained on transducers in any given field through the process of design, development, and implementation of instrumentation system.*
PSO - 3	*Design, Develop, Calibrate and test electronics engineering systems and utilize the modern computational tools to assess its effect on societal, health and environmental safety and consequent responsibilities relevant to engineering practices*

37. (e) Program Structure: B.Tech. in Electronics and Instrumentation Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	1	2
21GNH401T	Behavioural Psychology	2	1	0	3
21PDH201T	Social Engineering	2	0	0	2
	Total Credits				**13**

. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				**28**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21EIS204T	Industrial Data Communication	3	0	0	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**20**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21EIC101J	Sensors and Actuators	3	0	2	4
21EIC201J	Digital Principles and System Design	3	0	2	4
21EIC202T	Electrical and Electronic Measurements and Instrumentation	3	0	0	3
21EIC203J	Electronics for Analog Signal Processing	3	0	2	4
21EIC205J	Analog Integrated Circuits	3	0	2	4
21EIC206J	Control Systems Design and Analysis	3	0	2	4
21EIC301P	Embedded System Design	2	0	4	4
21EIC302J	Process Control	3	0	2	4
21EIC303T	Discrete Time Signal Processing	3	0	0	3
21EIC304T	Industrial Instrumentation	3	0	0	3
21EIC305J	Industrial Process Automation Systems	3	0	2	4
21EIC306J	Instrumentation System Design	2	0	2	3
21EIC401J	Image Processing	2	0	2	3
21EIC402J	Power Electronics and its Applications	2	0	2	3
21CSC206T	Artificial Intelligence	2	1	0	3
	Total Credits				**53**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21EIP302L	Project	0	0	6	3
21EIP303T	MOOC	3	0	0	
21EIP401L	Major Project	0	0	30	15
21EIP402L	Major Project	0	0	20	
21EIP403L	Internship#	0	0	10	
	Total Credits				**19**

List of Open Elective Courses (O)

Any 3 Courses

Course Code	Course Title	Hours/ Week L	T	P	C
21EIO131J	Virtual Instrumentation	2	0	2	3
21EIO132T	Analytical Instrumentation	3	0	0	3
21EIO133T	Industrial Automation Systems	3	0	0	3
21EIO134T	Introduction to Sensors	3	0	0	3
21EIO135T	Introduction to MEMS	3	0	0	3
21EIO136J	PLC for Industrial Automation	2	0	2	3
21EIO138T	Logical Foundation of Cyber Physical Systems	3	0	0	3
	Total Credits				**09**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

Professional Elective Courses (E) *Any 6 Courses*					
Course Code	Course Title	Hours/ Week L	T	P	C
21EIE201T	*Reliability and Safety Engineering*	*3*	*0*	*0*	*3*
21EIE202T	*Renewable Energy*	*3*	*0*	*0*	*3*
21EIE203T	*Fundamental of MEMS*	*3*	*0*	*0*	*3*
21EIE204J	*Fundamentals of Data Structures and Algorithm*	*2*	*0*	*2*	*3*
21EIE205T	*Transducers for biomedical applications*	*3*	*0*	*0*	*3*
21EIE301T	*Building Automation System*	*3*	*0*	*0*	*3*
21EIE302T	*Electrical Energy Management and Conversion*	*3*	*0*	*0*	*3*
21EIE303T	*Automotive Sensors and Smart Systems*	*3*	*0*	*0*	*3*
21EIE304T	*Machine Learning Algorithms*	*3*	*0*	*0*	*3*
21EIE305T	*Biomedical Devices and Instrumentation*	*3*	*0*	*0*	*3*
21EIE306T	*Industrial Internet of Things*	*3*	*0*	*0*	*3*
21EIE307T	*Modern Control Techniques*	*3*	*0*	*0*	*3*
21EIE308T	*Fault Diagnosis and Tolerance System*	*3*	*0*	*0*	*3*
21EIE309T	*E-Vehicle Technology*	*3*	*0*	*0*	*3*
21EIE310T	*Intelligent Systems and Control*	*3*	*0*	*0*	*3*
21EIE311T	*State Space Control Design*	*3*	*0*	*0*	*3*
21EIE312T	*Industrial Processes and Control*	*3*	*0*	*0*	*3*
21EIE313T	*Deep Learning Techniques*	*3*	*0*	*0*	*3*
21EIE314T	*Biomedical Signal and Image Processing*	*3*	*0*	*0*	*3*

Professional Elective Courses (E) *Any 6 Courses*					
Course Code	Course Title	Hours/ Week L	T	P	C
21EIE401T	*Cyber Security for Industrial Automation*	*3*	*0*	*0*	*3*
21EIE402J	*Electro-pneumatics and Hydraulics*	*2*	*0*	*2*	*3*
21EIE403T	*Multisensor and Decision Systems*	*3*	*0*	*0*	*3*
21EIE404T	*System on Chip*	*3*	*0*	*0*	*3*
21EIE405T	*Process Data Analytics*	*3*	*0*	*0*	*3*
21EIE406T	*System Identification*	*3*	*0*	*0*	*3*
21EIE407T	*Machine Vision Systems*	*3*	*0*	*0*	*3*
21EIE408T	*Non-linear Control system Design*	*3*	*0*	*0*	*3*
21EIE409T	*Bio-optical Instrumentation*	*3*	*0*	*0*	*3*
21EIE410T	*Bio-mechatronics*	*3*	*0*	*0*	*3*
21EIE411T	*Virtual and Augmented Reality*	*3*	*0*	*0*	*3*
Total Credits					**18**

37. (f) Programme Articulation Matrix: B.Tech. in Electronics and Instrumentation Engineering

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. &	Life Long Learning	PSO-1	PSO-2	PSO-3
21EIC101J	Sensors and Actuators	2.6	2	-	-	-	-	-	-	-	-	-	-	-	2	-
21EIC201J	Digital Principles and System Design	3	2	3	-	-	-	-	-	-	-	-	-	-	1.6	-
21EIC202T	Electrical and Electronic Measurements and Instrumentation	2.4	2	2	-	-	-	-	-	-	-	-	-	-	2	1
21EIC203J	Electronics for Analog Signal Processing	3	1.4	-	-	-	-	-	-	-	-	-	-	-	2	-
21EIS204T	Industrial Data Communication	3	1.4	-	-	-	-	-	-	-	-	-	-	-	1.4	-
21EIC205J	Analog Integrated Circuits	3	1.7	-	2	-	-	-	-	-	-	-	-	-	1.6	-
21EIC206J	Control Systems Design and Analysis	2.8	-	-	2	2	-	-	-	-	-	-	-	2.2	-	-
21EIC301P	Embedded System Design	2	2	3	3	-	-	-	-	3	-	-	-	2	3	-
21EIC302J	Process Control	2	2	2	-	-	-	-	-	-	-	-	-	2.8	-	-
21EIC303T	Discrete Time Signal Processing	2.8	3	2	-	-	-	-	-	-	-	-	-	-	1.2	-
21EIC304T	Industrial Instrumentation	3	2	-	-	-	-	-	-	-	-	-	-	-	3	-
21EIC305J	Industrial Process Automation Systems	3	-	2	1.3	-	-	-	-	-	-	-	-	2.75	-	2
21EIC306J	Instrumentation System Design	2	1.8	3	-	-	-	-	-	-	-	-	-	2	2	-
21EIC401J	Image Processing	2	2	-	2	-	-	-	-	-	-	-	-	-	-	1
21EIC402J	Power Electronics and its Applications	3	2	-	-	2	-	-	-	-	-	-	-	-	1	-
21EIE201T	Reliability and Safety Engineering	2.8	-	2.2	-	-	-	-	-	-	-	-	-	-	-	3
21EIE202T	Renewable Energy	2.2	2.2	-	-	-	-	-	-	-	-	-	-	-	-	3
21EIE203T	Fundamental of MEMS	3	-	2	-	-	-	-	-	-	-	-	-	-	2	-
21EIE204J	Fundamentals of Data Structures and Algorithm	2.25	2	2	2	-	-	-	-	-	-	-	-	-	2	2
21EIE205T	Transducers for Biomedical Applications	2.8	2	-	-	-	-	-	-	-	-	-	-	-	2.2	-
21EIE301T	Building Automation System	3	-	2	-	-	-	-	-	-	-	-	-	-	3	3
21EIE302T	Electrical Energy Management and Conversion	2.8	3	-	-	-	-	-	-	-	-	-	-	3	-	-
21EIE303T	Automotive Sensors and Smart Systems	3	-	2.3	-	-	-	-	-	-	-	-	-	1.5	2.5	3
21EIE304T	Machine Learning Algorithms	2.7	2.3	2	1	2	-	-	-	-	-	-	-	-	-	2
21EIE305T	Biomedical Devices and Instrumentation	3	2	-	-	-	-	-	-	-	-	-	-	2	3	2
21EIE306T	Industrial Internet of Things	3	-	-	2	-	-	-	-	-	-	-	-	-	3	-
21EIE307T	Modern Control Techniques	2	-	2	2	-	-	-	-	-	-	-	-	3	-	-
21EIE308T	Fault Diagnosis and Tolerance System	3	-	2.2	-	-	-	-	-	-	-	-	-	2	-	-
21EIE309T	E-Vehicle Technology	2	-	2	2	-	-	-	-	-	-	-	-	-	-	2
21EIE310T	Intelligent Systems and Control	3	-	2	-	-	-	-	-	-	-	-	-	1.8	-	-
21EIE311T	State Space Control Design	3	-	-	2	-	-	-	-	-	-	-	-	-	2.2	-
21EIE312T	Industrial Processes and Control	2.8	2	2	-	1	-	-	-	-	-	-	2	-	2	-
21EIE313T	Deep Learning Techniques	2.8	-	-	2.2	1	-	-	-	-	-	-	-	-	-	3
21EIE314T	Biomedical Signal and Image Processing	3	1	-	2	-	-	-	-	-	-	-	-	1	-	2.5
21EIE401T	Cyber Security for Industrial Automation	3	-	3	-	-	-	-	-	-	-	-	-	3	-	-
21EIE402J	Electro-pneumatics and Hydraulics	2	2	2	-	-	-	-	-	-	-	-	-	3	-	-
21EIE403T	Multi-sensor and Decision Systems	3	-	-	2.2	1	-	-	-	-	-	-	-	-	-	3
21EIE404T	System on Chip	3	-	2	-	-	-	-	-	-	-	-	-	1.3	2.5	-
21EIE405T	Process Data Analytics	2	2.7	2.25	-	-	-	-	-	-	-	-	-	2	2	3
21EIE406T	System Identification	2	2.3	3	-	-	-	-	-	-	-	-	-	2	-	-
21EIE407T	Machine Vision Systems	2.8	-	3	-	1	-	-	-	-	-	-	-	1	-	-
21EIE408T	Non-linear Control System Design	3	-	3	-	-	-	-	-	-	-	-	-	3	-	-
21EIE409T	Bio-optical Instrumentation	2.4	-	-	2	-	-	-	-	-	-	-	-	-	2	2
21EIE410T	Bio-mechatronics	3	-	2	-	-	-	-	-	-	-	-	-	2	2	-
21EIE411T	Virtual and Augmented Reality	2	-	3	-	-	-	-	-	-	-	-	-	-	-	3
21EIP321L	Community Connect	3	2	2	-	3	-	-	3	3	3	-	-	1.6	1	1.6
21EIP322L	Project	3	3	2	2.5	3	2.7	3	2	3	3	3	2	1.4	2	2
21EIP323L	MOOC	3	2	2	-	-	-	-	-	2	3	-	-	1.4	1	1.8
21EIP401L /21EIP403L	Major Project	3	3	2	2.5	3	2.7	3	2	3	3	3	2	1.4	2	2
21EIP404L	Semester Internship	3	2	2	-	-	-	-	-	3	3	3	2.2	1.6	1.2	1.8
	Program Average	2.7	2.1	2.28	2.04	2.11	2.7	3	2.33	2.83	2.5	3	2.05	2.03	2.01	2.26

37. (g) Implementation Plan: B.Tech. in Electronics and Instrumentation Engineering

Semester - I

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21EIC101J	Sensors and Actuators	3	0	2	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21EIC201J	Digital Principles and System Design	3	0	2	4
21EIC202T	Electrical and Electronic Measurements and Instrumentation	3	0	0	3
21EIC203J	Electronics for Analog Signal Processing	3	0	2	4
21PDH201T	Social Engineering	2	0	0	2
21EIS204T	Industrial Data Communication	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21EIC205J	Analog Integrated Circuits	3	0	2	4
21EIC206J	Control Systems Design and Analysis	3	0	2	4
	Professional Elective-I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**21**

Semester – V

Code	Course Title	Hours/ Week			C
		L	T	P	
21EIC301J	Embedded System Design	3	0	2	4
21EIC302J	Process Control	3	0	2	4
21EIC303T	Discrete Time Signal Processing	3	0	0	3
21EIC304T	Industrial Instrumentation	3	0	0	3
	Professional Elective – II				3
	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
18PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week			C
		L	T	P	
21CSS303T	Data Science	2	0	0	2
21EIC305J	Industrial Process Automation Systems	3	0	2	4
21EIC306J	Instrumentation System Design	2	0	2	3
	Professional Elective-III				3
	Professional Elective-IV				3
	Open Elective-II				3
21EIP302L	Project	0	0	6	3
21EIP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**21**

Semester – VII

Code	Course Title	Hours/ Week			C
		L	T	P	
21GNH401T	Behavioral Psychology	2	1	0	3
21EIC401J	Image Processing	2	0	2	3
21EIC402J	Power Electronics and its Applications	2	0	2	3
	Professional Elective-V				3
	Professional Elective-VI				3
	Open Elective-III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week			C
		L	T	P	
21EIP401L	Major Project	0	0	30	15
21EIP402L	Major Project	0	0	20	
21EIP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21EIP401L or 21EIP402L and 21EIP403L both in eighth semester

38. B.Tech. in Food Technology

38. (a) Mission of the Department

Mission Stmt – 1	To enrich knowledge in advance sectors of food, nutritional and food processing operations
Mission Stmt – 2	To focus on thrust areas of research in food and nutritional biotechnology.
Mission Stmt – 3	To adopt and apply high standards of technology for developing innovative food products and processes.
Mission Stmt – 4	To enhance professional ethics and moral in developing novel products.
Mission Stmt – 5	To create employability skills to meet the upcoming food technology sector.

38. (b) Program Educational Objectives (PEO)

PEO – 1	Attain advanced education, research and development, and other creative and innovative techniques in Food Technology
PEO – 2	Apply analytical techniques, problem-solving skills necessary to adapt the technological changes for a career in the field of Food Technology, Food Safety and Quality
PEO – 3	Execute engineering knowledge acquired from projects, laboratory experimentation, classroom lectures and demonstrations to acknowledge the full range of food and environment sustainability
PEO – 4	Effectual use of communication skills in oral, written, visual and graphic modes within interpersonal, team, and group environments
PEO – 5	Retain the intellectual curiosity that motivates lifelong learning making them versatile to the rapidly evolving industrial challenges

38. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	Mission Stmt. – 2	Mission Stmt. – 3	Mission Stmt. – 4	Mission Stmt. – 5
PEO – 1	3	2	2	1	1
PEO – 2	3	2	2	3	1
PEO – 3	3	3	2	2	3
PEO – 4	2	3	3	2	3
PEO – 5	3	2	3	3	2

38. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3	1	3	2	3	1	1	2	2	3	3	3	3	2	3
PEO – 2	3	2	2	3	3	2	2	1	2	2	1	2	2	2	3
PEO – 3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3
PEO – 4	1	2	1	1	2	1	2	3	3	3	2	2	2	2	1
PEO – 5	2	2	2	2	3	3	1	1	3	2	2	3	2	2	2

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	Ability to implement the knowledge of the food product development, safety, upstream processing and product marketing of major subsystems and technologies associated with food for sustainable professional career
PSO - 2	Ability to comprehend and communicate effectively within a multidisciplinary working environment in the context of the emerging technologies.
PSO - 3	Ability to acquire technical, managerial and entrepreneurial skill that makes them an employable graduate and / food entrepreneur

38. (e) Program Structure: B.Tech. in Food Technology

Humanities & Social Sciences including Management Courses (H)						
Course Code	Course Title	Hours/ Week L	T	P	C	
21LEH101T	Communicative English	2	1	0	3	
21LEH102T	Chinese	2	1	0	3	
21LEH103T	French					
21LEH104T	German					
21LEH105T	Japanese					
21LEH106T	Korean					
21LEH107T	Spanish					
21GNH101J	Philosophy of Engineering	1	0	1	2	
21GNH401T	Behavioural Psychology	2	1	0	3	
21PDH201T	Social Engineering	2	0	0	2	
	Total Credits				**13**	

3. Engineering Science Courses (S)					
Course Code	Course Title	Hours/ Week L	T	P	C
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21FPS101T	Fundamentals of Food Engineering	3	1	0	4
21FPS101L	Food Processing Lab	0	0	2	1
21CSS303T	Data Science	2	0	0	2
	Total Credits				**22**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)						
Course Code	Course Title	Hours/ Week L	T	P	C	
21GNP301L	Community Connect	0	0	2	1	
21FPP302L	Project	0	0	6	3	
21FPP303T	MOOC	3	0	0		
21FPP401L	Major Project	0	0	30	15	
21FPP402L	Major Project	0	0	20		
21FPP403L	Internship#	0	0	10		
	Total Credits				**19**	

Mandatory Courses (M)					
Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

. Basic Science Courses (B)						
Course Code	Course Title	Hours/ Week L	T	P	C	
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5	
21CYB101J	Chemistry	3	1	2	5	
21MAB101T	Calculus and Linear Algebra	3	1	0	4	
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4	
21MAB202T	Numerical Methods	3	1	0	4	
21BTB103T	Biology	2	0	0	2	
21MAB303T	Probability and Statistics	3	1	0	4	
	Total Credits				**32**	

4. Professional Core Courses (C)					
Course Code	Course Title	Hours/ Week L	T	P	C
21CSC206T	Artificial Intelligence	3	0	0	3
21FPC201J	Food Biochemistry and Nutrition	3	0	2	4
21FPC202T	Processing and Post - Harvest Technology of Fruits and Vegetables	3	0	0	3
21FPC203T	Unit Operation in Food processing	3	0	2	4
21FPC204J	Food Microbiology	3	0	2	4
21FPC205J	Processing Technology of Milk and Dairy Products	3	0	2	4
21FPC206T	Food Refrigeration and Cold Chain	3	0	0	3
21FPC301J	Processing Technology of Meat, Poultry and Marine Products	3	0	2	4
21FPC302J	Heat and Mass Transfer in Food Engineering	2	0	2	3
21FPC303T	Food Packaging Technology and Equipments	3	0	0	3
21FPC304J	Processing Technology of Grains	3	0	0	3
21FPC305T	Sensory evaluation of Food products	3	0	0	3
21FPC401	Instrumentation and Process Control in Food Engineering	3	0	0	3
21FPC402	Food Additives, preservatives and regulations	3	0	0	3
	Total Credits				**47**

List of Open Elective Courses (O) *Any 3 Courses*					
Course Code	Course Title	Hours/ Week L	T	P	C
21FPO301T	Food for Health and sustainability	3	0	0	3
21FPO302T	Personal Hygiene and Good Manufacturing Practices	3	0	0	3
21FPO303T	Food Entrepreneurship	3	0	0	3
21FPO304T	Food and Beverage Technology	3	0	0	3
21FPO305T	Bakery and Confectionery Technology	3	0	0	3
21FPO306T	Food Industry 4.0	3	0	0	3
	Total Credits				**09**

Professional Elective Courses (E) *Any 6 Courses*					
Course Code	Course Title	Hours/ Week L	T	P	C
Sub-stream: Food Technology					
21FPE201T	*Processing Technology in spices and plantation crops*	*3*	*0*	*0*	*3*
21FPE301T	*processing Technology in Bakery, confectionery and snack products*	*3*	*0*	*0*	*3*
21FPE302T	*Food Fortification and supplementation Technology*	*2*	*0*	*2*	*3*
21FPE303T	*Development of Designer Food and Smart Packaging materials*	*3*	*0*	*0*	*3*
21FPE401T	*Sensors and IoT in Food Technology*	*3*	*0*	*0*	*3*
21FPE402T	*Deep learning in Food Technology*	*3*	*0*	*0*	*3*
Sub-stream: Food Engineering					
21FPE202T	*Food Thermodynamics*	*3*	*0*	*0*	*3*
21FPE304T	*Fluid mechanics*	*3*	*0*	*0*	*3*
21FPE305T	*Food Process Equipments Design*	*3*	*0*	*0*	*3*
21FPE306T	*Food Storage Engineering*	*3*	*0*	*0*	*3*
21FPE403T	*Food process Optimization and simulation*	*3*	*0*	*0*	*3*
21FPE404T	*Computational Fluid Dynamics*	*3*	*0*	*0*	*3*
Sub-stream: Food Safety and Quality Management					
21FPE203T	*Food Biotechnology*	*3*	*0*	*0*	*3*
21FPE307T	*Instrumental Techniques in Food Analysis*	*3*	*0*	*0*	*3*
21FPE308T	*Nutraceuticals and Functional Foods*	*3*	*0*	*0*	*3*
21FPE309T	*Food Plant Sanitation*	*3*	*0*	*0*	*3*

Professional Elective Courses (E) *Any 6 Courses*					
Course Code	Course Title	Hours/ Week L	T	P	C
21FPE405T	*Food Quality, Safety, Standard and Certification*	*3*	*0*	*0*	*3*
21FPE406T	*IOT based Food Quality Monitoring System*	3	0	0	3
Sub-stream : Food Entrepreneurship and Business Development					
21FPE204T	*Business management and Economics*	*3*	*0*	*0*	*3*
21FPE310T	*ICT application in Food industry*	*3*	*0*	*0*	*3*
21FPE311T	*Marketing Management and International trading*	*3*	*0*	*0*	*3*
21FPE312T	*Project Preparation and Management*	*3*	*0*	*0*	*3*
21FPE407T	*Communication and Soft skill Development*	*3*	*0*	*0*	*3*
21FPE408T	*Tools and Techniques for Food Entrepreneurship Development*	*3*	*0*	*0*	*3*
Total Credits					**18**

38. (f) Programme Articulation Matrix

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21FPL101L	Food Properties Lab	2.8	2.4	1	2.8	2.4				1			1	2	1	1
21FPS101T	Fundamentals of Food Engineering	1.2	1.6	0.6				0.4						1.6	1.2	0.6
21FPC201J	Food Biochemistry and Nutrition	1.6	0.6	0.2	0.8	0.6		0.8						1.6	0.6	0.2
21FPC202T	Processing and Post - Harvest Technology of fruits and vegetables	2	1.8	1.2	1	1.8		1.8						2.2	0.6	
21FPC203J	Unit Operation in Food processing	3	2.8	2.6	2.4	1.8								2.6	1.8	2.6
21FPC204J	Food Microbiology	2.4	2	0.8	0.6			0.4						2.6	1	0.5
21FPC205J	Processing Technology of milk and dairy products	2.8	2.8	1.8	1.6	1.8				1	1		1	3	3	1
21FPC206T	Food Refrigeration and Cold Chain	3	3	0.4	2									3	2	
21FPC301J	Processing Technology of meat, poultry and marine products	2.8	2.8	1.8	1.6	1.8				1	1		1	3	3	1
21FPC302J	Heat and Mass Transfer in Food Engineering	3	3	0.4	2					1	1			3	2	1
21FPC303J	Food Packaging Technology and Equipments	3	2.8	1.8	1	1.2		2.2						3	1.8	1
21FPC304J	Processing Technology of grains	3	2.8	1.8	1	1.2		2						3	1.8	1
21FPC305T	Sensory evaluation of Food products	1.6	1.6	2.4	2	1.8		0.6	1	1.6	1			3	1.2	
21FPC401	Instrumentation and Process Control in Food Engineering	3	2.6	1.8	2	1								2.4	1.8	1.4
21FPC402	Food Additives, preservatives and regulations	2.4	0.4	0.8	1.6	0.8		1	1.8				1	2	1.8	1
21CSC206T	Artificial Intelligence	2.4	0.2	1.2	1.2	0.8								3	0.8	
21FPE201T	Processing Technology in spices and plantation crops	2.8	1.8	2.4	1.6	1.8		0.6		1	1		1	2.8	2	0.6
21FPE301T	processing Technology in Bakery, confectionery and snack products	2.8	1.8	2.4	1.6	1.8		0.6		1	1		1	2.8	2	0.6
21FPE302T	Food Fortification and supplementation Technology	1.6	1.6	2.4	2	1.8		0.6	1	1.6	1			2	1.2	0.8
21FPE303T	Development of Designer Food and Smart Packaging materials	3	3	3	2	1.8		1.8	1	1.2		2	1.6	1.8	1.2	2
21FPE401T	Sensors and IoT in Food Technology	3	2.8	3	2	3	0.6	1.8	1	1.2	1			2.8	1.2	1.2
21FPE402T	Deep learning in Food Technology	3	2.8	3	2	3	0.6	1.8	1	1.2	1			2.8	1.2	1.2
21FPE202T	Food Thermodynamics	3	2.8	1.4	1.2	0.8								2.8	2	0.6
21FPE304T	Fluid mechanics	2.8	2.6	1	0.8									2.2	0.6	
21FPE305T	Food Process Equipments Design	3	2.6	2.4	2.4	2.8		1	1	0.8	1		1	2.6	2	0.5
21FPE306T	Food Storage Engineering	2.8	1.8	2.4	1.6	1.8		0.6		1	1		1	2.8	2	0.6
21FPE403T	Food process Optimization and simulation	3	3	1.2	2.6	3		1		1.4	1		1	2	1.4	1
21FPE404T	Computational Fluid Dynamics	3	2.8	3	2	3	0.6	1.8	1	1.2	1			2.8	1.2	1.2
21FPE203T	Food Biotechnology	2.4	2	0.8	0.6			0.4						2.6	1	0.5
21FPE307T	Instrumental Techniques in Food Analysis	2.6	2.2	1.8	1.2	1.8								2.4	1.8	1.4
21FPE308T	Nutraceuticals and Functional Foods	2.4	2	0.8	0.6			0.4						2.6	1	0.5
21FPE309T	Food Plant Sanitation	2	1	2.4	1.8	2.2	1	1.8	2	1.4	1			2.6	2	1.8
21FPE405T	Food Quality, Safety, Standard and Certification	2	1	2.4	1.8	2.2	1	1.8	2	1.8	1			3	2	1.8
21FPE406T	IOT based Food Quality Monitoring System	3	3	1.2	2.6	3		1		1.4	1		1	2	1.4	1
21FPE204T	Business management and Economics	1	2.4	2.2	1.2			0.6	1					2	0.6	2
21FPE310T	ICT application in Food industry	3	3	1.2	2.6	3		1		1.4	1		1	2	1.4	2
21FPE311T	Marketing Management and International trading	1	1.8	0.6	0.6	1		0.6	1.6	1	1.8			1.8	1.6	2
21FPE312T	Project Preparation and Management	1	1.8	0.6	0.6	1		0.6	1.6	1	1.8	3	1	2	1.2	2
21FPE407T	Communication and Soft skill Development	2.8	2.4	1.2	0.4	1				1	2.6		1.2	1.8	1	2
21FPE408T	Tools and Techniques for Food Entrepreneurship Development	2.8	2.2	2.4	2.4	2.8	1	1	1.6			2.8	1.8	2.8	1.8	2
21FPP302L	MOOC	3	2	2							2		2			
21FPP303T	Project	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
21FPP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21FPP402L	Semester Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	2.2	1.7	1.7	2.0	1.4	1.2	1.6	1.4	1.4	2.8	1.5	2.5	1.6	1.3	

38. (g) Implementation Plan: B.Tech. in Food Technology

Semester - I

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21FPS101L	Food Processing Lab	0	0	2	1
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**19**

Semester - II

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21FPS101T	Fundamentals of Food Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21FPC202J	Processing and Post Harvest Technology of Fruits and Vegetables	3	0	0	3
21FPC201T	Food Biochemistry and Nutrition	3	0	2	4
21FPC203J	Unit Operation in Food processing	3	0	2	4
21PDH201T	Social Engineering	2	0	0	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**20**

Semester – IV

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21FPC204J	Food Microbiology	3	0	2	4
21FPC205J	Processing Technology of Milk and Dairy Products	3	0	2	4
21FPC206T	Food Refrigeration and Cold Chain	3	0	0	3
	Professional Elective-I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**24**

Semester – V

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB301T	Probability and Statistics	3	1	0	4
21FPC301J	Processing Technology of Meat, Poultry and Marine Products	3	0	2	4
21FPC302J	Heat and Mass Transfer in Food Engineering	2	0	2	3
21FPC303T	Food Packaging Technology and Equipments	3	0	0	3
	Professional Elective – II				3
	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
18PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week			C
		L	T	P	
21CSS303T	Data Science	2	0	0	2
21FPC304J	Processing Technology of Grains	2	0	2	3
21FPC305T	Sensory evaluation of Food products	3	0	0	3
	Professional Elective-III				3
	Professional Elective-IV				3
	Open Elective-II				3
21EIP302L	Project	0	0	6	3
21EIP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester – VII

Code	Course Title	Hours/ Week			C
		L	T	P	
21GNH401T	Behavioral Psychology	2	1	0	3
	Professional Elective-V				3
	Professional Elective-VI				3
	Professional Elective-VII				3
	Professional Elective-VIII				3
	Open Elective-III				3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week			C
		L	T	P	
21FPP401L	Major Project	0	0	30	15
21FPP402L	Major Project	0	0	20	
21FPP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21FPP401L or 21FPP402L and 21FPP403L both in eighth semester

39. B.Tech.in Mechanical Engineering

40. (a) Mission of the Department

Mission Stmt – 1	*To impart quality education to produce eminent mechanical engineers*
Mission Stmt – 2	*To establish Centers of Research Excellence to inculcate research acumen to faculty and students on the emerging thrust areas of mechanical engineering.*
Mission Stmt – 3	*To inculcate progressive education and intricate facts through cognitive training programs to the faculty and students using state-of-art facilities.*

40. (b) Program Educational Objectives (PEO)

PEO – 1	*Practice mechanical engineering in different disciplines towards system design, realization, and manufacturing*
PEO – 2	*Enhance professional practice to meet the global standards with ethical and social responsibility*
PEO – 3	*Provide solutions to industrial, social, and environmental issues with appropriate techniques and tools*
PEO – 4	*Progress in multi-disciplinary skills and transcend in leadership qualities*

40. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	*Mission Stmt. – 2*	*Mission Stmt. – 3*
PEO – 1	3	3	3
PEO – 2	2	2	3
PEO – 3	3	3	3
PEO – 4	*2*	*3*	*3*

40. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	
PEO – 1	3	3	2	3	3								3	3	
PEO – 2			3			3	3	3				3			
PEO – 3	3	3	3	3	3	3	3	2		1	2	3	3	3	
PEO – 4		3	3	2	3				3	3	3	3	3	3	

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Apply contemporary technologies for sustainable development in mechanical engineering systems*
PSO - 2	*Ability to adopt appropriate tools and techniques to solve the problems in various domains of mechanical engineering.*

40. (e) Program Structure: B.Tech. in Mechanical Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101T	Engineering Mechanics	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

Professional Elective Courses (E) (Any 5 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21MEE101T	Computer Aided Design- Computer Aided Manufacturing	3	0	0	3
21MEE102T	Composite Materials and Characterization	3	0	0	3
21MEE103T	Automation in Manufacturing Systems	3	0	0	3
21MEE104T	Energy Engineering and Management	3	0	0	3
21MEE105T	Solar Energy Systems	3	0	0	3
21MEE201T	Foundation skills in integrated product development	3	0	0	3
21MEE202T	Mechanical Vibrations	3	0	0	3
21MEE203T	Industrial Tribology	3	0	0	3
21MEE204T	Design for Manufacturing and Assembly	3	0	0	3
21MEE205T	Electric Vehicle Technology	3	0	0	3
21MEE206T	Biomechanics	3	0	0	3
21MEE207T	Operations Research	3	0	0	3
21MEE208T	Soft Computing Techniques and Applications in Mechanical Engineering	3	0	0	3
21MEE209T	Process Planning and Cost Estimation	3	0	0	3
21MEE210T	Mechatronics System Design	3	0	0	3
21MEE211T	Soft Robotics	3	0	0	3
21MEE212T	Heating, Ventilation and Air Conditioning Systems	3	0	0	3
21MEE213T	Emerging Technologies in Automotive Systems	3	0	0	3
21MEE214T	Gas Dynamics and Space Propulsion	3	0	0	3
21MEE215T	Computational Fluid Dynamics: Theory with Applications	3	0	0	3
21MEE216T	Modeling and Analysis of Thermal Systems	3	0	0	3
21MEE217J	Microelectronics Thermal Management.	2	0	2	3
21MEE218T	Aerodynamics of Electric and Sports Vehicles	3	0	0	3
21MEE219T	Green Energy Systems	3	0	0	3
21MEE301T	Optimization in Engineering Design	3	0	0	3
21MEE302T	Design of transmission Systems	3	0	0	3
21MEE303T	Micro and Nano Machining	3	0	0	3
21MEE304T	Machine Vision	3	0	0	3
21MEE305T	Quality Management Systems	3	0	0	3
21MEE306T	Energy Conversion Systems	3	0	0	3
21MEE307T	Sustainable and Renewable Energy Systems	3	0	0	3
21MEE308T	Sustainable Waste Management	3	0	0	3
	Total Credits				**15**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21MEC201T	Engineering Thermodynamics	3	0	0	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC204T	Manufacturing Processes and Metrology	3	0	0	3
21MEC201L	Manufacturing Processes and Metrology Laboratory	0	0	2	1
21MEC202L	Material Testing Laboratory	0	0	2	1
21CSC206T	Artificial Intelligence	3	0	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21MEC203L	Machine Dynamics Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
21MEC205L	Mechanical Modeling and Assembly	0	0	4	2
21MEC301T	Thermal Systems Engineering	3	1	0	4
21MEC301P	Design of Mechanical Systems	3	0	0	3
21MEC302T	Sensors and Control Systems	3	0	0	3
21MEC301L	Thermal Power Systems Laboratory	0	0	2	1
21MEC302L	Automation and Control Systems Laboratory	0	0	2	1
21MEC301J	Heat and Mass Transfer	3	0	2	4
21MEC302J	Finite Element Methods	3	0	2	4
21MEC303T	Industry 4.0	3	0	0	3
	Total Credits				**51**

Open Elective Courses (O)
Any 3 Course

Course Code	Course Title	Hours/ Week L	T	P	C
21MEO101T	Fundamentals of Composite Materials	3	0	0	3
21MEO102T	Reverse Engineering and Rapid Prototyping	3	0	0	3
21MEO103T	Fundamentals of Biomechanics	3	0	0	3
21MEO104T	TQM and Reliability Engineering	3	0	0	3
21MEO105T	Occupational Safety and Disaster Management	3	0	0	3
21MEO106T	Introduction to Robotics	3	0	0	3
21MEO107T	Fundamentals of Nano Engineering	3	0	0	3
21MEO108T	Computer Numerical Control Programming and Operation	3	0	0	3
21MEO109T	Resource Management Techniques	3	0	0	3
21MEO110T	Energy Systems for Sustainable Buildings	3	0	0	3
21MEO111T	Environmental Pollution and Abetment	3	0	0	3
21MEO112T	Renewable Energy Sources and Application	3	0	0	3
21MEO113J	Electronics Thermal Management	2	0	2	3
21MEO114T	Solar Energy for Societal Applications	3	0	0	3
21MEO115T	Introduction to Drones	3	0	0	3
	Total Credits				**9**

Mandatory Courses (M)					
Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
Total Credits					3

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)					
Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21MEP302L	Project	0	0	6	3
21MEP303T	MOOC	3	0	0	
21MEP401L	Major Project	0	0	30	15
21MEP402L	Major Project	0	0	20	
21MEP403L	Internship#	0	0	10	
Total Credits					19

40. (f) Programme Articulation Matrix: B.Tech. in Mechanical Engineering

Course Code	Course Name	Program Outcome (PO)												PSO	
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2
21MEC201T	Engineering Thermodynamics	3	3												
21MEC202T	Mechanics of Solids	3	2.6												
21MEC203T	Engineering Materials and Metallurgy	2.3		2.2		2									
21MEC204T	Manufacturing Processes and Metrology		2.7	2.5	3	2.5									2
21MEC201L	Manufacturing Process and Metrology Laboratory			1.4	3	1.5									
21MEC202L	Material Testing Lab				3	2				1					
21MEC205T	Fluid Mechanics and Machinery	3	3												
21MEC206T	Kinematics and Dynamics of Machines	3	3												
21MEC203L	Machine Dynamics Laboratory	3	2			1									
21MEC204L	Fluid Mechanics Laboratory	3								3					
21MEC205L	Mechanical Modelling and Assembly	2.2				3					2.8				
21MEC301T	Thermal Systems Engineering	3						1							
21MEC301P	Design of Mechanical Systems	3		3						2					
21MEC302T	Sensors and Control Systems	3				3								3	3
21MEC301L	Thermal Power Systems Laboratory	3						3						1.8	
21MEC302L	Automation & Control Systems Laboratory			2.7		1				1.5				1	2
21MEC301J	Heat and Mass Transfer	3			3										
21MEC302J	Finite Element Methods		3		3	2									
21MEC303T	Industry 4.0	1.4	2.5	2.3		1.5	3	2						2	2
21MEE101T	Computer Aided Design - Computer Aided Manufacturing		2	2		1.8									1.5
21MEE102T	Composite Materials and Characterization	2.2	1.5	3				2						2.3	2.5
21MEE103T	Automation in Manufacturing Systems		3	3		2.3								2	2
21MEE104T	Energy Engineering and Management				1			3						1.8	
21MEE105T	Solar Energy Systems	3	2					3						3	
21MEE201T	Foundation Skills in Integrated Product Development			3	1									2	
21MEE202T	Mechanical Vibrations	3	2.8												3
21MEE203T	Industrial Tribology	1	3					2						2.5	2
21MEE204T	Design for Manufacturing and Assembly	2	1	1											2.7
21MEE205T	Electric Vehicle Technology	2						2	3					2	
21MEE206T	Biomechanics	2.6						2					2	2.2	
21MEE207T	Operations Research		1	3		1						3			3
21MEE208T	Soft Computing Techniques and Applications in Mechanical Engineering	2.6			3	3									2.3
21MEE209T	Process Planning and Cost Estimation	1	2.6		2			1							2.8
21MEE210T	Mechatronics System Design		2	3	1										2.3
21MEE211T	Soft Robotics	3	2.8	3										2	2.25
21MEE212T	Heating, Ventilation and Air Conditioning Systems	2.8	2.5					3						2.6	
21MEE213T	Emerging Technologies in Automotive Systems							3						3	
21MEE214T	Gas Dynamics and Space Propulsion	1.6	1.6												1
21MEE215T	Computational Fluid Dynamics: Theory with Applications	2.5	2.5			2									2. 7
21MEE216T	Modeling and Analysis of Thermal Systems	3						3						3	
21MEE217J	Microelectronics Thermal Management	3		3	1	3									1.4
21MEE218T	Aerodynamics of Electric and Sports Vehicles	2.6													1.8
21MEE219T	Green Energy Systems		3					2						3	
21MEE301T	Optimization in Engineering Design	3	3	3											2.6
21MEE302T	Design of transmission Systems	2		3											3
21MEE303T	Micro and Nano Machining	3			1.4	2									2
21MEE304T	Machine Vision		2.8		2.5	2.5						3	3		2
21MEE305T	Quality Management Systems	3	3	2.5		3	2. 3			3		3	3	3	1. 3
21MEE306T	Energy Conversion Systems	3						3				3		2. 3	
21MEE307T	Sustainable and Renewable Energy Systems	3						2.4						3	
21MEE308T	Sustainable Waste Management	2.8						2. 7	2					2. 7	
21GNP301L	Community Connect														
21MEP302L	Project	3	2	2	3	3	3	1	3	3	3	3	3		
21MEP303T	MOOC	3	2	2	3	3	3		3	3	3		3		
21MEP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21MEP402L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21MEP403L	Internship	3	2	2	3	3	3	1	3	3	3	3	3		
	Program Average	2.6	2.4	2.5	2.3	2.3	3.0	2.2	2.8	2.5	3.0	3.0	2.9	2.4	2.3

40. (g) Implementation Plan: B.Tech. in Mechanical Engineering

Semester - I

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21MES101T	Engineering Mechanics	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MEC201T	Engineering Thermodynamics	3	0	0	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC204T	Manufacturing Processes and Metrology	3	0	0	3
21MEC201L	Manufacturing Processes and Metrology Laboratory	0	0	2	1
21MEC202L	Material Testing Laboratory	0	0	2	1
21PDH201T	Social Engineering	2	0	0	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
E	Professional Elective – I				3
21MEC203L	Machine Dynamics Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
21MEC205L	Mechanical Modeling and Assembly	0	0	4	2
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB301T	Probability and Statistics	3	1	0	4
21MEC301T	Thermal Systems Engineering	3	1	0	4
21MEC301P	Design of Mechanical Systems	3	0	0	3
21MEC302T	Sensors and Control Systems	3	0	0	3
21MEEXXXT	Professional Elective – II				3
O	Open Elective – I				3
21MEC301L	Thermal Power Systems Laboratory	0	0	2	1
21MEC302L	Automation and Control Systems Laboratory	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**23**

Semester – VI

Code	Course Title	Hours/ Week			C
		L	T	P	
21CSS303T	Data Science	2	0	0	2
21MEC301J	Heat and Mass Transfer	3	0	2	4
21MEC302J	Finite Element Methods	3	0	2	4
21MEC303T	Industry 4.0	3	0	0	3
21MEEXXXT	Professional Elective – III				3
21MEP302L	Project	0	0	6	3
21MEP303T	MOOC	3	0	0	
O	Open Elective – II				3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**22**

Semester – VII

Code	Course Title	Hours/ Week			C
		L	T	P	
21GNH401T	Behavioral Psychology	2	1	0	3
21MEEXXXT	Professional Elective – IV				3
21MEEXXXT	Professional Elective – V				3
O	Open Elective – III				3
	Total Credits				**12**

Semester – VIII

Code	Course Title	Hours/ Week			C
		L	T	P	
21MEP401L	Major Project	0	0	30	15
21MEP402L	Major Project	0	0	20	
21MEP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21MEP401L or 21MEP402L and 21MEP403L both in eighth semester

40. B.Tech.in Mechanical Engineering with Specialization in Artificial Intelligence and Machine Learning

40. (a) Mission of the Department

Mission Stmt – 1	*To impart quality education to produce eminent mechanical engineers*
Mission Stmt – 2	*To establish Centers of Research Excellence to inculcate research acumen to faculty and students on the emerging thrust areas of mechanical engineering.*
Mission Stmt – 3	*To inculcate progressive education and intricate facts through cognitive training programs to the faculty and students using state-of-art facilities.*

40. (b) Program Educational Objectives (PEO)

PEO – 1	*Practice mechanical engineering in different disciplines towards system design, realization, manufacturing, and industrial automation*
PEO – 2	*Enhance professional practice to meet the global standards with ethical and social responsibility*
PEO – 3	*Solve industrial, social, and environmental problems with appropriate techniques and tools*
PEO – 4	*Work in large cross-functional teams and pursue life-long learning*

40. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	*Mission Stmt. – 2*	*Mission Stmt. – 3*
PEO – 1	*3*	*3*	*3*
PEO – 2	*2*	*2*	*3*
PEO – 3	*3*	*3*	*3*
PEO – 4	*2*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

40. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	
PEO – 1	*3*	*3*	*2*	*3*	*3*								*3*	*3*	
PEO – 2			*3*			*3*	*3*	*3*				*3*			
PEO – 3	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*2*		*1*	*2*	*3*	*3*	*3*	
PEO – 4		*3*	*3*	*2*	*3*				*3*	*3*	*3*	*3*	*3*	*3*	

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Ability to analyse and implement AI techniques in mechanical engineering*
PSO - 2	*Ability to design and develop the contemporary programmable interfaces in mechanical systems*

40. (e) Program Structure: B.Tech. in Mechanical Engineering with specialization in Artificial Intelligence and Machine Learning

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101T	Engineering Mechanics	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

Professional Elective Courses (E) (Any 5 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21MEE351J	IoT Systems Design	2	0	2	3
21MEE352J	Programming for Machine Learning	2	0	2	3
21MEE353T	Mathematics for Machine Learning	3	0	0	3
21MEE354T	Soft Computing Techniques and Applications	3	0	0	3
21MEE355T	Artificial Neural Network	3	0	0	3
21MEE356T	Machine Diagnostics and Condition Monitoring	3	0	0	3
21MEE357T	Digital Signal and Image Processing	3	0	0	3
21MEE358T	Machine Learning Theory and Applications	3	0	0	3
21MEE359T	Artificial Intelligence Applications in Mechanical Engineering	3	0	0	3
	Total Credits				*15*

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				*3*

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21MEC201T	Engineering Thermodynamics	3	0	0	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC204T	Manufacturing Processes and Metrology	3	0	0	3
21MEC201L	Manufacturing Processes and Metrology Laboratory	0	0	2	1
21MEC202L	Material Testing Laboratory	0	0	2	1
21CSC206T	Artificial Intelligence	3	0	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21MEC203L	Machine Dynamics Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
21MEC205L	Mechanical Modeling and Assembly	0	0	4	2
21MEC301T	Thermal Systems Engineering	3	1	0	4
21MEC301P	Design of Mechanical Systems	3	0	0	3
21MEC302T	Sensors and Control Systems	3	0	0	3
21MEC301L	Thermal Power Systems Laboratory	0	0	2	1
21MEC302L	Automation and Control Systems Laboratory	0	0	2	1
21MEC301J	Heat and Mass Transfer	3	0	2	4
21MEC302J	Finite Element Methods	3	0	2	4
21MEC303T	Industry 4.0	3	0	0	3
	Total Credits				**51**

Open Elective Courses (O)
Any 3 Course

Course Code	Course Title	Hours/ Week L	T	P	C
21MEO101T	Fundamentals of Composite Materials	3	0	0	3
21MEO102T	Reverse Engineering and Rapid Prototyping	3	0	0	3
21MEO103T	Fundamentals of Biomechanics	3	0	0	3
21MEO104T	TQM and Reliability Engineering	3	0	0	3
21MEO105T	Occupational Safety and Disaster Management	3	0	0	3
21MEO106T	Introduction to Robotics	3	0	0	3
21MEO107T	Fundamentals of Nano Engineering	3	0	0	3
21MEO108T	Computer Numerical Control Programming and Operation	3	0	0	3
21MEO109T	Resource Management Techniques	3	0	0	3
21MEO110T	Energy Systems for Sustainable Buildings	3	0	0	3
21MEO111T	Environmental Pollution and Abetment	3	0	0	3
21MEO112T	Renewable Energy Sources and Application	3	0	0	3
21MEO113J	Electronics Thermal Management	2	0	2	3
21MEO114T	Solar Energy for Societal Applications	3	0	0	3
21MEO115T	Introduction to Drones	3	0	0	3
	Total Credits				*9*

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21MEP302L	Project	0	0	6	3
21MEP303T	MOOC	3	0	0	
21MEP401L	Major Project	0	0	30	15
21MEP402L	Major Project	0	0	20	
21MEP403L	Internship#	0	0	10	
	Total Credits				**19**

40. (f) Programme Articulation: B.Tech. in Mechanical Engineering with specialization in Artificial Intelligence and Machine Learning

Course Code	Course Name	Program Outcome (PO)												PSO	
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2
21MEC201T	Engineering Thermodynamics	3	3												
21MEC202T	Mechanics of Solids	3	2.6												
21MEC203T	Engineering Materials and Metallurgy	2.3		2.2		2									
21MEC204T	Manufacturing Processes and Metrology		2.7	2.5	3	2.5									2
21MEC201L	Manufacturing Process and Metrology Laboratory			1.4	3	1.5									
21MEC202L	Material Testing Lab				3	2				1					
21MEC205T	Fluid Mechanics and Machinery	3	3												
21MEC206T	Kinematics and Dynamics of Machines	3	3												
21MEC203L	Machine Dynamics Laboratory	3	2			1									
21MEC204L	Fluid Mechanics Laboratory	3								3					
21MEC205L	Mechanical Modelling and Assembly	2.2				3					2.8				
21MEC301T	Thermal Systems Engineering	3						1							
21MEC301P	Design of Mechanical Systems	3		3						2					
21MEC302T	Sensors and Control Systems	3				3								3	3
21MEC301L	Thermal Power Systems Laboratory	3						3						1.8	
21MEC302L	Automation & Control Systems Laboratory			2.7		1				1.5				1	2
21MEC301J	Heat and Mass Transfer	3			3										
21MEC302J	Finite Element Methods		3		3	2									
21MEC303T	Industry 4.0	1.4	2.5	2.3		1.5	3	2						2	2
21MEE351J	IoT Systems Design			2	1.2	1									1
21MEE352J	Programming for Machine Learning		2		3									2	
21MEE353T	Mathematics for Machine Learning		3	2.2									1	1.5	1
21MEE354T	Soft Computing Techniques and its Applications			2.8	3									2	3
21MEE355T	Artificial Neural Network		2.8		3	2.8								1.8	
21MEE356T	Machine Diagnostics and Condition Monitoring		2	2.4		1									1.3
21MEE357T	Digital Signal and Image Processing	2	2.8	3										2.5	3
21MEE358T	Machine Learning Theory and Applications		1.8	2.2		1.8									2.6
21MEE359T	Artificial Intelligence Applications in Mechanical Engineering		2	3	3									2	3
21GNP301L	Community Connect														
21MEP302L	Project	3	2	2	3	3	3	1	3	3	3	3	3		
21MEP303T	MOOC	3	2	2	3	3	3		3	3	3		3		
21MEP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21MEP402L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21MEP403L	Internship	3	2	2	3	3	3	1	3	3	3	3	3		
	Program Average	2.8	2.5	2.4	2.9	2.1	3.0	1.8	3.0	2.4	3.0	3.0	2.6	2.1	2.2

40. (g) Implementation Plan: B.Tech. in Mechanical Engineering with specialization in Artificial Intelligence and Machine Learning

Semester - I

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21MES101T	Engineering Mechanics	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MEC201T	Engineering Thermodynamics	3	0	0	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC204T	Manufacturing Processes and Metrology	3	0	0	3
21MEC201L	Manufacturing Processes and Metrology Laboratory	0	0	2	1
21MEC202L	Material Testing Laboratory	0	0	2	1
21PDH201T	Social Engineering	2	0	0	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
E	Professional Elective – I				3
21MEC203L	Machine Dynamics Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
21MEC205L	Mechanical Modeling and assembly	0	0	4	2
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB301T	Probability and Statistics	3	1	0	4
21MEC301T	Thermal Systems Engineering	3	1	0	4
21MEC301P	Design of Mechanical Systems	3	0	0	3
21MEC302T	Sensors and Control Systems	3	0	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21MEC301L	Thermal Power Systems Laboratory	0	0	2	1
21MEC302L	Automation and Control Systems Laboratory	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**23**

Semester – VI

Code	Course Title	Hours/ Week			C
		L	T	P	
21CSS303T	Data Science	2	0	0	2
21MEC301J	Heat and Mass Transfer	3	0	2	4
21MEC302J	Finite Element Methods	3	0	2	4
21MEC303T	Industry 4.0	3	0	0	3
E	Professional Elective – III				3
21MEP302L	Project	0	0	6	3
21MEP303T	MOOC	3	0	0	
O	Open Elective – II	3	0	0	3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**22**

Semester – VII

Code	Course Title	Hours/ Week			C
		L	T	P	
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – IV				3
E	Professional Elective – V				3
O	Open Elective – III				3
	Total Credits				**12**

Semester – VIII

Code	Course Title	Hours/ Week			C
		L	T	P	
21MEP401L	Major Project	0	0	30	
21MEP402L	Major Project	0	0	20	15
21MEP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21MEP401L or 21MEP402L and 21MEP403L both in eighth semester

41. B.Tech.in Mechanical Engineering with Specialization in Automation and Robotics

41. (a) Mission of the Department

Mission Stmt – 1	*To impart quality education to produce eminent mechanical engineers*
Mission Stmt – 2	*To establish Centers of Research Excellence to inculcate research acumen to faculty and students on the emerging thrust areas of mechanical engineering.*
Mission Stmt – 3	*To inculcate progressive education and intricate facts through cognitive training programs to the faculty and students using state-of-art facilities.*

41. (b) Program Educational Objectives (PEO)

PEO – 1	*Practice mechanical engineering in different disciplines towards system design, realization, automated manufacturing systems and robotics.*
PEO – 2	*Enhance professional practice to meet the global standards with ethical and social responsibility.*
PEO – 3	*Provide solutions to industrial, social, and environmental issues with appropriate techniques and tools.*
PEO – 4	*Progress in multi-disciplinary skills and transcend in leadership qualities*

41. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	*Mission Stmt. – 2*	*Mission Stmt. – 3*
PEO – 1	*3*	*3*	*3*
PEO – 2	*2*	*2*	*3*
PEO – 3	*3*	*3*	*3*
PEO – 4	*2*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

41. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO	
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2
PEO – 1	*3*	*3*	*2*	*3*	*3*								*3*	*3*
PEO – 2			*3*			*3*	*3*	*3*				*3*	*3*	*2*
PEO – 3	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*2*		*1*	*2*	*3*	*3*	*2*
PEO – 4		*3*	*3*	*2*	*3*				*3*	*3*	*3*	*3*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Ability to develop and implement new ideas on product design and development with the help of computer aided tools, automated manufacturing systems and robotics.*
PSO - 2	*Ability to adopt appropriate tools and techniques to solve the problems in various domains of mechanical engineering.*

41. (e) Program Structure: B.Tech. in Mechanical Engineering with specialization in Automation and Robotics

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101T	Engineering Mechanics	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**21**

Professional Elective Courses (E) (Any 5 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21MEE361T	PLC and Virtual Instrumentation	2	0	2	3
21MEE362T	Mechatronics for Automation and Robotics	2	0	2	3
21MEE363T	Industrial Internet of Things	3	0	0	3
21MEE364T	Advanced Automation Systems	3	0	0	3
21MEE365T	Robot System Design	3	0	0	3
21MEE366T	Robot Mechanics and Control	3	0	0	3
21MEE367T	Soft Robots	3	0	0	3
21MEE368T	Autonomous Robot Vehicles	3	0	0	3
21MEE369J	Robot Applications and Programming	2	0	2	3
21MEE370T	Microsystems Design and Applications	3	0	0	3
	Total Credits				*15*

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				*3*

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21MEC201T	Engineering Thermodynamics	3	0	0	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC204T	Manufacturing Processes and Metrology	3	0	0	3
21MEC201L	Manufacturing Processes and Metrology Laboratory	0	0	2	1
21MEC202L	Material Testing Laboratory	0	0	2	1
21CSC206T	Artificial Intelligence	3	0	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21MEC203L	Machine Dynamics Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
21MEC205L	Mechanical Modeling and Assembly	0	0	4	2
21MEC301T	Thermal Systems Engineering	3	1	0	4
21MEC301P	Design of Mechanical Systems	3	0	0	3
21MEC302T	Sensors and Control Systems	3	0	0	3
21MEC301L	Thermal Power Systems Laboratory	0	0	2	1
21MEC302L	Automation and Control Systems Laboratory	0	0	2	1
21MEC301J	Heat and Mass Transfer	3	0	2	4
21MEC302J	Finite Element Methods	3	0	2	4
21MEC303T	Industry 4.0	3	0	0	3
	Total Credits				**51**

Open Elective Courses (O)
Any 3 Course

Course Code	Course Title	Hours/ Week L	T	P	C
21MEO101T	Fundamentals of Composite Materials	3	0	0	3
21MEO102T	Reverse Engineering and Rapid Prototyping	3	0	0	3
21MEO103T	Fundamentals of Biomechanics	3	0	0	3
21MEO104T	TQM and Reliability Engineering	3	0	0	3
21MEO105T	Occupational Safety and Disaster Management	3	0	0	3
21MEO106T	Introduction to Robotics	3	0	0	3
21MEO107T	Fundamentals of Nano Engineering	3	0	0	3
21MEO108T	Computer Numerical Control Programming and Operation	3	0	0	3
21MEO109T	Resource Management Techniques	3	0	0	3
21MEO110T	Energy Systems for Sustainable Buildings	3	0	0	3
21MEO111T	Environmental Pollution and Abetment	3	0	0	3
21MEO112T	Renewable Energy Sources and Application	3	0	0	3
21MEO113J	Electronics Thermal Management	2	0	2	3
21MEO114T	Solar Energy for Societal Applications	3	0	0	3
21MEO115T	Introduction to Drones	3	0	0	3
	Total Credits				*9*

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21MEP302L	Project	0	0	6	3
21MEP303T	MOOC	3	0	0	
21MEP401L	Major Project	0	0	30	15
21MEP402L	Major Project	0	0	20	
21MEP403L	Internship#	0	0	10	
	Total Credits				**19**

40. (f) Programme Articulation: B.Tech. in Mechanical Engineering with specialization in Automation and Robotics

Course Code	Course Name	Program Outcome (PO)												PSO	
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2
21MEC201T	Engineering Thermodynamics	3	3												
21MEC202T	Mechanics of Solids	3	2.6												
21MEC203T	Engineering Materials and Metallurgy	2.3		2.2		2									
21MEC204T	Manufacturing Processes and Metrology		2.7	2.5	3	2.5									2
21MEC201L	Manufacturing Process and Metrology Laboratory			1.4	3	1.5									
21MEC202L	Material Testing Lab				3	2				1					
21MEC205T	Fluid Mechanics and Machinery	3	3												
21MEC206T	Kinematics and Dynamics of Machines	3	3												
21MEC203L	Machine Dynamics Laboratory	3	2			1									
21MEC204L	Fluid Mechanics Laboratory	3								3					
21MEC205L	Mechanical Modelling and Assembly	2.2				3					2.8				
21MEC301T	Thermal Systems Engineering	3						1							
21MEC301P	Design of Mechanical Systems	3		3						2					
21MEC302T	Sensors and Control Systems	3				3								3	3
21MEC301L	Thermal Power Systems Laboratory	3						3						1.8	
21MEC302L	Automation & Control Systems Laboratory			2.7		1				1.5				1	2
21MEC301J	Heat and Mass Transfer	3			3										
21MEC302J	Finite Element Methods		3		3	2									
21MEC303T	Industry 4.0	1.4	2.5	2.3		1.5	3	2						2	2
21MEE361T	PLC and Virtual Instrumentation														
21MEE362T	Mechatronics for Automation and Robotics														
21MEE363T	Industrial Internet of Things														
21MEE364T	Advanced Automation Systems														
21MEE365T	Robot System Design														
21MEE366T	Robot Mechanics and Control														
21MEE367T	Soft Robots														
21MEE368T	Autonomous Robot Vehicles														
21MEE369J	Robot Applications and Programming														
21MEE370T	Microsystems Design and Applications														
21GNP301L	Community Connect														
21MEP302L	Project	3	2	2	3	3	3	1	3	3	3	3	3		
21MEP303T	MOOC	3	2	2	3	3	3		3	3	3		3		
21MEP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21MEP402L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21MEP403L	Internship	3	2	2	3	3	3	1	3	3	3	3	3		
	Program Average														

41. (g) Implementation Plan: B.Tech. in Mechanical Engineering with specialization in Automation and Robotics

Semester - I

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21MES101T	Engineering Mechanics	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MEC201T	Engineering Thermodynamics	3	0	0	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC204T	Manufacturing Processes and Metrology	3	0	0	3
21MEC201L	Manufacturing Processes and Metrology Laboratory	0	0	2	1
21MEC202L	Material Testing Laboratory	0	0	2	1
21PDH201T	Social Engineering	2	0	0	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
E	Professional Elective – I	3	0	0	3
21MEC203L	Machine Dynamics Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
21MEC205L	Mechanical Modeling and assembly	0	0	4	2
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB301T	Probability and Statistics	3	1	0	4
21MEC301T	Thermal Systems Engineering	3	1	0	4
21MEC301P	Design of Mechanical Systems	3	0	0	3
21MEC302T	Sensors and Control Systems	3	0	0	3
E	Professional Elective – II	3	0	0	3
O	Open Elective – I	3	0	0	3
21MEC301L	Thermal Power Systems Laboratory	0	0	2	1
21MEC302L	Automation and Control Systems Laboratory	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**23**

Semester – VI

Code	Course Title	Hours/ Week			C
		L	T	P	
21CSS303T	Data Science	2	0	0	2
21MEC301J	Heat Transfer and Computational Fluid Dynamics	3	0	2	4
21MEC302J	Finite Element Methods	3	0	2	4
21MEC303T	Industry 4.0	3	0	0	3
E	Professional Elective – III	3	0	0	3
21MEP302L	Project	0	0	6	3
21MEP303T	MOOC	3	0	0	
O	Open Elective – II	3	0	0	3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**22**

Semester – VII

Code	Course Title	Hours/ Week			C
		L	T	P	
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – IV	3	0	0	3
E	Professional Elective – V	3	0	0	3
O	Open Elective – III	3	0	0	3
	Total Credits				**12**

Semester – VIII

Code	Course Title	Hours/ Week			C
		L	T	P	
21MEP401L	Major Project	0	0	30	15
21MEP402L	Major Project	0	0	20	
21MEP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21MEP401L or 21MEP402L and 21MEP403L both in eighth semester

42. B.Tech.in Mechatronics Engineering

42. (a) Mission of the Department

Mission Stmt – 1	*To impart the principles of Mechatronics Engineering to produce engineers who are capable of competing on the global stage.*
Mission Stmt – 2	*To excel at solving multidisciplinary challenges through structured teaching-learning methods and by providing state-of-the-art facilities.*
Mission Stmt – 3	*To cultivate future leaders with a strong sense of integrity, communication, teamwork, and entrepreneurship*

42. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will demonstrate a commitment to lifelong learning and career growth through participation and leadership in professional societies and organizations*
PEO – 2	*Graduates will advance professionally with a competency to solve challenges in industry, research, and academia leading to sustainable development of the society*
PEO – 3	*Graduates will be capable of solving ever-evolving-complex-system-integration problems through inter-disciplinary approaches.*
PEO – 4	*Graduates will be versatile in dealing with systems from a variety of modern engineering and technology fields with ease.*

42. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	*Mission Stmt. – 2*	*Mission Stmt. – 3*
PEO – 1	*2*	-	*3*
PEO – 2	*3*	-	*2*
PEO – 3	*3*	*3*	-
PEO – 4	-	*3*	-

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

42. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	-	-	-	-	-	*1*	*1*	*2*	-	*2*	-	-	-	*3*	-
PEO – 2	*3*	-	-	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*3*	-	*3*	*2*	*3*
PEO – 3	*3*	*3*	*3*	*3*	*3*	*2*	*1*	-	*3*	*3*	*2*	*1*	*3*	*2*	-
PEO – 4	*3*	*3*	*2*	*1*	*3*	*1*	-	-	*1*	*1*	-	-	*2*	*2*	*2*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Graduates will apply scientific principles for modelling and simulation of multi-disciplinary engineering systems*
PSO - 2	*Graduates will be able to interpret specifications of elements to design and develop an integrated system*
PSO - 3	*Graduates will be able to control Mechatronics and automation systems using modern programming tools*

42. (e) Program Structure: B.Tech. in Mechatronics Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MHS201T	Thermodynamics and Heat Transfer	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**20**

Professional Elective Courses (E) (Any 7 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
	Professional Elective -1				
21MHE401T	Fundamentals of Robotics	3	0	0	3
21MHE402L	Visual Computing Laboratory	0	0	5	3
21MHE403T	Industrial Electronics	3	0	0	3
	Professional Elective - 2				
21MHE404T	Robot Kinematics and Dynamics	3	0	0	3
21MHE405L	Neural Networks and Deep Learning Laboratory	0	0	5	3
21MHE406T	Virtual Instrumentation	3	0	0	3
	Professional Elective - 3				
21MHE407T	Autonomous Mobile Robotics	3	0	0	3
21MHE408L	Measurement and Data Acquisition Laboratory	0	0	5	3
21MHE409T	Advanced Microcontrollers and Signal Processors	3	0	0	3
	Professional Elective - 4	3	0	0	3
21MHE410T	Machine Vision and Image Processing	3	0	0	3
21MHE411T	Applied Mechatronics Systems	3	0	0	3
21MHE412T	Real Time Embedded Systems	3	0	0	3
	Professional Elective - 5				
21MHE413T	Condition Monitoring Techniques	3	0	0	3
21MHE414T	Advanced Control Systems	3	0	0	3
21MHE415T	Micro Electro Mechanical Systems	3	0	0	3
	Professional Elective - 6				
21MHE416T	Geometric Modelling	3	0	0	3
21MHE417T	Industrial Automation	3	0	0	3
21MHE418L	Robotics Laboratory	0	0	5	3
	Professional Elective - 7				
21MHE419T	Digital Manufacturing	3	0	0	3
21MHE420T	Energy Harvesting methods and applications	3	0	0	3
21MHE421T	Ergonomic Design	3	0	0	3
	Total Credits				21

Open Elective Courses (O)
Any 3 Course

Course Code	Course Title	Hours/ Week L	T	P	C
21MHO301T	Smart Farming	3	0	0	3
	Total Credits				3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB104J	Physics: Mechanics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21MHC101P	Elements of Mechatronics Systems	2	1	0	3
21MHC201T	Electrical actuators and Drives	3	0	0	3
21MHC202J	Analog and Digital Electronics	2	0	2	3
21MHC203J	Fluid power system and Automation	2	0	2	3
21MHC204L	Electrical Actuators and Drives Lab	0	0	2	1
21MHC205T	Microcontroller and Embedded Systems	3	0	0	3
21MHC206T	Mechanics of Solids and Fluids	3	0	0	3
21MHC207L	Microcontroller and Embedded Systems Lab	0	0	2	1
21MHC208L	Mechanics of Solids and Fluids Lab	0	0	2	1
21MHC209T	Project Management and Industrial Practices	2	1	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
21MHC301T	System Dynamics and Control	3	0	0	3
21MHC302J	Design and Analysis of Machine Elements	2	0	2	3
21MHC303J	Measurement, Sensors and Interfaces	2	0	2	3
21MHC304L	Modelling and Control Lab	0	0	2	1
21MHC305J	Manufacturing Processes	2	0	2	3
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	3	0	0	3
21MHC307P	Model Based Systems Engineering	1	2	0	3
	Total Credits				**46**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21MHP302L	Project	0	0	6	3
21MHP303T	MOOC	3	0	0	
21MHP401L	Major Project	0	0	30	15
21MHP402L	Major Project	0	0	20	
21MHP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				3

40. (f) Programme Articulation: B.Tech. in Mechatronics Engineering

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO - 3
21MHS201T	Thermodynamics and Heat Transfer	1	2			2										
21MHC101P	Elements of Mechatronics Systems	3	3													
21MHC201T	Electrical Actuators and Drives	3	2	2											1	2
21MHC202J	Analog and Digital Electronics	3	2	2											2	
21MHC203J	Fluid Power System and Automation	3	2	2		1									1	2
21MHC204L	Electrical Actuators and Drives Lab	3	2	2												
21MHC205T	Microcontroller and Embedded Systems	3		2		1										2
21MHC206T	Mechanics of Solids and Fluids	3	3	2												
21MHC208L	Mechanics of Solids and Fluids Lab	3	3	2												
21MHC207L	Microcontroller and Embedded Systems Lab	3	1	2		1										2
21MHC209T	Project Management and Industrial Practices					2						3		1		
21CSC206T	Artificial Intelligence															
21MHC301T	System Dynamics and Control	3	2	2										3		2
21MHC302J	Design and Analysis of Machine Elements	3	3	2		2								2	2	
21MHC303J	Measurement, Sensors and Interfaces	3	1	2										1		
21MHC304L	Modelling and Control Lab	2	2	3		2								3		2
21MHC305J	Manufacturing Processes	3	2	1												
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	1	2			3										
21MHC307P	Model Based Systems Engineering	3	3		2	1								2	2	
21MHE401T	Fundamentals of Robotics	3	2	2										2	2	
21MHE402L	Visual Computing Laboratory		3	3		2								2	2	
21MHE403T	Industrial Electronics	3	2	2										2	2	
21MHE404T	Robot Kinematics and Dynamics	3	3	2										2	2	
21MHE405L	Neural Networks and Deep Learning Laboratory	3	2			2								2		2
21MHE406T	Virtual Instrumentation	3	2	3										2	2	
21MHE407T	Autonomous Mobile Robotics	3	2		2									2	2	
21MHE408L	Measurement and Data Acquisition Laboratory	3		2		3									2	
21MHE409T	Advanced Microcontrollers and Signal Processors	2				1										
21MHE410T	Machine Vision and Image Processing	2	2	2		1								2	2	
21MHE411T	Applied Mechatronics Systems	3	2	3		3								2	2	
21MHE412T	Real Time Embedded Systems	1	3	3										2	2	
21MHE413T	Condition Monitoring Techniques	3	3	2		3								2	2	
21MHE414T	Advanced Control Systems	3	2	3		2								3		2
21MHE415T	Micro Electromechanical Systems	3	3		2									2	2	
21MHE416T	Geometric Modelling	3	3	2		2										
21MHE417T	Industrial Automation	3	2			2								2	2	
21MHE418L	Robotics Laboratory	3	3			3								2	2	
21MHE419T	Digital Manufacturing	3	3		2									2	2	
21MHE420T	Energy Harvesting Methods and Applications	3	2	1										2	2	
21MHE421T	Ergonomic Design	3	1			2										
21MHE422T	Industrial Data Communication	3													1	1
21MHE423T	Digital Signal Processing	3	2			2									2	
	Program Average	2.75	2.28	2.15	2	1.95						3		2.04	1.90	2

42. (g) Implementation Plan: B.Tech. in Mechatronics Engineering

Semester - I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB104J	Physics :Mechanics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21MHC101P	Elements of Mechatronics systems	2	1	0	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester - III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MHC201T	Electrical Actuators and Drives	3	0	0	3
21MHC202J	Analog and Digital Electronics	2	0	2	3
21MHC203J	Fluid power system and Automation	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21MHS201T	Thermodynamics and Heat Transfer	3	0	0	3
21MHC204L	Electrical Actuators and Drives Lab	0	0	2	1
21LEM201T	Professional Ethics*	1	0	0	0
21PDM201L	Verbal Reasoning*	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**22**

Semester - IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MHC205T	Microcontroller and Embedded Systems	3	0	0	3
21MHC206T	Mechanics of Solids and Fluids	3	0	0	3
21MHC207L	Microcontroller and Embedded Systems Lab	0	0	2	1
21MHC208L	Mechanics of Solids and Fluids Lab	0	0	2	1
21MHC209T	Project Management and Industrial Practices	2	1	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
	Professional Elective – I	3	0	0	3
21PDM202L	Critical and Creative Thinking Skills*	0	0	2	0
	Total Credits				**24**

Semester - V

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21MHC301T	System Dynamics and Control	3	0	0	3
21MHC303J	Measurement, Sensors and Interfaces	2	0	2	3
21MHC302J	Design and Analysis of Machine Elements	2	0	2	3
	Professional Elective – II	3	0	0	3
	Open Elective – I	3	0	0	3
21MHC304L	Modelling and Control Lab	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills*	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**21**

Semester - VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21MHC305J	Manufacturing Processes	2	0	2	3
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	3	0	0	3
21MHC307P	Model Based Systems Engineering	1	2	0	3
	Professional Elective – III	3	0	0	3
21MHP302L	Project	0	0	6	3
21MHP303T	MOOC	3	0	0	
O	Open Elective – II	3	0	0	3
21PDM302L	Employability Skills and Practices*	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioural Psychology	2	1	0	3
	Professional Elective – IV	3	0	0	3
	Professional Elective – V	3	0	0	3
	Professional Elective – VI				3
	Professional Elective – VII				3
O	Open Elective – III	3	0	0	3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21MHP401L	Major Project	0	0	30	15
21MHP402L	Major Project	0	0	20	
21MHP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21MHP401L or 21MHP402L and 21MHP403L both in eighth semester

43. B.Tech.in Mechatronics Engineering with specialization in Autonomous Driving Technology

43. (a) Mission of the Department

Mission Stmt – 1	*To impart the principles of Mechatronics Engineering to produce engineers who are capable of competing on the global stage.*
Mission Stmt – 2	*To excel at solving multidisciplinary challenges through structured teaching-learning methods and by providing state-of-the-art facilities.*
Mission Stmt – 3	*To cultivate future leaders with a strong sense of integrity, communication, teamwork, and entrepreneurship*

43. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will demonstrate a commitment to lifelong learning and career growth through participation and leadership in professional societies and organizations*
PEO – 2	*Graduates will advance professionally with a competency to solve challenges in industry, research, and academia leading to sustainable development of the society*
PEO – 3	*Graduates will be capable of solving ever-evolving-complex-system-integration problems through inter-disciplinary approaches.*
PEO – 4	*Graduates will be versatile in dealing with systems from a variety of modern engineering and technology fields with ease.*

43. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	*Mission Stmt. – 2*	*Mission Stmt. – 3*
PEO – 1	*2*	-	*3*
PEO – 2	*3*	-	*2*
PEO – 3	*3*	*3*	-
PEO – 4	-	*3*	-

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

43. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	-	-	-	-	-	*1*	*1*	*2*	-	*2*	-	*3*	*1*	-	*3*
PEO – 2	*3*	-	-	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*3*	-	*3*	*2*	*3*
PEO – 3	*3*	*3*	*3*	*3*	*3*	*2*	*1*	-	*3*	*3*	*2*	*1*	*3*	*2*	*3*
PEO – 4	*3*	*3*	*2*	*1*	*3*	*1*	-	*1*	*1*	-	-	-	*2*	*1*	*1*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Graduates will apply scientific principles for modelling and simulation of multi-disciplinary engineering systems*
PSO - 2	*Graduates will be able to interpret specifications of elements to design and develop an integrated system*
PSO - 3	*Graduates will be able to implement autonomous driving technology by applying the state-of-the-art system integration methods applicable for self-driving vehicles*

43. (e) Program Structure: B.Tech. in Mechatronics Engineering with specialization in Autonomous Driving Technology

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MHS201T	Thermodynamics and Heat Transfer	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**20**

Professional Elective Courses (E)
(Any 7 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
	Foundation Courses (Minimum 2 Courses)				
21MHE437J	Computational Techniques for Autonomous Vehicles	2	0	2	3
21MHE438T	Foundations of Autonomous Vehicles	3	0	0	3
21MHE439T	Introduction to Automotive Technology	3	0	0	3
	Technology Enablers (Minimum 4 Courses)				
21MHE440J	Perception for Autonomous Vehicle	2	0	2	3
21MHE441J	Localization and State Estimation	2	0	2	3
21MHE442J	Motion Planning and Control	2	0	2	3
21MHE443T	Vehicle Mechanics	3	0	0	3
21MHE444J	AI for Perception, Planning and Control	2	0	2	3
21MHE445L	Capstone Project	0	0	6	3
	Other Courses				
21MHE446T	Connected Vehicles	3	0	0	3
21MHE447T	Safety, Ethics and regulations for Driverless Cars	3	0	0	3
21MHE448T	Infrastructure for Self-Driving Technology	3	0	0	3
21MHE449T	Software Architecture of Self-Driving Vehicles	2	1	0	3
	Total Credits				21

Open Elective Courses (O)
Any 3 Course

Course Code	Course Title	Hours/ Week L	T	P	C
21MHO301T	Smart Farming	3	0	0	3
	Total Credits				3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB104J	Physics: Mechanics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21MHC101P	Elements of Mechatronics Systems	2	1	0	3
21MHC201T	Electrical actuators and Drives	3	0	0	3
21MHC202J	Analog and Digital Electronics	2	0	2	3
21MHC203J	Fluid power system and Automation	2	0	2	3
21MHC204L	Electrical Actuators and Drives Lab	0	0	2	1
21MHC205T	Microcontroller and Embedded Systems	3	0	0	3
21MHC206T	Mechanics of Solids and Fluids	3	0	0	3
21MHC207L	Microcontroller and Embedded Systems Lab	0	0	2	1
21MHC208L	Mechanics of Solids and Fluids Lab	0	0	2	1
21MHC209T	Project Management and Industrial Practices	2	1	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
21MHC301T	System Dynamics and Control	3	0	0	3
21MHC302J	Design and Analysis of Machine Elements	2	0	2	3
21MHC303J	Measurement, Sensors and Interfaces	2	0	2	3
21MHC304L	Modelling and Control Lab	0	0	2	1
21MHC305J	Manufacturing Processes	2	0	2	3
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	3	0	0	3
21MHC307P	Model Based Systems Engineering	1	2	0	3
	Total Credits				**46**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21MHP302L	Project	0	0	6	3
21MHP303T	MOOC	3	0	0	
21MHP401L	Major Project	0	0	30	15
21MHP402L	Major Project	0	0	20	
21MHP403L	Internship#	0	0	10	
	Total Credits				**19**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				3

43. (f) Implementation Plan: B.Tech. in Mechatronics Engineering with specialization in Autonomous Driving Technology

Semester - I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB104J	Physics :Mechanics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21MHC101P	Elements of Mechatronics systems	2	1	0	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester - III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MHC201T	Electrical Actuators and Drives	3	0	0	3
21MHC202J	Analog and Digital Electronics	2	0	2	3
21MHC203J	Fluid power system and Automation	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21MHS201T	Thermodynamics and Heat Transfer	3	0	0	3
21MHC204L	Electrical Actuators and Drives Lab	0	0	2	1
21LEM201T	Professional Ethics*	1	0	0	0
21PDM201L	Verbal Reasoning*	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**22**

Semester - IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MHC205T	Microcontroller and Embedded Systems	3	0	0	3
21MHC206T	Mechanics of Solids and Fluids	3	0	0	3
21MHC207L	Microcontroller and Embedded Systems Lab	0	0	2	1
21MHC208L	Mechanics of Solids and Fluids Lab	0	0	2	1
21MHC209T	Project Management and Industrial Practices	2	1	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
	Professional Elective – I	3	0	0	3
21PDM202L	Critical and Creative Thinking Skills*	0	0	2	0
	Total Credits				**24**

Semester - V

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21MHC301T	System Dynamics and Control	3	0	0	3
21MHC303J	Measurement, Sensors and Interfaces	2	0	2	3
21MHC302J	Design and Analysis of Machine Elements	2	0	2	3
	Professional Elective – II	3	0	0	3
	Open Elective – I	3	0	0	3
21MHC304L	Modelling and Control Lab	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills*	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**21**

Semester - VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21MHC305J	Manufacturing Processes	2	0	2	3
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	3	0	0	3
21MHC307P	Model Based Systems Engineering	1	2	0	3
	Professional Elective – III	3	0	0	3
21MHP302L	Project	0	0	6	3
21MHP303T	MOOC	3	0	0	
O	Open Elective – II	3	0	0	3
21PDM302L	Employability Skills and Practices*	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioural Psychology	2	1	0	3
	Professional Elective – IV	3	0	0	3
	Professional Elective – V	3	0	0	3
	Professional Elective – VI				3
	Professional Elective – VII				3
O	Open Elective – III	3	0	0	3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21MHP401L	Major Project	0	0	30	15
21MHP402L	Major Project	0	0	20	
21MHP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21MHP401L or 21MHP402L and 21MHP403L both in eighth semester

44. B.Tech.in Mechatronics Engineering with specialization in Immersive Technologies

44. (a) Mission of the Department

Mission Stmt – 1	*To impart the principles of Mechatronics Engineering to produce engineers who are capable of competing on the global stage.*
Mission Stmt – 2	*To excel at solving multidisciplinary challenges through structured teaching-learning methods and by providing state-of-the-art facilities.*
Mission Stmt – 3	*To cultivate future leaders with a strong sense of integrity, communication, teamwork, and entrepreneurship*

44. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will demonstrate a commitment to lifelong learning and career growth through participation and leadership in professional societies and organizations*
PEO – 2	*Graduates will advance professionally with a competency to solve challenges in industry, research, and academia leading to sustainable development of the society*
PEO – 3	*Graduates will be capable of solving ever-evolving-complex-system-integration problems through inter-disciplinary approaches.*
PEO – 4	*Graduates will be versatile in dealing with systems from a variety of modern engineering and technology fields with ease.*

44. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	*Mission Stmt. – 2*	*Mission Stmt. – 3*
PEO – 1	*2*	-	*3*
PEO – 2	*3*	-	*2*
PEO – 3	*2*	*3*	-
PEO – 4	-	*3*	-

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

44. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	-	-	-		-	-	-	-	*2*	-	-	*1*			*1*
PEO – 2	*2*	-	-	*3*	-	-	-	-	-	-	-	-	-	*2*	-
PEO – 3	*2*	*3*	-	-	-	-	-	-	-	-	-	-	*3*	-	*2*
PEO – 4	*2*	-	*3*	-	-	-	-	-	-	-	-	-	-	-	*2*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Graduates will apply scientific principles for modelling and simulation of multi-disciplinary engineering systems*
PSO - 2	*Graduates will be able to interpret specifications of elements to design and develop an integrated system*
PSO - 3	*Graduates will be able to develop solutions based on immersive technologies such as virtual reality, augmented reality and haptics for a variety of applications.*

44. (e) Program Structure: B.Tech. in Mechatronics Engineering with specialization in Immersive Technologies

Humanities & Social Sciences including Management Courses (H)						
Course Code	Course Title	Hours/ Week L	T	P	C	
21LEH101T	Communicative English	2	1	0	3	
21LEH102T	Chinese	2	1	0	3	
21LEH103T	French					
21LEH104T	German					
21LEH105T	Japanese					
21LEH106T	Korean					
21LEH107T	Spanish					
21GNH101J	Philosophy of Engineering	1	0	2	2	
21PDH201T	Social Engineering	2	0	0	2	
21GNH401T	Behavioral Psychology	2	1	0	3	
Total Credits						**13**

Engineering Science Courses (S)					
Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MHS201T	Thermodynamics and Heat Transfer	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
Total Credits					**20**

Professional Elective Courses (E) (Any 7 Courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
Foundation Courses (Minimum Two Courses)					
21MHE422L	Creative Programming	0	0	6	3
21MHE423T	Foundations of Immersive Technologies	3	0	0	3
21MHE424T	System Integration in XR Technologies	3	0	0	3
Key Technologies (Minimum Three Courses)					
21MHE425J	Virtual Reality and Its Applications	2	0	2	3
21MHE426J	Augmented and Mixed Reality	2	0	2	3
21MHE427J	Haptics	2	0	2	3
21MHE428L	Capstone Project	0	0	6	3
21MHE427T	Interaction Design and Prototyping for XR	2	1	0	3
21MHE428T	Immersive Game Design and Development	2	1	0	3
Technology Enablers (Minimum One Course)					
21MHE429J	Computer Vision for X-Reality	2	0	2	3
21MHE430J	AI for X-Reality	2	0	2	3
21MHE431J	Computer Graphics for X-Reality	2	0	2	3
Applications and XR Enterprise					
21MHE432T	Innovation, Entrepreneurship, and Enterprise	3	0	0	3
21MHE433T	X-Reality in Industries	3	0	0	3
Total Credits					21

Open Elective Courses (O) Any 3 Course					
Course Code	Course Title	Hours/ Week L	T	P	C
21MHO301T	Smart Farming	3	0	0	3
Total Credits					3

Basic Science Courses (B)					
Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB104J	Physics: Mechanics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
Total Credits					**32**

Professional Core Courses (C)					
Course Code	Course Title	Hours/ Week L	T	P	C
21MHC101P	Elements of Mechatronics Systems	2	1	0	3
21MHC201T	Electrical actuators and Drives	3	0	0	3
21MHC202J	Analog and Digital Electronics	2	0	2	3
21MHC203J	Fluid power system and Automation	2	0	2	3
21MHC204L	Electrical Actuators and Drives Lab	0	0	2	1
21MHC205T	Microcontroller and Embedded Systems	3	0	0	3
21MHC206T	Mechanics of Solids and Fluids	3	0	0	3
21MHC207L	Microcontroller and Embedded Systems Lab	0	0	2	1
21MHC208L	Mechanics of Solids and Fluids Lab	0	0	2	1
21MHC209T	Project Management and Industrial Practices	2	1	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
21MHC301T	System Dynamics and Control	3	0	0	3
21MHC302J	Design and Analysis of Machine Elements	2	0	2	3
21MHC303J	Measurement, Sensors and Interfaces	2	0	2	3
21MHC304L	Modelling and Control Lab	0	0	2	1
21MHC305J	Manufacturing Processes	2	0	2	3
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	3	0	0	3
21MHC307P	Model Based Systems Engineering	1	2	0	3
Total Credits					**46**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)						
Course Code	Course Title	Hours/ Week L	T	P	C	
21GNP301L	Community Connect	0	0	2	1	
21MHP302L	Project	0	0	6	3	
21MHP303T	MOOC	3	0	0		
21MHP401L	Major Project	0	0	30	15	
21MHP402L	Major Project	0	0	20		
21MHP403L	Internship#	0	0	10		
Total Credits						**19**

Mandatory Courses (M)					
Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
Total Credits					3

44. (f) Implementation Plan: B.Tech. in Mechatronics Engineering with specialization in Immersive Technologies

Semester - I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB104J	Physics :Mechanics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21MHC101P	Elements of Mechatronics systems	2	1	0	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester - III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MHC201T	Electrical Actuators and Drives	3	0	0	3
21MHC202J	Analog and Digital Electronics	2	0	2	3
21MHC203J	Fluid power system and Automation	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21MHS201T	Thermodynamics and Heat Transfer	3	0	0	3
21MHC204L	Electrical Actuators and Drives Lab	0	0	2	1
21LEM201T	Professional Ethics*	1	0	0	0
21PDM201L	Verbal Reasoning*	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**22**

Semester - IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MHC205T	Microcontroller and Embedded Systems	3	0	0	3
21MHC206T	Mechanics of Solids and Fluids	3	0	0	3
21MHC207L	Microcontroller and Embedded Systems Lab	0	0	2	1
21MHC208L	Mechanics of Solids and Fluids Lab	0	0	2	1
21MHC209T	Project Management and Industrial Practices	2	1	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
	Professional Elective – I	3	0	0	3
21PDM202L	Critical and Creative Thinking Skills*	0	0	2	0
	Total Credits				**24**

Semester - V

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21MHC301T	System Dynamics and Control	3	0	0	3
21MHC303J	Measurement, Sensors and Interfaces	2	0	2	3
21MHC302J	Design and Analysis of Machine Elements	2	0	2	3
	Professional Elective – II	3	0	0	3
	Open Elective – I	3	0	0	3
21MHC304L	Modelling and Control Lab	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills*	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**21**

Semester - VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21MHC305J	Manufacturing Processes	2	0	2	3
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	3	0	0	3
21MHC307P	Model Based Systems Engineering	1	2	0	3
	Professional Elective – III	3	0	0	3
21MHP302L	Project	0	0	6	3
21MHP303T	MOOC	3	0	0	
O	Open Elective – II	3	0	0	3
21PDM302L	Employability Skills and Practices*	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioural Psychology	2	1	0	3
	Professional Elective – IV	3	0	0	3
	Professional Elective – V	3	0	0	3
	Professional Elective – VI				3
	Professional Elective – VII				3
O	Open Elective – III	3	0	0	3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21MHP401L	Major Project	0	0	30	15
21MHP402L	Major Project	0	0	20	
21MHP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21MHP401L or 21MHP402L and 21MHP403L both in eighth semester

45. B.Tech.in Mechatronics Engineering with specialization in Industrial IoT and Systems Engineering

45. (a) Mission of the Department

Mission Stmt – 1	*To impart the principles of Mechatronics Engineering to produce engineers who are capable of competing on the global stage.*
Mission Stmt – 2	*To excel at solving multidisciplinary challenges through structured teaching-learning methods and by providing state-of-the-art facilities.*
Mission Stmt – 3	*To cultivate future leaders with a strong sense of integrity, communication, teamwork, and entrepreneurship*

45. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will demonstrate a commitment to lifelong learning and career growth through participation and leadership in professional societies and organizations*
PEO – 2	*Graduates will advance professionally with a competency to solve challenges in industry, research, and academia leading to sustainable development of the society*
PEO – 3	*Graduates will be capable of solving ever-evolving-complex-system-integration problems through inter-disciplinary approaches.*
PEO – 4	*Graduates will be versatile in dealing with systems from a variety of modern engineering and technology fields with ease.*

45. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	*Mission Stmt. – 2*	*Mission Stmt. – 3*
PEO – 1	*2*	-	*3*
PEO – 2	*3*	-	*2*
PEO – 3	*3*	*3*	-
PEO – 4	-	*3*	-

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

45. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	-	-	-	-	-	*1*	*1*	*2*	-	*2*	-	*3*	*3*	-	-
PEO – 2	*3*	-	-	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*3*	-	-	-	*2*
PEO – 3	*3*	*3*	*3*	*3*	*3*	*2*	*1*	-	*3*	*3*	*2*	*1*	*2*	*3*	-
PEO – 4	*3*	*3*	*2*	*1*	*3*	*1*	-	*1*	*1*	-	-	-	-	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Graduates will apply scientific principles for modelling and simulation of multi-disciplinary engineering systems*
PSO - 2	*Graduates will be able to interpret specifications of elements to design and develop an integrated system*
PSO - 3	*Graduates will be able to develop IoT solutions and apply systems engineering principles and techniques to integrate complex systems for a wide variety of applications.*

45. (e) Program Structure: B.Tech. in Mechatronics Engineering with specialization in Industrial IoT and Systems Engineering

Humanities & Social Sciences including Management Courses (H)						
Course Code	Course Title	Hours/ Week L	T	P	C	
21LEH101T	Communicative English	2	1	0	3	
21LEH102T	Chinese	2	1	0	3	
21LEH103T	French					
21LEH104T	German					
21LEH105T	Japanese					
21LEH106T	Korean					
21LEH107T	Spanish					
21GNH101J	Philosophy of Engineering	1	0	2	2	
21PDH201T	Social Engineering	2	0	0	2	
21GNH401T	Behavioral Psychology	2	1	0	3	
Total Credits						**13**

Engineering Science Courses (S)					
Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MHS201T	Thermodynamics and Heat Transfer	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
Total Credits					**20**

Professional Elective Courses (E) (Any 7 Courses)					
Course Code	Course Title	Hours/ Week L	T	P	C
IIoT Courses (Minimum 4 Courses)					
21MHE465T	Introduction to IoT and IIoT	3	0	0	3
21MHE466T	Foundations of Digital and Smart Manufacturing Technology	3	0	0	3
21MHE467J	Sensors and Actuators for IoT	2	0	2	3
21MHE468T	Communication Networks in IoT	3	0	0	3
21MHE469J	Cyber Physical System Design	2	0	2	3
21MHE470T	Cloud Computing, Big Data Analytics and Security	3	0	0	3
21MHE471J	X-Reality in Industries	2	0	2	3
21MHE472J	AI and Robotics in Smart Factories	2	0	2	3
21MHE473J	Data Modelling and Simulation	2	0	2	3
System Engineering (Minimum 3 Courses)					
21MHE474T	Foundations of Systems Engineering	2	1	0	3
21MHE475J	Systems architecture and design	2	0	2	3
21MHE476J	Object Process Modelling and SysML	2	0	2	3
21MHE477J	Verification and Validation	2	0	2	3
21MHE478L	Capstone Project	0	0	6	3
21MHE479T	Optimization Techniques in Systems Engineering	3	0	0	3
Total Credits					21

Open Elective Courses (O) Any 3 Course					
Course Code	Course Title	Hours/ Week L	T	P	C
21MHO301T	Smart Farming	3	0	0	3
Total Credits					3

Basic Science Courses (B)					
Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB104J	Physics: Mechanics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
Total Credits					**32**

Professional Core Courses (C)					
Course Code	Course Title	Hours/ Week L	T	P	C
21MHC101P	Elements of Mechatronics Systems	2	1	0	3
21MHC201T	Electrical actuators and Drives	3	0	0	3
21MHC202J	Analog and Digital Electronics	2	0	2	3
21MHC203J	Fluid power system and Automation	2	0	2	3
21MHC204L	Electrical Actuators and Drives Lab	0	0	2	1
21MHC205T	Microcontroller and Embedded Systems	3	0	0	3
21MHC206T	Mechanics of Solids and Fluids	3	0	0	3
21MHC207L	Microcontroller and Embedded Systems Lab	0	0	2	1
21MHC208L	Mechanics of Solids and Fluids Lab	0	0	2	1
21MHC209T	Project Management and Industrial Practices	2	1	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
21MHC301T	System Dynamics and Control	3	0	0	3
21MHC302J	Design and Analysis of Machine Elements	2	0	2	3
21MHC303J	Measurement, Sensors and Interfaces	2	0	2	3
21MHC304L	Modelling and Control Lab	0	0	2	1
21MHC305J	Manufacturing Processes	2	0	2	3
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	3	0	0	3
21MHC307P	Model Based Systems Engineering	1	2	0	3
Total Credits					**46**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)						
Course Code	Course Title	Hours/ Week L	T	P	C	
21GNP301L	Community Connect	0	0	2	1	
21MHP302L	Project	0	0	6	3	
21MHP303T	MOOC	3	0	0		
21MHP401L	Major Project	0	0	30	15	
21MHP402L	Major Project	0	0	20		
21MHP403L	Internship#	0	0	10		
Total Credits						**19**

Mandatory Courses (M)					
Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
Total Credits					3

45. (f) Implementation Plan: B.Tech. in Mechatronics Engineering with specialization in Industrial IoT and Systems Engineering

Semester - I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB104J	Physics :Mechanics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21MHC101P	Elements of Mechatronics systems	2	1	0	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester - III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MHC201T	Electrical Actuators and Drives	3	0	0	3
21MHC202J	Analog and Digital Electronics	2	0	2	3
21MHC203J	Fluid power system and Automation	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21MHS201T	Thermodynamics and Heat Transfer	3	0	0	3
21MHC204L	Electrical Actuators and Drives Lab	0	0	2	1
21LEM201T	Professional Ethics*	1	0	0	0
21PDM201L	Verbal Reasoning*	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**22**

Semester - IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MHC205T	Microcontroller and Embedded Systems	3	0	0	3
21MHC206T	Mechanics of Solids and Fluids	3	0	0	3
21MHC207L	Microcontroller and Embedded Systems Lab	0	0	2	1
21MHC208L	Mechanics of Solids and Fluids Lab	0	0	2	1
21MHC209T	Project Management and Industrial Practices	2	1	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
	Professional Elective – I	3	0	0	3
21PDM202L	Critical and Creative Thinking Skills*	0	0	2	0
	Total Credits				**24**

Semester - V

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21MHC301T	System Dynamics and Control	3	0	0	3
21MHC303J	Measurement, Sensors and Interfaces	2	0	2	3
21MHC302J	Design and Analysis of Machine Elements	2	0	2	3
	Professional Elective – II	3	0	0	3
	Open Elective – I	3	0	0	3
21MHC304L	Modelling and Control Lab	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills*	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**21**

Semester - VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21MHC305J	Manufacturing Processes	2	0	2	3
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	3	0	0	3
21MHC307P	Model Based Systems Engineering	1	2	0	3
	Professional Elective – III	3	0	0	3
21MHP302L	Project	0	0	6	3
21MHP303T	MOOC	3	0	0	
O	Open Elective – II	3	0	0	3
21PDM302L	Employability Skills and Practices*	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioural Psychology	2	1	0	3
	Professional Elective – IV	3	0	0	3
	Professional Elective – V	3	0	0	3
	Professional Elective – VI				3
	Professional Elective – VII				3
O	Open Elective – III	3	0	0	3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21MHP401L	Major Project	0	0	30	15
21MHP402L	Major Project	0	0	20	
21MHP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21MHP401L or 21MHP402L and 21MHP403L both in eighth semester

46. B.Tech.in Mechatronics Engineering with specialization in Robotics

46. (a) Mission of the Department

Mission Stmt – 1	*To impart the principles of Mechatronics Engineering to produce engineers who are capable of competing on the global stage.*
Mission Stmt – 2	*To excel at solving multidisciplinary challenges through structured teaching-learning methods and by providing state-of-the-art facilities.*
Mission Stmt – 3	*To cultivate future leaders with a strong sense of integrity, communication, teamwork, and entrepreneurship*

46. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will demonstrate a commitment to lifelong learning and career growth through participation and leadership in professional societies and organizations*
PEO – 2	*Graduates will advance professionally with a competency to solve challenges in industry, research, and academia leading to sustainable development of the society*
PEO – 3	*Graduates will be capable of solving ever-evolving-complex-system-integration problems through inter-disciplinary approaches.*
PEO – 4	*Graduates will be versatile in dealing with systems from a variety of modern engineering and technology fields with ease.*

46. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. – 1	*Mission Stmt. – 2*	*Mission Stmt. – 3*
PEO – 1	*2*		*3*
PEO – 2	*3*		*2*
PEO – 3	*3*	*3*	
PEO – 4		*3*	

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

46. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	-	-	-	-	-	*1*	*1*	*2*	-	*2*	-	-	-	*3*	-
PEO – 2	*3*	-	-	*3*	*3*	*3*	*3*	*3*	*2*	*2*	*3*	-	*3*	*2*	*3*
PEO – 3	*3*	*3*	*3*	*3*	*3*	*2*	*1*	-	*3*	*3*	*2*	*1*	*3*	*2*	-
PEO – 4	*3*	*3*	*2*	*1*	*3*	*1*	-	-	*1*	*1*	-	-	*2*	*2*	*2*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Graduates will apply scientific principles for modelling and simulation of multi-disciplinary engineering systems*
PSO - 2	*Graduates will be able to interpret specifications of elements to design and develop an integrated system*
PSO - 3	*Graduates will be able to control Robotics systems using modern programming tools*

46. (e) Program Structure: B.Tech. in Mechatronics Engineering with specialization in Robotics

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB104J	Physics: Mechanics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
	Total Credits				**32**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MHS201T	Thermodynamics and Heat Transfer	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**20**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21MHC101P	Elements of Mechatronics Systems	2	1	0	3
21MHC201T	Electrical actuators and Drives	3	0	0	3
21MHC202J	Analog and Digital Electronics	2	0	2	3
21MHC203J	Fluid power system and Automation	2	0	2	3
21MHC204L	Electrical Actuators and Drives Lab	0	0	2	1
21MHC205T	Microcontroller and Embedded Systems	3	0	0	3
21MHC206T	Mechanics of Solids and Fluids	3	0	0	3
21MHC207L	Microcontroller and Embedded Systems Lab	0	0	2	1
21MHC208L	Mechanics of Solids and Fluids Lab	0	0	2	1
21MHC209T	Project Management and Industrial Practices	2	1	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
21MHC301T	System Dynamics and Control	3	0	0	3
21MHC302J	Design and Analysis of Machine Elements	2	0	2	3
21MHC303J	Measurement, Sensors and Interfaces	2	0	2	3
21MHC304L	Modelling and Control Lab	0	0	2	1
21MHC305J	Manufacturing Processes	2	0	2	3
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	3	0	0	3
21MHC307P	Model Based Systems Engineering	1	2	0	3
	Total Credits				**46**

Professional Elective Courses (E)
(Any 7 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
	Professional Elective -1				
21MHE451J	Manipulator Robotics	2	0	2	3
21MHE452L	Computational Thinking Laboratory	0	0	5	3
	Professional Elective - 2				
21MHE453J	Mechanics of Manipulation	2	0	2	3
21MHE454J	Ground mobile Robotics	2	0	2	3
	Professional Elective - 3				
21MHE455T	Robot Control	3	0	0	3
21MHE456J	Vision Guided Robots	2	0	2	3
	Professional Elective - 4				
21MHE457L	Robot Programming	0	0	5	3
21MHE458T	Model Based System Engineering for Robotics	3	0	0	3
	Professional Elective - 5				
21MHE459J	Planning and Decision Making in Robotics	2	0	2	3
21MHE460T	Advanced Robotics	3	0	0	3
	Professional Elective - 6				
21MHE461J	AI for Perception Planning and Control	2	0	2	3
21MHE462TT	Advanced Dynamical Systems	3	0	0	3
	Professional Elective - 7				
21MHE463T	Soft Robotics	3	0	0	3
21MHE464T	Introduction to Marine and Aerial Robotics	3	0	0	3
	Total Credits				21

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21MHP302L	Project	0	0	6	3
21MHP303T	MOOC	3	0	0	
21MHP401L	Major Project	0	0	30	15
21MHP402L	Major Project	0	0	20	
21MHP403L	Internship#	0	0	10	
	Total Credits				**19**

Open Elective Courses (O)
Any 3 Course

Course Code	Course Title	Hours/ Week L	T	P	C
21MHO301T	Smart Farming	3	0	0	3
	Total Credits				3

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				3

46. (f) Programme Articulation: B.Tech. in Mechatronics Engineering with specialization in Robotics

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO - 3
21MHS201T	Thermodynamics and Heat Transfer	1	2			2										
21MHC101P	Elements of Mechatronics Systems	3	3													
21MHC201T	Electrical Actuators and Drives	3	2	2											1	2
21MHC202J	Analog and Digital Electronics	3	2	2											2	
21MHC203J	Fluid Power System and Automation	3	2	2		1									1	2
21MHC204L	Electrical Actuators and Drives Laboratory	3	2	2												
21MHC205T	Microcontroller and Embedded Systems	3		2		1										2
21MHC206T	Mechanics of Solids and Fluids	3	3	2												
21MHC208L	Mechanics of Solids and Fluids Lab	3	3	2												
21MHC207L	Microcontroller and Embedded Systems Lab	3	1	2		1										2
21MHC209T	Project Management and Industrial Practices					2						3		1		
21CSC206T	Artificial Intelligence															
21MHC301T	System Dynamics and Control	3	2	2										3		2
21MHC302J	Design and Analysis of Machine Elements	3	3	2		2								2	2	
21MHC303J	Measurement, Sensors and Interfaces	3	1	2										1		
21MHC304L	Modelling and Control Lab	2	2	3		2								3		2
21MHC305J	Manufacturing Processes	3	2	1												
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	1	2			3										
21MHC307P	Model Based Systems Engineering	3	3		2	1								2	2	
21MHE451J	Manipulator Robotics	2				2								3		2
21MHE452L	Computational Thinking Laboratory	3		2		2								2		
21MHE453J	Mechanics of Manipulation	3	2	2										2		
21MHE454J	Ground mobile Robotics	3	3	2											3	2
21MHE455T	Robot Control	3	2											1		
21MHE456J	Vision Guided Robots	3	2	2		2								2		
21MHE457L	Robot Programming	3	2	3		2										3
21MHE458T	Model Based System Engineering for Robotics	3	3			2								2	2	2
21MHE459J	Planning and Decision Making in Robotics	3				2								1	1	1
21MHE460T	Advanced Robotics	3	1											1	1	
21MHE461J	AI for Perception Planning and Control	3	2	2		1									2	2
21MHE462T	Advanced Dynamical Systems	3													1	
21MHE463T	Soft Robotics	1	2	3												
21MHE464T	Introduction to Marine and Aerial Robotics	3												2		
	Program Average															

46. (g) Implementation Plan: B.Tech. in Mechatronics Engineering with specialization in Robotics

Semester - I

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB104J	Physics :Mechanics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21MHC101P	Elements of Mechatronics systems	2	1	0	3
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**25**

Semester - III

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MHC201T	Electrical Actuators and Drives	3	0	0	3
21MHC202J	Analog and Digital Electronics	2	0	2	3
21MHC203J	Fluid power system and Automation	2	0	2	3
21MHS201T	Thermodynamics and Heat Transfer	3	0	0	3
21MHC204L	Electrical Actuators and Drives Lab	0	0	2	1
21PDH201T	Social Engineering	2	0	0	2
21LEM201T	Professional Ethics*	1	0	0	0
21PDM201L	Verbal Reasoning*	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**22**

Semester - IV

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MHC205T	Microcontroller and Embedded Systems	3	0	0	3
21MHC206T	Mechanics of Solids and Fluids	3	0	0	3
21MHC207L	Microcontroller and Embedded Systems Lab	0	0	2	1
21MHC208L	Mechanics of Solids and Fluids Lab	0	0	2	1
21MHC209T	Project Management and Industrial Practices	2	1	0	3
	Professional Elective – I	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills*	0	0	2	0
	Total Credits				**24**

Semester - V

Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB301T	Probability and Statistics	3	1	0	4
21MHC301T	System Dynamics and Control	3	0	0	3
21MHC303J	Measurement, Sensors and Interfaces	2	0	2	3
21MHC302J	Design and Analysis of Machine Elements	2	0	2	3
	Professional Elective – II	3	0	0	3
	Open Elective – I	3	0	0	3
21MHC304L	Modelling and Control Lab	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills*	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**21**

Semester - VI

Code	Course Title	Hours/ Week			C
		L	T	P	
21CSS303T	Data Science	2	0	0	2
21MHC305J	Manufacturing Processes	2	0	2	3
21MHC306T	Kinematic Analysis and Dynamics of Mechanisms	3	0	0	3
21MHC307P	Model Based Systems Engineering	1	2	0	3
	Professional Elective – III	3	0	0	3
21MHP302L	Project	0	0	6	3
21MHP303T	MOOC	3	0	0	
O	Open Elective – II	3	0	0	3
21PDM302L	Employability Skills and Practices*	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week			C
		L	T	P	
21GNH401T	Behavioral Psychology	2	1	0	3
	Professional Elective – IV				3
	Professional Elective – V				3
	Professional Elective – VI				3
	Professional Elective – VII				3
O	Open Elective – III	3	0	0	3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week			C
		L	T	P	
21MHP401L	Major Project	0	0	30	15
21MHP402L	Major Project	0	0	20	
21MHP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21MHP401L or 21MHP402L and 21MHP403L both in eighth semester

47. B.Tech.in Nanotechnology

47. (a) Mission of the Department

Mission Stmt - 1	*Actively contribute for the development of nanoscience, engineering and technology through world-class infrastructure, teaching & research*
Mission Stmt - 2	*Establish collaborative research with the institutions of national and international repute*
Mission Stmt - 3	*Encourage industry-academia interactions to translate scientific findings into technological development to meet the societal needs*
Mission Stmt - 4	*Organize and actively participate in workshops, conferences and seminars on advancements in nanoscience and nanotechnology*
Mission Stmt - 5	*Focus on developing skills of students to enhance the employability in various organizations*

47. (b) Program Educational Objectives (PEO)

PEO - 1	*Provide understanding of physical, chemical and biological principles in the multi-disciplinary field of nanoscience and nanotechnology*
PEO - 2	*Develop skills on the synthesis of nanomaterials and fabrication of micro- and nano-structures*
PEO - 3	*Familiarize the graduates with the advanced nanoscale characterization techniques and develop the analytical ability*
PEO - 4	*Enable graduates with professional, scientific research, and computational skills for employment in industries, R & D centres and higher education*
PEO - 5	*Prepare the graduates to take individual and team work responsibilities in a multidisciplinary environment*

47. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3	Mission Stmt. - 4	Mission Stmt. - 5
PEO - 1	3	2	1	3	1
PEO - 2	3	3	2	3	3
PEO - 3	3	3	2	3	2
PEO - 4	3	2	3	2	3
PEO - 5	2	3	3	3	2

47. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3	3	3	3	3	2	2	2	2	2	2	3	3	3	3
PEO – 2	3	3	3	3	3	2	2	2	3	3	3	2	3	3	3
PEO – 3	3	3	3	3	3	2	2	2	3	3	3	2	3	3	3
PEO – 4	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3
PEO - 5	3	3	3	2	2	2	3	3	3	3	3	3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Ability to understand materials and their properties at the atomic and nanometer scales, including an understanding of the intimate relationship between the scale and the properties of materials*
PSO - 2	*Ability to apply the learnt nanotechnology principles, analyze, evaluate and design advanced systems & processes*
PSO - 3	*Ability to employ the acquired skills in nanotechnology for the benefit of self and society*

47. (e) Program Structure: B.Tech. in Nanotechnology

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioural Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21MES102L	Engineering Graphics and Design	0	0	4	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21NTS201T	Materials Science	3	0	0	3
21CSS303T	Data Science	2	0	0	2
	Total Credits				**20**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				3

Open Elective Courses (O)

Course Code	Course Title	Hours/ Week L	T	P	C
21NTO311T	Nanomaterials in Cosmetics and Cosmeceuticals	3	0	0	3
21NTO312T	Societal Implications of Nanotechnology	3	0	0	3
21NTO313T	Nanotechnology in Food Science and Packaging	3	0	0	3
21PYO301T	Astrophysics	3	0	0	3
21PYO302T	Photonics	3	0	0	3
21PYO303T	Quantum Optics	3	0	0	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB203T	Probability and Stochastic Processes	3	1	0	4
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21NTC101T	Nanoscience and Nanotechnology	3	0	0	3
21NTC201J	Nanoscale Materials Chemistry	3	0	2	4
21NTC202T	Quantum Mechanics for Nanotechnologists	3	0	0	3
21NTC203T	Thermodynamics and Statistical Mechanics	3	0	0	3
21NTC204J	Advanced Characterization of Nanomaterials	3	0	2	4
21NTC205T	Design and Synthesis of Nanomaterials	3	1	0	4
21NTC206T	Solid State Engineering	3	0	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
21NTC301J	Micro and Nanofabrication	3	0	2	4
21NTC302J	Nanoelectronics	2	0	2	3
21NTC303T	Nanobiotechnology	3	0	0	3
21NTC304T	Nanotoxicology	3	0	0	3
21NTC305L	Nanobiotechnology and Nanotoxicology lab	0	0	6	3
21NTC401J	Polymer and Nanocomposites	2	0	2	3
21NTC402T	Modeling and Computational Tools	3	0	0	3
	Total Credits				**49**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21NTP302L	Project	0	0	6	3
21NTP303T	MOOC	3	0	0	
21NTP401L	Major Project	0	0	30	15
21NTP402L	Major Project	0	0	20	
21NTP403L	Internship#	0	0	10	
	Total Credits				**19**

Open Elective Courses (O)
Any 3 Courses

Course Code	Course Title	Hours/ Week L	T	P	C
21NTO301T	Applications of Nanotechnology	3	0	0	3
21NTO302T	Solid State Electronic Devices	3	0	0	3
21NTO303T	Micro and Nanoelectronics	3	0	0	3
21NTO304T	Environmental Nanotechnology	3	0	0	3
21NTO305T	Medical Nanotechnology	3	0	0	3
21NTO306T	Nanoscale Surface Engineering	3	0	0	3
21NTO307T	Nanocomputing	3	0	0	3
21NTO308T	Smart Sensor Systems	2	0	2	3
21NTO309T	2D Materials and Applications	3	0	0	3
21NTO310T	Nano and Micro electromechanical Systems	3	0	0	3
21NTO401T	Scientific Research Principles	3	0	0	3
21NTO402T	Micro and Nanofluidic Technology	3	0	0	3
21NTO403T	Thin film Photovoltaics	3	0	0	3
21NTO404T	Nanotechnology in Societal Development	3	0	0	3
21NTO405T	Polymer Engineering	3	0	0	3
21NTO406T	Industrial Nanotechnology	3	0	0	3
21NTO407T	Quantum Computing	3	0	0	3
	Total Credits				**09**

Professional Elective Courses (E)					
Course Code	Course Title	Hours/ Week L	T	P	C
21NTE201T	Carbon Nanotechnology	3	0	0	3
21NTE202P	Vacuum and Thin film technology	2	1	0	3
21NTE203T	Nanotribology	3	0	0	3
21NTE204T	Surfaces and Interfaces	3	0	0	3
21NTE301T	Spectroscopy tools for nanoscale analysis	3	0	0	3
21NTE302P	Lithography Techniques and Fabrication	2	1	0	3
21NTE303T	Sensors and Transducers	3	0	0	3
21NTE304T	Green Nanotechnology	3	0	0	3
21NTE305T	Nano magnetism and Spintronics	3	0	0	3
21NTE306T	2D layered Nanomaterials	3	0	0	3
21NTE307T	Nano catalysts	3	0	0	3
21NTE308T	MEMS and NEMS	3	0	0	3
21NTE309T	Solid State Devices	3	0	0	3
21NTE310T	Nanotechnology in Cosmetics	3	0	0	3
21NTE311T	Nanomedicine	3	0	0	3
21NTE312T	Microelectronics and VLSI	3	0	0	3
21NTE313T	Nanotechnology for Energy Systems	3	0	0	3
21NTE314T	Physics of Electronic Materials	3	0	0	3
21NTE315T	Nanotechnology in food production	3	0	0	3

Professional Elective Courses (E) Any 6 Courses					
Course Code	Course Title	Hours/ Week L	T	P	C
21NTE316T	Advanced Drug Delivery Systems	*3*	*0*	*0*	*3*
21NTE317T	Societal Implications of Nanotechnology	3	0	0	3
21NTE401T	Nanotechnology in Tissue Engineering	3	0	0	3
21NTE402T	Micro and Nanofluidics	3	0	0	3
21NTE403T	Nanorobotics	3	0	0	3
21NTE404T	Photovoltaic Technology	*3*	*0*	*0*	*3*
21NTE405T	Advanced computational Techniques	3	0	0	3
21NTE406T	Nanotechnology Legal Aspects	3	0	0	3
21NTE407T	Micro and Nano Emulsions	*3*	*0*	*0*	*3*
21NTE408T	Supramolecular Systems	3	0	0	3
21NTE409T	Cancer Nanotechnology	3	0	0	3
21NTE410T	Atomistic modelling	3	0	0	3
21NTE411T	Nanotechnology in Textiles	3	0	0	3
21NTE412T	Nano photonics	3	0	0	3
	Total Credits				**18**

47. (f) Program Articulation: B.Tech. in Nanotechnology

		Program Outcome (PO)												PSO		
Course Code	Course Name	*Engineering Knowledge*	*Problem Analysis*	*Design/development of solutions*	*Conduct investigations of complex problems*	*Modern Tool Usage*	*The engineer and society*	*Environment & Sustainability*	*Ethics*	*Individual & Team Work*	*Communication*	*Project Mgt. & Finance*	*Life Long Learning*	*PSO-1*	*PSO-2*	*PSO-3*
21NTC101T	Nanoscience and Nanotechnology	2.3	2	2.6	3	3	-	-	-	-	-	-	-	2.75	2	-
21NTC201J	Nanoscale materials chemistry	3	1.75	2										2.75	2	
21NTC202T	Quantum Mechanics for Nanotechnologists	2.5			2.8									2.7	2.5	
21NTC203T	Thermodynamics and Statistical Mechanics	3	3		3									2.5	2.3	
21NTS201T	Materials Science	3	3	3	3	3							2	3	3	3
21NTC204J	Advanced Characterization of Nanomaterials	3		3	2.7									3	2.5	2
21NTC205T	Design and Synthesis of Nanomaterials	3		2.7	2.5	3		2						2.5	2	2
21NTC206T	Solid State Engineering	3		2.7	2.5	3		2						2.5	2	2
21NTC301J	Micro and Nanofabrication	2.5	3	2	2.3	2.4		2						2.5	3	2
21NTC302J	Nanoelectronics	2.8	3	2	2.5	3		2						2.5	2.5	2
21NTC303T	Nanobiotechnology	3												2.5	2	2
21NTC304T	Nanotoxicology	3												3	2.7	2
21NTC305L	Nanobiotechnology and Nanotoxicology laboratory				3									3	2	2
21NTP101L	Community Connect						3	3	3	3	3	3	3	3	3	3
21NTP302L/21NTP303T	Project / MOOC	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTC401J	Polymer and Nanocomposites	3	2.5	2.5	2	1.5								3	2	2
21NTC402T	Modeling and Computational Tools	3	3	3	3	3								3	2	2
21NTP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTP403L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTP404L	Semester Internship (not for Integrated)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTE201T	Carbon Nanotechnology	2.4	2	2	2									3	2	2
21NTE202P	Vacuum and Thin film technology	2.5		3	2.5									3	2	
21NTE203T	Nanotribolgy	2.7		1.7	2.5	2								3	3	3
21NTE204T	Surfaces and Interfaces	2.6		2	2									3	2	2
21NTE301T	Spectroscopy tools for nanoscale analysis	3	3		3									3	3	2
21NTE302P	Lithography Techniques and Fabrication	2.5	2	2										2.3	2	
21NTE303T	Sensors and Transducers	2		2.5	2.6									3	3	
21NTE304T	Green Nanotechnology	2.3	3	2.3	3	2								2	2	2
21NTE305T	Nanomagnetism and Spintronics	3	3		3									3	2	2
21NTE306T	2D layered Nanomaterials	2.3		2	3									3	2.7	3
21NTE307T	Nanocatalysts	2.5	2.3	1	3			3						3	3	
21NTE308T	MEMS and NEMS	3	3	3										2.7	2.5	
21NTE309T	Solid State Devices	3	2	3	2									2.5	2	
21NTE310T	Nanotechnology in Cosmetics	3		2.5	2	2								3	2	2
21NTE311T	Nanomedicene	3												2	2	
21NTE312T	Microelectronics and VLSI	2.7			2.7									3	3	
21NTE313T	Nanotechnology for Energy Systems	2.7		2										3	2.5	
21NTE314T	Physics of Electronic Materials	2.6	2	3	2.3									2.5	2.7	
21NTE315T	Nanotechnology in food production	2.4		2.8											3	
21NTE316T	Advanced Drug Delivery Systems	3		1.3										2.5	2	2
21NTE317T	Societal Implications of Nanotechnology	2.8							2.4					3	2	
21NTE401T	Nanotechnology in Tissue Engineering	3												3	2	
21NTE402T	Micro and Nanofluidics	2.8	2.4											2	2	2
21NTE403T	Nanorobotics	2		2.7	2.25										2	2
21NTE404T	Photovoltaic Technology	2.8	2	3	2.3									3	3	2
21NTE405T	Advanced computaional Techniques	3	3	3	3									2.5	3	2
21NTE406T	Nanotechnology Legal Aspects	2.2					2	2.6	2.4							3
21NTE407T	Micro and Nano Emulsions	3		2	2									3	2	2
21NTE408T	Supramolecular Systems	2.5	2.5	2.7	2	1								2		2
21NTE409T	Cancer Nanotecholgy	3												2.7		1.5
21NTE410T	Atomistic modelling	3	3	3	3	2								3	2	
21NTE411T	Nanotechnology in Textiles	3	3	2	2.3	2	3									
21NTE412T	Nanophotinics	2.8	2.2		2.7									2.5	2.5	2
Program Average		2.8	2.6	2.5	2.6	2.5	2.8	2.6	2.8	3	3	3	3	2.7	2.4	2.2

47. (g) Implementation Plan: B.Tech. in Nanotechnology

Semester - I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**22**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21NTC101T	Nanoscience and Nanotechnology	3	0	0	3
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**21**

Semester - III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21NTC201J	Nanoscale Materials Chemistry	3	0	2	4
21NTC202T	Quantum Mechanics for Nanotechnologists	3	0	0	3
21NTC203T	Thermodynamics and Statistical Mechanics	3	0	0	3
21PDH201T	Social Engineering	2	0	0	2
21NTS201T	Materials Science	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**22**

Semester - IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21NTC204J	Advanced Characterization of Nanomaterials	3	0	2	4
21NTC205T	Design and Synthesis of nanomaterials	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
E	Professional Elective – I				3
21NTC206T	Solid State Engineering	3	0	0	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**24**

Semester - V

Code	Course Title	Hours/ Week L	T	P	C
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21NTC301J	Micro and Nanofabrication	3	0	2	4
21NTC302J	Nanoelectronics	2	0	2	3
21NTC303T	Nanobiotechnology	3	0	0	3
E-1	Professional Elective - II	3	0	0	3
O	Open Elective – I	3	0	0	3
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**21**

Semester - VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21NTC304T	Nanotoxicology	3	0	0	3
21NTC305L	Nanobiotechnology and Nanotoxicology lab	0	0	6	3
E-2	Professional Elective – III	3	0	0	3
E-3	Professional Elective - IV	3	0	0	3
21NTP302L	Project	0	0	6	3
21NTP303T	MOOC	3	0	0	
O	Open Elective – II	3	0	0	3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioural Psychology	2	1	0	3
E-4	Professional Elective – V	3	0	0	3
E-5	Professional Elective - VI	3	0	0	3
21NTC401J	Polymer and Nanocomposites	2	0	2	3
21NTC402T	Modeling and Computational Tools	3	0	0	3
O	Open Elective – III	3	0	0	3
	Total Credits				**18**

Semester – VIII

Code	Course Title	Hours/ Week L	T	P	C
21NTP401L	Major Project	0	0	30	15
21NTP402L	Major Project	0	0	20	
21NTP403L	Internship#	0	0	10	
	Total Credits				**15**

#Students have to register either 21NTP401L or 21NTP402L and 21NTP403L both in eighth semester

48. Integrated M.Tech.in Artificial Intelligence

48. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt – 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	*To produce successful Artificial Intelligence graduates with the ability to develop, test, iterate and demonstrate how Artificial Intelligence can be used to tackle the problems in divergent domains with commitment to lifelong learning*

48. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO – 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO – 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO – 5	*Graduates will be able to analyze the problems by applying the principles of computer science, mathematics, and scientific investigation and to design and implement industry accepted solutions using latest AI technologies to meet ever changing developments in computer science*

48. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3	Mission Stmt. - 4	Mission Stmt. - 5
PEO - 1	*3*				*2*
PEO - 2			*2*		
PEO - 3		*3*	*3*		
PEO - 4				*2*	*3*
PEO - 5	*2*				*3*

48. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)											PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*	*3*		*2*				*2*				*3*	*3*	*3*
PEO – 2	*3*	*3*	*3*	*3*		*3*		*2*					*3*	*3*	*3*
PEO – 3		*3*	*3*	*3*	*2*			*1*		*3*	*3*			*3*	*3*
PEO – 4			*2*	*2*		*3*	*3*	*3*	*3*		*3*	*2*	*1*	*2*	*3*
PEO - 5	*2*			*2*	*3*	*3*	*2*		*3*	*2*		*3*	*2*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To apply technology and algorithms that allows Computers and Machines to work Intelligently.*
PSO - 2	*To Understand, analyse and develop the Artificial Intelligence based Systems.*
PSO - 3	*Ability to apply the Artificial Intelligence Technology and to adapt to the Technological revolutions in building the Artificial Intelligence based systems for solving the real-world problems.*

48. (e) Program Structure: Integrated M.Tech. in Artificial Intelligence

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21AIS101J	Foundation of Data Analysis	2	0	2	3
21AIS201J	Foundation of Artificial Intelligence	2	0	2	3
21GNS502J	Research Methodology	2	1	2	4
	Total Credits				**29**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21AIP302L	Project	0	0	6	3
21AIP303T	MOOC	3	0	0	
21AIP401L	Major Project	0	0	30	15
21AIP402L	Major Project	0	0	20	
21AIP403L	Internship#	0	0	10	
21AIP501L	Specialization Project	0	0	40	20
21AIP502L	Specialization Project	0	0	30	
21AIP503L	Domain Internship	0	0	10	
	Total Credits				**39**

Open Elective Courses
(Any 4 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21AIO351T	Introduction to Artificial Intelligence	2	1	0	3
21AIO352T	Machine Learning	2	1	0	3
21AIO353T	Python for Data Analytics	2	1	0	3
21AIO354T	Soft Computing	2	1	0	3
	Total Credits				**12**

5. Professional Elective Courses (E)

Course Code	Course Title	Hours/ Week L	T	P	C
21AIE321T	Stochastic Decision Making	3	0	0	3
21AIE322T	Cognitive Science and Analytics	3	0	0	3
21AIE323T	Internet of Things Architecture and Protocols	3	0	0	3
21AIE324T	Intelligent Autonomous Systems	3	0	0	3
21AIE325T	Intelligence of Biological Systems	3	0	0	3
21CSE311P	Robot Programming	2	1	0	3
21CSE312P	Software Engineering in Artificial Intelligence	2	1	0	3
21CSE313P	Accelerated Data Science	2	1	0	3
21AIE338P	High Performance Computing System	2	1	0	3
21CSE398T	Logic and Knowledge Representation	3	0	0	3
21CSE320T	Evolutionary Computing	3	0	0	3
21CSE439T	Virtual Reality and Augmented Reality	3	0	0	3
21AIE422T	Autonomous Navigation and Vehicles	3	0	0	3
21AIE423T	Mobile Game Development	3	0	0	3
21CSE323T	Marketing Analytics	2	1	0	3
21AIE330T	Text Processing	3	0	0	3
21AIE331T	Advanced Social, Text and Media Analytics	3	0	0	3
21AIE332T	Image and Video processing	3	0	0	3
21CSE252T	Biometrics	2	1	0	3
21AIE335T	Surveillance Video Analytics	3	0	0	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB304T	Probability and Applied Statistics	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				32

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21AIC202J	Neural Networks and Machine Learning	2	0	2	3
21CSC202J	Operating Systems	3	0	2	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC205P	Database Management Systems	3	1	0	4
21AIC301J	Deep Learning Techniques	3	0	2	4
21AIC302J	Reinforcement Learning Techniques	2	0	2	3
21AIC303T	Computer Networks and Communications	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21AIC401T	Inferential Statistics and Predictive Analytics	3	0	0	3
21AIC402T	Design of Artificial Intelligence Products	3	0	0	3
21AIC501T	Ambient Intelligence	3	1	0	4
21AIC502J	Emerging Artificial Intelligence Applications	3	0	2	4
	Total Credits				55

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				3

5. Professional Elective Courses (E)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE376T	Nature Inspired Computing Techniques	3	0	0	3
21AIE434T	Bio Informatics	3	0	0	3
21AIE435T	Theoretical and Computational Neuroscience	3	0	0	3
21AIE531T	Matrix Theory for Artificial Intelligence	3	0	0	3
21AIE532T	Soft Computing and its Applications	3	0	0	3
21AIE533T	Artificial Intelligence and High Performance Computing	3	0	0	3
21CSE421T	Business Intelligence and Analytics	2	1	0	3
21AIE535T	Artificial Intelligence and Internet of Things	3	0	0	3
21AIE536T	Artificial Intelligence Engines	3	0	0	3
21AIE537T	Artificial Intelligence in Finance	3	0	0	3
21AIE538T	Artificial Intelligence for Industrial Applications	3	0	0	3
21AIE539T	Artificial Intelligence in Medical Imaging	3	0	0	3
21AIE540T	Super Intelligence	3	0	0	3
21AIE541T	Multimodal Machine Learning	3	0	0	3
21CSE545T	Computational Perception and Cognition	3	0	0	3
21CSE525T	Agent Technology	3	0	0	3

21CSE546T	Medical Signal Processing	3	0	0	3

5. Professional Elective Courses (E)

Course Code	Course Title	Hours/ Week			
		L	T	P	C
21AIE337T	Speech Recognition and Understanding	3	0	0	3
21CSE418T	Cyber Physical Systems	3	0	0	3
21CSE411T	Artificial Intelligence in Genomics and Disease Prediction	3	0	0	3
21CSE412T	Machine Learning in Drug Discovery	3	0	0	3
21AIE428T	Time Series Analysis	3	0	0	3
21CSE362T	Cloud Computing	2	1	0	3
21AIE430T	Distributed Systems	3	0	0	3
21AIE431T	Big Data Analytics: Hadoop, Spark and NoSQL	3	0	0	3
21CSE543T	Brain Machine Interface: Science, Technology and Application	3	0	0	3

5. Professional Elective Courses (E)

Course Code	Course Title	Hours/ Week			
		L	T	P	C
21CSE552T	Computational Linguistics	3	0	0	3
21CSE551T	Affective Computing and Interaction	3	0	0	3
21CSE548T	Spatial and Temporal Computing	3	0	0	3
Total Credits					**30**

48. (f) Programme Articulation: Integrated M.Tech. in Artificial Intelligence

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21AIS101J	Foundation of Data Analysis		2			2							2	3		
21AIS201J	Foundation of Artificial Intelligence		2					2			2		2	3	2	
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21AIC202J	Neural Networks and Machine Learning		3			3						3		2	3	
21AIM201T	Professional Ethics for Artificial Intelligence							3	3	3			1			3
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21AIC303T	Computer Networks and Communications	2		3		3										
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21AIC301J	Deep Learning Techniques		3			3						3		2	3	3
21AIC302J	Reinforcement Learning Techniques		3			3						3		2	3	3
21AIC401T	Inferential Statistics and Predictive Analytics		3		3								2	1	2	3
21AIC402T	Design of Artificial Intelligence Products			3		3							1	3	3	3
21AIC403T	Ambient Intelligence		3	3		2									3	
21AIC404J	Emerging Artificial Intelligence Applications			3	3	3									3	
21AIE321T	Stochastic Decision Making		2			2								1	2	3
21AIE322T	Cognitive Science & Analytics	1	2			2								3	3	2
21AIE323T	Internet of Things Architecture and Protocols					2		2						1		3
21AIE324T	Intelligent Autonomous Systems			2					2					2	2	3
21AIE325T	Intelligence of Biological Systems			2		2								2	3	
21CSE398T	Logic and Knowledge Representation		2		3									2		3
21CSE320T	Evolutionary Computing	3	1	2	2									2	3	
21CSE439T	Virtual Reality and Augmented Reality	3	3	2	2	3								2		2
21AIE422T	Autonomous Navigation and Vehicles				2	2		2							2	3
21AIE423T	Mobile Game Development			3		3							3		3	
21CSE311P	Robot Programming	2	2		3		2							2		3
21CSE312P	Software Engineering in Artificial Intelligence		3	3		3								2	2	3
21CSE313P	Accelerated Data Science	1	2		3									1		2
21CSE323T	Marketing Analytics								3		3			2	2	1
21AIE330T	Text Processing		3			3						3			3	2
21AIE331T	Advanced Social, Text and Media Analytics		3			3						3			3	
21AIE332T	Image and Video processing			3		3			2						3	3
21CSE252T	Biometrics	3		1	2					2					2	
21AIE335T	Surveillance Video Analytics			3		3			2						2	3
21CSE546T	Medical Signal Processing	1		3										1		3
21CSE411T	Artificial Intelligence in Genomics and Disease Prediction	3	3	2												3
21CSE412T	Machine Learning in Drug Discovery	3	2	3												3
21AIE337T	Speech Recognition and Understanding		2			2			2		2			2	3	
21AIE428T	Time Series Analysis				3			2							2	3
21CSE362T	Cloud Computing	2	3	2	1	2										3
21AIE430T	Distributed Systems	2		3		3										3
21AIE431T	Big Data Analytics: Hadoop, Spark and NoSQL		3			3							2		2	3
21CSE543T	Brain Machine Interface: Science, Technology and Application	3	2		3									1	1	3
21CSE376T	Nature Inspired Computing Techniques	3	2													3
21AIE434T	Bio Informatics			3					3				2	2	2	
21AIE435T	Theoretical and Computational Neuroscience		3	3			2							3		
21CSE418T	Cyber Physical Systems	3	3	2										2		3
21AIE427T	Artificial Intelligence in Finance			2	2			3							2	
21AIE531T	Matrix Theory for Artificial Intelligence	2	2	2											2	
21AIE532T	Soft Computing and its Applications		3		3		2								2	

21AIE533T	*Artificial Intelligence and High Performance Computing*		*3*	*3*	*1*			*3*								*3*
21AIE534T	*Business Intelligence and Analytics*		*2*	*2*								*2*			*2*	
21AIE535T	*Artificial Intelligence and Internet of Things*			*3*	*2*			*2*								*3*
21AIE536T	*Artificial Intelligence Engines*	*3*	*2*	*2*										*1*	*2*	*1*
21AIE537T	*Artificial Intelligence in Finance*			*2*				*3*				*3*			*2*	*2*
21AIE538T	*Artificial Intelligence for Industrial Applications*				*3*	*3*					*1*		*2*	*1*	*3*	*2*
21AIE539T	*Artificial Intelligence in Medical Imaging*	*3*	*3*	*3*										*1*	*2*	*2*
21AIE540T	*Super Intelligence*			*3*	*3*		*2*								*3*	*2*
21AIE541T	*Multimodal Machine Learning*	*3*	*3*	*3*										*1*	*2*	*2*
21CSE545T	*Computational Perception and Cognition*	*3*	*3*		*3*									*2*	*1*	*3*
21CSE525T	*Agent Technology*		*1*	*3*			*2*									*3*
21CSE552T	*Computational Linguistics*	*3*	*2*											*2*		*3*
21CSE551T	*Affective Computing and Interaction*		*3*	*3*	*3*									*1*	*1*	
21CSE548T	*Spatial and Temporal Computing*		*2*	*2*		*2*									*2*	*2*
	Programme Average															

48. (g) Implementation Plan: Integrated M.Tech. in Artificial Intelligence

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**22**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21AIS101J	Foundation of Data Analysis	2	0	2	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				21

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS201T	Computer Organization and Architecture	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC203P	Advanced Programming Practice	3	1	0	4
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**22**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB304T	Probability and Applied Statistics	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21AIS201J	Foundation of Artificial Intelligence	2	0	2	3
21AIC202J	Neural Networks and Machine Learning	2	0	2	3
21CSC202J	Operating Systems	3	0	2	4
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC205P	Database Management Systems	3	1	0	4
21AIC301J	Deep Learning Techniques	3	0	2	4
E	Professional Elective – I				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**22**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21AIC303T	Computer Networks and Communications	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21AIC302J	Reinforcement Learning Techniques	2	0	2	3
E	Professional Elective – II				3
E	Professional Elective – III				3
O	Open Elective – II				3
21AIP302L	Project	0	0	6	3
21AIP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
21AIC401T	Inferential Statistics and Predictive Analytics	3	0	0	3
21AIC402T	Design of Artificial Intelligence Products	3	0	0	3
E	Professional Elective – IV				3
E	Professional Elective – V				3
O	Open Elective –III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21AIC501T	Ambient Intelligence	3	1	0	4
21AIC502J	Emerging Artificial Intelligence Applications	3	0	2	4
21GNS502J	Research Methodology	2	1	2	4
21AIP401L	Major Project	0	0	30	15
21AIP402L	Major Project	0	0	20	
21AIP403L	Internship#	0	0	10	
	Total Credits				**27**

Semester - IX

Code	Course Title	Hours/ Week L	T	P	C
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
E	Professional Elective – IX				3
E	Professional Elective –X				3
O	Open Elective-IV				3
	Total Credits				**18**

Semester - X

Code	Course Title	Hours/ Week L	T	P	C
21AIP501L	Specialization Project	0	0	40	20
21AIP502L	Specialization Project	0	0	30	
21AIP503L	Domain Internship	0	0	10	
	Total Credits				**20**

#Students have to register either 21AIP401L or 21AIP402L and 21AIP403L both in eighth semester and either 21AIP501L or 21AIP502L and 21AIP503L in tenth semester

49. Integrated M.Tech.in Computer Science and Engineering

49. (a) Mission of the Department

Mission Stmt - 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt - 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt - 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt - 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt - 5	*To produce successful Computer Science and Engineering graduates with personal and professional responsibilities and commitment to lifelong learning*

49. (b) Program Educational Objectives (PEO)

PEO - 1	*Graduates will be able to demonstrate their knowledge in technical/managerial roles with right skills and aptitude in software industries and R&D sectors*
PEO - 2	*Graduates will possess the proficiencies and additional skills in core computer science and engineering discipline in par with industry requirements.*
PEO - 3	*Graduates will be able to successfully pursue higher education in reputed institutions and also extend their research career.*
PEO - 4	*Graduates will be self-empowered solution providers and entrepreneurs in Computer Science and Engineering*
PEO - 5	*Graduates will possess the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering*

49. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3	Mission Stmt. - 4	Mission Stmt. - 5
PEO - 1	***3***				*1*
PEO - 2			*2*		
PEO - 3		*3*	*3*		
PEO - 4				*2*	*3*
PEO - 5				*3*	

49. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*				*3*	*3*	*2*
PEO – 2		*2*	*2*		*3*		*3*	*2*					*2*	*3*	*3*
PEO – 3		*3*	*3*	*2*						*2*		*3*	*3*	*3*	*3*
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*	*3*	*3*	*2*
PEO - 5						*3*			*3*	*3*	*3*	*3*	*3*	*3*	*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*To identify and use appropriate upcoming technologies and implement software solutions.*

49. (e) Program Structure: Integrated M.Tech. in Computer Science and Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
21GNS502J	Research Methodology	2	1	2	4
	Total Credits				**25**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
21CSP501L	Specialization Project	0	0	40	20
21CSP502L	Specialization Project	0	0	30	
21CSP503L	Domain Internship	0	0	10	
	Total Credits				**39**

Open Elective Courses
(Any 4 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**12**

5. Professional Elective Courses (E)
(Any 13 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE251T	Digital Image Processing	3	0	0	3
21CSE252T	Biometrics	2	1	0	3
21CSE253T	Internet of Things	3	0	0	3
21CSE254T	Bio Inspired Computing	3	0	0	3
21CSE255T	Computer Graphics and Animation	3	0	0	3
21CSE310J	Quantum Computation	2	1	0	3
21CSE327T	Cloud Computing for Data Analytics	2	1	0	3
21CSE351T	Computational Logic	2	1	0	3
21CSE352T	Neuro Fuzzy and Genetic Programming	2	1	0	3
21CSE353T	Augmented, Virtual and Mixed Reality	2	1	0	3
21CSE354T	Full Stack Web Development	2	1	0	3
21CSE355T	Data mining and Analytics	2	1	0	3
21CSE356T	Natural Language Processing	2	1	0	3
21CSE357T	Distributed Computing	2	1	0	3
21CSE358T	Network security and Cryptography	2	1	0	3
21CSE359T	Information Storage and Management	2	1	0	3
21CSE360T	High Performance Computing	2	1	0	3
21CSE361T	Database security and Privacy	3	0	0	3
21CSE362T	Cloud Computing	2	1	0	3
21CSE416T	Robotics: Computational Motion Planning	3	0	0	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB204T	Probability and Queueing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				32

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
21CSC305P	Machine Learning	2	1	0	3
21CSC510T	Parallel Computing	3	1	0	4
21CSC511J	Web Technologies	3	0	2	4
	Total Credits				**50**

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				3

5. Professional Elective Courses (E)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE452T	Semantic Web	2	1	0	3
21CSE453T	Speech Recognition	2	1	0	3
21CSE454T	Computer Vision	2	1	0	3
21CSE455T	Social Network Analysis	2	1	0	3
21CSE456T	Software Defined Networks	2	1	0	3
21CSE457T	Service Oriented Architecture	2	1	0	3
21CSE458T	Wireless and Mobile Communication	2	1	0	3
21CSE459T	Wireless Sensor Networks	2	1	0	3
21CSE460T	Network Protocols and Algorithms	2	1	0	3
21CSE553T	Neural Network models of Cognition	3	0	0	3
21CSE522T	Functional Programming	2	1	0	3
21CSE531T	Cyber Security Operations	2	1	0	3
21CSE535T	Network Intrusions and Computer Forensics	2	1	0	3

21CSE417T	Reinforcement Learning Techniques	2	1	0	3
21CSE418T	Cyber Physical Systems	3	0	0	3
21CSE421T	Business Intelligence and Analytics	2	1	0	3
21CSE422T	Convolutional Neural Networks	2	1	0	3
21CSE425T	Advanced Machine Learning	2	1	0	3
21CSE426T	Financial Machine Learning	2	1	0	3
21CSE428T	Healthcare Analytics	2	1	0	3
21CSE451T	Pattern Recognition Techniques	2	1	0	3

21CSE536T	Mobile Forensics	2	1	0	3
21CSE541T	Probabilistic Graphical Models : Principles and Techniques	3	0	0	3
21CSE542T	Deep Generative Models	3	0	0	3
21CSE543T	Brain machine Interface : Science, Technology and Application	3	0	0	3
21CSE544T	Data Analysis and Visualization	3	0	0	3
21CSE545T	Computational Perception and Cognition	3	0	0	3
21CSE548T	Spatial and Temporal Computing	3	0	0	3
Total Credits					**39**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester and either 21CSP501L or 21CSP502L and 21CSP503L in tenth semester

49. (f) Programme Articulation Matrix : Integrated M.Tech. in Computer Science and Engineering

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC304J	Compiler Design	3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC305P	Machine Learning	-	3	-	3	-	-	-	-	-	-	-	-	-	1	3
21CSE251T	Digital Image Processing	3	2	2	3	-	-	-	-	-	-	-	-	2	3	-
21CSE252T	Biometrics	3	-	1	2	-	-	-	-	2	-	-	-	-	1	-
21CSE253T	Internet of Things	1	2	1	3	1	2	-	-	-	-	-	-	-	-	2
21CSE254T	Bio Inspired Computing	2	2	2	2	-	-	-	-	-	-	-	-	-	3	2
21CSE255T	Computer Graphics and Animation	3	2	3	-	2	-	-	-	-	-	-	-	-	3	2
21CSE310J	Quantum Computation	2	3	1	3	-	-	-	-	-	-	-	-	-	-	-
21CSE327T	Cloud Computing for Data Analytics	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
21CSE351T	Computational Logic	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
21CSE352T	Neuro Fuzzy and Genetic Programming	2	3	-	-	3	-	-	-	-	-	-	-	-	2	-
21CSE353T	Augmented, Virtual and Mixed Reality	3	-	3	-	2	-	-	2	-	-	-	-	-	-	2
21CSE354T	Full Stack Web Development	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-
21CSE355T	Data Mining and Analytics	1	2	-	-	3	-	-	-	-	-	-	-	2	-	-
21CSE356T	Natural Language Processing	3	3	2	3	3	-	-	-	-	-	-	-	2	-	-
21CSE357T	Distributed Computing	-	-	2	2	2	-	-	-	-	-	-	-	2	-	-
21CSE358T	Network Security and Cryptography	2	3	2	-	2	-	-	-	-	-	-	-	2	-	-
21CSE359T	Information Storage and Management	-	3	3	-	1	-	-	-	-	-	-	-	1	2	-
21CSE360T	High Performance Computing	1	1	1	1	2	-	-	-	-	-	-	-	-	3	-
21CSE361T	Database Security and Privacy	3	2	2	2	1	-	-	-	-	-	-	2	1	-	-
21CSE362T	Cloud Computing	2	1	1	1	2	-	-	-	-	-	-	-	2	-	-
21CSE416T	Robotics :Computational Motion Planning	3	3	2	-	-	-	-	-	-	-	-	-	1	2	3
21CSE417T	Reinforcement Learning Techniques	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
21CSE418T	Cyber Physical Systems	3	3	2	-	-	-	-	-	-	-	-	-	2	-	3
21CSE421T	Business Intelligence and Analytics	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
21CSE422T	Convolutional Neural Networks	-	-	-	-	-	-	-	-	-	-	-	1	2	2	2
21CSE425T	Advanced Machine Learning	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
21CSE426T	Financial Machine Learning	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
21CSE428T	Healthcare Analytics	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
21CSE451T	Pattern Recognition Techniques	3	2	2	-	2	-	-	-	-	-	-	-	1	2	2
21CSE452T	Semantic Web	2	2	3	2	2	-	-	-	-	-	-	-	-	3	-
21CSE453T	Speech Recognition	2	2	2	2	-	-	-	-	-	-	-	-	-	3	-
21CSE454T	Computer Vision	2	2	1	1	1	-	-	-	-	-	-	-	3	-	2
21CSE455T	Social Network Analysis	2	3	2	3	3	-	-	-	-	-	-	-	-	2	2
21CSE456T	Software Defined Networks	1	1	1	3	1	2	-	-	-	-	-	-	2	-	
21CSE457T	Service Oriented Architecture	2	1	2	-	-	-	-	-	-	-	-	-	2-	-	-
21CSE458T	Wireless and Mobile Communication	1	2	2	-	-	-	-	-	-	-	-	-	1	-	-
21CSE459T	Wireless Sensor Networks	1	2	2	-	-	-	-	-	-	-	-	-	1	-	-
21CSE460T	Network Protocols and Algorithms	1	2	1	-	-	-	-	-	-	-	-	-	1	-	-
21CSE522T	Functional Programming	-	-	-	-	-	-	-	-	-	-	-	-	2	2	1
21CSE531T	Cyber Security Operations	-	2	-	-	-	-	2	-	-	3	-	3	-	-	3
21CSE535T	Network Intrusions and Computer Forensics	2	2	-	-	-	-	-	-	-	-	-	-	-	-	3
21CSE536T	Mobile Forensics	-	-	2	-	-	-	-	2	-	-	-	-	-	-	3
21CSE541T	Probabilistic Graphical Models : Principles and Techniques	2	-	-	3	-	-	-	-	-	-	-	-	-	-	3
21CSE542T	Deep Generative Models	-	3	-	3	-	-	-	-	3	-	-	-	1	-	3

21CSE543T	Brain machine Interface : Science, Technology and Application	3	2	-	3	-	-	-	-	-	-	-	-	1	1	3
21CSE544T	Data Analysis and Visualization	1	-	-	3	2	-	-	-	-	-	-	-	3	1	3
21CSE545T	Computational Perception and Cognition	3	3	-	3	-	-	-	-	-	-	-	-	2	1	3
21CSE548T	Spatial and Temporal Computing	-	2	2	-	2	-	-	-	-	-	-	-	-	2	2
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Semester Internship-I	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP501L	Specialization Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP502L	Semester Internship-II	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average															

49. (g) Implementation Plan: Integrated M.Tech. in Computer Science and Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**22**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				21

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201 P	Design Thinking and Methodology	1	0	4	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective – I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC305P	Machine learning	2	1	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSC510T	Parallel Computing	3	1	0	4
21CSC511J	Web Technologies	3	0	2	4
21GNS502J	Research Methodology	2	1	2	4
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship	0	0	10	
	Total Credits				**27**

Semester - IX

Code	Course Title	Hours/ Week L	T	P	C
E	Professional Elective – IX				3
E	Professional Elective – X				3
E	Professional Elective –XI				3
E	Professional Elective – XII				3
E	Professional Elective –XIII				3
O	Open Elective-IV				3
	Total Credits				**18**

Semester - X

Code	Course Title	Hours/ Week L	T	P	C
21CSP501L	Specialization Project	0	0	40	20
21CSP502L	Specialization Project	0	0	30	
21CSP503L	Domain Internship	0	0	10	
	Total Credits				**20**

50. Integrated M.Tech.in Computer Science and Engineering with specialization in Cognitive Computing

50. (a) Mission of the Department

Mission Stmt - 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt - 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt - 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt - 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt - 5	*To produce successful Computer Science and Engineering graduates with personal and professional responsibilities and commitment to lifelong learning*

50. (b) Program Educational Objectives (PEO)

PEO - 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO - 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO - 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO - 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO - 5	*Graduates will possess the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering*

50. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3	Mission Stmt. - 4	Mission Stmt. - 5
PEO - 1	*3*				*1*
PEO - 2			*2*		
PEO - 3		*3*	*3*		
PEO - 4				*2*	*3*
PEO - 5				*3*	*3*

50. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*	*3*			*2*		
PEO – 2		*2*	*2*		*3*		*3*	*2*						*2*	
PEO – 3		*3*	*3*	*2*						*2*		*3*			*2*
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*			*2*
PEO - 5	*3*			3		3						3			3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*Ability to utilize Cognitive principles to design and develop cutting edge solutions for meeting the current demand of the industry .*

50. (e) Program Structure: Integrated M.Tech. in Computer Science and Engineering with specialization in Cognitive Computing

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
21GNS502J	Research Methodology	2	1	2	4
	Total Credits				**25**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
21CSP501L	Specialization Project	0	0	40	20
21CSP502L	Specialization Project	0	0	30	
21CSP503L	Domain Internship	0	0	10	
	Total Credits				**39**

Open Elective Courses
(Any 4 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**12**

5. Professional Elective Courses (E)
(any 13 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE251T	Digital Image Processing	3	0	0	3
21CSE252T	Biometrics	2	1	0	3
21CSE271T	Programming in Java	2	1	0	3
21CSE272T	Genetic Algorithm and its Applications	3	0	0	3
21CSE291T	Introduction to Cognitive Neuroscience	3	0	0	3
21CSE311P	Robot Programming	2	1	0	3
21CSE312P	Software Engineering in Artificial Intelligence	2	1	0	3
21CSE313P	Accelerated Data Science	2	1	0	3
21CSE326T	Artificial Neural Networks	3	0	0	3
21CSE355T	Data Mining and Analytics	2	1	0	3
21CSE356T	Natural Language Processing	2	1	0	3
21CSE358T	Cryptography and Network security	3	0	0	3
21CSE361T	Database Security and Privacy	3	0	0	3
21CSE371T	Advanced Algorithms	3	0	0	3
21CSE376T	Nature Inspired Computing Techniques	3	0	0	3
21CSE381T	Forensics and Incident Response	3	0	0	3
21CSE397T	Philosophy of Cognitive Science	3	0	0	3
21CSE398T	Logic and Knowledge Representation	3	0	0	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB204T	Probability and Queueing Theory	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				32

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
21CSC305P	Machine Learning	2	1	0	3
21CSC505T	Computer Graphics and Vision	3	1	0	4
21CSC506J	Computation and Cognition: The Probabilistic Approach	3	0	2	4
	Total Credits				50

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**3**

5. Professional Elective Courses (E)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE542T	Deep Generative Models	3	0	0	3
21CSE543T	Brain Machine Interface: Science, Technology and Application	3	0	0	3
21CSE544T	Data Analysis and Visualization	3	0	0	3
21CSE545T	Computational Perception and Cognition	3	0	0	3
21CSE546T	Medical Signal Processing	3	0	0	3
21CSE547T	Deep Multitask and Meta Learning	2	1	0	3
21CSE548T	Spatial and Temporal Computing	3	0	0	3
21CSE549T	Decision Making Under Uncertainty	3	0	0	3
21CSE552T	Computational Linguistics	3	0	0	3
21AIE536T	Artificial Intelligence Engines	3	0	0	3

5. Professional Elective Courses (E) (any 13 courses)					
Course Code	Course Title	Hours/ Week			C
		L	T	P	
21CSE411T	Artificial Intelligence in genomics and disease prediction	3	0	0	3
21CSE412T	Machine learning in drug discovery	3	0	0	3
21CSE414T	IoT Concepts and Applications	3	0	0	3
21CSE416T	Robotics: Computational Motion Planning	3	0	0	3
21CSE417T	Reinforcement Learning Techniques	2	1	0	3
21CSE418T	Cyber Physical Systems	3	0	0	3
21CSE421T	Business Intelligence and Analytics	2	1	0	3
21CSE430T	Automatic Speech Recognition	3	0	0	3
21CSE439T	Virtual Reality and Augmented Reality	3	0	0	3
21CSE451T	Pattern Recognition Techniques	2	1	0	3
21CSE553T	Neural Network Models of Cognition	3	0	0	3
21CSE541T	Probabilistic Graphical Models: Principles and Techniques	3	0	0	3

5. Professional Elective Courses (E)					
Course Code	Course Title	Hours/ Week			C
		L	T	P	
21AIE538T	Artificial Intelligence for Industrial Applications	3	0	0	3
21AIE539T	Artificial Intelligence in Medical Imaging	3	0	0	3
21AIE541T	Multimodal Machine Learning	3	0	0	3
Total Learning Credits					**39**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester and either 21CSP501L or 21CSP502L and 21CSP503L in tenth semester

50. (f) Programme Articulation: Integrated M.Tech. in Computer Science and Engineering with specialization in Cognitive Computing

		Program Outcome (PO)												PSO		
Course Code	Course Name	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC304J	Compiler Design	3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC305P	Machine Learning	-	3	-	3	-	-	-	-	-	-	-	-	-	1	3
21CSC505T	Computer Graphics and Vision	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
21CSC506J	Computation and Cognition: the probabilistic approach	-	2	3	-	-	-	-	-	-	-	-	-	-	-	3
21CSE251T	Digital Image Processing	3	2	2	3	-	-	-	-	-	-	-	-	2	3	-
21CSE252T	Biometrics	3	-	1	2	-	-	-	-	2	-	-	-	-	1	-
21CSE271T	Programming in Java	3	2	1	2	-	-	-	-	-	-	-	1	3	2	-
21CSE272T	Genetic algorithm and its applications	1	2	3	-	-	-	-	-	-	-	-		3	1	-
21CSE291T	Introduction to Cognitive Neuroscience	1	3	2	2	-	-	-	-	-	-	-	1	3	2	-
21CSE311P	Robot Programming	2	2	-	3	-	-	-	-	-	-	-	-	2	-	3
21CSE312P	Software Engineering in Artificial Intelligence	-	3	3	-	3	-	-	-	-	-	-	-	2	2	3
21CSE313P	Accelerated Data science	1	2		3	-	-	-	-	-	-	-	-	1	-	2
21CSE326T	Artificial Neural Networks	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
21CSE355T	Data Mining and Analytics	1	2	-	-	3	-	-	-	-	-	-	-	2	-	-
21CSE356T	Natural Language Processing	3	3	2	3	3	-	-	-	-	-	-	-	2	-	-
21CSE358T	Network Security and Cryptography	2	3	2	-	2	-	-	-	-	-	-	-	2	-	-
21CSE361T	Database Security and Privacy	3	2	2	2	1	-	-	-	-	-	-	2	1	-	-
21CSE371T	Advanced Algorithms	-	2	-	2	-	-	-	-	-	-	-	-	1	-	2
21CSE376T	Nature Inspired Computing Techniques	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
21CSE381T	Forensics and Incident Response			2					2							3
21CSE397T	Philosophy of Cognitive science	-	3	-	3	-	-	-	-	-	-	-	-	1	-	3
21CSE398T	Logic and Knowledge representation	-	2	-	3	-	-	-	-	-	-	-	-	2	-	3
21CSE411T	Artificial Intelligence in genomics and disease prediction	3	3	2	-	-	-	-	-	-	-	-	-	-	-	3
21CSE412T	Machine learning in Drug Discovery	3	2	3	-	-	-	-	-	-	-	-	-	-	-	3
21CSE414T	IoT Concepts and applications	2	3	3	-	-	-	-	-	-	-	-	1	1		3
21CSE416T	Robotics: Computational Motion Planning	3	3	2	-	-	-	-	-	-	-	-	-	1	2	3
21CSE417T	Reinforcement Learning Techniques	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
21CSE418T	Cyber physical systems	3	3	2	-	-	-	-	-	-	-	-	-	2	-	3
21CSE421T	Business Intelligence and Analytics	-	-	-	-	-	-	-	3	-	3	-	-	2	2	2
21CSE430T	Automatic Speech Recognition	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
21CSE439T	Virtual Reality and Augmented Reality	3	3	2	2	3	-	-	-	-	-	-	-	2		2
21CSE451T	Pattern Recognition Techniques	3	2	2	-	2	-	-	-	-	-	-	-	1	2	2
21CSE553T	Neural Network models of Cognition	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
21CSE541T	Probabilistic Graphical models: Principles and Techniques	2	-	-	3	-	-	-	-	-	-	-	-	1	-	3
21CSE542T	Deep Generative Models	-	3	-	3	-	-	-	-	3	-	-	-	1	-	3
21CSE543T	Brain machine Interface: Science, Technology and Application	3	2	-	3	-	-	-	-	-	-	-	-	1	1	3
21CSE544T	Data Analysis and Visualization	1	-	-	3	2	-	-	-	-	-	-	-	3	1	3
21CSE545T	Computational Perception and Cognition	3	3	-	3	-	-	-	-	-	-	-	-	2	1	3
21CSE546T	Medical signal Processing	1	-	3	-	-	-	-	-	-	-	-	-	1	-	3
21CSE547T	Deep Multitask and meta learning	3	3	-	-	-	-	-	-	-	-	-	-	1	-	3
21CSE548T	Spatial and Temporal Computing	-	2	2	-	2	-	-	-	-	-	-	-	-	2	2
21CSE549T	Decision making under uncertainty	-	3	2	2	-	-	-	-	-	-	-	-	1	-	3

21CSE552T	Computational Linguistics	3	2	-	-	-	-	-	-	-	-	-	2	-	3
21AIE536T	Artificial Intelligence Engines	3	2	2	-	-	-	-	-	-	-	-	1	2	1
21AIE538T	Artificial Intelligence for Industrial applications	-	-	-	3	3	-	-	-	-	1		2	1	3	2
21AIE539T	Artificial Intelligence in Medical Imaging	3	3	3	-	-	-	-	-	-	-	-	1	2	2
21AIE541T	Multimodal machine learning	3	3	3	-	-	-	-	-	-	-	-	1	2	2
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Semester Internship-I	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP501L	Specialization Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP502L	Semester Internship-II	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3

50. (g) Implementation Plan: Integrated M.Tech. in Computer Science and Engineering with specialization in Cognitive Computing

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**22**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				21

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201 P	Design Thinking and Methodology	1	0	4	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective – I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC305P	Machine learning	2	1	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSC505T	Computer Graphics and Vision	3	1	0	4
21CSC506J	Computation and Cognition: The Probabilistic Approach	3	0	2	4
21GNS502J	Research Methodology	2	1	2	4
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship	0	0	10	
	Total Credits				**27**

Semester - IX

Code	Course Title	Hours/ Week L	T	P	C
E	Professional Elective – IX				3
E	Professional Elective – X				3
E	Professional Elective – XI				3
E	Professional Elective – XII				3
E	Professional Elective –XIII				3
O	Open Elective-IV				3
	Total Credits				**18**

Semester - X

Code	Course Title	Hours/ Week L	T	P	C
21CSP501L	Specialization Project	0	0	40	20
21CSP502L	Specialization Project	0	0	30	
21CSP503L	Domain Internship	0	0	10	
	Total Credits				**20**

51. Integrated M.Tech.in Computer Science and Engineering with specialization in Cyber Security & Digital Forensics

51. (a) Mission of the Department

Mission Stmt – 1	*To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.*
Mission Stmt – 2	*To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society*
Mission Stmt – 3	*To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.*
Mission Stmt – 4	*To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities*
Mission Stmt – 5	To *Identify and address the Knowledge, Professional Skills, Professional Aptitude in the field of Cyber security*

51. (b) Program Educational Objectives (PEO)

PEO – 1	*Graduates will be able to perform in technical/managerial roles ranging from design, development, problem solving to production support in software industries and R&D sectors.*
PEO – 2	*Graduates will be able to successfully pursue higher education in reputed institutions.*
PEO – 3	*Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.*
PEO – 4	*Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.*
PEO – 5	Graduates will be able to obtain *Job orientations / proficiencies / skills* in the field of cyber security and digital forensics.

51. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3	Mission Stmt. - 4	Mission Stmt. - 5
PEO - 1	*3*				*1*
PEO - 2			*2*		
PEO - 3		*3*	*3*		
PEO - 4				*2*	*3*
PEO - 5				*3*	

51. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*			*1*		*2*		*3*	*2*	*3*					*2*
PEO – 2		*2*	*2*		*3*		*3*	*2*					*2*		
PEO – 3		*3*	*3*	*2*						*2*		*3*		*2*	
PEO – 4		*2*	*3*			*3*	*2*		*2*		*2*	*2*		*2*	
PEO - 5						*3*			*3*	*3*	*3*	*3*			*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*To understand, analyze, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.*
PSO - 2	*To apply computing principles, skills and practices to develop solutions using logical and reasoning skills, for real life problems.*
PSO - 3	*To identify and utilize cyber security principles to create secure infrastructure*

51. (e) Program Structure: Integrated M.Tech. in Computer Science and Engineering with specialization in Cyber Security & Digital Forensics

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
21GNS502J	Research Methodology	2	1	2	4
	Total Credits				**25**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship	0	0	10	
21CSP501L	Specialization Project	0	0	40	20
21CSP502L	Specialization Project	0	0	30	
21CSP503L	Domain Internship#	0	0	10	
	Total Credits				**39**

5. Professional Elective Courses (E)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE281T	Cryptography and Network Security	2	1	0	3
21CSE229J	Check Point System Administration	2	0	2	3
21CSE282T	Information Security	3	0	0	3
21CSE283T	Cyber Law	2	1	0	3
21CSE381T	Forensics And Incident Response	2	1	0	3
21CSE382T	Security Ma2CS2nagement	2	1	0	3
21CSE383T	Security Governance, Risk and compliance	2	1	0	3
21CSE384J	Security Audit and Risk Assessment	2	0	2	3
21CSE385J	Advanced Malware Analysis	2	0	2	3
21CSE386J	Penetration Testing and Vulnerability Assessment	2	0	2	3
21CSE387J	Hacker Techniques, Tools, and Incident Handling	2	0	2	3
21CSE399J	Comprehensive Linux for All	2	0	2	3
21CSE485T	Database Security	2	1	0	3
21CSE486T	Operation System Security	2	1	0	3
21CSE487T	Cyberwarfare	2	1	0	3
21CSE488T	Hacker Mind: Profiling the IT Criminal	2	1	0	3
21CSE489T	Mobile and Wireless Security	2	1	0	3
21CSE490J	Windows and Linux Internals	2	0	2	3
21CSE491T	Cyber Crime and Digital Forensics	2	1	0	3
21CSE492T	Cyber Crimes and Cyber Security	2	1	0	3
21CSE531T	Cyber Security Operations	2	1	0	3
21CSE532T	Network Management and Protocols	2	1	0	3
21CSE533T	Firewalls and Access Controls	2	1	0	3
21CSE534T	Network Programming and Management	2	1	0	3
21CSE535T	Network Intrusions and Computer Forensics	2	1	0	3
21CSE536T	Mobile Forensics	2	1	0	3
21CSE537T	Digital Forensics	2	1	0	3
21CSE538T	Security Scripting and Analysis	2	1	0	3
21CSE539T	Principles of Secure Coding Principles	2	1	0	3
21CSE540T	Android Security and Design Internals	2	1	0	3
	Total Credits				**39**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21MAB204T	Probability and Queuing Theory	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				32

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC310J	Malware Analysis	2	0	2	3
21CSC308T	Security Risk Management Principles	3	0	0	3
21CSC503T	Security Service Management	3	1	0	4
21CSC504J	Android Malware Analysis	3	0	2	4
	Total Credits				*50*

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				3

6. Open Elective Courses (O) (Any 4 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
21CSO358T	Network Security	2	1	0	3
21CSO359T	Fundamentals of Information System Security	2	1	0	3
21CSO360T	Security Policy Implementation	2	1	0	3
	Total Learning Credits				**12**

51. (f) Programme Articulation: Integrated M.Tech. in Computer Science and Engineering with specialization in Cyber Security & Digital Forensics

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC310J	Malware Analysis		2					2			3		3			3
21CSC308T	Security Risk Management Principles		3			3						3				3
21CSC504J	Android Malware Analysis							2			3					3
21CSC308T	Security Risk Management Principles		3										2			3
21CSE281T	Cryptography and Network Security	2	2													3
21CSE282T	Information Security			2					2							3
21CSE283T	Cyber Law					2		2								3
21CSE229J	Check Point System Administration			2		2										3
21CSE381T	Forensics And Incident Response			2					2							3
21CSE382T	Security Management			2		2										3
21CSE383T	Security Governance, Risk and compliance	2	2		2											3
21CSE384J	Security Audit and Risk Assessment		2	2					2							3
21CSE385J	Advanced Malware Analysis		2	2		2										3
21CSE386J	Penetration Testing and Vulnerability Assessment		2	2		2	1									3
21CSE387J	Hacker Techniques, Tools, and Incident Handling		2			2										3
21CSE399J	Comprehensive Linux For All	3		2	2	3										
21CSE485T	Database Security		2			2			2		2					3
21CSE486T	Operation System Security	2		3		3										3
21CSE487T	Cyberwarfare			2					2							3
21CSE488T	Hacker Mind: Profiling the IT Criminal			2		2						3				3
21CSE489T	Mobile and Wireless Security	2		3		3										3
21CSE490J	Windows and Linux Internals			2					2							3
21CSE491T	Cyber Crime and Digital Forensics	2		3		3										3
21CSE492T	Cyber Crimes and Cyber Security		2	2					2							3
21CSE531T	Cyber Security Operations		2					2			3		3			3
21CSE532T	Network Management and Protocols		3			3						3				3
21CSE533T	Firewalls and Access Controls							2			3					3
21CSE534T	Network Programming and Management		3										2			3
21CSE535T	Network Intrusions and Computer Forensics	2	2													3
21CSE536T	Mobile Forensics			2					2							3
21CSE537T	Digital Forensics					2		2								3
21CSE538T	Security Scripting and Analysis			2					2							3
21CSE539T	Principles of Secure Coding Principles			2		2										3
21CSE540T	Android Security and Design Internals	2	2		2											3
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP501L	Specialization Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP502L	Semester Internship-II	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

51. (g) Implementation Plan: Integrated M.Tech. in Computer Science and Engineering with specialization in Cyber Security & Digital Forensics

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**22**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				21

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB206T	Numerical Methods and Analysis	3	1	0	4
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC203P	Advanced Programming Practice	3	1	0	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201 P	Design Thinking and Methodology	1	0	4	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB204T	Probability and Queueing Theory	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective – I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC308T	Security Risk Management Principles	3	0	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC310J	Malware Analysis	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSC503T	Security Service Management	3	1	0	4
21CSC504J	Android Malware Analysis	3	0	2	4
21GNS502J	Research Methodology	2	1	2	4
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship	0	0	10	
	Total Credits				**27**

Semester - IX

Code	Course Title	Hours/ Week L	T	P	C
E	Professional Elective –IX				3
E	Professional Elective – X				3
E	Professional Elective – XI				3
E	Professional Elective – XII				3
E	Professional Elective –XIII				3
O	Open Elective-IV				3
	Total Credits				**18**

Semester - X

Code	Course Title	Hours/ Week L	T	P	C
21CSP501L	Specialization Project	0	0	40	20
21CSP502L	Specialization Project	0	0	30	
21CSP503L	Domain Internship	0	0	10	
	Total Credits				**20**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester and either 21CSP501L or 21CSP502L and 21CSP503L in tenth semester

52. Integrated M.Tech.in Computer Science and Engineering with specialization in Data Science

52. (a) Mission of the Department

Mission Stmt - 1	To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.
Mission Stmt - 2	To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society
Mission Stmt - 3	To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.
Mission Stmt - 4	To instill societal, safety, cultural, environmental, and ethical responsibilities in all professional activities
Mission Stmt - 5	To produce successful Data Science graduates with personal and professional responsibilities and commitment to lifelong learning

52. (b) Program Educational Objectives (PEO)

PEO - 1	Graduates will be able to demonstrate their knowledge in technical/managerial roles with right skills and aptitude in software industries and R&D sectors
PEO - 2	Graduates will possess the proficiencies and additional skills in core computer science and engineering discipline in par with industry requirements.
PEO - 3	Graduates will be able to successfully pursue higher education in reputed institutions and also extend their research career.
PEO - 4	Graduates will be self-empowered solution providers and entrepreneurs in Computer Science and Engineering
PEO - 5	Graduates will possess the ability to adapt, contribute and innovate new technologies and systems in the key domains of Data Science

52. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3	Mission Stmt. - 4	Mission Stmt. - 5
PEO - 1	3				1
PEO - 2			2		
PEO - 3		3	3		
PEO - 4				2	3
PEO - 5		3	3	2	3

52. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3			1		2		3	2	3			3	3	3
PEO – 2		2	2		3		3	2					3	3	3
PEO – 3		3	3	2						2		3	3	3	3
PEO – 4		2	3			3	2		2		2	2	3	3	3
PEO - 5	3				3	3		2		3	3	3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	To understand, analyse, design, and develop computing solutions by applying fundamental concepts of computer science and engineering.
PSO - 2	To apply computing principles, skills and practices to develop solutions using logical and reasoning skills for real life problems.
PSO - 3	Ability to understand the requirements, gather a large amount of data, analyze, utilize the tools to extract insights to increase the productivity and efficiency of the business along with better visual representations.

52. (e) Program Structure: Integrated M.Tech. in Computer Science and Engineering with specialization in Data Science

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS202T	Fundamentals of Data Science	3	2	0	5
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS301T	Full Stack Development	1	1	0	2
21GNS502J	Research Methodology	2	1	2	4
	Total Credits				**26**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
21CSP501L	Specialization Project	0	0	40	20
21CSP502L	Specialization Project	0	0	30	
21CSP503L	Domain Internship	0	0	10	
	Total Credits				**39**

Open Elective Courses
(Any 4 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSO351T	Web Programming	2	1	0	3
21CSO352T	Python Programming	2	1	0	3
21CSO353T	Mobile Application Development	2	1	0	3
21CSO354T	Data Analytics	2	1	0	3
	Total Credits				**12**

5. Professional Elective Courses (E)
(Any 13 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE222T	Big Data Tools and Techniques	3	0	0	3
21CSE224T	Computer Architecture	3	0	0	3
21CSE253T	Internet of Things	2	1	0	3
21CSE251T	Digital Image Processing	2	1	0	3
21CSE321T	Data Warehousing and Data Mining	2	1	0	3
21CSE322T	Multivariate Techniques for Data Analytics	2	1	0	3
21CSE323T	Marketing Analytics	2	1	0	3
21CSE359T	Information Storage Management	2	1	0	3
21CSE325T	Applied Social Network Analysis	2	1	0	3
21CSE326T	Artificial Neural Networks	2	1	0	3
21CSE373T	Streaming Analytics	2	1	0	3
21CSE425T	Advanced Machine Learning	2	1	0	3
21CSE327T	Cloud Computing for Data Analytics	2	1	0	3
21CSE422T	Convolutional Neural Networks	2	1	0	3
21CSE426T	Financial Machine Learning	2	1	0	3
21CSE427T	Augmented and Virtual Reality	2	1	0	3
21CSE428T	Healthcare Analytics	2	1	0	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB102T	Introduction to Computational Biology	2	0	0	2
	Total Credits				**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21CSC206P	Advanced Object Oriented Programming	2	1	0	3
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
21CSC307P	Machine Learning for Data Analytics	2	1	0	3
21CSC502J	Applied Deep Learning	3	0	2	4
21CSC501T	Natural Language Processing Techniques	3	1	0	4
	Total Credits				*49*

Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				*3*

5. Professional Elective Courses (E)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSE429T	Data Science for Internet of Things	2	1	0	3
21CSE447T	Robotics: Computational Motion Planning	3	0	0	3
21CSE448T	Bio-inspired computing and Fuzzy Logic	2	1	0	3
21CSE421T	Business Intelligence and Analytics	2	1	0	3
21CSE430T	Automatic Speech Recognition	2	1	0	3
21CSE449T	Risk Analytics	2	1	0	3
21CSE521T	Advanced Algorithms Analysis	2	1	0	3
21CSE522T	Functional Programming	2	1	0	3
21CSE524T	Computer Vision Techniques	2	1	0	3
21CSE527T	Text Mining and Analytics	2	1	0	3
21CSE529T	Web Intelligence	2	1	0	3
	Total Learning Credits				**39**

51. (f) Programme Articulation: Integrated M.Tech. in Computer Science and Engineering with specialization in Data Science

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21CSS101J	Programming for Problem Solving	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
21CSS303T	Data Science	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
21CSS201T	Computer Organization and Architecture	3	2	-	-	-	-	-	-	-	-	-	-	1	2	1
21CSC201J	Data Structures and Algorithms	2	3	3	1	-	-	-	-	-	-	-	-	1	1	2
21CSC101T	Object Oriented Design and Programming	-	2	2	-	2	-	-	-	-	-	-	3	-	2	2
21CSC204J	Design and Analysis of Algorithms	2	1	2	1	-	-	-	-	-	3	-	3	3	1	-
21CSC202J	Operating Systems	3	3	3	2	-	-	-	-	-	-	-	3	2	-	-
21CSC303J	Software Engineering and Project Management	-	3	2	-	-	-	-	-	2	-	2	-	3	-	-
21CSC203P	Advanced Programming Practice	3	2	2	1	2	-	-	-	1	-	-	-	2	-	-
21CSC301T	Formal Language and Automata	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
21CSC302J	Computer Networks	3	-	-	2	3	-	-	-	-	-	-	-	1	-	-
21CSC205P	Database Management Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
21CSC206T	Artificial Intelligence	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
21CSC310J	Malware Analysis		2					2			3		3			3
21CSC308T	Security Risk Management Principles		3			3						3				3
21CSC504J	Android Malware Analysis							2			3					3
21CSC308T	Security Risk Management Principles		3										2			3
21CSE281T	Cryptography and Network Security	2	2													3
21CSE282T	Information Security			2					2							3
21CSE283T	Cyber Law					2		2								3
21CSE229J	Check Point System Administration			2		2										3
21CSE381T	Forensics And Incident Response			2					2							3
21CSE382T	Security Management			2		2										3
21CSE383T	Security Governance, Risk and compliance	2	2		2											3
21CSE384J	Security Audit and Risk Assessment		2	2					2							3
21CSE385J	Advanced Malware Analysis		2	2		2										3
21CSE386J	Penetration Testing and Vulnerability Assessment		2	2		2	1									3
21CSE387J	Hacker Techniques, Tools, and Incident Handling		2			2										3
21CSE399J	Comprehensive Linux For All	3		2	2	3										
21CSE485T	Database Security		2			2			2		2					3
21CSE486T	Operation System Security	2		3		3										3
21CSE487T	Cyberwarfare			2					2							3
21CSE488T	Hacker Mind: Profiling the IT Criminal			2		2						3				3
21CSE489T	Mobile and Wireless Security	2		3		3										3
21CSE490J	Windows and Linux Internals			2					2							3
21CSE491T	Cyber Crime and Digital Forensics	2		3		3										3
21CSE492T	Cyber Crimes and Cyber Security		2	2					2							3
21CSE531T	Cyber Security Operations		2					2			3		3			3
21CSE532T	Network Management and Protocols		3			3						3				3
21CSE533T	Firewalls and Access Controls							2			3					3
21CSE534T	Network Programming and Management		3										2			3
21CSE535T	Network Intrusions and Computer Forensics	2	2													3
21CSE536T	Mobile Forensics			2					2							3
21CSE537T	Digital Forensics					2		2								3
21CSE538T	Security Scripting and Analysis			2					2							3
21CSE539T	Principles of Secure Coding Principles			2		2										3
21CSE540T	Android Security and Design Internals	2	2		2											3
21CSP302L	Project	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP303T	MOOC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21CSP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP402L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP501L	Specialization Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21CSP502L	Semester Internship-II	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Program Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

51. (g) Implementation Plan: Integrated M.Tech. in Computer Science and Engineering with specialization in Data Science

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CYM101T	Environmental Science*	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**22**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB102T	Introduction to Computational Biology	2	0	0	2
21CSC101T	Object Oriented Design and Programming	2	1	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				21

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21CSS202T	Fundamentals of Data Science	3	2	0	5
21CSC201J	Data Structures and Algorithms	3	0	2	4
21CSC202J	Operating Systems	3	0	2	4
21CSC206P	Advanced Object Oriented Programming	2	1	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
	Total Credits				**23**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21CSC204J	Design and Analysis of Algorithms	3	0	2	4
21CSC205P	Database Management Systems	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
E	Professional Elective – I				3
21PDH201T	Social Engineering	2	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB302T	Discrete Mathematics	3	1	0	4
21CSC301T	Formal Language and Automata	3	0	0	3
21CSC302J	Computer Networks	3	0	2	4
21CSC307P	Machine Learning for Data Analytics	2	1	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**21**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS301T	Full Stack Development	1	1	0	2
21CSC303J	Software Engineering and Project Management	2	0	2	3
21CSC304J	Compiler Design	2	0	2	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21CSP302L	Project	0	0	6	3
21CSP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**20**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
E	Professional Elective – VII				3
E	Professional Elective – VIII				3
O	Open Elective –III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21CSC502J	Applied Deep Learning	3	1	0	4
21CSC501T	Natural Language Processing Techniques	3	0	2	4
21GNS502J	Research Methodology	2	1	2	4
21CSP401L	Major Project	0	0	30	15
21CSP402L	Major Project	0	0	20	
21CSP403L	Internship#	0	0	10	
	Total Credits				**27**

Semester - IX

Code	Course Title	Hours/ Week L	T	P	C
E	Professional Elective – IX				3
E	Professional Elective – X				3
E	Professional Elective – XI				3
E	Professional Elective – XII				3
E	Professional Elective –XIII				3
O	Open Elective-IV				3
	Total Credits				18

Semester - X

Code	Course Title	Hours/ Week L	T	P	C
21CSP501L	Specialization Project	0	0	40	20
21CSP502L	Specialization Project	0	0	30	
21CSP503L	Domain Internship#	0	0	10	
	Total Credits				**20**

#Students have to register either 21CSP401L or 21CSP402L and 21CSP403L both in eighth semester and either 21CSP501L or 21CSP502L and 21CSP503L in tenth semester

53. Integrated M.Tech.in Electronics and Communication Engineering with Specialization in Microelectronics System Design

53. (a) Mission of the Department

Mission Stmt - 1	*Build an educational process that is well suited to local needs as well as satisfies the national and international accreditation requirements.*
Mission Stmt - 2	*Attract the qualified professionals and retain them by building an environment that fosters work freedom and empowerment.*
Mission Stmt - 3	*With the right talent pool, create knowledge and disseminate, get involved in collaborative research with reputed universities and produce competent graduands.*

53. (b) Program Educational Objectives (PEO)

PEO - 1	*Apply the acquired knowledge and skills in solving real-world engineering problems, considering national/global and societal issues such as health, environment, and safety.*
PEO - 2	*Design microelectronics circuits and systems, which are economically feasible and socially relevant for promoting sustainable semiconductor and electronics eco-system.*
PEO - 3	*Develop an attitude toward pursuing knowledge and advanced education for sustained career advancement to adapt to emerging fields.*
PEO - 4	*Demonstrate leadership qualities and effective communication skills to work in a team of enterprising people in a multidisciplinary and multicultural environment with strong adherence to professional ethics.*

53. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3
PEO - 1	*1*	*2*	*3*
PEO - 2	*3*	*3*	*3*
PEO - 3	*2*	*1*	*3*
PEO - 4	*3*	*3*	*3*

53. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	*3*	*3*				*3*	*3*	*2*					*3*	*3*	
PEO – 2			*3*	*3*	*3*	*3*			*2*		*3*		*3*		
PEO – 3				*3*	*3*		*2*	*2*		*2*		*3*			*3*
PEO – 4								*3*	*3*	*3*	*3*				*3*

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	***Problem-Solving Skills:*** *Contribute to the Indian/global semiconductor and electronics ecosystem with innovative approaches to design, manufacture, and test integrated systems.*
PSO - 2	***Professional Skills****: Apply knowledge of complete design flow from specification to silicon in areas of both digital and analog microelectronic system design.*
PSO - 3	***Successful Career and Entrepreneurship:*** *Promote inter-disciplinary work in semiconductor physics, computer science, and electrical engineering to create exciting new systems with greatly increased functionalities.*

53. (e) Program Structure: Integrated M.Tech. in Electronics and Communication Engineering with Specialization in Microelectronics System Design

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21MAB302T	Discrete Mathematics	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				32

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21CSS201T	Computer Organization and Architecture	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
21GNS502J	Research Methodology	2	1	2	4
	Total Credits				**25**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECC101J	Electronic System and PCB Design	2	0	2	3
21ECC201T	Solid State Devices	3	0	0	3
21ECC202T	Analog and Linear Electronic Circuits	3	0	0	3
21ECC203T	Digital logic Design	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC205T	Electromagnetic Theory and Interference	3	0	0	3
21ECC211L	Devices and Digital IC Lab	0	0	4	2
21ECC222L	Analog and Linear Electronic Circuits Lab	0	0	4	2
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques	3	1	0	4
21ECC302T	Analog and Digital Communication	3	0	0	3
21ECC303T	VLSI Design and Technology	3	0	0	3
21ECC304T	Microwave and Optical Communication	3	0	0	3
21ECC311L	VLSI Design Lab	0	0	4	2
21ECC322L	Communication Lab	0	0	4	2
21ECC401T	Wireless Communication and Antenna Systems	3	0	0	3
21ECC402P	Computer Communication and Network Security	2	1	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
21ECC561P	Analog and Mixed Signal IC Design	3	1	0	4
21ECC562J	Chip design verification	3	0	2	4
	Total Credits				**54**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21ECP302L	Project	0	0	6	3
21ECP303T	MOOC	3	0	0	
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship#	0	0	10	
21ECP501L	Specialization Project	0	0	40	20
21ECP502L	Specialization Project	0	0	30	
21ECP503L	Domain Internship	0	0	10	
	Total Credits				**39**

6. Open Elective Courses (O) (Any 4 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECO101T	Short-Range Wireless Communication	3	0	0	3
21ECO102J	Electronic Circuits and Systems	2	0	2	3
21ECO103T	Modern Wireless Communication Systems	3	0	0	3
21ECO104J	PCB Design and Manufacturing	2	0	2	3
21ECO105T	Fiber Optics and Optoelectronics	3	0	0	3
21ECO106J	Embedded System Design using Arduino	2	0	2	3
21ECO107J	Embedded System Design using Raspberry Pi	2	0	2	3
21ECO108J	3D Printing Hardware and Software	2	0	2	3
	Total Learning Credits				**12**

7. Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				3

8. Professional Elective Courses (E) (Any 11 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECE260T	Industrial Electronics	3	0	0	3
21ECE261T	Measurements and Instrumentation	3	0	0	3
21ECE262T	Low Power Sensors Technology	3	0	0	3
21ECE263T	Micro, Nano Electro Mechanical devices	3	0	0	3
21ECE204T	Optoelectronics	3	0	0	3
21ECE205T	Flexible Electronics	3	0	0	3
21ECE301T	Nanoscale Electronic Devices	3	0	0	3
21ECE361T	Consumer Electronics and Trouble shooting	3	0	0	3
21ECE362T	Quality and Reliability Engineering	3	0	0	3
21ECE363T	Electronic Packaging	3	0	0	3

8. Professional Elective Courses (E) (Any 11 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21ECE560T	Testing and Diagnosis of VLSI Circuits	2	1	0	3
21ECE561J	Hardware design for Machine learning	2	0	2	3
21ECE562J	Modern ASIC Design	2	0	2	3
21ECE563T	Low power CMOS VLSI design	2	1	0	3
21ECE564J	Reconfigurable Systems	2	0	2	3
21ECE566J	Process and Device Modeling using CAD	2	0	2	3
21ECE567J	Quantum Technologies and Application	2	0	2	3

8. Professional Elective Courses (E) (Any 11 courses)					
Course Code	Course Title	Hours/ Week			C
		L	T	P	
21ECE364T	Digital Signal Processors Architectures and Applications	3	0	0	3
21ECE366T	Digital Integrated circuits and Synthesis	3	0	0	3
21ECE402T	Semiconductor Device Modeling	3	0	0	3
21ECE460T	Emerging Processor based System Design	3	0	0	3
21ECE461T	Semiconductor Memory Design	3	0	0	3
21ECE463T	Scripting Language for Electronic Design Automation	3	0	0	3
21ECE464T	Statistical Analysis and Optimization for VLSI	3	0	0	3
21ECE404T	Terahertz Devices and Applications	3	0	0	3
21ECE468T	System and Network on Chip	3	0	0	3

8. Professional Elective Courses (E) (Any 11 courses)					
Course Code	Course Title	Hours/ Week			C
		L	T	P	
21ECE568J	RF System Design	2	0	2	3
21ECE569T	VLSI Signal processing Techniques	2	1	0	3
21ECE570T	CAD for High Speed Chip-Package-Systems	2	1	0	3
21ECE571T	Hardware Acceleration and Optimization	2	1	0	3
21ECE572T	Hardware and Software Codesign with FPGAs	3	0	0	3
21ECE573J	Board Design Practice Part-I: Electronics System Design and Analysis	2	0	2	3
21ECE574J	Board Design Practice Part-II: PCB Design, Fabrication & Testing	2	0	2	3
	Total Credits				**33**

53. (f) Programme Articulation: Integrated M.Tech. in Electronics and Communication Engineering with Specialization in Microelectronics System Design

		Program Outcome (PO)												PSO		
Course Code	Course Name	*Engineering Knowledge*	*Problem Analysis*	*Design/development of solutions*	*Conduct investigations of complex problems*	*Modern Tool Usage*	*The engineer and society*	*Environment & Sustainability*	*Ethics*	*Individual & Team Work*	*Communication*	*Project Mgt. & Finance*	*Life Long Learning*	*PSO-1*	*PSO-2*	*PSO-3*
21ECC101J	Electronic System and PCB Design	3	2.5	2.67	-	3						2		2.8	2.5	
21ECC201T	Solid State Devices	3	2										1	1		
21ECC202T	Analog and Linear Electronic Circuits	2	2	3												3
21ECC203T	Digital logic Design	3	2	2		3								3		
21ECC204T	Signal Processing	2	2.2	3	3											2.2
21ECC205T	Electromagnetic Theory and Interference	2.4	2.6													
21ECC211L	Devices and Digital IC Lab	3	2			1								1		
21ECC222L	Analog and Linear Electronic Circuits Lab	2		2		3										
21ECC301P	Microprocessor, Microcontroller and Interfacing Techniques		3	3		3								2.67		
21ECC302T	Analog and Digital Communication	3	2.5	3		3							2	2.5	3	2.5
21ECC303T	VLSI Design and Technology		2.4	2.25										2	2	
21ECC304T	Microwave and Optical Communication	2.8	2	2	3									3	2	
21ECC311L	VLSI Design Lab	3	3			1								1		
21ECC322L	Communication Lab	2		2.5	3						3			3	2	
21ECC401T	Wireless Communication and Antenna Systems	3	2.3										2			3
21ECC402P	Computer Communication and Network Security	2.67	3	2												3
21ECC561P	Analog and Mixed Signal IC Design	2.2	3	3	1	3								2	1	
21ECC562J	Chip design verification	3	2.2	1.5		2								3	3	
21ECE260T	Industrial Electronics	2.75	2	2	3									1.66	2	
21ECE261T	Measurements and Instrumentation	3	2	2	2								2	1		
21ECE262T	Low Power Sensors Technology	2.2		3										2.66		
21ECE263T	Micro, Nano Electro Mechanical devices	2.4	2	2.75										3	2.67	3
21ECE204T	Optoelectronics	2.8	2.67	2.67	2.67											2.4
21ECE205T	Flexible Electronics	3	3										3			
21ECE301T	Nanoscale Electronic Devices	3	2.5			2.5								2		2.5
21ECE361T	Consumer Electronics and Trouble shooting	2.75	2	2	3									1.66	2.5	
21ECE362T	Quality and Reliability Engineering	3	1.5	2												2
21ECE363T	Electronic Packaging	3	2										2.33	2.25		
21ECE364T	Digital Signal Processors Architectures and Applications	2.2		3										2	2	
21ECE366T	Digital Integrated circuits and Synthesis	3	2	3	1	2								1.5	2.67	
21ECE402T	Semiconductor Device Modeling	3	2	3										1	2	
21ECE460T	Emerging Processor based System Design		2	2.4	1.66	1.5									2	2
21ECE461T	Semiconductor Memory Design	2.8	2											1.8		
21ECE463T	Scripting Language for Electronic Design Automation	-	2	3	2.66	2										2
21ECE464T	Statistical Analysis and Optimization for VLSI	1	2	3	2.5											1.8
21ECE404T	Terahertz Devices and Applications	3	2.75	2	2			2						2.3	2	3
21ECE468T	System and Network on Chip															
21ECE560T	Testing and Diagnosis of VLSI Circuits	1.8	2.4	3										3		
21ECE561J	Hardware design for Machine learning		2.4	2.25										2	2	
21ECE562J	Modern ASIC Design	3	2.5	3	2	2				2				3		2
21ECE563T	Low power CMOS VLSI design	3	3											2		
21ECE564J	Reconfigurable Systems		2	2.4	2	2	2							3		2
21ECE566J	Process and Device Modeling using CAD	3				3										3
21ECE567J	Quantum Technologies and Applications	3	2	3	2.5	2							1	1.4		
21ECE568J	RF System Design	2.67	2.67	3	3	2.33								3	2	
21ECE569T	VLSI Signal processing Techniques	2.8	2		2										3	
21ECE570T	CAD for High-Speed Chip-Package-Systems	2	2	1.75	2								2	1.25		
21ECE571T	Hardware Acceleration and Optimization	1.5	2.4	2.67	2											1.5
21ECE572T	Hardware and Software Co-Design for FPGAs	3		2									2	2		
21ECE573J	Board Design Practice Part-I: Electronics System Design and Analysis	3		2		3									2	
21ECE574J	Board Design Practice Part-II: PCB Design, Fabrication & Testing	1.8	2	2.5		3								1	2	
	Programme Average	2.63	2.29	2.51	2.30	2.37	2	2		2	3	2	1.93	2.10	2.22	2.41

53. (g) Implementation Plan: Integrated M.Tech. in Electronics and Communication Engineering with Specialization in Microelectronics System Design

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21ECC101J	Electronic System and PCB Design	2	0	2	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				25

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21PDH201T	Social Engineering	2	0	0	2
21CSS201T	Computer Organization and Architecture	3	1	0	4
21ECC201T	Solid State Devices	3	0	0	3
21ECC203T	Digital logic Design	3	0	0	3
21ECC205T	Electromagnetic Theory and Interference	3	0	0	3
21ECC211L	Devices and Digital IC Lab	0	0	4	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB203T	Probability and Stochastic Process	3	1	0	4
21ECC202T	Analog and Linear Electronic Circuits	3	0	0	3
21ECC204T	Signal Processing	3	0	0	3
21ECC222L	Analog and Linear Electronic Circuits Lab	0	0	4	2
21CSC206T	Artificial Intelligence	2	1	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
E	Professional Elective-I				3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**21**

Semester - IX

Code	Course Title	Hours/ Week L	T	P	C
E	Professional Elective - VII				3
E	Professional Elective - VIII				3
E	Professional Elective – IX				3
E	Professional Elective – X				3
E	Professional Elective – XI				3
	Open Elective – 4				3
	Total Credits				18
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				**20**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21ECC302T	Analog and Digital Communication	3	0	0	3
21ECC304T	Microwave and Optical Communication	3	0	0	3
21ECC322L	Communication Lab	0	0	4	2
E	Professional Elective – III				3
E	Professional Elective – IV				3
O	Open Elective – II				3
21ECP302L	Project	0	0	6	3
21ECP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**22**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
21ECC401T	Wireless Communication and Antenna Systems	3	0	0	3
21ECC402P	Computer Communication and Network Security	2	1	0	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
O	Open Elective –III				3
	Total Credits				**18**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21ECC561P	Analog and Mixed Signal IC Design	3	1	0	4
21ECC562J	Chip Design Verification	3	0	2	4
21GNS502J	Research Methodology	2	1	2	4
21ECP401L	Major Project	0	0	30	15
21ECP402L	Major Project	0	0	20	
21ECP403L	Internship	0	0	10	
	Total Credits				**27**

Semester - X

Code	Course Title	Hours/ Week L	T	P	C
21ECP501L	Specialization Project	0	0	40	20
21ECP502L	Specialization Project	0	0	30	
21ECP503L	Domain Internship	0	0	10	
	Total Credits				**20**

54. Integrated M.Tech.in Materials Science & Engineering

54. (a) Mission of the Department

Mission Stmt - *1*	*Actively contribute for the development of materials science, engineering and technology through world class infrastructure, teaching & research*
Mission Stmtt -*2*	*Establish collaborative research with the institutions of national and international repute*
Mission Stmt - *3*	*Encourage industry academia interactions to translate scientific findings into technological development to meet the societal needs*
Mission Stmt - *4*	*organize and actively participate in workshops, conferences and seminars on advancements in materials science and engineering.*
Mission Stmt - *5*	*Focus on developing skills of students to enhance the employability in various organizations*

54. (b) Program Educational Objectives (PEO)

PEO - 1	*Provide understanding of structures and properties, i.e., physical, chemical and biological properties of materials*
PEO - 2	*Develop skills on the synthesis of various materials ranging from glass, ceramics to metals to polymers to different composites*
PEO - 3	*Familiarize the graduates with the advanced micro and nano-scale characterization techniques for optical, electrical, mechanical characterization and also develop a keen knowledge about various computational tools for design, synthesis and characterization of materials*
PEO - 4	*Enable graduates with professional, scientific research, and computational skills for employment in industries, R & D centres and higher education*
PEO - 5	*Prepare the graduates to take individual and team work responsibilities in a multidisciplinary environment*

54. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	*Mission Stmt. - 2*	*Mission Stmt. - 3*	*Mission Stmt. - 4*	*Mission Stmt. - 5*
PEO - 1	*3*	*2*	*1*	*3*	*1*
PEO - 2	*3*	*3*	*2*	*3*	*2*
PEO - 3	*3*	*3*	*2*	*3*	*2*
PEO - 4	*3*	*2*	*3*	*2*	*3*
PEO - 5	*2*	*3*	*3*	*1*	*2*

54. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												PSO		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO – 1	3	3	3	3	3	1	2	2	3	3	3	3	3	3	3
PEO – 2	3	3	3	3	3	1	2	3	3	3	3	3	3	3	3
PEO – 3	3	3	3	3	3	2	2	3	3	3	2	3	3	3	3
PEO – 4	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3
PEO - 5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Ability to understand the properties and behaviour of materials across the size and dimension.*
PSO - 2	*Ability to apply, Analyse and evaluate the learnt principles*
PSO - 3	*Ability to employ the learnt skills to benefit of self, science and society.*

54. (e) Program Structure: Integrated M.Tech. in Materials Science & Engineering

1. Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
	Total Credits				**13**

2.Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical methods	3	1	0	4
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21BTB103T	Biology	2	0	0	2
	Total Credits				**32**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21CSS101J	Programming for Problem Solving	3	0	2	4
21NTS211T	Computational methods for materials science	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
21GNS502J	Research Methodology	2	1	2	4
	Total Credits				**24**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21NTC111T	Physics of Materials	3	0	0	3
21NTC211J	Electric, Electronic and Dielectric properties of materials	3	0	2	4
21NTC212T	Engineering Thermodynamics	3	0	0	3
21NTC213T	Kinetic, Diffusion and Mass Transfer	3	0	0	3
21CSC206T	Artificial Intelligence	2	1	0	3
21NTC214J	Optical and Photonic Properties of Materials	3	0	2	4
21NTC215J	Physical Metallurgy	3	0	2	4
21NTC216T	Polymer Materials and Composites	3	0	0	3
21NTC311L	Materials characterization Lab	0	0	6	3
21NTC312T	Mechanical Behavior of Materials	3	0	0	3
21NTC313T	Electrochemistry and Corrosion	3	1	0	4
21NTC315J	Magnetism and Magnetic Materials	2	0	2	3
21NTC316T	Glass and Ceramics materials	3	0	0	3
21NTC411L	Nanoindentation and Nanotribology	0	0	6	3
21NTC412T	Soft Matter	3	0	0	3
21NTC413T	Alloys: Ferrous and Non-ferrous	3	1	0	4
21NTC414T	Engineering Biomaterials	3	1	0	4
	Total Credits				**57**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21NTP302L	Project	0	0	6	3
21NTP303T	MOOC	3	0	0	
21NTP401L	Major Project	0	0	30	
21NTP402L	Major Project	0	0	20	15
21NTP403L	Internship#	0	0	10	
21NTP501L	Specialization Project	0	0	40	
21NTP502L	Specialization Project	0	0	30	20
21NTP503L	Domain Internship	0	0	10	
	Total Credits				**39**

7. Mandatory Courses (M)

Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				3

6. Open Elective Courses (O) (Any 4 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21NTO314T	Energy Materials	3	0	0	3
21NTO315T	Nano-composites	3	0	0	3
21NTO407T	Quantum Computing	3	0	0	3
21NTO511T	Materials Processing and Design	3	0	0	3
	Total Learning Credits				**12**

8. Professional Elective Courses (E) (Any 11 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21NTE221T	Concept of Nanoscience for Engineers	3	0	0	3
21NTE222T	Synthesis of Nanostructured Materials	3	0	0	3
21NTE321T	Advanced Drug Delivery Systems	3	0	0	3
21NTE322P	Vacuum and Thin Film Technology	2	1	0	3
21NTE323T	Additive Manufacturing techniques	3	0	0	3
21NTE324T	Physics of Electronic Materials	3	0	0	3
21NTE325T	Physics of Solid State Devices	3	0	0	3
21NTE326T	Molecular Spectroscopy and it's Applications	3	0	0	3
21NTE327T	Nanocatalysts	3	0	0	3
21NTE421T	Surface Engineering	3	0	0	3
21NTE422T	Microelectronics and VLSI	3	0	0	3
21NTE424T	Sensors and Transducers	3	0	0	3
21NTE425T	Micro and Nanofluids	3	0	0	3

8. Professional Elective Courses (E) (Any 11 courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21NTE520T	MEMS and NEMS	3	0	0	3
21NTE521T	2D Layered Materials	3	0	0	3
21NTE522T	Functional Materials	3	0	0	3
21NTE523T	Materials Under Extreme Temperature	3	0	0	3
21NTE524T	Micro and Nano Processing of Materials	3	0	0	3
21NTE525T	Smart Engineering Materials	3	0	0	3
21NTE526P	Nano Fabrications	2	1	0	3
21NTE527T	Biocomposites	3	0	0	3
21NTE528T	Atomistic Modeling	3	0	0	3
21NTE529T	Defects in Materials	3	0	0	3
	Total Credits				**33**

54 (f) Programme Articulation Matrix: Integrated M.Tech. in Materials Science & Engineering

Course Code	Course Name	Program Outcome (PO)												PSO		
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21NTC111T	Physics of Materials		3		3											
21NTC211J	Electric, Electronics and Dielectric Properties of Materials	3	2		2									3	3	3
21NTC212T	Engineering Thermodynamics	3	2.33											2.75	3	3
21NTC213T	Kinetic, Diffusion and Mass Transfer	2	2		3									3		3
21NTC214J	Optical and Photonic Properties of Materials	2.8	2.4											3	2	2.7
21NTC215J	Physical Metallurgy	2.5	2	3	2.67	2								3	2.33	3
21NTC216T	Polymer Materials	3	2													
21NTC311L	Materials characterization Lab	3	3											2.5	2.5	3
21NTC312T	Mechanical Behaviour of Materials	3	3											3	3	2.75
21NTC313T	Electrochemistry and Corrosion	3	2	2										3	3	3
21NTC315J	Magnetism and Magnetic Materials	2.83	2	3	2.33									2.5	2	3
21NTC316T	Glass and Ceramics materials	2.5	2	3	2.33									2.5		
21NTC411L	Nanoindentation and Nanotribology	3		3		3									3	
21NTC412T	Soft Matter	2.5	2.5	1										2	2	
21NTC413T	Alloys: Ferrous and Non-ferrous	3	3	3	3	2								3	2	
21NTC414T	Engineering Bio-materials	3	2	1.67										2	2	
21NTP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTP402L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTP501L	Specialization Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTP502L	Domine Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTE221T	Concept of Nanoscience for engineers	3	2	2		1								3		2
21NTE222T	Synthesis of Nanostructured Materials	2.8	2	2	2									2	2	
21NTE321T	Advanced Drug Delivery Systems	3	2	1.67										2	2	
21NTE322P	Vacuum and thin film technology	2.4	2	2.5										2	2	
21NTE323T	Additive Manufacturing techniques	3		3										2		
21NTE324T	Physics of Electronic Materials	2.6	2.4		2.4					2				2.75		
21NTE325T	Physics of solid state devices	2.8	2		3									2	2.5	
21NTE326T	Molecular spectroscopy and it's applications	3	2.5		3									2.5	2	3
21NTE327T	Nanocatalysts	2.5	2.33	1	3			3						2.5		
21NTE421T	Surface Engineering	3	2	2										2.67	2	3
21NTE422T	Microelectronics and VLSI	2.6			2.4									3		
21NTE424T	Sensors and transducers	3	2	2	2									3		
21NTE425T	Micro and Nanofluids	2.8	2.2											3	2.33	2.5
21NTE520T	MEMS and NEMS	3	3	3										3		
21NTE521T	2D layered materials	2.75	2	2.5	2.5									2	2	
21NTE522T	Functional Materials	2.75	2	2.5	2.5									2	2	
21NTE523T	Materials under extreme temperature	2.5	2.3	1	3									2	2	
21NTE524T	Micro and Nano processing of materials	3		3	3	3								3	2	
21NTE525T	Smart Engineering Materials	2.4	2		2.75									3		
21NTE526P	Nano fabrications	3	2	2										2.33	2.5	
21NTE527T	Biocomposites	3	2	1.67										2	2	
21NTE528T	Atomistic Modeling	3	3	3	3	2								3	2	
21NTE529T	Defects in Materials	2			3	2								3	2	
21NTO311T	Energy Materials	3	3			3								2	2.5	
21NTO312T	Nano-composites	2	2	3	2.33									3	3	
21NTO405T	Quantum Computing	3	3	3	3										3	3
21NTO511T	Materials processing and Design	3		3	3	2								3	2	
21NTS211T	Computational methods for materials science	3	3			3								3	2.67	3
Course Average		2.81	2.38	2.44	2.72	2.5	3	3	3	2.8	3	3	3	2.64	2.32	2.89

54. (g) Implementation Plan: Integrated M.Tech. in Materials Science & Engineering

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB102J	Semiconductor Physics and Computational methods	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				22

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21NTC111T	Physics of Materials	3	0	0	3
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude*	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				21

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21NTC211J	Electric, Electronic and Dielectric properties of materials	3	0	2	4
21NTC212T	Engineering Thermodynamics	3	0	0	3
21NTC213T	Kinetic, Diffusion and Mass Transfer	3	0	0	3
21PDH201T	Social Engineering	2	0	0	2
21NTS211T	Computational Methods for Materials Science	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				22

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical Methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21NTC214J	Optical and Photonic Properties of Materials	3	0	2	4
21NTC215J	Physical Metallurgy	3	0	2	4
21NTC216T	Polymer Materials and Composites	3	0	0	3
21DCS201P	Design Thinking and Methodology	1	0	4	3
E	Professional Elective – I				3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				24

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB203T	Probability and Stochastic Processes	3	1	0	4
21NTC311L	Materials Characterization Lab	0	0	6	3
21NTC312T	Mechanical Behavior of Materials	3	0	0	3
21NTC313T	Electrochemistry and Corrosion	3	1	0	4
E	Professional Elective – II	3	0	0	3
O	Open Elective – I	3	0	0	3
21GNP301L	Community Connect	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
	Total Credits				21

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21NTC315J	Magnetism and Magnetic Materials	2	0	2	3
21NTC316T	Glass and Ceramics materials	3	0	0	3
E	Professional Elective – III	3	0	0	3
E	Professional Elective – IV	3	0	0	3
O	Open Elective – II	3	0	0	3
21NTP302L	Project	0	0	6	3
21NTP303T	MOOC	3	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				20

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
E	Professional Elective - V	3	0	0	3
E	Professional Elective - VI	3	0	0	3
21NTC411L	Nanoindentation and Nanotribology	0	0	6	3
21NTC412T	Soft Matter	3	0	0	3
O	Open Elective – III	3	0	0	3
	Total Credits				18

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21NTC413T	Alloys: Ferrous and Non-ferrous	3	1	0	4
21NTC414T	Engineering Bio-materials	3	1	0	4
21GNS502J	Research Methodology	2	1	2	4
21NTP401L	Major Project	0	0	30	15
21NTP402L	Major Project	0	0	20	
21NTP403L	Internship	0	0	10	
	Total Credits				27

Semester - IX

Code	Course Title	Hours/ Week L	T	P	C
E	Professional Elective - VII				3
E	Professional Elective - VIII				3
E	Professional Elective – IX				3
E	Professional Elective – X				3
E	Professional Elective – XI				3
	Open Elective – IV				3
	Total Credits				18

Semester - X

Code	Course Title	Hours/ Week L	T	P	C
21NTP501L	Specialization Project	0	0	40	20
21NTP502L	Specialization Project	0	0	30	
21NTP503L	Domain Internship	0	0	10	
	Total Credits				20

#Students have to register either 21NTP401L or 21NTP402L and 21NTP403L both in eighth semester and either 21NTP501L or 21NTP502L and 21NTP503L in tenth semester

55. Integrated M.Tech.in Mechanical Engineering

55. (a) Mission of the Department

Mission Stmt - *1*	*To impart quality education to produce eminent mechanical engineers*
Mission Stmt*t* -2	*To establish Centers of Research Excellence to inculcate research acumen to faculty and students on the emerging thrust areas of mechanical engineering.*
Mission Stmt - *3*	*To inculcate progressive education and intricate facts through cognitive training programs to the faculty and students using state-of-art facilities.*

55. (b) Program Educational Objectives (PEO)

PEO - 1	*Practice mechanical engineering in different disciplines towards system design, realization, and manufacturing*
PEO - 2	*Enhance professional practice to meet the global standards with ethical and social responsibility.*
PEO - 3	*Manufacturing the components with state-of-art techniques to solve industrial, social and environmental problems*
PEO - 4	*Progress in multi-disciplinary skills and transcend in leadership qualities*

55. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	*Mission Stmt. - 2*	*Mission Stmt. - 3*
PEO - 1	*3*	*3*	*3*
PEO - 2	*2*	*2*	*3*
PEO - 3	*3*	*3*	*3*
PEO - 4	*2*	*3*	*3*

55. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)													
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2
PEO – 1	*3*	*3*	*2*	*3*	*3*								*3*	*3*
PEO – 2			*3*			*3*	*3*	*3*				*3*		
PEO – 3	*3*	*3*			*3*	*3*	*3*				*2*	*3*	*1*	*3*
PEO – 4		*3*	*3*	*2*	*3*				*3*	*3*	*3*	*3*	*3*	

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes

PSO - 1	*Apply contemporary technologies for sustainable development in mechanical engineering systems*
PSO - 2	*Ability to adopt the state-of-art technology in manufacturing*

55. (e) Program Structure: Integrated M.Tech. in Mechanical Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21PDH201T	Social Engineering	2	0	0	2
21GNH401T	Behavioral Psychology	2	1	0	3
Total Credits					**13**

Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
21CSS101J	Programming for Problem Solving	3	0	2	4
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21MES101T	Engineering Mechanics	3	1	0	4
21DCS201P	Design Thinking and Methodology	1	0	4	3
21CSS303T	Data Science	2	0	0	2
21GNS502J	Research Methodology	2	1	2	4
Total Credits					**25**

Professional Elective Courses (E) (Any 10 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
21MEE101T	Computer Aided Design- Computer Aided Manufacturing	3	0	0	3
21MEE102T	Composite Materials and Characterization	3	0	0	3
21MEE103T	Automation in Manufacturing Systems	3	0	0	3
21MEE104T	Energy Engineering and Management	3	0	0	3
21MEE105T	Solar Energy Systems	3	0	0	3
21MEE201T	Foundation skills in integrated product development	3	0	0	3
21MEE202T	Mechanical Vibrations	3	0	0	3
21MEE203T	Industrial Tribology	3	0	0	3
21MEE204T	Design for Manufacturing and Assembly	3	0	0	3
21MEE205T	Electric Vehicle Technology	3	0	0	3
21MEE206T	Biomechanics	3	0	0	3
21MEE207T	Operations Research	3	0	0	3
21MEE208T	Soft Computing Techniques and Applications in Mechanical Engineering	3	0	0	3
21MEE209T	Process Planning and Cost Estimation	3	0	0	3
21MEE210T	Mechatronics System Design	3	0	0	3
21MEE211T	Soft Robotics	3	0	0	3
21MEE212T	Heating, Ventilation and Air Conditioning Systems	3	0	0	3
21MEE213T	Emerging Technologies in Automotive Systems	3	0	0	3
21MEE214T	Gas Dynamics and Space Propulsion	3	0	0	3
21MEE215T	Computational Fluid Dynamics: Theory with Applications	3	0	0	3
21MEE216T	Modeling and Analysis of Thermal Systems	3	0	0	3
21MEE217J	Microelectronics Thermal Management.	2	0	2	3
21MEE218T	Aerodynamics of Electric and Sports Vehicles	3	0	0	3
21MEE219T	Green Energy Systems	3	0	0	3
21MEE301T	Optimization in Engineering Design	3	0	0	3
21MEE302T	Design of transmission Systems	3	0	0	3
21MEE303T	Micro and Nano Machining	3	0	0	3
21MEE304T	Machine Vision	3	0	0	3
21MEE305T	Quality Management Systems	3	0	0	3
21MEE306T	Energy Conversion Systems	3	0	0	3
21MEE307T	Sustainable and Renewable Energy Systems	3	0	0	3
21MEE308T	Sustainable Waste Management	3	0	0	3
21MEE501T	Smart Manufacturing	3	0	0	3
21MEE502T	Industrial Automation	3	0	0	3
21MEE503T	Embedded System Design for Manufacturing	3	0	0	3
21MEE504T	AI and Expert Systems for Manufacturing	3	0	0	3
21MEE505T	Machine Learning for Manufacturing	3	0	0	3
21MEE506T	Computer Aided Metrology	3	0	0	3

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21BTB103T	Biology	2	0	0	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MAB202T	Numerical Methods	3	1	0	4
21MAB301T	Probability and Statistics	3	1	0	4
Total Credits					**32**

Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
21MEC201T	Engineering Thermodynamics	3	0	0	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC204T	Manufacturing Processes and Metrology	3	0	0	3
21MEC201L	Manufacturing Processes and Metrology Laboratory	0	0	2	1
21MEC202L	Material Testing Laboratory	0	0	2	1
21CSC206T	Artificial Intelligence	3	0	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
21MEC203L	Machine Dynamics Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
21MEC205L	Mechanical Modeling and Assembly	0	0	4	2
21MEC301T	Thermal Systems Engineering	3	1	0	4
21MEC301P	Design of Mechanical Systems	3	0	0	3
21MEC302T	Sensors and Control Systems	3	0	0	3
21MEC301L	Thermal Power Systems Laboratory	0	0	2	1
21MEC302L	Automation and Control Systems Laboratory	0	0	2	1
21MEC301J	Heat and Mass Transfer	3	0	2	4
21MEC302J	Finite Element Methods	3	0	2	4
21MEC303T	Industry 4.0	3	0	0	3
21MEC501J	Cyber Physical Systems & Industrial Internet of Things	3	0	2	4
21MEC502J	Additive Manufacturing	2	1	2	4
Total Credits					**59**

Open Elective Courses (O)
Any 4 Course

Course Code	Course Title	Hours/ Week L	T	P	C
21MEO101T	Fundamentals of Composite Materials	3	0	0	3
21MEO102T	Reverse Engineering and Rapid Prototyping	3	0	0	3
21MEO103T	Fundamentals of Biomechanics	3	0	0	3
21MEO104T	TQM and Reliability Engineering	3	0	0	3
21MEO105T	Occupational Safety and Disaster Management	3	0	0	3
21MEO106T	Introduction to Robotics	3	0	0	3
21MEO107T	Fundamentals of Nano Engineering	3	0	0	3
21MEO108T	Computer Numerical Control Programming and Operation	3	0	0	3
21MEO109T	Resource Management Techniques	3	0	0	3
21MEO110T	Energy Systems for Sustainable Buildings	3	0	0	3
21MEO111T	Environmental Pollution and Abetment	3	0	0	3
21MEO112T	Renewable Energy Sources and Application	3	0	0	3
21MEO113J	Electronics Thermal Management	2	0	2	3
21MEO114T	Solar Energy for Societal Applications	3	0	0	3
21MEO115T	Introduction to Drones	3	0	0	3
Total Credits					**12**

21MEE507T	Sensors for Intelligent Manufacturing and Condition Monitoring	3	0	0	3
21MEE508T	Smart Operations Management	3	0	0	3
21MEE509T	Micro Fabrication and Machining Techniques	3	0	0	3
21MEE510T	Augmented Reality and Virtual Reality	3	0	0	3
21MEE511T	Robotics and Autonomous Systems	3	0	0	3
Total Credits					**30**

Mandatory Courses (M)					
Code	Course Title	L	T	P	C
21PDM101L	Professional Skills and Practices	0	0	2	0
21PDM102L	General Aptitude	0	0	2	0
21PDM201L	Verbal Reasoning	0	0	2	0
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21PDM302L	Employability Skills and Practices	0	0	2	0
21CYM101T	Environmental Science	1	0	0	0
21LEM101T	Constitution of India	1	0	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0	0
21LEM201T	Professional Ethics	1	0	0	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
21LEM301T	Indian Art Form	1	0	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
Total Credits					**3**

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)

Course Code	Course Title	Hours/ Week L	T	P	C
21GNP301L	Community Connect	0	0	2	1
21MEP302L	Project	0	0	6	3
21MEP303T	MOOC	3	0	0	
21MEP401L	Major Project	0	0	30	15
21MEP402L	Major Project	0	0	20	
21MEP403L	Internship#	0	0	10	
21MEP501L	Specialization Project	0	0	40	20
21MEP502L	Specialization Project	0	0	30	
21MEP503L	Domain Internship	0	0	10	
Total Credits					**39**

55. (f) Implementation Plan: Integrated M.Tech. in Mechanical Engineering

Semester - I

Code	Course Title	Hours/ Week L	T	P	C
21LEH101T	Communicative English	2	1	0	3
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21MES102L	Engineering Graphics and Design	0	0	4	2
21EES101T	Electrical and Electronics Engineering	3	1	0	4
21CYM101T	Environmental Science	1	0	0	0
21PDM101L	Professional Skills and Practices	0	0	2	0
21LEM101T	Constitution of India	1	0	0	0
	Total Credits				**18**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering	1	0	2	2
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21MES101T	Engineering Mechanics	3	1	0	4
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB103T	Biology	2	0	0	2
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2
21PDM102L	General Aptitude	0	0	2	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0
21GNM102L	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
	Total Credits				**26**

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21MEC201T	Engineering Thermodynamics	3	0	0	3
21MEC202T	Mechanics of Solids	3	1	0	4
21MEC203T	Engineering Materials and Metallurgy	3	0	0	3
21MEC204T	Manufacturing Processes and Metrology	3	0	0	3
21MEC201L	Manufacturing Processes and Metrology Laboratory	0	0	2	1
21MEC202L	Material Testing Laboratory	0	0	2	1
21PDH201T	Social Engineering	2	0	0	2
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
	Total Credits				**24**

Semester – IV

Code	Course Title	Hours/ Week L	T	P	C
21MAB202T	Numerical methods	3	1	0	4
21CSC206T	Artificial Intelligence	2	1	0	3
21MEC205T	Fluid Mechanics and Machinery	3	0	0	3
21MEC206T	Kinematics and Dynamics of Machines	3	0	0	3
	Professional Elective – I				3
21MEC203L	Machine Dynamics Laboratory	0	0	2	1
21MEC204L	Fluid Dynamics Laboratory	0	0	2	1
21MEC205L	Mechanical Modeling and assembly	0	0	4	2
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
	Total Credits				**23**

Semester – V

Code	Course Title	Hours/ Week L	T	P	C
21MAB301T	Probability and Statistics	3	1	0	4
21MEC301T	Thermal Systems Engineering	3	1	0	4
21MEC301P	Design of Mechanical Systems	3	0	0	3
21MEC302T	Sensors and Control Systems	3	0	0	3
	Professional Elective – II				3
	Open Elective – I				3
21MEC301L	Thermal Power Systems Laboratory	0	0	2	1
21MEC302L	Automation and Control Systems Laboratory	0	0	2	1
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
	Total Credits				**23**

Semester – VI

Code	Course Title	Hours/ Week L	T	P	C
21CSS303T	Data Science	2	0	0	2
21MEC301J	Heat and Mass Transfer	3	0	2	4
21MEC302J	Finite Element Methods	3	0	2	4
21MEC303T	Industry 4.0	3	0	0	3
	Professional Elective – III				3
21MEP302L	Project	0	0	6	3
21MEP303T	MOOC	3	0	0	
	Open Elective – II				3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
	Total Credits				**22**

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
21GNH401T	Behavioral Psychology	2	1	0	3
	Professional Elective – IV				3
	Professional Elective – V				3
O	Open Elective – III				3
	Total Credits				**12**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
21MEC501J	Cyber Physical Systems & Industrial Internet of Things	3	0	2	4
	Professional Elective - VI				3
21GNS502J	Research Methodology	2	1	2	4
21MEP401L	Major Project	0	0	30	15
21MEP402L	Major Project	0	0	20	
21MEP403L	Internship	0	0	10	
	Total Credits				**26**

Semester - IX					
Code	Course Title	Hours/ Week			C
		L	T	P	
21MEC502J	*Additive Manufacturing*	*2*	*1*	*2*	*4*
	Professional Elective - VII				*3*
	Professional Elective – VIII				*3*
	Professional Elective – IX				*3*
	Professional Elective – X				*3*
	Open Elective – IV				*3*
Total Credits					**19**

Semester - X					
Code	Course Title	Hours/ Week			C
		L	T	P	
21MEP501L	*Specialization Project*	*0*	*0*	*40*	*20*
21MEP502L	*Specialization Project*	*0*	*0*	*30*	
21MEP503L	*Domain Internship*	*0*	*0*	*10*	
Total Credits					**20**

#Students have to register either 21MEP401L or 21MEP402L and 21MEP403L both in eighth semester and either 21MEP501L or 21MEP502L and 21MEP503L in tenth semester

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Deemed to be University u/s 3 of UGC Act, 1956)

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