20. B.Tech. in Computer Science and Business Systems

(In Collaboration with TCS)

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 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 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*

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	*H*	*H*	*H*	*H*	*H*
PEO - 2	*L*	*H*	*H*	*H*	*H*
PEO - 3	*H*	*H*	*M*	*L*	*H*
PEO - 4	*M*	*H*	*M*	*H*	*H*
PEO - 5	*H*	*H*	*M*	*M*	*H*

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

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

	Program Learning Outcomes (PLO)														
	Graduate Attributes (GA)												Program Specific Outcomes (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
PEO - 1	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*
PEO - 2	*H*	*H*	*H*	*H*	*H*	*L*	*L*	*H*	*L*	*H*	*L*	*H*	*H*	*H*	*H*
PEO - 3	*H*	*H*	*H*	*H*	*H*	*L*	*L*	*L*	*L*	*L*	*H*	*H*	*H*	*H*	*H*
PEO - 4	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*
PEO - 5	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*

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

PSO – Program Specific Outcomes (PSO)

PSO - 1	*Ability to understand client requirements and suggest solutions*
PSO - 2	*Ability to create innovative Software for business and service orientations*
PSO - 3	*Ability to utilize Logic & Reasoning Skills*

20. (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
18MBH161T	Business Communication & Value Science - I	2	0	0	2
18MBH162T	Business Communication & Value Science - II	2	0	0	2
18MBH163T	Fundamentals of Economics	2	0	0	2
18MBH261T	Introduction to Innovation, IP Management and Entrepreneurship	3	0	0	3
18MBH262J	Design Thinking	2	0	2	3
18MBH361T	Business Communication & Value Science – III	2	0	0	2
18MBH362T	Business Communication & Value Science - IV	2	0	0	2
18MBH363T	Fundamentals of Management	2	0	0	2
18MBH364T	Business Strategy	2	0	0	2
18MBH365T	Financial and Cost Accounting	2	0	0	2
18MBH461T	Financial Management	2	0	0	2
18MBH462T	Human Resource Management	2	0	0	2
18MBH463J	Services Science and Service Operational Management	3	0	2	4
18MBH464J	IT Project Management	3	0	2	4
18MBH465T	Marketing Research and Marketing Management	2	0	0	2
	Total Learning Credits				**36**

2. Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
18PYB161J	Fundamentals of Physics	2	0	2	3
18MAB161T	Discrete Mathematics	3	1	0	4
18MAB162T	Probability and Statistics	3	0	0	3
18MAB163T	Linear Algebra	3	1	0	4
18MAB164J	Statistical Modeling	3	0	2	4
18MAB261J	Operations Research	2	0	2	3
	Total Learning Credits				**21**

3. Engineering Science Courses (S)

Course Code	Course Title	Hours/ Week L	T	P	C
18EES161J	Principles of Electrical Engineering	2	0	2	3
18EES162J	Principles of Electronics	2	0	2	3
	Total Learning Credits				**6**

4. Professional Core Courses (C)

Course Code	Course Title	Hours/ Week L	T	P	C
18CSC161J	Fundamentals of Computer Science	3	0	4	5
18CSC162J	Data Structures and Algorithms	3	0	4	5
18CSC261T	Formal Language and Automata Theory	3	0	0	3
18CSC262J	Computer Organization and Architecture	3	0	2	4
18CSC263J	Object Oriented Programming	2	0	4	4
18CSC264J	Computational Statistics	3	0	2	4
18CSC265J	Software Engineering	3	0	2	4
18CSC266J	Operating Systems	3	0	2	4
18CSC267J	Database Management Systems	3	0	2	4
18CSC268J	Software Design with UML	2	0	2	3
18CSC361J	Design and Analysis of Algorithms	3	0	2	4
18CSC362J	Compiler Design	3	0	2	4
18CSC363J	Computer Networks	3	0	2	4
18CSC364J	Information Security	3	0	2	4
18CSC365J	Artificial Intelligence	3	0	2	4
18CSC461J	Usability Design of Software Applications	2	0	2	3
18CSC462J	IT Workshop using Scilab	1	0	2	2
	Total Learning Credits				**65**

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

Course Code	Course Title	Hours/ Week L	T	P	C
	Professional Elective - 1				
18CSE361J	Conversational Systems	2	0	2	3
18CSE362J	Cloud, Microservices& Application	2	0	2	3
18CSE363J	Machine Learning	2	0	2	3
	Professional Elective - 2				
18CSE364J	Robotics and Embedded Systems	2	0	2	3
18CSE365J	Modern Web Applications	2	0	2	3
18CSE366J	Data Mining and Analytics	2	0	2	3
	Professional Elective - 3				
18CSE467J	Enterprise Systems	2	0	2	3
18CSE468J	Advance Finance	2	0	2	3
18CSE469J	Image Processing and Pattern Recognition	2	0	2	3
	Professional Elective - 4				
18CSE461J	Cognitive Science & Analytics	2	0	2	3
18CSE462J	Introduction to IoT	2	0	2	3
18CSE463J	Cryptology	2	0	2	3
	Professional Elective - 5				
18CSE464J	Quantum Computation & Quantum Information	2	0	2	3
18CSE465J	Advanced Social, Text and Media Analytics	2	0	2	3
18CSE466J	Mobile Computing	2	0	2	3
	Total Learning Credits				**15**

Open Elective Courses (O)
(Any 1 Courses))

Course Code	Course Title	Hours/ Week L	T	P	C
18CSO161T	Behavioral Economics	2	1	0	3
18CSO162T	Computational Finance & Modeling	2	1	0	3
18CSO163T	Psychology	2	1	0	3
	Total Learning Credits				**3**

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

Course Code	Course Title	Hours/ Week L	T	P	C
18CSP361L	Mini Project - 1	0	0	2	1
18CSP461L	Project Evaluation - 1	0	0	6	3
18CSP462L	Project Evaluation - 2	0	0	20	10
	Total Learning Credits				**14**

8. Mandatory Courses (M)

Code	Course Title	L	T	P	C
18PDM101L	Professional Skills and Practices	0	0	2	0
18PDM201L	Competencies in Social Skills	0	0	2	0
18PDM202L	Critical and Creative Thinking Skills	0	0	2	0
18PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
18LEM101T	Constitution of India	1	0	0	0
18LEM102J	Value Education	1	0	1	0
18LEM10XJ	Chinese / French / German / Japanese/ Korean	2	0	2	0

8. Mandatory Courses (M)

Code	Course Title	L	T	P	C
18GNM101L	Physical and Mental Health using Yoga	0	0	2	0
18GNM102L	NSS	0	0	2	0
18GNM103L	NCC				
18GNM104L	NSO				
18LEM109T	Indian Traditional Knowledge	1	0	0	0
18LEM110L	Indian Art Form	0	0	2	0
18CYM101T	Environmental Science	1	0	0	0

20. (f) Program Articulation: B.Tech. in Computer Science and Business Systems

Course Code	Course Name	Program Learning Outcomes (PLO)													
		Graduate Attributes											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
18PYB161J	*Fundamentals of Physics*	*H*	*H*	*H*	*H*	*H*	*M*	*L*	*M*	*H*	*M*	*M*	*H*	*H*	*H*	*M*
18MAB161T	*Discrete Mathematics*	*H*	*H*	*H*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*L*	*H*	*H*	*H*	*H*
18MAB162T	*Probability and Statistics*	*H*	*H*	*H*	*H*	*M*	*M*	*L*	*L*	*M*	*M*	*L*	*H*	*H*	*H*	*H*
18MAB163T	*Linear Algebra*	*M*	*H*	*M*	*H*	*M*	*M*	*L*	*M*	*M*	*M*	*M*	*H*	*L*	*H*	*H*
18MAB164J	*Statistical Modeling*	*M*	*H*	*H*	*H*	*H*	*M*	*L*	*M*	*M*	*M*	*M*	*H*	*L*	*H*	*H*
18MAB261J	*Operations Research*	*H*	*H*	*H*	*M*	*H*	*M*	*L*	*M*	*H*	*M*	*M*	*H*	*L*	*H*	*H*
18EES161J	*Principles of Electrical Engineering*	*H*	*H*	*H*	*H*	*H*	*L*	*L*	*M*	*H*	*H*	*L*	*H*	*H*	*H*	*H*
18EES162J	*Principles of Electronics*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*
18MBH161T	*Business Communication & Value Science – I*	*H*	*H*	*M*	*M*	*H*	*L*	*L*	*M*	*H*	*M*	*L*	*H*	*L*	*H*	*H*
18MBH162T	*Business Communication & Value Science – II*	*H*	*H*	*H*	*H*	*M*	*L*	*L*	*M*	*H*	*M*	*M*	*H*	*L*	*H*	*H*
18MBH163T	*Fundamentals of Economics*	*H*	*H*	*H*	*H*	*H*	*M*	*L*	*M*	*H*	*H*	*M*	*H*	*L*	*H*	*H*
18MBH261T	*Introduction to Innovation, IP Management and Entrepreneurship*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*L*	*L*	*L*	*M*	*H*	*M*	*M*
18MBH262J	*Design Thinking*	*H*	*H*	*H*	*H*	*M*	*M*	*L*	*M*	*M*	*M*	*M*	*H*	*L*	*H*	*H*
18MBH361T	*Business Communication & Value Science – III*	*H*	*H*	*H*	*H*	*H*	*M*	*L*	*M*	*H*	*M*	*M*	*H*	*H*	*H*	*M*
18MBH362T	*Business Communication & Value Science – IV*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*L*	*H*	*M*
18MBH363T	*Fundamentals of Management*	*H*	*H*	*M*	*M*	*H*	*L*	*L*	*M*	*H*	*M*	*L*	*H*	*L*	*H*	*H*
18MBH364T	*Business Strategy*	*H*	*H*	*H*	*H*	*L*	*L*	*L*	*L*	*M*	*M*	*L*	*H*	*H*	*H*	*H*
18MBH365T	*Financial and Cost Accounting*	*H*	*H*	*H*	*H*	*H*	*M*	*L*	*M*	*H*	*M*	*M*	*H*	*H*	*H*	*M*
18MBH461T	*Financial Management*	*H*	*H*	*H*	*H*	*H*	*M*	*L*	*M*	*H*	*M*	*M*	*H*	*H*	*H*	*M*
18MBH462T	*Human Resource Management*	*H*	*H*	*H*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*L*	*H*	*H*	*H*	*H*
18MBH463J	*Services Science and Service Operational Management*	*H*	*H*	*H*	*H*	*M*	*M*	*L*	*L*	*M*	*M*	*L*	*H*	*H*	*H*	*H*
18MBH464J	*IT Project Management*	*M*	*H*	*M*	*H*	*M*	*M*	*L*	*M*	*M*	*M*	*M*	*H*	*L*	*H*	*H*
18MBH465T	*Marketing Research and Marketing Management*	*M*	*H*	*H*	*H*	*H*	*M*	*L*	*M*	*M*	*M*	*M*	*H*	*L*	*H*	*H*
18CSC161J	*Fundamentals of Computer Science*	*H*	*H*	*H*	*M*	*H*	*M*	*L*	*M*	*H*	*M*	*M*	*H*	*L*	*H*	*H*
18CSC162J	*Data Structures and Algorithms*	*H*	*H*	*H*	*H*	*H*	*L*	*L*	*M*	*H*	*H*	*L*	*H*	*H*	*H*	*H*
18CSC261T	*Formal Language and Automata Theory*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*
18CSC262J	*Computer Organization and Architecture*	*H*	*H*	*H*	*H*	*H*	*M*	*L*	*M*	*H*	*M*	*M*	*H*	*H*	*H*	*M*
18CSC263J	*Object Oriented Programming*	*M*	*H*	*H*	*H*	*M*	*M*	*H*	*M*	*H*	*M*	*M*	*H*	*H*	*H*	*H*
18CSC264J	*Computational Statistics*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*M*	*M*	*M*	*M*	*H*	*L*	*H*	*H*
18CSC265J	*Software Engineering*	*H*	*H*	*H*	*H*	*H*	*H*	*L*	*M*	*H*	*M*	*M*	*H*	*M*	*H*	*H*
18CSC266J	*Operating Systems*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*M*	*H*	*H*	*H*	*M*	*H*
18CSC267J	*Database Management Systems*	*H*	*H*	*H*	*H*	*M*	*M*	*M*	*M*	*M*	*H*	*L*	*H*	*H*	*H*	*H*
18CSC268J	*Software Design with UML*	*H*	*H*	*H*	*H*	*M*	*M*	*M*	*M*	*M*	*H*	*L*	*H*	*H*	*H*	*H*
18CSC361J	*Design and Analysis of Algorithms*	*H*	*H*	*H*	*H*	*M*	*M*	*M*	*M*	*M*	*H*	*L*	*H*	*H*	*H*	*H*
18CSC362J	*Compiler Design*	*H*	*H*	*H*	*H*	*H*	*L*	*L*	*M*	*H*	*H*	*L*	*H*	*H*	*H*	*H*
18CSC363J	*Computer Networks*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*
18CSC364J	*Information Security*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*M*	*M*	*H*	*M*	*H*	*H*	*H*	*H*
18CSC365J	*Artificial Intelligence*	*M*	*H*	*H*	*H*	*H*	*M*	*L*	*M*	*M*	*H*	*M*	*H*	*M*	*H*	*H*
18CSC461J	*Usability Design of Software Applications*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*M*	*H*	*M*	*H*	*H*	*H*	*H*
18CSC462J	*IT Workshop using Scilab*	*M*	*H*	*H*	*H*	*H*	*M*	*M*	*M*	*M*	*H*	*M*	*H*	*H*	*H*	*H*
18CSP361L	*Mini Project – 1*	*H*	*M*	*M*	*M*	*M*	*M*	*M*	*M*	*H*	*H*	*H*	*M*	*H*	*H*	*H*
18CSP461L	*Project Evaluation – 1*	*H*	*M*	*M*	*M*	*M*	*M*	*M*	*M*	*H*	*H*	*H*	*M*	*H*	*H*	*H*
18CSP462L	*Project Evaluation – 2*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*
	Program Average	*H*	*H*	*M*	*H*	*M*	*L*	*M*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*

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

20. (g) Implementation Plan: B.Tech. in Computer Science andBusiness Systems

Semester - I

Code	Course Title	Hours/ Week L	T	P	C
18MBH161T	Business Communication & Value Science - I	2	0	0	2
18PYB161J	Fundamentals of Physics	2	0	2	3
18MAB161T	Discrete Mathematics	3	1	0	4
18MAB162T	Probability and Statistics	3	0	0	3
18EES161J	Principles of Electrical Engineering	2	0	2	3
18CSC161J	Fundamentals of Computer Science	3	0	4	5
18PDM101L	Professional Skills and Practices	0	0	2	0
18LEM101T	Constitution of India	1	0	0	0
18GNM101L	Physical and Mental Health using Yoga	0	0	2	0
	Total Learning Credits				20

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
18MBH162T	Business Communication & Value Science - II	2	0	0	2
18MBH163T	Fundamentals of Economics	2	0	0	2
18MAB163T	Linear Algebra	3	1	0	4
18MAB164J	Statistical Modeling	3	0	2	4
18EES162J	Principles of Electronics	2	0	2	3
18CSC162J	Data Structures and Algorithms	3	0	4	5
18LEM102J	Value Education	1	0	1	0
18GNM10XL	NCC / NSS / NSO	0	0	2	0
18LEM10XJ	Chinese / French / German / Japanese/ Korean	2	0	2	0
	Total Learning Credits				20

Semester - III

Code	Course Title	Hours/ Week L	T	P	C
18MBH461T	Financial Management	2	0	0	2
18MBH462T	Human Resource Management	2	0	0	2
18CSC261T	Formal Language and Automata Theory	3	0	0	3
18CSC262J	Computer Organization and Architecture	3	0	2	4
18CSC263J	Object Oriented Programming	2	0	4	4
18CSC264J	Computational Statistics	3	0	2	4
18CSC265J	Software Engineering	3	0	2	4
18PDM201L	Competencies in Social Skills	0	0	2	0
	Total Learning Credits				23

Semester - IV

Code	Course Title	Hours/ Week L	T	P	C
18MBH261T	Introduction to Innovation, IP Management and Entrepreneurship	3	0	0	3
18MBH465T	Marketing Research and Marketing Management	2	0	0	2
18MBH262J	Design Thinking	2	0	2	3
18MAB261J	Operations Research	2	0	2	3
18CSC266J	Operating Systems	3	0	2	4
18CSC267J	Database Management Systems	3	0	2	4
18CSC268J	Software Design with UML	2	0	2	3
18PDM202L	Critical and Creative Thinking Skills	0	0	2	0
18CYM101T	Environmental Science	1	0	0	0
	Total Learning Credits				22

Semester - V

Code	Course Title	Hours/ Week L	T	P	C
18MBH361T	Business Communication & Value Science - III	2	0	0	2
18MBH363T	Fundamentals of Management	2	0	0	2
18MBH364T	Business Strategy	2	0	0	2
18CSC361J	Design and Analysis of Algorithms	3	0	2	4
18CSC362J	Compiler Design	3	0	2	4
	Professional Elective – 1	2	0	2	3
	Open Elective – 1	2	0	2	3
18CSP361L	Mini Project – 1	0	0	2	1
18PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
18LEM109T	Indian Traditional Knowledge	1	0	0	0
	Total Learning Credits				21

Semester - VI

Code	Course Title	Hours/ Week L	T	P	C
18MBH362T	Business Communication & Value Science - IV	2	0	0	2
18MBH365T	Financial and Cost Accounting	2	0	0	2
18CSC365J	Artificial Intelligence	3	0	2	4
18CSC364J	Information Security	3	0	2	4
18CSC363J	Computer Networks	3	0	2	4
	Professional Elective – 2	2	0	2	3
	Professional Elective – 3	2	0	2	3
18LEM110L	Indian Art Form	0	0	2	0
	Total Learning Credits				22

Semester – VII

Code	Course Title	Hours/ Week L	T	P	C
18MBH463J	Services Science and Service Operational Management	3	0	2	4
18MBH464J	IT Project Management	3	0	2	4
18CSC461J	Usability Design of Software Applications	2	0	2	3
18CSC462J	IT Workshop using Scilab	1	0	2	2
	Professional Elective – 4	2	0	2	3
	Professional Elective – 5	2	0	2	3
18CSP461L	Project Evaluation – 1	0	0	6	3
	Total Learning Credits				22

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
18CSP462L	Project Evaluation –2	0	0	20	10
	Total Learning Credits				10

SEMESTER - I

Course Code	18MBH161T	Course Name	BUSINESS COMMUNICATION & VALUE SCIENCE – I	Course Categor	*H*	*Humanities and Social Sciences*	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Basic Knowledge of high school English	Co-requisite Courses	NA	Progressive Courses	NA
Course Offering Department	MBA	Data Book / Codes/Standards			

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	*Understand what life skills are and their importance in leading a happy and well-adjusted life*
CLR-2 :	*Motivate students to look within and create a better version of self*
CLR-3 :	*Introduce them to key concepts of values, life skills and business communication*
CLR-4 :	*To recognize their own strength and opportunities*
CLR-5 :	*Understand the basic skills in Business Communication*
CLR-6 :	*Apply the learnt techniques in the business world.*

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning			Program Learning Outcomes (PLO)															
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking(Bloom)	Expected Proficiency(%)	Expected Attainment(%)	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
CLO-1 :	Recognize the need for life skills and values	2	60	50	H	H	H	M	M	L	M	M	L	M	H	L			
CLO-2 :	Recognize own strengths and opportunities	2	80	70	H	H	L	L	M	M	M	L	L	M	H	H			
CLO-3 :	Apply the life skills to different situations	1	80	75	H	H	L	L	M	M	L	L	L	M	H	M			
CLO-4 :	Understand the basic tenets of communication	2	80	70	H	H	M	L	M	M	L	L	L	M	H	H			
CLO-5 :	Apply the basic communication practices in different types of communication	3	90	80	H	H	H	L	M	M	L	L	L	M	H	L			
Overall	Gain Knowledge in techniques of business communication and succeed in effective implementation in the corporate arena.	3	90	80	H	H	H	M	H	M	H	M	L	H	M	H			

T

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Overview of Leadership Oriented Learning (LOL) Theory and Practice	Communication Skills: Overview of Communication Skills Barriers of communication, Effective communication Business communication	Verbal communication: clarity of speech Pronunciation	Understanding Life Skills: Movie based learning – Pursuit of Happiness. What are the skills and values you can identify, what Can you relate to? (Part 1) Post discussion	Life skill: Join a trek – Values to be learned: Leadership Types and styles
	SLO-2	Activity on introducing Self Introducing self and SWOT	Types of communication- verbal and non – verbal – Role-play based learning Importance of Questioning	Vocabulary Enrichment: Exposure to words from General Service List (GSL) by West, Academic word list (AWL) technical specific terms related to the field of technology, phrases, idioms, significant abbreviations formal business vocabulary Read Economic Times, Reader's Digest, National Geographic and take part in a GD, using the words you Learnt/liked from the articles. Group discussion using words learnt	Understanding Life Skills: Movie based learning – Pursuit of Happiness. What are the skills and values you can identify, what can you relate to? (Part 2) Post discussion	Life skill: Join a trek – Values to be learned: Team Work Activity
S-2	SLO-1	Class activity – presentation on favorite cricket captain in IPL The skills and values they demonstrate	Listening Skills: Law of nature-Importance of listening skills, Difference between listening and Hearing, Types of listening. Listening activity	Practice: Toastmaster style Table Topics speech with evaluation Activity	Understanding Life Skills: Movie based learning – Pursuit of Happiness. What are the skills and values you can identify, what can you relate to? (Part 3)	Life skill: Join a trek – Values to be learned: Dealing with ambiguity Activity

					Post discussion	
	SLO-2	Self-work with immersion – interview a maid, watchman and Sweeper and narrate what you think are the values that drive them Report on interview	Expressing self On stage activity	Practice: Toastmaster style Table Topics speech with evaluation 2 Activity	Introduction to life skills What are the critical life skills Current trend	Life skill: Join a trek – Values to be learned: Managing stress Yoga
S-3	SLO-1	Self-work with immersion – interview a cab driver, beggar and narrate what you think are the values that drive them Report on interview	Connecting with emotions Best moments	Written Communication: Summary writing, story writing Various scenario	Multiple Intelligences Embracing diversity –Activity on appreciation of diversity Post activity discussion	Life skill: Join a trek – Values to be learned: Motivating people Intrinsic and extrinsic
	SLO-2	Overview of business communication Types and techniques	Visualizing Visual Activity	Build your CV –start writing your comprehensive CV including every achievement in your life, no format, no page limit Mistakes to avoid in CV	Life skill: Community service– work with an NGO and make a Presentation (Part 1) Team outing	Life skill: Join a trek – Values to be learned: Creativity Special Activity
S-4	SLO-1	Activity: Write a newspaper report on an IPL match Compare the report with friends	Experiencing Purpose Discussion	Project: Create a podcast on a topic that will interest college students Activity	Life skill: Community service– work with an NGO and make a Presentation (Part 2) Team outing	Life skill: Join a trek – Values to be learned: Result Orientation Assessment
	SLO-2	Activity: Record a conversation between a celebrity and an interviewer. Quiz Time	Activity: Skit based on communication skills	Life skill: Stress management Causes of stress	Life skill: Community service– work with an NGO and make a Presentation (Part 3) Team outing	Life skill: Join a trek – Values to be learned: Motivating people (2) Intrinsic and extrinsic
S-5	SLO-1	Self-Awareness: Identity Self-assessment Self-Awareness: Body Awareness Self-Awareness: Stress Management	Activity: Skit 2 based on communication skills. Record skit. Activity: Skit 3 based on communication skills. Activity: Skit 4 based on communication skills	Life skill: working with rhythm Activity. Life skill: Balance. Life skill: Team Work	Life skill: Community service– work with an NGO and make a Presentation (Part 4) Team outing. Life skill: Community service– work with an NGO and make a Presentation (Part 5) Life skill: Community service– work with an NGO and make a Presentation (Part 6)	Life skill: Join a trek – Values to be learned: Dealing with ambiguity Activity Life skill: Join a trek – Values to be learned: Motivating people (3) Life skill: Join a trek – Values to be learned: Creativity (2)
	SLO-2	Essential Grammar – I: Refresher on Parts of Speech – Listen to an audio clip and note down the different parts of speech followed by discussion. Tenses: Applications of tenses in Functional Grammar – Take a quiz and then discuss	Evaluation on Listening skills – listen to recording and answer questions based on them. Evaluate audio clip	Project: Create a musical using the learnings from unit. Activity	Life skill: Community service– work with an NGO and make a Presentation (Part 7) Team outing	Life skill: Join a trek – Values to be learned: Creativity (3). Adzap
S-6	SLO-1	Sentence formation (general & Technical), Common errors, Voices. Show sequence from film where a character uses wrong Sentence structure	Email writing: Formal and informal emails, activity	Project: Create a musical using the learnings from unit (2)	Community Service :work with an NGO and make a Presentation (Part 7)	Life skill: Join a trek – Values to be learned: Result Orientation (2)
	SLO-2	(e.g. Zindagi Na MilegiDobara where the characters use 'the' before every word)	Paper and web based	Activity	Team outing	Activity

Learning Resources	English vocabulary in use – Alan Mc'carthy and O'dell APAART: Speak Well 1 (English language and communication	APAART: Speak Well 2 (Soft Skills) Bernadin , Human Resource Management ,Tata Mcgraw Hill ,8th edition 2012. Wayne Cascio, Managing Human Resource, McGraw Hill, 2007.

Learning Assessment											
	Bloom's Level of Thinking	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	30%	-	30%	-	30%	-	40%	-	30%	-
Level 2	Apply Analyze	40%	-	40%	-	40%	-	30%	-	40%	-
Level 3	Evaluate Create	30%	-	30%	-	30%	-	30%	-	30%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study

Course Designers

Experts from Industry	Experts from Higher Technical Institutions I	Internal Experts
Experts From TCS	Dr.K.Latha, Chandasekara University, Kanchipuram	Mr.Vijay Raja, Assistant Professor, SRMSOM
	Dr.Thenmozhi, Professor, University of Madras	Dr.SanthoshKumart, Head – Human Resources , SRMSOM

Course Code	18PYB161J	Course Name	FUNDAMENTALS OF PHYSICS	Course Category	B	Basic Sciences	L	T	P	C
							2	0	2	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Physics and Nanotechnology	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)

CLR-1 :	Understand the concepts of periodic motion
CLR-2 :	Create insights to the concepts of optical effects
CLR-3 :	Identify the applications of lasers and optical fibers
CLR-4 :	Identify the significance of quantum theory
CLR-5 :	Analyze the principles of thermodynamics
CLR-6 :	Utilize the concepts of physics for application in engineering and technology

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Apply the periodic motion to different systems	2	85	75	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Apply ray propagation and optical effects	2	85	75	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Identify the applications of lasers and optical fiber	2	75	70	H	-	-	H	-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Apply quantum mechanics to basic physical problems	2	85	80	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-5 :	Analyze the thermodynamic process	2	85	75	H	-	H	-	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	Apply the concepts of optics, quantum theory and thermodynamics in real problems	2	80	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to periodic motion	Theory of interference fringes	Absorption and emission processes-two level system	Introduction to Quantum Mechanics, Planck's hypothesis	X-ray Diffraction, Debye Scherrer powder
	SLO-2	Simple harmonic motion-characteristics of simple harmonic motion	Types of interference	Einstein's theory of matter radiation A and B coefficients	de Broglie hypothesis for matter waves	Laue Method
S-2	SLO-1	Vibration of simple springs mass system	Fresnel's prism	Characteristics of laser beams	Heisenberg Uncertainty principle	Concept of band gap
	SLO-2	Characteristic of mass-spring system	Newton's rings	Essential components of laser system and pumping mechanisms	Physical significance of wave function	Conductor, semiconductor, and insulator
S-3	SLO-1	Resonance-definition.	Diffraction-types of diffraction	Threshold population inversion	Time independent Schrödinger's wave equation	Concept of Band theory: basic idea
	SLO-2	Damped harmonic oscillator	Difference between interference and diffraction	CO2 Laser	Time dependent Schrödinger's wave equation	Formation of Band gap
S-4-5	SLO-1	Lab 1: Basics of experimentation	Lab 3:Study of I-V characteristics of a light dependent resistor (LDR)	Lab 5: Determine the wavelength of monochromatic light Newton's ring	Lab 7 : Determine Particle size by using laser light	Lab 9: Determine of Hall coefficient of semiconductor
	SLO-2					
S-6	SLO-1	Heavy, critical and light damping	Fresnel's half period zone and zone plate	Ruby laser	Particle in a 1 D box	Laws of thermodynamics-Zeroth law of thermodynamics
	SLO-2	Energy decay in a damped harmonic oscillator	Fraunhofer diffraction at single slit-plane	Nd-YaG laser	Normalization and Eigen values	First law of thermodynamics
S-7	SLO-1	Quality factor	Plane diffraction grating	Application of Laser in engineering	Crystallography: Introduction, Basic terms-types of crystal systems	Brief discussion on application of first law
	SLO-2	Quality factor of Different oscillators	Temporal and Spatial Coherence	Holography	Bravais lattices, miller indices d spacing	Second law of thermodynamics
S-8	SLO-1	Forced mechanical	Polarization	Optical fiber-physical structure	Crystal Symmetry	Concept of Engine
	SLO-2	Electrical oscillator	Concept of production of polarized beam of light from two SHM acting at right angles	Total internal reflection	Plane of Symmetry, Axis of Symmetry	Efficiency of engine

S-9-10	**SLO-1**	Lab 2: Determine spring constant – expansion of a helical spring	Lab 4: Determine Planck's constant	Lab 6: Determine laser parameters – divergence and wavelength for a given laser source	Lab 8:- Study of attenuation and propagation characteristics of optical fiber	Lab 10 : Mini Project
	SLO-2					
S-11	**SLO-1**	Del, divergence, curl and gradient operations in vector calculus	Production of Plane polarized light	Numerical aperture	Coordination number, Atomic Packing Fraction	Entropy and internal energy
	SLO-2	Gauss-divergence and Stoke's theorem	Circularly and Elliptically polarized light	Acceptance angle	Atomic Packing fraction for SC, BCC	Entropy as a thermodynamic parameter
S-12	**SLO-1**	Maxwell's equations	Production of Circularly polarized light	Classification of optical fibers : Mode	Atomic Packing fraction for FCC	Change of Entropy in reversible process
	SLO-2	Maxwell's equations	Brewster's Law, Double refraction	Classification of optical fibers : Refractive index	Atomic Packing fraction for HCP	Change of Entropy in irreversible process

Learning Resources	1. David Jeffery Griffiths, Introduction to Electrodynamics, Revised Edition, Pearson, 2013 2. Ajay Ghatak, Optics, Tata McGraw Hill Education, 5th Edition, 2016	. 3. David Halliday, Fundamentals of Physics, 7th Edition, John Wiley & Sons Australia, Ltd, 2015 4. Eisberg and Resnick, Quantum Physics: of Atoms, Molecules, Solids, Nuclei and Particles, 6th Edition, 2015

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Expert from TCS	Prof . V. Subramanian, IITM, Chennai, manianvs@iitm.ac.in	Dr.M.Krishnamohan, SRMIST
	Prof . C. Venkateswaran, University of Madras, Chennai, cvenkateswaran@unom.ac.in	Dr.TrilochanSahoo, SRMIST

Course Code	18MAB161T	Course Name	DISCRETE MATHEMATICS	Course Category	*B*	*Basic Sciences*	L	T	P	C
							3	1	0	4

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	
Course Offering Department	*Mathematics*	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning
CLR-1 :	*Apply Boolean algebra,truth table,logic gates,in computer science andcommunication .*	1
CLR-2 :	*Apply set theory, relations in storage, communication and manipulation of data. Learning about groups, rings and fields. Using them to solveengineering related problems*	
CLR-3 :	*Using combinatory, counting problems, generating functions, recurrence relations in computer network .Apply principle of Mathematical induction and Pigeon hole principle.*	
CLR-4 :	*Understand the basic concepts in Graph Theory*	
CLR-5 :	*Understand the basic concepts in Logic*	
CLR-6 :	*Utilize the concepts in Discrete Mathematics for the understanding of Engineering and Technology*	

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	*Level of Thinking (Bloom)*	*Expected Proficiency (%)*	*Expected Attainment (%)*	*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*
		1	2	3	Program Learning Outcomes (PLO)														
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLO-1 :	*Gaining knowledge in Boolean arithmetic to solve problems using logic gates.*	2	85	80	M	H	L						M	L		H			
CLO-2 :	*Problem solving in sets and relations.Gaining knowledge in groups, rings and fields. Solving simple problems using elementary concepts.*	2	85	80	M	H		M	M				M			H			
CLO-3 :	*Solving problems in basic counting principles, inclusion exclusion and number theory.*	2	85	80	M	H							M			H			
CLO-4 :	*Solving problems in Graph Theory and its applications.*	2	85	80	M	H		M					M			H			
CLO-5 :	*Solving problems in Logic and its applications.*	2	85	80	M	H	L						M	L		H			
CLO-6 :	*Apply the concepts of Boolean Algebra, Abstract Algebra, counting principles, recurrence relations, Logic and Graph theory in real world problems related to Computer Science and Business systems*	2	85	80	M	H	L						M	L		H			

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to Boolean Algebra- basic definitions.	Introduction to Sets – simple examples.	Basic counting-Permutation and Combination	Basic concepts of Graphs	Propositional calculus
	SLO-2	Axiomatic definition of Boolean Algebra, logic gates.	Properties of sets	Basic counting-Permutation and Combination	Complement	Propositions
S-2	SLO-1	Postulates of Boolean Algebra.	Relations- definitions and examples.	***Balls and bins problems.***	Isomorphism	Connectives
	SLO-2	Postulates of Boolean Algebra.	Relations- definitions and examples.	***Balls and bins problems.***	Connectedness	Syntax
S-3	SLO-1	Problems using the postulates of Boolean Algebra	Problems on relations- types of relations.	***Balls and bins problems.***	Reachability	Semantics
	SLO-2	Problems using the postulates of Boolean Algebra	Problems on relations- types of relations.	***Balls and bins problems.***	Adjacency matrix	Truth assignments and truth tables
S-4	SLO-1	**Problem solving using tutorial sheet 1**	**Problem solving using tutorial sheet 4**	**Problem solving using tutorial sheet 7**	**Problem solving using tutorial sheet 10**	**Problem solving using tutorial sheet 13**
	SLO-2	**Problem solving using tutorial sheet 1**	**Problem solving using tutorial sheet 4**	**Problem solving using tutorial sheet 7**	**Problem solving using tutorial sheet 10**	**Problem solving using tutorial sheet 13**
S-5	SLO-1	Principle of Duality.	Binary operation on a set- Groups and axioms of groups.	Generating functions	Eulerian paths	Validity
	SLO-2	Principle of Duality.	Properties of groups.	***Problems on generating functions***	Circuits in graphs and digraphs	Satisfiability

S-6	**SLO-1**	*Problems based on* principle of Duality	Examples of groups.	***Problems on generating functions***	Hamiltonian paths and circuits	Tautology
	SLO-2	*Problems based on* principle of Duality.	Permutation group, equivalence classes with addition modulo m and multiplication modulo m.	***Problems on generating functions***	Tournaments	Adequate set of connectives
S-7	**SLO-1**	Canonical forms.	Cyclic groups and properties.	***Recurrence relations problems***	Trees	Equivalence
	SLO-2	Minterms and maxterms, sum of minterms, product of maxterms,	Subgroups and necessary and sufficiency of a subset to be a subgroup.	***Recurrence relations problems***	Planar graphs	Normal forms
S-8	**SLO-1**	**Problem solving using tutorial sheet 2 in duality and minterm and maxterm concepts.**	**Problem solving using tutorial sheet 5**	**Problem solving using tutorial sheet 8**	**Problem solving using tutorial sheet 11**	**Problem solving using tutorial sheet 14**
	SLO-2	**Problem solving using tutorial sheet 2 in duality and minterm and maxterm concepts.**	**Problem solving using tutorial sheet 5**	**Problem solving using tutorial sheet 8**	**Problem solving using tutorial sheet 11**	**Problem solving using tutorial sheet 14**
S-9	**SLO-1**	Conversion between canonical forms.	Cosets and examples.	***Recurrence relations problems***	Euler's formula	Compactness
	SLO-2	Conversion between canonical forms.	Rings- definition and examples. Properties	***Recurrence relations problems***	Dual of a planer graph	Resolution
S-10	SLO-1	Karnaugh maps.	***Special classes of rings***	Proof techniques- principle of Mathematical induction	Independence number and clique number	Formal reducibility
	SLO-2	Two and three variable maps.	Ideal and Quotient rings.	Problems using the principle of Mathematical induction	Independence number and clique number	Natural deduction system and axiom system
S-11	SLO-1	Four variable maps.	Fields – definition and examples.	Pigeon hole principle	Chromatic number	Soundness
	SLO-2	Five and six variable maps.	Fields – definition and examples.	Problems on pigeon hole principle.	Statement of Four-color theorem	completeness
S-12	SLO-1	**Problem solving using tutorial sheet 3 for** conversion between canonical forms.	**Problem solving using tutorial sheet 6**	**Problem solving using tutorial sheet 9**	**Problem solving using tutorial sheet 12**	**Problem solving using tutorial sheet 15**
	SLO-2	**Problem solving using tutorial sheet 3 using K-maps.**	**Problem solving using tutorial sheet 6**	**Problem solving using tutorial sheet 9**	**Problem solving using tutorial sheet 12**	**Problem solving using tutorial sheet 15**

	REFERENCE BOOKS/OTHER READING MATERIAL
	Text Book
1	I. N. Herstein, "Topics in Algebra", John Wiley andSons
2	M. Morris Mano, "Digital Logic & Computer Design",Pearson
3	*Elements of Discrete Mathematics*, (Second Edition) C. L. LiuMcGraw Hill, New Delhi.
4	*Graph Theory with Applications*, J. A. Bondy and U. S. R. Murty, Macmillan Press, London.
5	*Mathematical Logic for Computer Science*,L. Zhongwan, World Scientific, Singapore.
	Reference Book
1	*Introduction to linear algebra.* Gilbert Strang.
2	*Introductory Combinatorics*, R. A. Brualdi, North-Holland, New York.

3	*Graph Theory with Applications to Engineering and Computer Science*, N. Deo, Prentice Hall, Englewood Cliffs.
4	*Introduction to Mathematical Logic*,(Second Edition), E. Mendelsohn, Van-Nostrand, London

Learning Assessment											
	Bloom's Level of Thinking	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (15%)**		**CLA – 3 (15%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	**Remember**	**40%**	**-**	**30%**	**-**	**30%**	**-**	**30%**	**-**	**30%**	**-**
	Understand										
Level 2	**Apply**	**40%**	**-**	**40%**	**-**	**40%**	**-**	**40%**	**-**	**40%**	**-**
	Analyze										
Level 3	**Evaluate**	**20%**	**-**	**30%**	**-**	**30%**	**-**	**30%**	**-**	**30%**	**-**
	Create										
	Total	**100 %**		**100 %**		**100 %**		**100 %**		**100%**	

 # CLA –4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,
SLO – Session Learning Outcome

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Expert from TCS	***Dr.K.C.Sivakumar, IIT, Madras,*** *kcskumar@iitm.ac.in*	***Dr.A.Govindarajan***
		Dr.N.Parvathi

Course Code	18MAB162T	Course Name	PROBABILITY AND STATISTICS	Course Category	B	Basic Sciences	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mathematics	Data Book / Codes/Standards	Statistical tables		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning		
		1	2	3
CLR-1 :	To apply the basic rules and theorems of probability theory such as Baye's Theorem, to determine probabilities that help to solve engineering problems and to determine the expectation and variance of a random variable from its distribution.			
CLR-2 :	To appropriately choose, define probability distributions such as the Binomial, Poisson and Normal etc to model and solve engineering problems.			
CLR-3 :	To learn the basics of statistics, collection, estimate of statistical data			
CLR-4 :	To understand measures of central tendency and how correlation and regression analysis can be used to develop an equation that estimates how two variables are related			
CLR-5 :	To comprehend the applications of differential and integral calculus			
CLR-6 :	Acquired the knowledge of statistics Probability and calculus applications to the computer science and business systems			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Program Learning Outcomes (PLO)														
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					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
CLO-1 :	Pertain the Knowledge of probability concepts, to determine probabilities that help to solve engineering problems. and to determine the expectation and variance of a random variable from its distribution	3	85	80	M	H	L						M	L		H			
CLO-2 :	Gain familiarity in deriving probability distributions such as the Binomial, Poisson and Normal etc and apply them tn the problems involving Science and Engineering	3	85	80	M	H		M	M										
CLO-3 :	Acquire knowledge in descriptive statistics	3	85	80		M							M			H			
CLO-4 :	Getting the knowledge of measures of central tendency and dispersion, correlation, regression analysis and apply them in the problems in Science and Engineering	3	85	80	M	H	L	M					M	L		H			
CLO-5 :	Understanding the concept differential and integral calculus	3	85	80		M	H	M					M			H			
CLO-6 :	To solve the problems based on statistics, probability and calculus in computer science and business systems	3	85	80	M	H							M			H			

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	probability concepts, Types of experiments, Events, sample space, combinatorial probability	Discrete distributions	Definition of Statistics	Descriptive measures	Differential calculus introduction
	SLO-2	Axioms and theorems	Binomial distribution	Basic objectives	central tendency	Successive differentiation.
S-2	SLO-1	Conditional probability Baye's theorem – without proof	Fitting binomial distribution	Applications in various branches of science with examples	Mean, median and mode	Taylor's series simple problems
	SLO-2	Applications- Baye's Theorem.	Poisson distribution	More examples	Problems on mean	Taylor's series simple problems
S-3	SLO-1	Random variables – Discrete case	Fitting Poisson distribution	Collection of Data, internal and external data	Problems on median and mode	Problems on radius of curvature and centre of curvature.
	SLO-2	Probability Mass function	Applications of binomial and Poisson distribution	Primary and secondary data	Dispersion	Problems on radius of curvature and centre of curvature.
S-4	SLO-1	Problem solving using tutorial sheet 1	Problem solving using tutorial sheet 4	Problem solving using tutorial sheet 7	Range	Problem solving using tutorial sheet 13
	SLO-2	Problem solving using tutorial sheet 1	Problem solving using tutorial sheet 4	Problem solving using tutorial sheet 7	Quartile deviation	Problem solving using tutorial sheet 13
S-5	SLO-1	Cumulative distribution function	Geometric distribution	Population and sample	Standard deviation	Problems on radius of curvature and centre of curvature.
	SLO-2	Mathematical expectation –discrete case	Memory less property	Representative sample	Standard deviation	Problems on radius of curvature and centre of curvature.
S-6	SLO-1	Variance	Continuous distribution: Uniform distribution	Descriptive Statistics,	Coefficient of variation	Integral calculus-reduction formulae
	SLO-2	Probability density function	Applications of Uniform distribution	Classification of Univariate data	Coefficient of variation	Problems based on reduction formulae.

S-7	**SLO-1**	Cumulative distribution function	Exponential distribution, Memory less property	tabulation of univariate data	Problems based on dispersion	Definite integrals properties without proof.
	SLO-2	Mathematical expectation-continuous case	Applications of exponential distribution	Applications of descriptive statistics	Problems based on dispersion	Problems based on definite integral properties.
S-8	**SLO-1**	Problem solving using tutorial sheet 2	Problem solving using tutorial sheet 5	Problem solving using tutorial sheet 8	Problem solving using tutorial sheet 11	Problem solving using tutorial sheet 14
	SLO-2	Problem solving using tutorial sheet 2	Problem solving using tutorial sheet 5	Problem solving using tutorial sheet 8	Problem solving using tutorial sheet 11	Problem solving using tutorial sheet 14
S-9	**SLO-1**	Variance	Normal distribution	Graphical representation	Bivariate data. Summarization	Double integrals
	SLO-2	Raw Moments	Applications of normal distribution	Graphical representation	marginal and conditional frequency distribution	Double integrals problems
S-10	SLO-1	Central Moments	Chi-Square distribution	Applications of graphical representation	marginal and conditional frequency distribution	Changing the order of integration.
	SLO-2	Moment generating function	Applications of Chi- square distribution	Frequency curves	Problems on marginal and conditional frequency distribution	Area enclosed by plane curves
S-11	SLO-1	MGF- discrete random variable	t- Distribution, F- Distribution	Frequency curves	Applications central tendency and dispersion	Volume of solids- volume as double integrals
	SLO-2	MGF- continous random variable	Applications of t, F- distributions	Applications of Frequency curves	Applications central tendency and dispersion	Volume of solids- volume as triple integrals
S-12	SLO-1	Problem solving using tutorial sheet 3	Problem solving using tutorial sheet 6	Problem solving using tutorial sheet 9	Problem solving using tutorial sheet 12	Problem solving using tutorial sheet 15
	SLO-2	Applications of Probability in Engineering field	Application of distributions in Engineering	Applications and the importance of descriptive statistics	Engineering Applications of Correlation and Regression	Applications of Differential and integral calculus in Engineering.

Learning Resources

1. S.M. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
2. A. M. Gun, M.K. Gupta and B. Dasgupta, "Fundamentals of Statistics", vol. I & II, WorldPress, 2016.
3. I. R. Miller, J.E. Freund and Richard. A.. Johnson, "Probability and Statistics for Engineers". Eighth Edition,PHI, 2015 .
4. A. M. Mood, F.A. Graybill and D.C. Boes, "Introduction to the Theory of Statistics", McGraw Hill, Third edition, 2017.
5. T. Veerarajan, Probability and Statistics, Tata McGraw- Hill, New Delhi, 2010
6. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publication, Delhi.
7. Advanced Engineering Mathematics, (Second Edition) M. D. Greenberg, Pearson Education.

Learning Assessment

	Bloom's Level of Thinking	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (15%)**		**CLA – 3 (15%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	**Remember**	**40%**	-	**30%**	-	**30%**	-	**30%**	-	**30%**	-
	Understand										
Level 2	**Apply**	**40%**	-	**40%**	-	**40%**	-	**40%**	-	**40%**	-
	Analyze										
Level 3	**Evaluate**	**20%**	-	**30%**	-	**30%**	-	**30%**	-	**30%**	-
	Create										
	Total	**100 %**		**100 %**		**100 %**		**100 %**		**100%**	

 # CLA –4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,
SLO – Session Learning Outcome

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Expert from TCS	***Dr.Y.V.S.S. Sanyasiraju, IIT, Madras, sryedida@iitm.ac.in***	***Dr.A.Govindarajan***
		Dr. P.Sambath

Course Code	18EES161J	Course Name	PRINCIPLES OF ELECTRICAL ENGINEERING	Course Category	S	Engineering Sciences	L	T	P	C
							2	0	2	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning	Program Learning Outcomes (PLO)

CLR-1 :	Analyze DC circuits using network theorems
CLR-2 :	Examine single phase AC series circuit and parallel circuits. Also understand the basics of three phase
CLR-3 :	Introduce the basic concepts of electrostatics and magnetostatics
CLR-4 :	Comprehend the construction, working and performance of transformers and DC machines
CLR-5 :	Outline the concepts of transducers, measuring devices, electrical wiring and illumination
CLR-6 :	Enrich the concepts of electric circuits, flux distribution and electrical wiring

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1 Level of Thinking(Bloom)	2 Expected Proficiency (%)	3 Expected Attainment(%)	1 Engineering Knowledge	2 Problem Analysis	3 Design & Development	4 Analysis, Design, Research	5 Modern Tool Usage	6 Society & Culture	7 Environment & Sustainability	8 Ethics	9 Individual & TeamWork	10 Communication	11 Project Mgt .& Finance	12 Life Long Learning	13 PSO-1	14 PSO-2	15 PSO–3
CLO-1 :	Compute the various electrical quantities in a DC circuit	3	85	80	H	H	M			-	-		M	-	-		-	-	-
CLO-2 :	Determine the parameters involved in AC circuits.	3	85	80	H	H	M			-	-		M	-	-		-	-	-
CLO-3 :	Understand the electric , magnetic flux distribution and their applications	2	85	80	H	H	M		M	-	-		M	-	-		-	-	-
CLO-4 :	Recall the working of transformers and electrical machines	2	85	80	H	L				-	-		M	-	-		-	-	-
CLO-5 :	Explain the operation of various transducers, sensors and wiring schemes	2	85	80	H					-	-		M	-	-		-	-	-
CLO-6 :	Gain knowledge on the basics of electrical and magnetic circuits, measuring devices , transducers and wiring	2	85	80	H	H	M		M	-	-		M	-	-		-	-	-

Duration (hour)		**12**	**12**	**12**	**12**	**12**
S-1	**SLO-1**	Fundamental of passive and active elements-VI relationship	Introduction to AC Circuits	Principle of Electrostatics	Introduction to Electrostatic devices	Introduction tomeasuring devices and Sensors
	SLO-2	Concept of Potential difference, voltage, current-Ohm's law	Definition : Average value, RMS value, form factor and peak factor of AC waveform	Electrostatic field, electric field intensity, electric flux density, absolute permittivity, relative	Energy conversion in Electrostatic device	Basic concept of indicating and integrating instruments
S-2	**SLO-1**	Electric networks- Terminology and symbols-voltage source and current sources, ideal and practical	Form factor and peak factor : Half wave rectifier, full wave rectifier	Coulomb's law, capacitor composite, dielectric capacitors	Construction of Single phase transformer	Concepts of Digital instruments: Digital Ammeter
	SLO-2	Concept of work, power, energy and conversion of energy	Form factor and peak factor : Triangular wave , trapezoidal wave	capacitors in series& parallel, energy stored in capacitors, charging and discharging of capacitors	principle of operation of Single phase transformer	Digital multimeter, Digital storage oscilloscope
S-3 to 4	**SLO-1**	Lab 1:Demonstration of measurement of electrical quantities in DC systems	Lab 4:Verification of Superposition, Maximum Power Transfer theorem	Lab 7: Simulation of simple solenoid using FEM software	Lab 10 : Verification of relation in between voltage and current in three phase balanced delta connected loads	Lab 13 :Familiarization of electrical Elements, sources and measuring devices related to electrical circuits
	SLO-2					
S-5	**SLO-1**	Introduction to DC Circuits-Verification of KCL-KVL	Phasor representation in polar and rectangular form	Electro-mechanics: Electricity and Magnetism, Magnetic field	EMF equation	Active and passive transducers
	SLO-2	Network solutions using Mesh analysis	Star/Delta transformation	faraday's law - self and mutual inductance	Problems in EMF equation	Capacitive transducers, Inductive transducers, LVDT
S-6	**SLO-1**	Nodal analysis	Derive the Impedance, Admittance, active, reactive and apparent power, power factor of R-L excited by AC	Ampere's law- Magnetic flux density and Magnetic field intensity	voltage ratio, current ratio, KVA rating	Electrical Strain Gauges, PIR sensor,
	SLO-2	Simplifications of networks using series- parallel	Derive the Impedance, Admittance, active, reactive and apparent power, power factor of R-C circuit excited by	Magnetic circuit, Magnetic material and B- H Curve	Efficiency and regulation.	Proximity Sensor, Hall effect sensors
S-7 to 8	**SLO-1**	Lab 2:Circuit reduction and basic laws	Lab 5: Simulation of Time domain analysis of R-C transient circuit	Lab 8 : Simulation of Time domain analysis of R-L-C transient circuit for XL> XC, XL< XC& XL = XC	Lab 11 : Demo on single phase transformer	Lab 14 :Determination of resistance temperaturecoefficient
	SLO-2					

S-9	**SLO-1**	Superposition theorem in DC circuits	Derive the Impedance, Admittance, active, reactive and apparent power, power factor of R-L-C series circuit excited by AC supply	Magnetostatics Vs Electrostatics	Application to electromechanical devices: DC motor	Electrical Wiring and Illumination system
	SLO-2	Thevenin'stheorem in DC circuits	Derive the Impedance, Admittance, active, reactive and apparent power, power factor of R-L-C parallel circuit excited by AC supply	Application of Electrostatics and Magnetostatics	Types of DC motors	Types of lighting system-lamps Incandescent Fluorescent, CFL Sodium Vapour lamp, Mercury Vapour lamp, Metal Halidelamp
S-10	**SLO-1**	Norton's theorem in DC circuits	Star connected 3 phase balanced AC circuits	Principle and types of batteries	Construction and operation DC motors	Necessity of earthing
	SLO-2	Maximum Power Transfer theorem in DC	Delta connected 3 phase balanced AC circuits	Construction and application of battery	Characteristics of DC motor	Types of earthing
S-11 to 12	**SLO-1** **SLO-2** **SLO-2**	Lab 3:Verification of Thevenin's and Norton's theorem	Lab 6: Simulation of Time domain analysis of R-L transient circuit	Lab 9 :Verification of relation in between voltage and current in three phase balanced star connected loads.	Lab 12: Demo on Electrical Machine	Lab 15 : Familiarization of transducers related to electrical circuit

Learning Resources	Dash.S.S,Subramani.C,Vijayakumar.K,BasicElectricalEngineering,1sted.,VijayNicole,2013. Jegatheesan .R, Analysis of Electric Circuits, Tata McGraw-Hill,2014. Vincent.Del.Toro,"ElectricalEngineeringFundamentals",SecondEdition,PrenticeHallIndia	4.S.K. Bhattacharya Basic Electrical and Electronics Engineering, Second edition, Pearson Education, 2017. 5. R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering, Tata McGraw-Hill, 2012.

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Experts From TCS		1. Mr.B.VinothKumar,SRMIST
		2.Mr.T.Vigneswaran,SRMIST

Course Code	18CSC161J	Course Name	FUNDAMENTALS OF COMPUTER SCIENCE	Course Category	C	Professional Core	L	T	P	C
							3	0	4	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

CLR-1 :	*Think and evolve a logically to construct an algorithm into a flowchart and a pseudocode that can be programmed*
CLR-2 :	*Utilize the various operators ,expressions and programming constructs to solve problems in engineering and real-time*
CLR-3 :	*Utilize custom designed functions and that can be used to perform tasks and can be repeatedly used in any application*
CLR-4 :	*Store and retrieve data in a single and multidimensional array along with references*
CLR-5 :	*Create storage constructs using structure and unions. Create and Utilize files to store and retrieve information*
CLR-6 :	*Create a logical mindset to solve various engineering applications using programming constructs in C*

Course Learning Outcomes (CLO): **At the end of this course, learners will be able to:**

Learning			Program Learning Outcomes (PLO)														
1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Level of Thinking(Bloom)	Expected Proficiency (%)	Expected Attainment(%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & TeamWork	Communication	Project Mgt .& Finance	Life Long Learning	Engineering Knowledge	PSO-2	PSO–3
CLO-1 : Identify methods to solve a problem through computer programming. List the basic data types and variables in	2	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 : Apply the logic operators and expressions. Use loop constructs and recursion. Use array to store and retrieve	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 : Analyze programs that need storage and form single and multi-dimensional arrays. Use pointer and preprocessor constructs in C	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 : Create user defined functions for mathematical and other logical operations. Use pointer to address memory and data	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 : Create structures and unions to represent data constructs. Use files to store and retrieve data	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 : Apply programming concepts to solve problems. Learn about how C programming can be effectively used for solutions	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

Duration (hour)		**21**	**21**	**21**	**21**	**21**
S-1	SLO-1	Evolution of Programming& Languages	Arithmetic Operators, Relational Operators	Basics of functions	Array Basic and Types	Structures: Initializing Structure, Declaring structure variable
	SLO-2	Problem solving through programming	Logical Operators, Comma, Conditional operators	Function declaration and definition	Array Initialization and Declaration	Structure using typedef, Accessing members, Nested structure
S-2	SLO-1	Creating algorithms	Increment Decrement Operators , Bitwise Operators	Parameter passing and returning type	Accessing, Indexing Array Operations	Array of structure Accessing elements in a structure array
	SLO-2	Drawing flowcharts	Assignment Operators and Expressions	C main return as integer and void	Multi-dimensional array	Passing Array of structure to function, Array of pointers to structures
S-3	SLO-1	Writing pseudocode	Precedence and Order of Evaluation	External, Local, Auto and Static storage classes	Row/column major formats	Self-referral Structures,
	SLO-2	Evolution of C language, its usage history	Associativity of operators	Variable Parameters	Command Line Arguments	Table look up, Typedef, Unions, Bit-fields
S 4-7	SLO-1 SLO-2	Lab 1: Algorithm, Flow Chart, Pseudocode	Lab 4: Operators ,Precedence and Associativity, problem solving	Lab 7: Practicing Functions and storage classes, Variable Parameters	Lab 10: Arrays – Programs using Arrays , 1D, 2D and Multi Dimensional, Command line arguments	Lab 13: Structures & Unions
S-8	SLO-1	Input and output functions: Printf and scanf	Statements and Blocks	Register Variables	Pointers and address operator	Files: opening, defining, closing, file access including FILE structure, fopen, fclose
	SLO-2	Variable Names	If-Else-If	Scope Rules,	Size of Pointer Variable and Pointer Operator	File Modes & File Types, stdin, sdtout and stderr
S-9	SLO-1	Proper variable naming and Hungarian Notation	Nested if, else if	Block structure	Pointer Declaration and dereferencing pointers	Writing contents into a file, Reading file contents- fprintf, fscanf, fwrite,
	SLO-2	Data Type and Sizes (Little Endian Big Endian)	Switch case	Initialization, Recursion	Pointers and Function Arguments	Appending an existing file

S-10	SLO-1	Integer floating Point representations	Goto , labels	Preprocessor directive , Macro	Pointers and Arrays	File permissions and rights,
	SLO-2	Declaration of Variables and Dynamic Initialization of variables	Programs on conditional and unconditional branching	Standard Library Functions and return types	Address Arithmetic	Error Handling including exit, perror and error.h, Line I/O, related miscellaneous functions
S 11-14	SLO-1 SLO-2	Lab 2: Illustration of Data types, declaration, representations	Lab 5: Control flow : Conditional and Unconditional statements	Lab 8: Illustration of Scope, register variables, Recursion and STL	Lab 11: Functions	Lab 14 : make File utility, multi file processing
S-15	SLO-1	Constants, Named Constants	While loop	String Basics	Character Pointers and Functions	Unix system Interface: File Descriptor,
	SLO-2	Type Conversion	Do..While loop	String Declaration and Initialization	Pointer Arrays , Initialization of Pointer Arrays	Low level I/O – read and write, Open, create, close and unlink
S-16	SLO-1	Type Modifiers	For Loop	String Functions: gets(), puts(), getchar(),	Pointer to Pointer,	Random access – lseek
	SLO-2	Header Files	Break and continue	String Functions: atoi, strlen, strcat, strcmp	Pointer to functions	Discussions on Listing Directory, Storage
S-17	SLO-1	Structure of C Program	Structured and un- structured programming	String Functions: sprint, sscanf, strrev,	Complicated declarations and their evaluation	Debugging
	SLO-2	Compiling and Executing C Programs	Programs using looping statements	Arithmetic Characters on Strings	Practicing Pointers	User Defined Header, User Defined Library
S 18-21	SLO-1 SLO-2	Lab 3: Simple C Programs	Lab 6: Practicing using while, Do, For	Lab 9: Programs on Strings and its operations, substring matching	Lab 12: Programs using Pointers and arithmetic , Pointer to function	Lab 15: User defined header, Unix System interface

Learning Resources	B.W.KernighanandD.M.Ritchi,"TheCProgrammingLanguage",SecondEdition,PHI. B.Gottfried,"ProgramminginC",SecondEdition,SchaumOutlineSeries.	Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGrawHill. YashavantKanetkar, "Let Us C",BPBPublications

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Experts From TCS		1. Dr. S.S.Sridhar, SRMIST

Course Code	18LEM101T	Course Name	CONSTITUTION OF INDIA	Course Category	M	Mandatory	L	T	P	C
							1	0	0	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Utilize the citizen's rights
CLR-2 :	Utilize the basic citizen's fundamental rights of freedom of speech, expression, equality, religion and privacy
CLR-3 :	Identify the Indian constitutional framework with union parliament, government and their functions and citizen's rights
CLR-4 :	Utilize the States functionality and provisions for the betterment of the individual and society
CLR-5 :	Identify the emergency provisions, the functions of election and public service commissions, identify the tax system
CLR-6 :	Utilize the rights of a citizen both individual and as a society by understanding the constitutional provision and rights

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Identify the basic provisions in the indian constitution	2	80	75	-	-	-	-	-	-	M	H	H	H	-	H	-	-	-
CLO-2 :	List the fundamental rights, rights to equality, freedom, religion, culture, education and the right against exploitation	2	75	70	-	-	-	-	-	-	M	H	H	H	-	H	-	-	-
CLO-3 :	Identify the fundamental duties of the Union of India, President, Vice-President, Union Ministers and Parliament functions	2	80	75	-	-	-	-	-	-	M	H	H	H	M	H	-	-	-
CLO-4 :	Identify the power of states, its legislature, Governors role and the state judiciary	2	75	70	-	-	-	-	-	-	M	H	H	H	M	H	-	-	-
CLO-5 :	List the special provisions and functionality of election commission, public service commission, individual tax and GST	2	85	80	-	-	-	-	-	-	M	H	H	H	H	H	-	-	-
CLO-6 :	Build knowledge on the various aspects in the Indian Constitution, its provisions and right of a citizen and the society	2	85	80	-	-	-	-	-	-	M	H	H	H	M	H	-	-	-

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Meaning of the constitution law and constitutionalism	The Directive Principles of State Policy	President of India (with Powers and Functions)	Governor of the State (with Powers and Functions)	Local Self Government – Constitutional Scheme in India
	SLO-2	Historical perspective of the Constitution of India	Scheme of the Fundamental Right to Equality	Prime Minister of India (with Powers and Functions)	The Chief Minister of the State (with Powers and Functions)	Emergency Provisions : National, President Rule, Financial Emergency
S-2	SLO-1	Salient features and characteristics of the Constitution of India	Scheme of the Fundamental Right to certain Freedom under Article 19	Union Judiciary (Supreme Court) Jurisdiction of the Supreme Court	State Judiciary (High Courts)	Election Commission of India (with Powers and Functions)
	SLO-2	Citizenship	Scope of the Right to Life and Personal Liberty under Article 21	State Government	Union Territories, Panchayats,	The Union Public Service Commission (with Powers and Functions)
S-3	SLO-1	Scheme of the fundamental rights	Union Government, Union Legislature (Parliament)	State Legislature, Legislative Assembly, Legislative Council	Municipalities, Scheduled and Tribal Areas	Amendment of the Constitutional Powers and Procedure
	SLO-2	The scheme of the Fundamental Duties and its legal status	Lok Sabha and Rajya Sabha (with Powers and Functions), Union Executive	Powers and Functions of the State Legislature, State Executive	Co-operative Societies	Income Tax, Goods and Services Tax

Learning Resources	1. DurgadasBasu, Introduction to the Constitution of India,Lexis- Nexis, 2015 2. Subash C Kashyap, Our Parliament, National Books Trust, 2011	3. Kaushal Kumar Agarwal, India's No 1 book on Tax : Simple Language Advanced Problems: Income Tax, Kindle, 2017 4. Vivek K R Agarwal, GST Guide for students: Making GST – Good and Simple Tax, Neelam Book House, 2017

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)								Final Examination	
		CLA – 1 (20%)		CLA – 2 (30%)		CLA – 3 (30%)		CLA – 4 (20%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	40%	-	30%	-	30%	-	30%	-	-	-
Level 2	Apply Analyze	40%	-	40%	-	40%	-	40%	-	-	-

Level 3	Evaluate Create	*20%*	-	*30%*	-	*30%*	-	*30%*	-	-	-
	Total	100 %		100 %		100 %		100 %		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers				
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts		
1. Dr. Usha Kodandaraman, ABK AOTS, Chenna . drushak@gmail.com	1 .Dr. S. P.Dhanavel, IITM, Chennai, dhanavelsp@iitm@ac.in	1. Dr. K. Anbazhagan, SRMIST	3. Dr.SukanyaSaha, SRMIST	5. S. Ramya, SRMIST
2. Mr. Durga Prasad Bokka, TCS Chennai, durgaprasad@tcs.com	2. Ms. Subashree, VIT, Chennai, subashree@vit.ac.in	2. Ms. Cauveri B, SRMIST	4. Dr. M. M.Umamaheswari, SRMIST	

Course Code	18GNM101L	Course Name	PHYSICAL AND MENTAL HEALTH USING YOGA	Course Category	M	Mandatory	L	T	P	C
							0	0	2	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Centre for Applied Research in Education	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Utilize rich Indian heritage and knowledge for self-healing and self-protection from diseases*			
CLR-2 :	*Apply meditation for attaining happiness and balancing emotions and state of mind and body*			
CLR-3 :	*Intellectually develop oneself by identifying oneness with divine state and transform towards absolute oneness in space*			
CLR-4 :	*Socially transform into a meaningful and purposeful individual to both self and society*			
CLR-5 :	*Spiritually enlighten oneself by purifying the body, soul and have a blissful existence*			
CLR-6 :	*Achieve personal benefits of whole health and wellbeing by practicing yoga for physical, emotional and mental fitness*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	*Identify Indian heritage, culture. Identify key anatomical structures in the human body and basic exercises for the same*	*2*	*80*	*75*	-	*M*	-	-	-	*H*	*H*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-2 :	*Apply yoga meditation practices for emotional development and wellbeing*	*2*	*75*	*70*	-	*M*	-	-	-	*H*	*H*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-3 :	*Identify educational and intellectual development methods using five sense realization and transformation*	*3*	*80*	*75*	-	*M*	-	-	-	*H*	*H*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-4 :	*Demonstrate human values and emotions through thorough understanding about life, naturopathy and food habits*	*3*	*75*	*70*	-	*M*	-	-	-	*H*	*H*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-5 :	*Impact self and society by peaceful coexistence with self-introspection and balanced diet charts*	*3*	*85*	*80*	-	*M*	-	-	-	*H*	*H*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-6 :	*Demonstrate yoga exercises and postures to stretch and strengthen the body and mind*	*3*	*85*	*80*	-	*M*	-	-	-	*H*	*H*	*H*	*H*	*H*	-	*H*	-	-	-

		Physical Development	*Emotional Development*	*Intellectual Development*	*Social Development*	*Spiritual Development*
Duration (hour)		**6**	**6**	**6**	**6**	**6**
S-1	**SLO-1**	*Indian Heritage & Culture, Concept of Yoga, Objectives, Science & Art of Yoga*	*Brain Functions, Bio-Magnetism, Cognitive Mind*	*Education & Intelligence Development using Yoga. Improving Intelligence*	*Introduction: Social Intelligence*	*Spiritual Connect & Yoga: Self-Realization, Self-Awareness, Self-Actualization*
	SLO-2	*Women and Yoga Practice – Classification, Modern Age, Philosophy of Life*	*Emotional Intelligences, Managing Stress and Emotions*	*Learnability through Concentration, Intelligence through learning sense organs*	*Human values, Ethics & Morality*	*Cause and Effect Realization (Karma Yoga), Harmony in Life*
S-2	**SLO-1**	*Practice1: Standing exercise, Surya Namaskar*	*Practice4: Surya Namaskar, Standing asanas*	*Practice7: Yoga for Youthfulness (Kayakalpah Yoga)*	*Practice10: Kayakalpha, Bhandas, Meditation (Crown)*	*Practice13: Management of Physical problems (Yoga therapy)*
	SLO-2	*Meditation (Self Realization), Relaxation*	*Meditation (Five Sense Realization), Relaxation*	*Meditation (Five Sense Realization), Relaxation*	*Self-introspection Practice (Moralization of Desire) & Relaxation*	*Meditation (Nine centre) & Relaxation*
S-3	**SLO-1**	*Physical Health: Body Structure, Diseases and Causes, Science of Human Body*	*Meditation for Emotional development: Eyebrow Center (Agna) Meditation*	*Theory of Intellectual Transformation: Divine state origin, absolute space,*	*Exercises for Self-Introspection: Analysis of thoughts, Moralization of desires*	*Spiritual Enlightenment*
	SLO-2	*Yoga &Youthfulness. Benefits, Comparison between other exercises and Yoga*	*Genetic Centre (Santhi) Meditation. Stress Relaxation Exercises*	*Transformation of universe, living beings, Intelligence, Knowledge, Wisdom & Peace*	*Anger Management, Eradicating worries, concerns & challenges*	*Purifying the Body (Genetic center)*
S-4	**SLO-1**	*Practice2: Surya Namaskar, Sitting Exercises*	*Practice5: Surya Namaskar, Sitting asanas,*	*Practice8: Kayakalpha Yoga, Pranayama*	*Practice11: Kayakalpha Yoga, Krisya Yoga*	*Practice14: Project Submission*
	SLO-2	*Meditation (Self Realization) – Relaxation*	*Meditation (Agna) & Relaxation*	*Meditation (Agna) - Relaxation*	*Yoga Mudhras, Meditation (Santhi) & Relaxation*	*Meditation, Introspection, Sublimination*
S-5	**SLO-1**	*Exercises: Hands, Legs, Neuro-Muscular breathing, Eye, Ears, Nostrils, kidney, brain*	*Asanas (Postures) for Body Structure: Full Body Structure Maintenance*	*Exercises: Intellectual development Brain Crown Centre (Thuriyam) Meditation*	*Therapy for Social Development: Gestures Yoga (Mudhras) – Body locks (Bhandhas)*	*Spirituality for Stress Management*

	SLO-2	*digestive tract, stomach, lungs, spine, hip, neck. Pressure points in our body*	*Standing, Sitting, Prone & Supine Posture, Benefits of asanas*	*Five Senses (Panchendriya) Meditation, Consciousness and Law of nature*	*Indian Medical System: Naturopathy, Food, Nutrition, Diet Chart for Youthfulness*	*Yoga Practices for blissful existence*
S-6	**SLO-1**	*Practice3: Prone & Supine posture Exercises*	*Practice6: Surya Namaskar, Prone & Supine posture Asanas*	*Practice9: Kayakalpha, Mudhras, Self-introspection Practice (Thought Analysis)*	*Practice12: Balancing Asanas,*	*Practice15: Practical Exam*
	SLO-2	*Meditation (Self Realization) – Relaxation*	*Meditation (Shanthi) & Relaxation*	*Meditation (Santhi), & Relaxation*	*Meditation (Crown) & Relaxation*	*Meditation & Relaxation*

Learning Resources	1. *SadhguruJaggiVasudev, Inner Engineering – A yogi's guide to joy, 2016* 2. *Shri Shri Ravi Shankar, The Art of stress-free Living, 2011* 3. *Swami Ramdev Ji Yog Its Philosophy and Practice, 2008* 4. *YogirajVethathiri Maharishi, Yoga for Modern Age, Tenth edition, Vethathiri Publications, 2007* 5. *YogirajVethathiri Maharishi, Simplified Physical Exercises, Forty Second edition, Jan-2014*	6. *Vivekananda KenthriaPrkasan Trust, Yogam, 2006* 7. *Swami Chetanananda, Meditation and Its Methods According to Swami Vivekananda, Jan 2001* 8. *Dr.Lakshminarain Sharma, Yoga for the cure of Common Diseases, Mar 2016* 9. *Swami SatyanandaSaraswati, Asana Pranayama Mudra Bandha, Bihar School of Yoga, 1993* 10. *Dr. Asana Andiappan, Thirumoolar'sAstanga Yoga, International Yoga Academy, 2017*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)								Final Examination	
		CLA – 1 (20%)		CLA – 2 (30%)		CLA – 3 (30%)		CLA – 4 (20%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	-	*40%*	-	*30%*	-	*30%*	-	*30%*	-	-
	Understand										
Level 2	Apply	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-	-
	Analyze										
Level 3	Evaluate	-	*20%*	-	*30%*	-	*30%*	-	*30%*	-	-
	Create										
	Total	*100 %*		*100 %*		*100 %*		*100 %*		-	

 # CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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Course Code	18PDM101L	Course Name	PROFESSIONAL SKILLS AND PRACTICES	Course Category	M	Mandatory	L	T	P	C
							0	0	2	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Career Development Centre	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Utilize success habits to improve achievement in life			
CLR-2 :	Develop inter personal skills and be an effective goal oriented team player to achieve success			
CLR-3 :	Utilize professionalism with idealistic, practical and moral values that govern the behavior			
CLR-4 :	Become an expert in communication and problem solving skills			
CLR-5 :	Re-engineer attitude required to succeed and understand its influence on behavior to achieve professionalism			
CLR-6 :	Enhance holistic development of students and improve their employability skills			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:				Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Identify success habits	2	80	75	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
CLO-2 :	Acquire inter personal skills and be an effective goal oriented team player	2	75	70	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
CLO-3 :	Develop professionalism with idealistic, practical and moral values	2	80	75	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
CLO-4 :	Acquire communication and problem solving skills.	2	75	70	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
CLO-5 :	Re-engineer their attitude and understand its influence on behavior	2	85	80	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
CLO-6 :	Apply behavior changing elements to construct professionalism in character and behavior	2	85	80	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Personality profiling	Etiquette and Grooming	Surveying and Reporting	Profile building	Innovation
	SLO-2	Being Proactive	Etiquette and Grooming	Surveying and Reporting	Profile building	Innovation
S-2	SLO-1	Begin with the end in mind	Collaborative skills	Projects	Personal Branding	Innovation
	SLO-2	Putting first things first	Collaborative skills	Projects	Personal Branding	Innovation
S-3	SLO-1	Thinking Win-Win	Networking skills	Paper presentations	Personal Branding	Creativity and out of box thinking
	SLO-2	Seeking first to understand and then to be understood	Networking skills	Paper presentations	Personal Branding	Creativity and out of box thinking
S-4	SLO-1	Synergizing	Team work and Support	Introduction to design thinking	USP	Creativity and out of box thinking
	SLO-2	Sharpening the saw	Team work and Support	Introduction to design thinking	USP	Creativity and out of box thinking
S-5	SLO-1	Character building	Leadership Skills	Generate ideas that are potential solutions to the problem identified	Developing profile	Six thinking hats
	SLO-2	IKIGAI	Leadership Skills	Generate ideas that are potential solutions to the problem identified	Developing profile	Six thinking hats
S-6	SLO-1	Self-worth	Leadership Styles	Report writing	Developing profile	Six thinking hats
	SLO-2	Attitude	Leadership Styles	Report writing	Developing profile	Six thinking hats

Learning Resources	1. Charles Harrington Elstor, Covey Sean, Seven Habits of Highly Effective Teens, New York, Fireside Publishers, 1998	2. Thomas A Harris, I am ok, You are ok, New York-Harper and Row, 1972 3. Carol Dweck, Mindset, The New Psychology of Success, Random House Pub. 2006

Learning Assessment											
	Bloom's Level of Thinking	**Continuous Learning Assessment (100% weightage)**								**Final Examination**	
		CLA – 1 (20%)		CLA – 2 (30%)		CLA – 3 (30%)		CLA – 4 (20%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	-	*40%*	-	*30%*	-	*30%*	-	*30%*	-	-
	Understand										
Level 2	Apply	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-	-
	Analyze										
Level 3	Evaluate	-	*20%*	-	*30%*	-	*30%*	-	*30%*	-	-
	Create										
	Total	100 %		100 %		100 %		100 %		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers			
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts	
1. Ms. SudhaMahadevan, Career Launcher, sudha.m@careerlauncher.com	*1. Mr. Nishith Sinha, dueNorth India Academics LLP, nsinha.alexander@gmail.com*	*1. Dr. T. Mythili, SRMIST*	*2. Mrs. B. Revathi, SRMIST*
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SEMESTER - II

Course Code	18MBH162T	Course Name	BUSINESS COMMUNICATION & VALUE SCIENCE - II	Course Category	H	Humanities and Social Sciences	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Basic Knowledge of English (verbal and written) Completion of all units from Semester 1	Co-requisite Courses	NA	Progressive Courses	NA
Course Offering Department	MBA	Data Book / Codes/Standards			

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning	Program Learning Outcomes (PLO)

LR-1 :	Develop effective writing, reading, presentation and group discussion skills.
CLR-2	Help students identify personality traits and evolve as a better team player.
CLR-3	Introduce them to key concepts of Morality and Behavior and beliefs
CLR-4	Introduce them to the key concepts of diversity and inclusion
CLR-5	Understand the concept of speed reading
CLR 6:	Identify the individual personality types

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	*LevelofThinking(*	*ExpectedProficie*	*ExpectedAttainm*
CLO-1	Understand tools of structured written communication	2	60	50
CLO-2	Understand the basics of presentation	2	80	70
CLO-3	Apply the basic concept of speed reading, skimming and scanning.	1	80	75
CLO-4	Identify individual personality types and role in a team.	2	80	70
CLO-5	Recognize the concepts of outward behavior and internal behavior	3	90	80
Overall	Gain Knowledge in application of the various techniques of communication	3	90	80

T

1	2	3	4	5	6	7	8	9	10	11	12
Effective communication skills	Initiate critical thinking	Resources analysis for organizations	Familiarize organizations and its stakeholders	Integrate functional knowledge with strategic skills	Comprehend effectively in globalized environment	Practice business ethics with integrity	Enhance careers and commitment	Instigate entrepreneurial drive	Applicationofmultidisciplinaryknowledgecomprisingoffinance,operations,system,marketingandhumanresourcesmanagementtointegratebusinessprojects.	Usageofbusinessmetricstoevaluatebusinessprojectstodevelopgrowthstrategies.	Authorizethestudentstoinnovateandexecutethebusinessideaduringthechallenging business situation.
H	*H*	*H*	*M*	*M*	*L*	*M*	*M*	*L*	*M*	*H*	*L*
H	*H*	*L*	*L*	*M*	*M*	*M*	*L*	*L*	*M*	*H*	*H*
H	*H*	*L*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*M*
H	*H*	*M*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*H*
	H	*H*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*L*
H	H	H	M	H	M	H	M	L	H	M	H

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Icebreaker. 1) Participate in Join Hands Movement of .Individual identification of social issues. 2)Each Individual chooses One particular social issue which the ywould like to address. 3)Class to be divided in teams for the entire semester. All activities to be done in teams and the grades, credit Points will be captured in the leader board in the class room. 4)Theory to introduce the	Each group will form an NGO. Create Vision, Mission, Value statement, tagline and Design a logo. Practical (practical)	Design a skit- a) write the script articulating the message of their respective NGOs. Read out the script. (Skit time- 5 minutes). Feedback of Theory. Practical based Learning Formative Evaluation	Touch the target (Blind man) - Debriefing of the Practical. Film: “The fish and I’ ’by BabakHabibifar” (1.37mins). Practical and Discussion	Prepare and publish the final episode of the E Magazine. Practical

		participant Slam book to be used for capturing Individual learning points and observations. Group discussion, Practical				
	SLO-2	Research on the social cause each group will work for. Practical (practical)	Introduction to basic presentation skills & ORAI app Theory and video	Promote the play through asocial media and gather your audience. Enact the play. Capture the numbers of likes and reviews. Theory to assign grades to individual team.(Lab Time) Practical based learning Formative Evaluation	Groups to create a story – 10 minutes of a person's life affected by the social issue groups are working on .Narrate the story in first person. Feedbacks to be shared by the other groups. Practical, sharing and Practical	SATORI –Participants share the personal takes way acquired from working in teams, GD, learning about presentations and understanding diversity inclusion. Discussion
S-2	SLO-1	Class discussion- Good and Bad Writing. Common errors punctuation rules, use of words. PPT, Theory and Practical	Groups to present their NGOs. Apply the learning gathered from session 2. Presentation to be recorded by the groups. feedback from the audience/ Professor Formative evaluation	Promote the play through asocial media and gather your audience. Enact the play. Capture the numbers of likes and reviews. Theory to assign grades to individual team.(Class Time) Practical based learning Formative Evaluation	Groups to create a story – 10 minutes of a person's life affected by the social issue groups are working on. Narrate the story in first person. Feedbacks to be shared by the other groups. (Part 2) Practical, sharing and Practical	Revisit your resume Include your recent achievements in your resume. Submit it to the Professor
	SLO-2	Group Practical- As a group, they will work on the social issue identified by them. Research, read and generate a report based on the findings. (Apply the learning and recap from the session) Formative evaluation	Group to come back and share their findings from there cording. Post work- individual write up to be written and evaluated for the E- magazine Sharing of learning, written Practical and formative evaluation	(1) Theory to find out from the participants their Views, observations and experiences of working in a team(2) Intro of Dr. Meredith Belbin and his research on team work and how individuals contribute. Discussion and Theory	Research on a book, incident or film based on the topic of your respective NGO Research and written Practical	Quiz Time Summative Evaluation for Unit
S-3	SLO-1	Practical: Plan and design an EMagazine. Apply and assimilate the knowledge gathered from Sem-1 till date. Share objective & guideline. All members to contribute an article to the magazine, trainer to evaluate the content. Practical (Practical)	Group to come back and share their findings from the recording. Post work-individual write up to be written and evaluated for the E- magazine (Part 2). *Sharing of learning, written Practical and formative evaluation*	Cont. (3) Belbin's 8 TeamRoles and Lindgren's Big 5personality traits.(4) Belbin's 8team player styles. Practical based learning followed by a presentation	Research on a book, incident or film based on the topic of your respective NGO(Part2). Research and written Practical	Project- 1) Each team to look for an NGO/ social group in the city which is working on the issue their college group is supporting. 2) Spend a day with the NGO/ social group to understand exactly how they work and the challenges they face. 3) Render voluntary service to the group for one day Invite the NGO/ social group to address their university students for couple of hours. Plan the suitable venue in the university, gather audience, invite faculty members etc.(they need to get their plan ratified their professor). Outcome-Host an interactive session with the NGO spokesperson The groups to present their experience of a day with the NGO and inspire students to work for the cause. (A). Field work: Formative Evaluation
	SLO-2	*Practical: Plan and design an EMagazine. Apply and assimilate the knowledge egathered from Sem-1 till date. Share objective & guideline.* *All members to contribute an article to the magazine, trainer to evaluate the content. (Part 2)* Practical (Practical)	Prepare and publish the Second episode of the EMagazine. Practical (Lab)	(1) Team Falcon Practical to identify individual personality traits with Belbin's 8 team player styles Practical based learning followed by a presentation.	Write a review in a blog on the topics they are covering in their research. Theory will give grades to each team. Written Practical and Formative Evaluation	Project- 1) Each team to look for an NGO/ social group in the city which is working on the issue their college group is supporting. 2) Spend a day with the NGO/ social group to understand exactly how they work and the challenges they face.

						3) Render voluntary service to the group for one day 4) Invite the NGO/ social group to address their university students for couple of hours. Plan the suitable venue in the university, gather audience, invite faculty members etc.(they need to get their plan ratified their professor). Outcome-- Host an interactive session with the NGO spokesperson The groups to present their experience of a day with the NGO and inspire students to work for the cause.(B) **Field work: Formative Evaluation**
S-4	SLO-1	Lucid Writing: Encourage the students to go through the links given about Catherine Morris and Joanie Mcmahon's writing techniques. Theory and Discussion	Prepare and publish the Second episode of the EMagazine. (Part 2). Practical (Lab)	(2) Similar personality types to form groups (3) Groups present their traits. Presentation	Session on Diversity &Inclusion- Different forms of Diversity in our society. PPT, Theory, discussion	Project- 1) Each team to look for an NGO/ social group in the city which is working on the issue their college group is supporting. 2) Spend a day with the NGO/ social group to understand exactly how they work and the challenges they face. 3) Render voluntary service to the group for one day 4) Invite the NGO/ social group to address their university students for couple of hours. Plan the suitable venue in the university, gather audience, invite faculty members etc.(they need to get their plan ratified their professor). Outcome-- Host an interactive session with the NGO spokesperson 5) The groups to present their experience of a day with the NGO and inspire students to work for the cause.(C). Field work: Formative Evaluation
	SLO-2	Create the magazine Practical (Lab)	Speed Reading session: Introduction to skimming and scanning; practice the same. Theory and Practical	Prepare and publish the third episode of the EMagazine. Practical	Teams to video record interviews of people from diverse groups (Ask 5 questions). Share the recordings in FB Practical	Project- 1) Each team to look for an NGO/ social group in the city which is working on the issue their college group is supporting. 2) Spend a day with the NGO/ social group to understand exactly how they work and the challenges they face. 3) Render voluntary service to the group for one day 4) Invite the NGO/ social group to address their university students for couple of hours. Plan the suitable venue in the university, gather audience, invite faculty members etc.(they need to get their plan ratified their professor). Outcome-- Host

						an interactive session with the NGO spokesperson The groups to present their experience of a day with the NGO and inspire students to work for the cause.(D) Field work: Formative Evaluation
S-5	SLO-1	SATORI – Participants share the personal take away acquired from GD, writing and reading skills activities captured in their handbook. Share the most Important learning points from the activities done so far and how that learning has brought a change. Theory/Discussion	SATORI – Join the dots- Participants to connect their learning gathered from AIPUnit-2 with their Existing curriculum. Share the most important learning points	SATORI – (join the dots with participants personal life)Participants share the personal take away acquired from working in teams, GD, learning about Presentations, presenting their NGOs. Share the most important learning points from the activities done so far. Participants talk about the Changes they perceive in themselves	Teams to video record interviews of people from diverse groups (Ask 5 questions). Share the recordings in FB(Part b). Practical	Project- 1) Each team to look for an NGO/ social group in the city which is working on the issue their college group is supporting. 2) Spend a day with the NGO/ social group to understand exactly. How they work and the challenges they face. 3) Render voluntary service to the group for one day 4) Invite the NGO/ social group to address their university students for couple of hours. Plan the suitable venue in the university, gather audience, invite faculty members etc.(they need to get their Plan ratified their professor). Outcome--Host an interactive session with the NGO spokesperson 5) The groups to present their experience of a day with the NGO and inspire students to work for The cause. (E). Field work: Formative Evaluation
	SLO-2	Launching an E Magazine. Practical (Lab)	Quiz Time Summative Evaluation for Unit	Quiz Time Summative Evaluation for Unit	Debate on the topic of diversity with an angle of ethics, morality and Respect for individual(In the Presence of an external moderator).Groups will be graded By The professor. Practical and formative evaluation	Project- 1) Each team to look for an NGO/ social group in the city which Is working on the issue their college group is supporting. 2) Spend a day with the NGO/ social group to understand exactly How they work and the challenges they face. 3) Render voluntary service to the group for one day 4) Invite the NGO/ social group to address their university students for couple of hours. Plan the suitable venue in the university, gather audience, invite faculty members etc.(they need to get their Plan ratified their professor). Outcome--Host an interactive session with the NGO spokesperson 5) The groups to present their experience of a day with the NGO and inspire students to work

						for the cause.(F) Field work: Formative Evaluation
S-6	SLO-1	Launching an E Magazine. (Part 2). Practical (Lab)	Ad campaign-Brain Storming session- Students to Discuss and explore the means of articulating and amplifying the social issue their NGO are working for. Discussion	Ten minutes of your time – a short film on diversity. Play the video.(Link to be attached in the FG). Video & discussion	Prepared speech- Every student will narrate the challenges faced by a Member of a diverse group in 4minutes (speech in first person).Theory to give feedback to each student.. Practical and formative evaluation	Project- 1) Each team to look for an NGO/ social group in the city which Is working on the issue their college group is supporting. 2) Spend a day with the NGO/ social group to understand exactly How they work and the challenges they face. 3) Render voluntary service to the group for one day 4) Invite the NGO/ social group to address their university students for couple of hours. Plan the suitable venue in the university, gather audience, invite faculty members etc.(they need to get their Plan ratified their professor). Outcome--Host an interactive session with the NGO spokesperson 5) The groups to present their experience of a day with the NGO and inspire students to work for the Cause (G). Field work: Formative Evaluation
	SLO-2	Quiz Time Summative Evaluation for Unit	Design a skit- a) write the script articulating the message of their Respective NGOs. Read out the script. (Skit time-5 minutes). Feedback of Theory. Practical based learning. Formative evaluation by Theory	Discuss key take away of the film. Theory to connect the key takeaway of the film to the concept of empathy. Practical	Discussion on TCS values, Respect for Individual and Integrity. PPT, Theory ,Practical and discussion	Project- 1) Each team to look for an NGO/ social group in the city which Is working on the issue their college group is supporting. 2) Spend a day with the NGO/ social group to understand exactly How they work and the challenges they face. 3) Render voluntary service to the group for one day 4) Invite the NGO/ social group to address their university students for couple of hours. Plan the suitable venue in the university, gather audience, invite faculty members etc.(they need to get their Plan ratified their professor). Outcome- Host an interactive session with the NGO spokesperson 5) The groups to present their experience of a day with the NGO and inspire students to work for the cause. (H) Field work: Formative Evaluation

Learning Resources	1. Guiding Souls : Dialogues on the purpose of life; Dr. A.P.J Abdul Kalam ;Publishing Year-2005; Co-author--ArunTiwari 2. The Family and the Nation; Dr. A.P.J Abdul Kalam; Publishing year: 2015; Co-author: AcharyaMahapragya.	3. The Scientific India: A twenty First Century Guide to the World around Us; Dr. A.P.J Abdul Kalam; Publishing year: 2011; Co-author-Y.S.Rajan 4. ForgeYour Future: Candid, Forthright,Inspiring;Dr.A.P.JAbdulKalam;Publishingyear:2014.

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50%								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	30%	-	30%	-	30%	-	40%	-	30%	-
Level 2	Apply Analyze	40%	-	40%	-	40%	-	30%	-	40%	-
Level 3	Evaluate Create	30%	-	30%	-	30%	-	30%	-	30%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Experts From TCS	Dr.K.Latha, Chandasekara University, Kanchipuram	Mr.Vijay Raja, Assistant Professor, SRMSOM
	Dr.Thenmozhi, Professor, University of Madras	Dr.SanthoshKumart, Head – Human Resources , SRMSOM

Course Code	18MBH163T	Course Name	FUNDAMENTALS OF ECONOMICS	Course Category	H	Humanities & Social Sciences	L	T	P	C
							2	0	0	2

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*School of Management*	**Data Book / Codes/Standards**	*Nil*		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*To provide a brief understanding of basic principles in economics*			
CLR-2 :	*Understand the concepts of demand and supply analysis*			
CLR-3 :	*Acquire knowledge on the principles of costs and other concepts of production*			
CLR-4 :	*Understand market structures*			
CLR-5 :	*Introduction to macro economics*			
CLR-6 :	*Knowledge of various concepts of micro and macro economics in real time economy*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	*Able to assess and understand the firm and the industry basic framework*	*2*	*80*	*70*	*H*	*H*	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	*Able to gauge and incorporate consumers behavior in decision making by the firm and consumers*	*2*	*85*	*75*	*H*	*H*	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	*Able to understand production decisions*	*2*	*75*	*70*	*H*	-			-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	*Able to understand and assess decisions of an economy and its working*	*2*	*85*	*80*	*H*	*H*	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-5 :	*Able to understand the relationship between world economy and Indian economy*	*2*	*85*	*75*	*H*	-	*H*	-	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	*Able to understand the relationship between world economy and Indian economy*	*2*	*80*	*70*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Duration (hour)		**6**	**6**	**6**	**6**	**6**
S-1	**SLO-1**	*Introduction- Firm and industry- Micro economics*	*Utility Maximization and Consumption*	Production Function	*Macro economics-Introduction*	*External sector*
	SLO-2	*Meaning and scope of economics*	*Consumers' and Producers' Surplus*	Iso-quants	*Aggregate demand*	Exports and Imports
S-2	**SLO-1**	*Importance of study of economics*	*Price Ceilings and Price Floors; Consumer Behaviour*	Isocosts	*Aggregate supply*	*Money* —Definitions; *Demand for Money*
	SLO-2	*Functions of economics*	*Axioms of Choice*	Producer equilibrium	*Circular flow of income*	Transactionary and Speculative Demand
S-3	**SLO-1**	*Demand - Introduction*	*Budget Constraints and Indifference Curves*	Cost Minimization	*National Income and its Components*	*Supply of Money*
	SLO-2	*Theory of demand*	*Consumer's Equilibrium*	Cost Curves — Total, Average and Marginal Costs	GNP, NNP, GDP, NDP	Bank's Credit Creation Multiplier
S-4	**SLO-1**	*Shifting and Expansion of demand*	*Income and Substitution Effects*	Long Run and Short Run Costs	Consumption Function	*Integrating Money and Commodity Markets*
	SLO-2	*Elasticity of demand*	*Derivation of a Demand Curve;*	Equilibrium of a Firm Under Perfect Competition	Investment	IS,LM Model
S-5	**SLO-1**	*Theory of supply*	*Applications — Tax and Subsidies*	Equilibrium of a Firm Under Monopoly	*Simple Keynesian Model of Income Determination*	*Business Cycles and Stabilization* — Monetary and Fiscal Policy
	SLO-2	*Market equilibrium*	*Intertemporal Consumption*	Equilibrium of a Firm Under Monopolistic Competition	*Keynesian Multiplier*	Central Bank and the Government; *The Classical*
S-6	**SLO-1**	*Price and output-Firm*	*Suppliers' Income Effect*	*Pricing decisions under various market structures*	*Government Sector*	Price and Wage Rigidities
	SLO-2	*Price and output - Industry*	*Decision making*	*Implications of pricing decisions*	Taxes and Subsidies	Voluntary and Involuntary Unemployment

Learning Resources	*Microeconomics*, Pindyck, Robert S., and Daniel L. Rubinfeld *Macroeconomics*, Dornbusch, Fischer and Startz. *Economics*, Paul Anthony Samuelson, William D. Nordhaus.	*Intermediate Microeconomics: A Modern Approach*, Hal R, Varian *Principles of Macroeconomics*, N. Gregory Mankiw.

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50%								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	40%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	30%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Experts From TCS		*Dr. Nisha Ashokan*
		Dr. Padmaja M

Course Code	18MAB163T	Course Name	LINEAR ALGEBRA	Course Category	*B*	*Basic Sciences*	L	T	P	C
							3	1	0	4

Pre-requisite Courses	18MAB161T	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Mathematics*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLR-1 :	*Apply basic concepts of Matrix method to solve linear equations.*																		
CLR-2 :	*Apply analytical concepts and numerical methods of Matrix to solve linear equations.*																		
CLR-3 :	*Apply Vector space and its properties like Dimension, Basis, orthogonality, Projections, Gram-Schmidt orthogonalization and QR decomposition to solve engineering related problems.*																		
CLR-4 :	*Apply Eigen values and Eigenvectors, Positive definite matrices, Linear transformations, Hermitian matrices and unitary matrices tosolve engineering related problems.*																		
CLR-5 :	*Understand the concepts of Singular value decomposition and Principal component analysis on basic applications in Image Processing and Machine Learning.*																		
CLR-6 :	*Utilize the concepts in Linear Algebra for the understanding of Engineering and Technology.*																		
Course Learning Outcomes (CLO):	***At the end of this course, learners will be able to:***																		
CLO-1 :	*Gaining knowledge in basic concepts of Matrix method to solve linear equations.*	2	85	80	M	H	L						M	L		H			
CLO-2 :	*Gaining knowledge in analytical concepts and numerical methods of Matrix to solve linear equations.*	2	85	80	M	H		M	M				M			H			
CLO-3 :	*Understanding the concepts of vector space and its properties related to engineering problems.*	2	85	80	M	H							M			H			
CLO-4 :	*Understanding the concepts of linear equations obtained from real world problems based on the characteristics of matrix.*	2	85	80	M	H		M					M			H			
CLO-5 :	*Knowing and comprehend the machine learning methods on simple model of image process by the concepts of Singular value decomposition and Principal component analysis.*	2	85	80	M	H	L						M	L		H			
CLO-6 :	*Apply the basic concepts of Linear Algebra to understand how to create a mathematical simulations for any real world problems.*	2	85	80	M	H	L						M	L		H			

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		**12**	**12**	**12**	**12**	**12**
S-1	**SLO-1**	Introduction to Matrices	Basic definitions of vectors	Introduction to vector space	Introduction to Eigen values and corresponding Eigen vectors	Introduction to Singular value decomposition
	SLO-2	Problems on Matrices	Examples of vectors	Examples of vector space	Simple problems on Eigen values and corresponding Eigen vectors	Examples of Singular value decomposition
S-2	**SLO-1**	Problems on Matrices	Formation of linear combinations	Definition of dimension of vector space	Problems on Eigen values and corresponding Eigen vectors	Introduction to Principal component analysis
	SLO-2	Problems on Matrices	Examples of linear combinations	Definition of basis of vector space	Problems on Eigen values and corresponding Eigen vectors	Examples of Principal component analysis
S-3	**SLO-1**	Introduction to Determinants	Introduction to Rank of matrix	Problems ondimension and basis of vector space	Problems on Eigen values and corresponding Eigen vectors	Simple problems on singular value and principle of decomposition
	SLO-2	Problems on Determinants	Problems on Rank of matrix	Problems on dimension and basis of vector space	Problems on Eigen values and corresponding Eigen vectors	Simple problems on singular value and principle of decomposition
S-	**SLO-1**	Problem solving using tutorial sheet 1	Problem solving using tutorial sheet 4 in	Problem solving using tutorial sheet 7	Problem solving using tutorial sheet 10 in finding Eigen values and	Problem solving using tutorial sheet

4		in Matrices	rank of matrix	on dimension and basis of vector space	corresponding Eigen vectors	13
	SLO-2	Problem solving using tutorial sheet 1 in determinants	Problem solving using tutorial sheet 4 in rank of matrix	Problem solving using tutorial sheet 7 on dimension and basis of vector space	Problem solving using tutorial sheet 10 in finding Eigen values and corresponding Eigen vectors	Problem solving using tutorial sheet 13
S-5	**SLO-1**	Solution of Linear Equations	Definition of Gaussian elimination	Definition of Orthogonality with simple examples	Definition of Positive definite matrices.	Introduction to Image Processing
	SLO-2	Solution of Linear Equations	Problems using Gaussian elimination	Definition of Projections with simple examples	Examples of Positive definite matrices.	Examples on Image Processing
S-6	**SLO-1**	Definition of Cramer's rule	Problems using Gaussian elimination	Problems based on Orthogonality and Projections	Problems on Positive definite matrices.	Simple problems on applications in Image Processing based on Singular value decomposition and Principal component analysis
	SLO-2	Problems based on Cramer's rule	Problems using Gaussian elimination	Problems based on Orthogonality and Projections	Problems on Positive definite matrices.	Simple problems on applications in Image Processing based on Singular value decomposition and Principal component analysis
S-7	**SLO-1**	Problems based on Cramer's rule	Problems using Gaussian elimination	Introduction to Gram-Schmidt orthogonalization	Introduction to Linear transformations	Simple problems on applications in Image Processing based on Singular value decomposition and Principal component analysis
	SLO-2	Problems based on Cramer's rule	Problems using Gaussian elimination	Simple Problems on Gram-Schmidt orthogonalization	Problems on Linear transformations	Simple problems on applications in Image Processing based on Singular value decomposition and Principal component analysis
S-8	**SLO-1**	Problem solving using tutorial sheet 2 in solving Linear Equations	Problem solving using tutorial sheet 5 in Gaussian elimination method	Problem solving using tutorial sheet 8 in Orthogonality and Projections	Problem solving using tutorial sheet 11 in Positive definite matrices.	Problem solving using tutorial sheet 14
	SLO-2	Problem solving using tutorial sheet 2 in solving Linear Equations	Problem solving using tutorial sheet 5 in Gaussian elimination method	Problem solving using tutorial sheet 8 in Orthogonality and Projections	Problem solving using tutorial sheet 11 in Linear transformations	Problem solving using tutorial sheet 14
S-9	**SLO-1**	Definition of Inverse of a Matrix	Definition of LU Decomposition	Simple Problems on Gram-Schmidt orthogonalization	Definition of Hermitian matrices with examples	Introduction to Machine Learning
	SLO-2	Problem on Inverse of a Matrix	Problems on LU Decomposition	Simple Problems on Gram-Schmidt orthogonalization	Examples on Hermitian matrices with examples	Examples of Machine Learning
S-10	SLO-1	Problem on Inverse of a Matrix	Problems on LU Decomposition	Definition of QR decomposition	Problem on Hermitian matrices	Simple problems on applications in Machine Learning based on Singular value decomposition and Principal component analysis
	SLO-2	Problem on Inverse of a Matrix	Problems on LU Decomposition	Problems on QR decomposition	Problem on Hermitian matrices	Simple problems on applications in Machine Learning based on Singular value decomposition and Principal component analysis
S-11	SLO-1	Problem on Inverse of a Matrix	Solving Systems of Linear Equations using the tools of Matrices	Problems on QR decomposition	Definition of unitary matrices	Simple problems on applications in Machine Learning based on Singular value decomposition and Principal component analysis

	SLO-2	Problem on Inverse of a Matrix	Solving Systems of Linear Equations using the tools of Matrices	Problems on QR decomposition	Examples on unitary matrices	Simple problems on applications in Machine Learning based on Singular value decomposition and Principal component analysis
S-12	SLO-1	Problem solving using tutorial sheet 3 to find Inverse of a Matrix	Problem solving using tutorial sheet 6 in Solving Systems of Linear Equations using the tools of Matrices	Problem solving using tutorial sheet 9	Problem solving using tutorial sheet 12	Problem solving using tutorial sheet 15
	SLO-2	Problem solving using tutorial sheet 3 to find Inverse of a Matrix	Problem solving using tutorial sheet 6 in Solving Systems of Linear Equations using the tools of Matrices	Applications of Orthogonality and Projections in Engineering on tutorial sheet 9.	Problem solving using tutorial sheet 12	Problem solving using tutorial sheet 15

	REFERENCE BOOKS/OTHER READING MATERIAL
1	*Higher Engineering Mathematics*, B. S. Grewal
2	*Advanced Engineering Mathematics*, 7th Edition, Peter V. O'Neil
3	*Advanced Engineering Mathematics*, 2nd Edition, Michael. D. Greenberg
4	*Introduction to linear algebra*, 5th Edition, Gilbert Strang
5	*Applied Mathematics* (Vol. I & II) , by P. N. Wartikar& J. N. Wartikar
6	*Digital Image Processing*, R C Gonzalez and R E Woods
7	https://machinelearningmastery.com/introduction-matrices-machine-learning/

Learning Assessment											
	Bloom's Level of Thinking	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (15%)**		**CLA – 3 (15%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	**Remember**	**40%**	-	**30%**	-	**30%**	-	**30%**	-	**30%**	-
	Understand										
Level 2	**Apply**	**40%**	-	**40%**	-	**40%**	-	**40%**	-	**40%**	-
	Analyze										
Level 3	**Evaluate**	**20%**	-	**30%**	-	**30%**	-	**30%**	-	**30%**	-
	Create										
	Total	**100 %**		**100 %**		**100 %**		**100 %**		**100%**	

 # CLA –4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,
SLO – Session Learning Outcome

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Expert from TCS	***Dr.K.C.Sivakumar, IIT, Madras, kcskumar@iitm.ac.in***	***Dr.A.Govindarajan***
		Dr.N.Parvathi

Course Code	18MAB164J	Course Name	STATISTICAL MODELLING	Course Category	B	Basic Sciences	L	T	P	C
							3	0	2	4

Pre-requisite Courses	18MAB162T	Co-requisite Courses	*Nil*	Progressive Courses	
Course Offering Department	*Mathematics*	Data Book / Codes/Standards	Statistical tables		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	To apply the sampling techniques in Engineering field to understand various sampling methods
CLR-2 :	To learn the procedure of correlation, regression and ANOVA
CLR-3 :	To learn the basics and importance of estimate of statistical data
CLR-4 :	To learn the basics and importance of Non-parametric methods in testing hypothesis
CLR-5 :	To know the procedure for Time Series Analysis & Forecasting
CLR-6 :	To comprehend the applications statistical modeling

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning 1 (Level of Thinking (Bloom))	Learning 2 (Expected Proficiency (%))	Learning 3 (Expected Attainment (%))	PLO 1 (Engineering Knowledge)	PLO 2 (Problem Analysis)	PLO 3 (Design & Development)	PLO 4 (Analysis, Design, Research)	PLO 5 (Modern Tool Usage)	PLO 6 (Society & Culture)	PLO 7 (Environment & Sustainability)	PLO 8 (Ethics)	PLO 9 (Individual & Team Work)	PLO 10 (Communication)	PLO 11 (Project Mgt. & Finance)	PLO 12 (Life Long Learning)	PLO 13 (PSO - 1)	PLO 14 (PSO - 2)	PLO 15 (PSO – 3)
CLO-1 :	Understand the sampling techniques	3	85	80	M	H	L						M	L		H			
CLO-2 :	Pertain the Knowledge of Linear Statistical Models, ANOVA in Engineering field	3	85	80	M	H		M	M				M			H			
CLO-3 :	Gain familiarity in estimate of statistical data	3	85	80		M							M			H			
CLO-4 :	Gaining knowledge in non-parametric methods	3	85	80	M	H	L	M					M	L		H			
CLO-5 :	Getting the knowledge of Time Series Analysis & Forecasting and apply them in the problems in Science and Engineering	3	85	80	M	H	M						M			H			
CLO-6 :	Understanding the concept and applications of statistical modelling	3			M	H							M			H			

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		15	15	15	15	15
S-1	SLO-1	Sampling techniques	Linear Statistical Models - Introduction	Introduction to Estimation	Non-parametric Inference	Basics of Time Series Analysis & Forecasting
	SLO-2	Random sampling	Linear Statistical Models - Introduction	Point estimation	Non-parametric Inference	Basics of Time Series Analysis & Forecasting
S-2	SLO-1	Sampling from finite and infinite population	Simple linear correlation	criteria for good estimates (un-biasedness	Comparison with parametric inference	Stationary models
	SLO-2	Simple random sampling	Simple linear correlation	criteria for good estimates (consistency)	Use of order statistics	Stationary models identification
S-3	SLO-1	Simple random sampling	Karl Pearson method	Methods of estimation including maximum likelihood estimation.	Sign test	Stationary models Estimation and Forecasting
	SLO-2	Stratified random sampling	Spearman rank correlation	Methods of estimation including maximum likelihood estimation.	Wilcoxon signed rank test	Stationary models Estimation and Forecasting
S-4,5	SLO-1	**Lab 1:** Introduction to R	**Lab 4:** Working with Vectors and Matrices	**Lab 7:** Writing Data	**Lab 10:** Manipulating Data	**Lab 13:** Data Frame
	SLO-2					
S-6	SLO-1	Systematic sampling	Simple linear regression	Sufficient Statistic: Concept & examples	Mann-Whitney	ARIMA Models
	SLO-2	Systematic sampling	Simple linear regression	Sufficient Statistic: Concept & examples	Mann-Whitney	ARIMA Models identification
S-7	SLO-1	Cluster sampling	multiple correlation	complete sufficiency, their application in estimation	Run test	ARIMA Models Estimation and Forecasting
	SLO-2	Cluster sampling	multiple correlation	complete sufficiency, their application in estimation	Run test	ARIMA Models Estimation and Forecasting
S-8	SLO-1	Estimates and standard error of sampling with replacement	Introduction to Analysis of variance	Introduction to Test of hypothesis	Kolmogorov-Smirnov test	Problems based on ARIMA Models
	SLO-2	Estimates and standard error of sampling with replacement	One way ANOVA with as well as without interaction	Concept & formulation	Kolmogorov-Smirnov test	Problems based on ARIMA Models

S-9,10	SLO-1	**Lab 2:** Functions- Control flow and Loops	**Lab 5:** Working with Vectors and Matrices	**Lab 8:** Working with Data	**Lab 11:** Manipulating Data	**Lab 14:** Graphics in R
	SLO-2					
S-11	SLO-1	Estimates and standard error of sampling without replacement	Problems based on One way ANOVA	Type I and Type II errors	Spearman's and Kendall's test, Tolerance region	Problems based on Stationary models
	SLO-2	Sampling distribution of sample mean	Problems based on Two way ANOVA	Neyman Pearson lemma	Spearman's and Kendall's test, Tolerance region	Problems based on Stationary models
S-12	SLO-1	Applications of sampling distribution of mean	Problems based on one and Two way ANOVA	Neyman Pearson lemma	More problems based on Non-Parametric methods	Problems based on Stationary models ARIMA Models
	SLO-2					
S-13	SLO-1	Engineering applications of sampling techniques	Applications of Linear Statistical Models and ANOVA in Engineering field	Application of estimation and testing hypothesis in Engineering	Applications and the importance of Non - Parametric Testing Hypothesis	Engineering Applications of Time Series Analysis & Forecasting
	SLO-2					
S - 14-15	SLO-1	**Lab 3:** Functions- Control flow and Loops	**Lab 6:** Reading in Data	**Lab 9:** Working with Data	**Lab 12:** Simulation - Linear model	**Lab 15:** Graphics in R
	SLO-2					
Learning Resources		1. Probability and Statistics for Engineers (4th Edition), I.R. Miller, J.E. Freund and R. Johnson, 2015. 2. Fundamentals of Statistics (Vol. I & Vol. II), A. Gun, M. k. Gupta and B.Dasgupta, 2016. 3. The Analysis of Time Series: An Introduction, Chris Chatfield, Sixth edition-2016. 4. Hands-on Programming with R,- Garrett Grolemund, 2014 5. R for Everyone: Advanced Analytics and Graphics, Jared P. Lander, First edition-2013. 6. D.C. Montgomery and E.Peck , Introduction to Linear Regression Analysis, Third Edition, Wiley, 2010				

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	**Remember** / **Understand**	20 %	20 %	15%	15%	15%	15%	15%	15%	15%	15%
Level 2	**Apply** / **Analyze**	20 %	20 %	20 %	20 %	20 %	20 %	20 %	20 %	20 %	20 %
Level 3	**Evaluate** / **Create**	10 %	10 %	15 %	15 %	15 %	15 %	15 %	15 %	15 %	15 %
	Total	100%		100%		100%		100%		100%	

 # CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc., SLO – Session Learning Outcome

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Expert from TCS	Dr.Y.V.S.S. Sanyasiraju, IIT, Madras, **sryedida@iitm.ac.in**	Dr.A.Govindarajan
		Dr. R. Varadharajan

Course Code	18EES162J	Course Name	PRINCIPLES OF ELECTRONICS	Course Categor	S	Engineering Sciences	L	T	P	C
							2	0	2	3

Pre-requisite	*Nil*	Co-requisite	*Nil*	Progressive	*Nil*
Course Offering Department	*Computer Science Engineering*	**Data Book / Codes/Standards**	*Nil*		

Course Learning Rationale (CLR):	*The purpose of learning this course is to: Understand Electronic circuits and design simple circuits*	**Learning**	**Program Learning Outcomes (PLO)**

CLR-1:	*For the student to understands the use of Silicon based diode and transistor operations he can build complex circuits*	*1*	*2*	*3*
CLR-2:	*BJT is the initial transistor made, by learning about it the use of multiple pn junction devices can be understood*			
CLR-3:	*MOSFET is a building block for any complex electronic circuit and hence the need to understand its working and application*			
CLR-4:	*Many of electronic circuits are based on signal amplifiers; it can be configured to provide many functionalities*			
CLR-5:	*Without knowing digital electronics, computational circuits are not possible*			
CLR-6:	-			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	LevelofThinking(Bloom)	ExpectedProficiency(%)	ExpectedAttainment(%)	1 EngineeringKnowledge	2 ProblemAnalysis	3 Design&Development	4 Analysis,Design,Research	5 ModernToolUsage	6 Society&Culture	7 Environment&Sustainability	8 Ethics	9 Individual&TeamWork	10 Communication	11 ProjectMgt.&Finance	12 LifeLongLearning	13 PSO–1(Knowingthebasics)	14 PSO–2(Applyinglearntknowledge)	15 PSO–3(Exentdingleamtheory)
CLO-1 :	*Understand physical process of Si based pn junctions; able to design simple circuits using pn junction diodes.*	*2*	*80*	*70*	*H*	*M*	-	-	-	-	-	-	-	-	-	-	*L*	-	-
CLO-2 :	*Understand the working of diodes and BJTs.; In addition he will gain knowledge on using it for simple designs*	*2*	*85*	*75*	*H*	*M*	-	-	-	-	-	-	-	-	-	-	*M*	-	-
CLO-3 :	*Understand the working of MOSFETs and circuits based on it. He will also be capable of making small circuits*	*2*	*85*	*75*	*H*	-	*H*	*H*	-	-	-	-	-	-	-	-	-	*M*	-
CLO-4 :	*Study and analyze linear and non linear circuits, including amplifiers in small and large signal conditions.*	*4*	*85*	*75*	*H*	*H*	-	*H*	-	-	-	-	-	-	-	-	-	*M*	-
CLO-5 :	*Design simple digital circuits and analyze, simulate and implement*	*4*	*90*	*85*	*H*	*M*	-	*M*	-	-	-	-	-	-	-	-	-	*H*	*L*

Duration (hour)		**12**	**12**	**12**	**12**	**12**
S- 1	**SLO-1**	*Crystalline materials*	*BJT formation*	*MOSFET fundamentals*	*Theoretical basis of small signal amplifiers*	*Analog and digital signals, waveform,*
	SLO-2	*Electrical and mechanical properties*	*Difference between the three regions*	*MOSFET fundamentals*	*Theoretical basis of small signal amplifiers*	*Levels, representation and noise*
S- 2	**SLO-1**	*Energy band theory*	*BJT electrical characteristics*	*FET biasing*	*Concept of feed back*	*Boolean Algebra*
	SLO-2	*Fermi level*	*BJT electrical characteristics*	*Fixed and self biasing*	*Types of feedback and its effects*	*Boolean function and truth tables*
S- 3	**SLO-1**	*Pn junction*	*Analysis of BJT in CE mode*	*Depletion and enhancement modes*	*Loop gain and open loop gain*	*Simplification of logic expressions*
	SLO-2	*Drift and diffusion carriers*	*Biasing and load line effect*	*Depletion and enhancement modes*	*Problems*	*K- map & problems*
S- 4	**SLO-1**	*Built-in potential*	*Analysis of CB and CC mode*	*CS configuration analysis*	*Output and input impedance*	*Adder and subtractor*
	SLO-2	*Biased pn junction*	*Analysis of CB and CC mode*	*Problems*	*Output and input impedance*	*Multipluxers, demultipluxers and its uses*
S	**SLO-**	*Lab: Simulating pn junction*	*Lab: BJT characteristics, load*	*Lab on FET characteristics, load*	*Lab: Simulation of any one*	*Lab: Implementing a digital*

5-6	**1** **SLO-2**	*characteristics*	*biasing effects.*	*biasing*	*amplifier and analysis*	*using gates and digital ICs, measuring noise.*
S- 7	**SLO-1**	*Zener Diodes*	*Cut-off, active and saturation modes*	*CD configuration analysis*	*Operation amplifier*	*Concept of sequential circuits and clock*
	SLO-2	*LEDs*	*Cut-off, active and saturation modes*	*Problem*	*Typical circuit diagram*	*Flip flop and typical circuit*
S- 8	**SLO-1**	*Load line analysis*	*Injection efficiency*	*CG configuration*	*Characteristics of OPAMP*	*Various types of FFs*
	SLO-2	*Series – parallel configurations of*	*Base transport factor in CE mode*	*Combining configurations*	*Characteristics of OPAMP*	*Various types of FFs*
S- 9	SLO	*AND / OR gates with diodes*	*Current amplification factor in CB mode*	*Designing FET amplifier networks*	*Inverting and non-inverting modes*	*Shift register – serial to parallel*
	SLO-2	*Rectifiers*	*Current amplification factor in CB mode*	*Problems*	*Problems*	*Parallel to serial*
S-10	SLO-1	*Ripple factor and filtering*	*Biasing and stability analysis*	*CMOS fundamentals*	*Applications of OPAMPS: Adder, subtractor, constant*	*Ripple carry counter*
	SLO-2	*Effect of load on ripple factor*	*Simple CE amplifier*	*Problems*	*Voltage follower, Integrator,*	*Synchronous counter*
S 11-12	SLO-1 SLO-2	*Lab: Full wave and half wave rectifiers, with and without RC filter*	*Lab: Design and testing of CE amplifier*	*Lab: FET amplifier, simple and cascade*	*Lab: Design and build OPAMP amplifier*	*Lab: Implementation of any one shift register or counter*

Learning Resources	*1. Adel S. Sedra and Kenneth Carless Smith, "Microelectronic Circuits, Theory and applications", 7th edition, Oxford press.2. Jacob Millman, Christos Halkias, Chetan Parikh, "Millman's Integrated Electronics", McGraw Hill, 2017.*	1. *Morismano, "Digital Logic & Computer Design", Pearson, 2017.*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50%								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*20%*	*20%*	*15%*	*15%*	*10%*	*10%*	*10%*	*10%*	*15%*	*15%*
Level 2	Apply Analyze	*20%*	*20%*	*20%*	*20%*	*30%*	*30%*	*20%*	*30%*	*20%*	*20%*
Level 3	Evaluate Create	*10%*	*10%*	*15%*	*15%*	*10%*	*10%*	*10%*	*10%*	*15%*	*15%*
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Experts From TCS		*Prof. V. Natarajan (ECE department SRMIST)*

Course Code	18CSC162J	Course Name	DATA STRUCTURES AND ALGORITHMS	Course Categor	C	Professional Core	L	T	P	C
							3	0	4	5

Pre-requisite	Nil	Co-requisite	Nil	Progressive	
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Utilize the different data types; Utilize searching and sorting algorithms for data search
CLR-2 :	Utilize linked list in developing applications
CLR-3 :	Utilize stack and queues in processing data for real-time applications
CLR-4 :	Utilize tree data storage structure for real-time applications
CLR-5 :	Utilize algorithms to find shortest data search in graphs for real-time application development
CLR-6 :	Utilize the different types of data structures and its operations for real-time programming applications

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking(Bloom)	Expected Proficiency(%)	Expected Attainment(%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment&Sustainabilit	Ethics	Individual & Team Work	Communication	ProjectMgt.&Finance	LifeLongLearning	PSO-1	PSO-2	PSO–3
CLO-1 :	Identify linear and non-linear data structures. Create algorithms for searching and sorting	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-
CLO-2 :	Create the different types of linked lists and evaluate its operations	3	85	75	M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
CLO-3 :	Construct stack and queue data structures and evaluate its operations	3	75	70	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-4 :	Create tree data structures and evaluate its types and operations	3	85	80	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-5 :	Create graph data structure, evaluate its operations, implement algorithms to identify shortest path	3	85	75	H	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-6 :	Construct the different data structures and evaluate their types and operations	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-

Duration		21	21	21	21	21
S-1	SLO-1	Introduction-Basic Terminology	Array	General Trees	Graph Terminology	Hashing: Hash functions - Introduction
	SLO-2	Data Structures	Operations on Arrays – Insertion and Deletion	Tree Terminologies	Graph Traversal	Types of hashing
S-2	SLO-1	Data Structure Operations	Applications on Arrays - Multidimensional Arrays- Sparse	Tree Representation	Topological sorting	Hash functions
	SLO-2	ADT	Linked List Implementation - Insertion	Tree Traversal	Minimum spanning tree – Prims Algorithm	Applications of Hash Table
S-3	SLO-1	Algorithm specification	Linked List- Deletion and Search	Binary Tree Representation	Minimum Spanning Tree - Kruskal's Algorithm	Hashing : Collision avoidance
	SLO-2	Recursion, Performance analysis	Applications of Linked List - Polynomial Arithmetic	Expression Trees	Shortest Path Algorithm: Dijkstra's Algorithm	Hashing : Separate chaining
S 4-7	SLO-1	Lab 1: Implementation of Towers of Hanoi Using recursion	Lab 4 :Implementation of Linked List	Lab 7 :Implementation of Tree Traversals	Lab 10: Implementation of Minimal Spanning Tree	Lab 13: Implementation of Bubble Sort ,Insertion sort
	SLO-2					
S-8	SLO-1	Programming Style, Refinement of Coding	Cursor Based Implementation	Binary Tree Traversal	Searching -Linear search	Open Addressing
	SLO-2	Complexity – Time , Space Trade off	Circular Linked List - Applications of Circular List -	Threaded Binary Tree	Searching -Binary search	Linear Probing
S-9	SLO-1	Mathematical notations	Doubly Linked List Insertion	Binary Search Tree :Construction, Searching	Breadth First search	Quadratic probing
	SLO-2	Asymptotic notations-Big O, Omega	Doubly Linked List Deletion	Binary Search Tree : Insertion and Deletion	Depth First search	Double Hashing

S-10	SLO-1	*Asymptotic notations - Theta*	*Stack ADT- Stack Array Implementation*	*AVLTrees: Rotations*	*Introduction to Sorting*	*Rehashing*
	SLO-2	*Mathematical functions*	*Stack Linked List Implementation*	*AVL Tree: Insertions*	*Bubble sort*	*Extensible Hashing*
S 11-	SLO-1 SLO-2	*Lab 2: Implementation of Array – Insertion, Deletion.*	*Lab 5: Implementation of Doubly linked List*	*Lab 8: Implementation of Binary search tree*	*Lab 11:Implementation of Shortest path Algorithm*	*Lab 14 :Implementation of Graph using Array*
S-15	SLO-1	*Data Structures and its Types*	*Applications of Stack- Infix to Postfix Conversion*	*B-Trees Constructions*	*Insertion sort*	*Introduction to Files*
	SLO-2	*Linear and Non-Linear Data Structures*	*Applications of Stack- Postfix Evaluation*	*B-Trees Search*	*Selection sort*	*File Organization*
S-16	SLO-1	*1D, 2D Array Initialization using Pointers*	*Applications of Stack- Balancing symbols*	*B-Trees Deletions*	*Shell sort*	*Sequential*
	SLO-2	*1D, 2D Array Accessing usingPointers*	*Queue ADT-Queue Implementation using array - Queue Implementation using Linked List*	*B+ tree*	*Merge sort*	*Direct*
S-17	SLO-1	*Declaring Structure and accessing*	*Circular Queue -Implementation of Circular Queue*	*Splay Trees*	*Quick sort*	*Index Sequential*
	SLO-2	*Declaring Arrays of Structures and accessing*	*Applications of Queue*	*Applications of Trees*	*Heap sort*	*Hashed*
S 18-	SLO-1 SLO-2	*Lab 3: Implement Structures using Pointers*	*Lab 6: Implementation of Stack and its Applications*	*Lab 9: Implementation of B-Trees*	*Lab 12: Implementation of Quick Sort ,Merge sort*	*Lab 15 :Implementation of File concepts*

Learning Resources	*1. Fundamentals of Data Structures, E. Horowitz and S. Sahni,1977.* *2. DataStructuresandAlgorithms,AlfredV.Aho,JohnE.Hopcroft,JeffreyD.Ullman.* *3. Mark Allen Weiss, Data Structuresand Algorithm Analysis in C, 2nd ed., Pearson Education, 2015*	*4. Reema Thareja, Data Structures Using C, 1st ed., Oxford Higher Education,2011* *5. Thomas H Cormen, Charles E Leiserson, Ronald L Revest, Clifford Stein, Introduction to Algorithms 3rd ed., The MIT Press Cambridge,2014*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
Level 2	Apply Analyze	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
Level 3	Evaluate Create	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Total	100 %		100 %		100 %		100 %		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Experts From TCS		***1****. Mr. G. Manoj Kumar, SRMIST*

Course Code	18LEM102J	Course Name	VALUE EDUCATION	Course Category	M	Mandatory	L	T	P	C
							1	0	1	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Connect the learners to their potential, identifytheir potential to create a new positive world
CLR-2 :	Analyze the merits and demerits of different educational systems. Identify the different systems of education
CLR-3 :	Draw attention towards the weaknesses they are susceptible to and inspire them through positive models
CLR-4 :	Instill a sense of professional ethics which help them develop a safe comfortable and prosperous society
CLR-5 :	Cultivate a spirit of willing accommodation in an increasingly diverse world
CLR-6 :	Strengthen, enhance the spirit of positivity and facilitate positive contribution in various spheres of life

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning: 1 Level of Thinking (Bloom)	2 Expected Proficiency (%)	3 Expected Attainment (%)	Program Learning Outcomes (PLO): 1 Engineering Knowledge	2 Problem Analysis	3 Design & Development	4 Analysis, Design, Research	5 Modern Tool Usage	6 Society & Culture	7 Environment & Sustainability	8 Ethics	9 Individual & Team Work	10 Communication	11 Project Mgt. & Finance	12 Life Long Learning	13 PSO - 1	14 PSO - 2	15 PSO – 3
CLO-1 :	Equipped with an awareness of their positive energy and power	2	80	75	L	M	-	-	M	H	-	H	H	H	-	H	-	-	-
CLO-2 :	Identify the meaning of 'education'; have a clearer and better understanding in taking education to the masses	2	75	70	M	H	M	-	H	H	M	M	H	H	-	H	-	-	-
CLO-3 :	Assess their weaknesses; understand risks involved and rectify them through learning from positive and negative instances	2	80	75	M	-	-	-	M	H	M	M	H	H	-	H	-	-	-
CLO-4 :	Realize their professional responsibilities	2	75	70	H	M	-	-	H	H	H	H	H	H	-	H	-	-	-
CLO-5 :	Acquire the required values in an expanding pluralistic world not be swept off their feet due to the rapid changes	2	85	80	M	-	-	-	H	H	H	H	H	H	-	H	-	-	-
CLO-6 :	Equip with better understanding of themselves, society they live. Identify responsibilities in creating a peaceful world	2	80	75	M	M	-	-	H	H	H	H	H	H	-	H	-	-	-

		Visions for Youth	Youth and Education	Youth and Society	Youth as Professionals	Youth in Pluralistic Society
Duration (hour)		6	6	6	6	6
S-1	SLO-1	Introduction	Meaning and the significance of education	Need for social values in the present context	Introduction to professional values	Introduction to pluralistic society, forces of globalization
	SLO-2	Quiz	Brainstorming	Poem – "Where the mind is without fear" Write up on various instances from real life	Brainstorming through visual cues	Group Discussion
S-2	SLO-1	Two speeches by great personalities	Overview of different (traditional, modern) educational systems	Individual and group behavior, respect for others	Engineering societies in India	Science and technology intercultural proximity
	SLO-2	Oral presentations	Debate	Case study on recent happenings	Quiz	Narration of stories from various religions to illustrate the oneness of humanity
S-3	SLO-1	Quotes, proverbs relating to the power and potential of youth, Excerpts: Wings of Fire	Overview of different (traditional, modern) educational systems	Civic sense, bullying-substance abuse, uses of expletives	Challenges to be addressed by Engineers in India	Positive, Negative impact: religion, politics, gender, economic status, aesthetics
	SLO-2	Collecting proverbs highlighting the potential of youth	Debate	Case study on recent happenings	Case Study	Discussion on "To Kill a Mocking Bird"
S-4	SLO-1	Two news articles highlighting the initiatives for social causes by youth	Role of youth in education, Urban and Rural set up, dissemination	Hero worship, gender insensitivity, moral policing	Challenges in different sectors: agriculture	Values required to live in a global society
	SLO-2	Role play in a similar context	Student presentations	Case study on recent happenings	Case Study	Poster presentation on festivals of various religions
S-5	SLO-1	Two news articles highlighting the initiatives for social causes by youth	Designing and framing educational curriculum and materials	Positive contribution by youth in promoting social welfare	Challenges in different sectors: urban development, environment	Learning the etiquettes of various societies
	SLO-2	Role play in a similar context	Students' Presentation based on write ups	Short videos followed by discussions	Group activity (oral and written)	Poster presentation on festivals of various religions

S-6	**SLO-1**	*One song exhibiting the positive energy of youth*	*The pressing challenges in current educational system*	*Positive contribution by youth in promoting social welfare*	*Challenges in different sectors: sustainable development, cyber security*	*Success of pluralistic society, enliven the society, religious harmony through literary*
	SLO-2	*Discussion on the song*	*Collage Design*	*Short videos followed by discussions*	*Case Study – from Newspapers*	*Writing the aspects of pluralistic society based on the text*

Learning Resources	1. *Kalam, APJ Abdul. Wings of Fire: AN Autobiography of APJ Abdul Kalam. Ed. Sangam Books Ltd., 1999* 2. *"Banaras Hindu University Speech" and "To Students". The Voice of Truth. General Editor Shriman Narayan. Navajivan Publishing House. pp. 3-13 and pp. 425-30. www.mkgandhi.org* 3. *Piroda, Sam. "Challenges in Science and Technology". www.nfdindia.org/loc19.htm*	4. *Thomas A Address to VTU Students by Narayana Murthy. https://www.karnataka.com/personalities/narayana-murthy/vtu-address-2006/* 5. *World Economic forum. "India's top 7 challenged from skills to water scarcity*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)								Final Examination	
		CLA – 1 (20%)		CLA – 2 (30%)		CLA – 3 (30%)		CLA – 4 (20%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	-	-
Level 2	Apply Analyze	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	-	-
Level 3	Evaluate Create	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	-	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts		
1. Dr. Usha Kodandaraman, ABK AOTS, drushsk@gmail.com	*1. Dr. S. P.Dhanavel, IIT Madras, dhanavelsp@iitmac.in*	*1. Dr .K.Anbazhagan, SRMIST*	*2. Dr. B. Cauveri, SRMIST*	
2. Mr. Durga Prasad Bokka, TCS, durgaprasad@tcs.com	*2. Ms. Subashree, VIT, Chennai, subashree@vit.ac.in*	*3. Dr. M. M.Umamaheswari, SRMIST*	*4. Dr. Sukanya Saha, SRMIST*	*5. Ms .S. Ramya, SRMIST*

Course Code	18LEM103J	Course Name	CHINESE	Course Category	M	Mandatory	L	T	P	C
							2	0	2	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	NA		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	To help the students to know the pronunciation of the language, To make the students understand the basic concepts Chinese scripts, tones and greetings.
CLR-2 :	To make students understand the basic concept of grammar, to count numbers, Telling time and date, To make simple interrogative sentences and basic conversations.
CLR-3 :	To ask about directions, Focus on class activities through conversation on orientation.
CLR-4 :	Daily activities and asking about places and Chinese etiquette
CLR-5 :	To learn the usage of different verbs and adjectives,
CLR-6 :	This Chinese language course is designed for needs of beginners with no knowledge in Chinese language. This course will develop basic knowledge of the language, gain the four language skills, learning, speaking, reading and writing Chinese scripts.

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Pronounce Chinese Romanization , Get to know about China and the Chinese speaking countries, , Read basic characters	52	60	60	-	-	M	-	M	H	L	M	H	L	-	H	-	-	-
CLO-2 :	To ask about the need, counting numbers , Greet each other, express time and date in daily conversations.	55	65	62	-	-	H	-	H	M	L	M	H	M	-	H	-	-	-
CLO-3 :	To ask different kind of questions , to tell age with the help of Chinese words.	53	68	63	-	-	M	-	M	L	L	M	L	M	-	H	-	-	-
CLO-4 :	To learn different usage of Chinese grammar and vocabulary and introduce own self.	60	69	65	-	-	H	-	H	H	L	M	H	H	-	H	-	-	-
CLO-5 :	To learn about Chinese festivals and Chinese culture, to acquire conversational skills	58	72	63	-	-	H	-	H	H	L	M	M	H	-	H	-	-	-
CLO-6 :	The Chinese language skills will help in career orientation ,to acquire writing ability and communicate with Chinese speaker.	56	70	60	-	-	H	-	H	H	L	M	H	H	-	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	General discussion about China , Chinese speaking country, chinese language & culture.	Numbers in Chinese.	Introduction of few basic W/H words and framing basic interrogative sentences	Making of Affirmative negative question in Chinese	Introduction & application of few frequentlyused construction in Chinese.
	SLO-2	Introduction of initials and finals in Mandarin	Counting numbers and numeric system	Nationality	conversation how to make suggestion, how to accept of dealing suggestion and to makecomments.	Introduction & application of few frequentlyused construction in Chinese.
S-2	SLO-1	Tables of combination of initials and finals in Putonghua(Mandarin)	Chinese monetary system, Counting Chinesecurrency.	Direction in Chinese.	Introduction of sentence with nominal predicate, Subjectverb construction as itspredicate.	FamousChinese festivals
	SLO-2	Basic greetings and phrases used in daily life (in pinyin)	*Converse to greetothers and express yourneed*	Making question wih几,多少	Fruit relatedvocabulary, application.	Major Chinesecities
S-3	SLO-1	Tables of combination of initials and finals in Putonghua(Mandarin)	Asking your need	Introducingone'snationality	. Asking question withma ,whwords, affermative -negative	Application and usage of construction
	SLO-2	Tables of combination of initials and finals in Putonghua(Mandarin)	Nominal measureword	Asking aboutnationality	*Lianxi*	*lianxi*
S-4	SLO-1	*Prononciation of Pinyin chart*	Telling phone number in chinese	Askingprice	Asking question withma ,whwords, affermative -negative	Application and usage of construction
	SLO-2	*Prononciation of Pinyin chart*	Convertingnumbers	*Lianxi*	*Lianxi*	*lianxi*
S-5	SLO-1	Introduction of FourTones in Chineselanguage.	Time & time relatedgreetings,	Politelyand formallyaskingnames ,Expressingapology.	MakingChinese sentences with verbal & Adjectival predicate.	Grammarrelated to 但是，可是，以前，以后，后来。

	SLO-2	Four Tones and relatedpronunciation.	Days&Seasons.	Introduction & Application of verbal Measure Word.	Introduction of 地	Introduction & Application of the basic optative verbslike会，能，可以.
S-6	SLO-1	Tonesandhi（一，不）in ChineseTonediscrimination in Chinese	The basic sentence patterns in Chinese, S-V-O sentences withdetailedexamples.Framing simple sentences.	*Make sentences with在,and few corelated location wordslike这儿，那儿 withexample*	Few basic verbs and adjectives.	conversation how todescribelikes ,dislikes,interest and hobbies
	SLO-2	Introduction of Chinese characters. The eight basic strokes of characters-Chinese characters with proper stoke orders.	Introduce是 and 不是	Important locations used in daily life.	Opposite words.	Conduct conversation how todescribelikes, dislikes.,interest and hobbies
S-7	SLO-1	Pronounceword in propertone	Vocabulary	Asking about places..	Usage of verbs	Usage of grammar
	SLO-2	PersonalPronouns and relations,Pluralforms of pronouns	Asking date and time	*lianxi*	*练习*	*lianxi*
S-8	SLO-1	Writing characters with proper stroke order	Usage of time words in a sentence	Asking about directions.	*Usage of adjectives with different adverbs*	*Asking about interest and hobbies*
	SLO-2	Writing characters with proper stroke order	Introducingeachother	*lianxi*	*练习*	*lianxi*
S-9	SLO-1	Sentence structure with the adjective 很and Framing sentences, negative of 很。	Weekdays in Chinese, Month, Year&Writing Date.	Profession relatedvocabulary, application withexamples.	Colour and vocabulary, application withexamples.	conversation how to bergain and purchaseproducts.
	SLO-2	Introduction of adverb也， Interrogative particle呢， application & Usages.	Introduction of verb有 and it'snegativeform.Nominalmeasureword.	Basicconversation about personsouccupation	conversation how to describeyourfamilymembers and talk about university and department	conversation how to bergain and purchaseproducts.
S-10	SLO-1	Possesive/ Structural Particle的, application of 的withpronouns. Writing Chinese characters	Framing of basic interrogative sentences with modal particle吗。	Introduction of interrogative phrase 多大， Tellingone'sage in Chinese.	Sports &Gamesrealatedvocabulary, special usages,	Use of conjugation还是，或者with example.
	SLO-2	basic conversation related to greetings	Framing of basic interrogative sentences with modal particle吗。	Introduction of pasttenseand aspect particle了。	application withexamples.	
S-11	SLO-1	Writing greetings in characters with proper stoke order	Asking simple question	Askingage	*Askingaboulikes and dislikes*	Asking about purchasing products
	SLO-2	*练习*	*Asking date*	*lianxi*	*Askingaboulikes and dislikes*	Asking about purchasing products
S-12	SLO-1	Basic Expression	birthday in Chinese	*Asking about occupation*	*Asking about familymembers*	Usage of conjugation
	SLO-2	*练习*	Grammar – has, have	*lianxi*	*Asking about familymembers*	Usage of conjugation

Learning Resources	1. Text Book- New Practical Chinese reader, Chief editor-Liu Xun, Beijing Language and Culture University Press - 2008 2. Reference Book–Elementary Chinese Reader- 1, Sinolingua Beijing China - 2007

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	-	-
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	-	-
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	-	-
	Create										
	Total	100%		100%		100%		100%		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts

1. Dr. USHA KOTHANDARAMAN, Faculty of Japanese, ABK AOTS DOSOKAI, Chennai, Tamilnadu.	1. Ms.SubhashriVijaykumar , Assistant Professor VIT chennai,	1.Ms. PoulomiGhosal VisistingLecturer SRM University.
2. Mr. PAUL DAS. Senior Manager, NEC, Chennai	2. Dr. P.DHANAVEL Professor, IIT, Chennai.	2. Mr. SoumyaBrataHalder, VisistingLecturer SRM University

Course Code	18LEM104J	Course Name	FRENCH	Course Category	M	Mandatory	L	T	P	C
							2	0	2	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	NA		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1 :	To help the students know the basics of the language and the facts of France, To make the students understand the basic concepts of French grammar, greetings and self-introduction and useful expressions for daily conversations.	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLR-2 :	To identify someone and ask for information. Physical description of people with adjectives. Focus of class activities through conversation																		
CLR-3 :	to ask and give directions, Focus on class activities through conversation on orientation and an overview of the French educational system.																		
CLR-4 :	Daily activities and to tell time and the French etiquette. They will also learn to conjugate a reflexive verb and 3rd group of regular verbs in “re”																		
CLR-5 :	to learn about the diverse French cuisine, the food habits of the French people. Alimentation is associated with partitive articles.																		
CLR-6 :	This language course is designed to cater to the needs of ‘’complete beginners”. This course is intended to develop basic knowledge of the language, gain the four language skills, learning, speaking, reading and writing and the different aspects of French culture																		
Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*																		
CLO-1 :	Identify and pronounce the letters of the French alphabet, Get to know about France, its culture and the French speaking countries, Greet each other and converse ,Introduce themselves and someone else, Read small dialogues on introduction	55	70	60	-	-	M	-	M	H	L	M	H	H	-	H	-	-	-
CLO-2 :	To describe someone with the help of French adjectives, first group verbs ending in”er” and hence frame simple sentences.	50	65	62	-	-	H	-	H	M	L	M	H	H	-	H	-	-	-
CLO-3 :	Orient someone by giving directions, Express possession and conjugate 2nd group verbs in “ir’, Draft their own curriculum vitae.	50	68	63	-	-	L	-	M	L	L	M	L	L	-	H	-	-	-
CLO-4 :	Express time and use the expressions of time in daily conversations, paragraph on daily routine with the help of reflexive verbs.	60	75	65	-	-	H	-	H	H	L	M	H	H	-	H	-	-	-
CLO-5 :	Paragraph on the food habits of the French people and also their own using partitive articles.	58	72	63	-	-	H	-	H	H	L	M	M	H	-	H	-	-	-
CLO-6 :	The language skills coupled with technical skills help in career orientation and to communicate effectively with any French speaker.	56	70	60	-	-	H	-	H	H	L	M	H	H	-	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	L’alphabet, Les accents	Les nombres 70 à 100	Les articles contractes (au...)	Les adjectifs démonstratifs	La forme négative (2)(ne…plus, ne…. Jamais
	SLO-2	Les salutations	Les nombres 101 a 1000	Les articles contractes (du..)	La famille	La forme négative (2)(ne…que. Ne… rien)
S-2	SLO-1	Les pronoms sujets, Les verbes: être, avoir, s’appeler, habiter	Le genre des noms	Les verbes : Vouloir, pouvoir, devoir	Les 2 groupes verbes	Les verbes acheter, manger, Commencer, payer
	SLO-2	Les articles indéfinis	le nombre des noms	Les verbes irréguliers	Les verbes : sortir, partir	L’argent
S-3	SLO-1	L’expression	Comprendre une petite annonce	Faire une enquête	Proposer a qqn pour une sortie	Demander le prix
	SLO-2	Les salutations	Rédiger une annonce simple	Ecrire une liste	Proposer a qqn de faire qqc	Faire les courses
S-4	SLO-1	Se communiquer en classe	Chercher un logement	Les gouts des autres	Apprécier qqc	Les services et les commerces
	SLO-2	Epeler, s’appeler	Décrire un logement	Les temps libres et les loisirs	Ne pas apprécier qqc	Payer ses achats

S-5	SLO-1	Les numéros 0 a 69	Le 1 e groupe verbe, les professions	Les adjectifs interrogatifs	Le 3e groupe verbes	L'impératif affirmatif
	SLO-2	Les jours, les mois, les émotions	Les verbes venir et aller	Les mots interrogatifs	Les vêtements	L'impératif négatif
S-6	SLO-1	Les pays, les couleurs	Le genre des adjectifs	Les verbes pronominaux(1)	Les adverbes de fréquence	Les articles partitifs
	SLO-2	Des portraits de pays francophones	les nombre des adjectifs	Les verbes pronominaux(1)	Les adverbes de temps	Les exp. De quantités
S-7	SLO-1	Présentez- vous	Les vocabulaires des objets	Parler de ses loisirs	Décrire une tenue	Accepter une invitation
	SLO-2	Présenterqqn	Décrire son voisin	Exprimer ses gouts	Décrire les accessoires	refuser une invitation
S-8	SLO-1	S'informer sur qqn	Décrire votre profession	Exprimer une préférence	Parler qqc	Donner son appréciation
	SLO-2	Demander des informations personnelles	La langue, activité recap.	Exprimer une envie, Activité quotidienne	justifier	S'exprimer a table
S-9	SLO-1	Les prépositions de lieu (1)	Les adjectifs possessifs(sing)	Le verbe aller	Le passe compose : avoir	Le pronom « en » de quantité
	SLO-2	Les verbes : parler, habiter	Les adjectifs possessifs(pl)	Le futur proche	Le passe compose :etre	Il faut
S-10	SLO-1	Les articles définis	Les prépositions de lieu(2)	L'heure	L\imparfait (1)	Les festivals du mot
	SLO-2	Les pronoms Personnelles	Les orientations	Les Temps	L'imparfait (2)	Les festivals en France
S-11	SLO-1	Demander poliment	Les pièces, l'équipement	Demander l'heure	Parler d'un film	Donner des instructions (il Faut)
	SLO-2	Répondre poliment	S'infirmer un logement	Dire l'heure	Féliciterun souhait	Cuisine d'une parisienne d'adoption
S-12	SLO-1	Les vocabulaires d'informatique	Ecrire un portrait	Raconter sa vie sur un blog	Adresser un souhait	Commander au restaurant
	SLO-2	S'inscrire sur un site	La description physique	Justifier	Ecrire une carte postale	Ecrire une recette
Learning Resources		1. **SAISONS 1 – Didier - 2017** 2. **BIENVENUE –Course Book in French – Department of EFL, SRMIST- 2017**				

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	20%	20%	15%	15%	15%	15%	15%	15%	-	-
Level 2	Apply Analyze	20%	20%	20%	20%	20%	20%	20%	20%	-	-
Level 3	Evaluate Create	10%	10%	15%	15%	15%	15%	15%	15%	-	-
	Total	100%		100%		100%		100%		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.D.Hemachandran Renault Nissan Senior Language Specialist	Ms.JudyNiranjala, Assistant Professor SIET college for Women, Chennai	Dr.K.Anbazhagan Prof &Head, Dept of EFL SRMIST
Mr. Durga Prasad Bokka, TCS	DR.S.P. Dhanavel Professor Dept of English IIT - Chennai	Ms. K.Sankari, Assistant Professor Dept of EFL SRMIST

Course Code	18LEM105J	Course Name	GERMAN	Course Category	M	Mandatory	L	T	P	C
							2	0	2	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	NA		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	To help the students know the Basics of the language like Grammar, Self introduction and greetings.			
CLR-2 :	To learn how to introduce oneself and ask and give information about others and express simple terms like hobbies, Telephone numbers.			
CLR-3 :	To ask and give directions, an overview of German cities, buildings and everyday life like Cuisine.			
CLR-4 :	To develop the ability among the students to read, understand and initiate the conversation.			
CLR-5 :	To enable the students to achieve basic conversational skills.			
CLR-6 :	They can understand and use familiar everyday expressions and very simple sentences in German.			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	To know the culture, geography, greet each other and introduce themselves.	55	70	60	-	-	L	L	M	H	L	H	H	H	-	H	-	-	-
CLO-2 :	To compose dialogue between strangers to ask for simple information's like telephone numbers, seasons etc ..,	60	65	55	-	-	M	L	M	H	L	H	H	H	-	H	-	-	-
CLO-3 :	To help someone with directions by using Imperatives and different types of definite & indefinite articles.	65	73	60	-	-	M	M	H	M	M	H	H	H	-	H	-	-	-
CLO-4 :	To write a dialogue during shopping by using different verbs of Accusative articles.	65	65	55	-	-	M	M	H	H	M	H	H	H	-	H	-	-	-
CLO-5 :	To know how to order food, different varieties of food in Germany and also hold conversation in the Restaurant.	57	65	55	-	-	M	M	H	H	L	H	H	H	-	H	-	-	-
CLO-6 :	To know the culture, geography, greet each other and introduce themselves.	55	70	60	-	-	L	L	M	H	L	H	H	H	-	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Alphabets, Grüβen und Verabschieden.	UmbestimmtArtikelimNominativ.	T, N, Dverbenkonjugationen und Satzschreiben.	Die Uhezeitenverstehen und nennen.	Etwasgemeinsamplanen, überGeburtstagsprechen.
	SLO-2	Über Länder und Sprachensprechenim Deutschland, WichtigeStädteim Deutschland.	Zahlenbis1000 undWortschatz.	Ordinal Zahlen und Tagezeiten	Zeitangabenmachen.	SchreibenSie: EinladungfürihreGeburtstag.
S-2	SLO-1	Zahelenbis 20, Sichund andereVorstellen.	Plätze und Gebäudebenennen, Fragenzuortenstellen.	Überessensprechen und VerschiedeneGerichte in Deutschland durch PPT.	Umregelmäβige verbenkonjugationen und BeispieleSatz.	Possessive ArtikelimAkkuativ.
	SLO-2	Telefonnummer und E-mail Adressenennen.	Negation und übersetzung.	Buchstabieren und Wortschtz.	"ieren" verben conjugation und Beispielesatz.	BeispieleSätze.
S-3	SLO-1	Alphabet Aussprache und hört die grüβen.	Hörübung: Die Telefonnummer.	Hörübung: Aussprache die Umlauteä, ö, ü und beispieleSätze.	Hörübung: Dem Dialog zuhören und die Zeitschreiben.	E-mail schreiben: EinladungihrerGeburtstagsferier.
	SLO-2	VerabschiedenenWörten.	Buchstabieren und Wortschtz.	Hören und buchstabieren.	Übungen.	Übungen.
S-4	SLO-1	Länder und Sprachen Der Film: Über den Guten Tag und die Telefonnummer.	Der Film: Über die Sehenwürdigkeiten in Detschland.	Dialog: Über das Essen und seine preisepraktizieren.	Mit den Reguläβige und Umregelmäβigen verbeneigeneSätzeschreiben	Das Gesprächhörenund verstehen.
	SLO-2	Übungen.	Sprechen über den wichtigeStädteim Deutschland.	Übungen.	"ieren" verbenkonjugationen.	Wortschatz und buchstabieren.
S-5	SLO-1	Über Länder und Sprachensprechen.	Himmelsrichtungenund Verkehrsmittelnennen.	EinenEinkaufPlanen und sprechen	Über die Familiesprechenundsichverabreden.	Das Briefeschreibenerklären, eineEinldungverstehen und schreiben.
	SLO-2	Hören und buchstabieren.	NachdemWegfragen und einemWegbeschreiben	GesprächebeimEinkaufführen.	Sichfüreineverspätungentschuldigen.	Personal pronomen und beispieleSätze.
S-6	SLO-1	Aussagesatz und personal pronomen in Nominativ und beispieleSätze.	Textemitinternationalenwörternversteh en.	Gesprächebeim Essen führen.	EinenTermintelefonischvereinbaren.	ImRestaurentbestellen und bezahlen, übereinEreignissprechen,
	SLO-2	ÜberArbeit, Berufe und Arbeitszeitensprechen.	Artikellernen.	W-fragentexteverstehen.	SchreibenSie die Uhrzeiten.	BestimmtInformationen in Textenfinden.

S-7	SLO-1	Übersich und anderesprechen.	Hörübung: SchreibenSie die Zahlen.	Kurzer Dialog über das Einkaufen.	Üben: Wie man den Terminfestlegt.	SchreibeneinesBriefesüberjedegegebene situation.
	SLO-2	Fragen und antworten.	Events im Hamburg.	Übungen: Verbenkonjugationen.	Hören und buchstabieren.	Übungen: TrennbareVerbenkonjugationen.
S-8	SLO-1	Sich und anderevorstellen.	FragenSie die Wegbeschreibungindemsie die Bildersehen.	Kurzer Dialog über das Essen.	Hörübung: Die Zeitdurchhören des Dialogs schreiben.	Hörübung und Schreiben: Freizeitaktivitäten.
	SLO-2	W-Fragen.	Lesen und verstehen.	Hören: wie man bestellt.	Übungen.	Satzmithilfsverben.
S-9	SLO-1	Zahlenab 20 nennen, überJahrezeitenim Deutschland.	ImperativmitSie, Lesen und verstehen.	Wortschatz und Buchstabieren.	UmbestimmtArtikelimAkkusativ.	Untrennbareverbenkonjugationen.BeispieleSätze.
	SLO-2	Wochentage und Monate.	Lange und KurzeVokale.	SchreibenSie die Sätze.	Zeitangabenmit am, um, von…. bis.	BeispieleSätze.
S-10	SLO-1	BestimmtArtikel in Nominativ.	Regelmäβige verbenKonjugationen.	PositionenimSatz, BestimmtArtikelimAkkusativ.	Erklärt die Grammatik PräpositionenimAkkusativ.	Präteritum von Hilfsverben undkonjugationen.
	SLO-2	Verwendungen von Hilfsverben.	Satzschreiben.	AkkusativVerbenkonjugationen.	BeispieleSätzeimPräpositionen .	Modal verbenkonjugationen und beispieleSätze.
S-11	SLO-1	JaoderNeinFragendurch PPT.	Der Imperetivsätze und auch die Regelmäβigeverben	Essen im D-A-CH, Beruferund ums Essen.	Hören und sprechen: die Tagesablauf.	Übungfür Modal verbenwie, Aussagesatz, Satzfrage.
	SLO-2	Typische Hobby's.	LernenSie die Sätzedurch PPT.	HörenSie den dialog.	Schreiben: Die Tagesabluf.	W-Frage und Trennabreverben.
S-12	SLO-1	Der Film: Über den Termin.	Der Film: Die Autofahrt und das Verkehrsmittel.	Der Film: Frühstückbei den Bergs.	Pünktlichkeit in D-A-CH und Der Film: Nie hast du Zeit und Termine.	Der Film: Hast du Zeit? Im Restaurant und Überraschung.
	SLO-2	ÜberdeineFamilie.	Claudia Berg in der Arbeit.	Einkaufenplanen.	Der Termin und die Verabredung.	SchreibenSie die SätzemitHilfsverben.

Learning Resources	1. **Netzwerk – Klett – Langeiseheidt , Munchen- 2015** 2. **Grundkurs Deutsch – Dept.of EFL - SRMIST**

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	-	-
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	-	-
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	-	-
	Create										
	Total	100%		100%		100%		100%		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Dr. UshaKodandaraman, ABK AOTS, Chennai . drushak@gmail.com	**Ms.SubhashriVijaykumar,** **Assistant Professor** **VIT chennai,**	**Dr.K.Anbazhagan** **Prof &Head,** **Dept of EFL** **SRMIST**
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		Dr.P.Tamilarasan, **Assistant Professor** **Dept of EFL, SRMIST**

Course Code	18LEM106J	Course Name	JAPANESE	Course Category	M	Mandatory	L	T	P	C
							2	0	2	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	NA		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
CLR-1 :	To help the students know the basics of the language and the facts of Japan, To make the students understand the basic concepts of Japan grammar, greetings and self-introduction and useful expressions for daily conversations			
CLR-2 :	To identify someone and ask for information. Physical description of people with adjectives. Focus of class activities through conversation			
CLR-3 :	to ask and give directions, Focus on class activities through conversation on orientation and an overview of the Japan educational system			
CLR-4 :	Daily activities and to tell time and the Japan etiquette. They will also learn to conjugate a reflexive verb and 3rd group of regular verbs in			
CLR-5 :	to learn about the diverse , the food habits of the Japanese people. Alimentation isassociatedwith partitive articles.			
CLR-6 :	This language course is designed to cater to the needs of ‘’complete beginners”. This course is intended to develop basic knowledge of the language, gain the four language skills, learning, speaking, reading and writing and the different aspects of Japan culture			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Program Learning Outcomes (PLO)														
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					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
CLO-1 :	Identify and pronounce the letters of the Japan alphabet, Get to know about Japan, its culture. Greet each other and converse ,Introduce themselves and someone else.	55	70	60	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M
CLO-2 :	To describe someone with the help of Japan adjectives, first group verbs ending in e and hence frame simple sentences.	50	65	62	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M
CLO-3 :	Orient someone by giving directions, Express possession and conjugate 2nd group verbs. Draft their own curriculum vitae.	50	68	63	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M
CLO-4 :	Express time and use the expressions of time in daily conversations, paragraph on daily routine with the help of reflexive verbs.	60	75	65	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M
CLO-5 :	Paragraph on the food habits of the Japan people and also their own using particles.	58	72	63	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M
CLO-6 :	The language skills coupled with technical skills help in career orientation and to communicate effectively with any Japanese speaker.	58	72	63	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to Japan	Hiragana Lesson 7 Ma and Ya series.	Lesson 5 – Particles.	Lesson 6 – renshuu and exercises	Lesson 9Renshuu
	SLO-2	Japanese language and culture	ma/ya series related words	Japanese sports.	Religious beliefs,.	Explanation of ~te form I Group
S-2	SLO-1	Greetings	Lesson 3 – time - reading	Japanese martial arts.	Lesson 7 – reading and grammar	Explanation of ~te form II Group
	SLO-2	SelfIntroduction	Lesson 3 grammar.Classroom expressions. Kara, made, ni, ne and o	De and to	Ongaku and manga	Explanation of ~te form II and III Group
S-3	SLO-1	Hiragana Lesson 1 (vowels and related words)	Hiragana Lesson 8 Ra/Wa series	Kanji	Common expressions	**Exceptional cases of verb groups**
	SLO-2	Lesson1– reading. Selfintroduction	Ra/Wa series related words	iku, miru, yasumu and kau	Bodyparts (vocabulary).	Line
S-4	SLO-1	Lesson 1 grammar (wa,ka,mo,no,desu/jaarimasen)	Lesson 3 – renshuu and exercises	**Revision of complete Hiragana**	Explanation of past tense of verbs.	Lesson 10 - reading and grammar
	SLO-2	Days of the week	Family. Festivals of Japan.Omiyage	**Revision of all Particles**	Kanji – kuchi, ame, hairimasu, kirimasu, ji, han and fun	Explanation of ~tai form

S-5	SLO-1	Hiragana Lesson 2	Hiragana Lesson 9	**Assignment**	Lesson 7 reading.	Japanese currency.
	SLO-2	ka and ga series and related words	Double consonants and related words	**Assignment**	Lesson 7 exercises	Japanese political system
S-6	SLO-1	Lesson 1 – renshuu	Lesson 4 – reading, grammar and vocabulary	**Surprise Test**	Introduction to Adjectives	Lesson 10 –renshuu and exercises.
	SLO-2	Ojigiand exercises. Numbers and months	Directions. Kanji – person, man, woman, child, tree and book	**Surprise Test**	I-ending and na-ending adjectives Forms.	Kanji – ookii, chiisai, eki and chuui
S-7	SLO-1	Hiragana Lesson 3	Directions. Kono…, kochira…, yo.	Revision of Hiragana (3 charts),	Lesson 8 Reading	Kanji – daigaku, nen, nihon and nihongo
	SLO-2	sa and za series and related words	I &na-ending adjectives introduction	long vowels and double consonants	Lesson 8 grammar	Places of interest in Japan
S-8	SLO-1	Seasons.	Hiragana Lesson 10(long vowels and related words).	Review of grammar	Explanation of ~masenka	Food and drink (vocabulary).
	SLO-2	Kore/kono – demonstrative pronouns	Lesson 4 – renshuu	particles	Explanation of mashou	Transport
S-9	SLO-1	Hiragana Lessons 4 and 5	Hashi	Katakana – introduction	Lesson 8 –renshuu.	Review of particles
	SLO-2	ta/da and na/ha series and related words	Hiragana Lesson 11 (chart 3 and related words).	Katakana – rules.	Value your time	Review of Kana and Kanji
S-10	SLO-1	Kore…/kono…-reading, grammar and vocabulary	Counters explanation	Review of lessons 1-5	Kanji - days of the week	Review of verbs and adjectives
	SLO-2	Ni and ga, arimasu/imasu, Dare/donata.Renshuu and Meishi	Kanji – days of the week	Grammar and vocabulary	Japanese food and	Japanese house and living style
S-11	SLO-1	Hiragana Lesson 6 (ba/pa series).	Hiragana – special words like wa, e and o and sentence reading	Katakana vocabulary	Lesson 9 reading	Japanese tea ceremony
	SLO-2	Lesson 2 – exercises. Introduction to time.	Lesson 5 – reading.	Kanji – ikimasu, mimasu, yasumimasu	Lesson 9 grammar	Japanese Religious beliefs.
S-12	SLO-1	Kanji numbers – 13. Time expressions	Lesson 5 Grammar.	Lesson 6 – reading and grammar	Stationery	Japanese Economy
	SLO-2	Coloursand basic 5 kanjis (ue, shita, naka, yama and kawa)	Lesson 5 Vocabulary.	Visiting a Japanese home	Transport (vocabulary)	Calligraphy

Learning Resources	1. **Minna no Nihon Go – 3A Corporation, Tokyo, Japan – 2002.** 2. **A Basic Course in Japanese–Department of EFL,SRMIST- 2017**

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	-	-
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	-	-
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	-	-
	Create										
	Total	100%		100%		100%		100%		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1 Dr. Usha Kothandaraman, Faculty of Japanese, ABK AOTS DOSOKAI, Chennai, Tamilnadu.	1. Dr.K.Anbazhagan, Professor and Head, Department of EFL. SRM University.	1. Ms.R.Padmajaa, Assistant Professor SRM University.

2. Mr. PAUL DAS. Senior Manager, NEC, Chennai	2 Dr. P.DHANAVEL Professor, IIT, Chennai.	2. Mr. B.VIJAYA KUMAR, Assistant Professor SRM University

Course Code	18LEM107J	Course Name	KOREAN	Course Category	M	Mandatory	L	T	P	C
							2	0	2	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	NA		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Learn about Korea and its culture; to be able to read and write the Korean script, and to introduce oneself and other people in the language.			
CLR-2 :	Be able to manage daily life living in Korea - talking about daily activities, asking for and giving directions, describing the location of things, learning numbers and to shop for things (asking for items and the number of said items).			
CLR-3 :	Be able to shop by asking for the availability of things, and learning about the currency system; To be able to talk about past activities (past tense) and the weather.			
CLR-4 :	Tell time, to socialize: make appointments, phone calls			
CLR-5 :	Communicate about studying Korean and about future career or academic plans.			
CLR-6 :	This course is designed to develop the basic knowledge of the country and the language by training the candidate in reading, writing, listening and speaking. The conversational level of various basic topics covered in the course eliminates the fundamental hardships of language barriers faced in Korea.			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Read, pronounce and write the Korean script, and to introduce oneself and other people in the language. Get to know about Korea, its culture and its language.	55	70	60	-	-	L	-	H	H	L	M	M	H	-	H	-	-	-
CLO-2 :	Manage daily life in Korea - ask for and give directions, describe locations, count, shop, and talk about daily activities.	65	55	52	-	-	L	-	H	M	L	M	H	H	-	H	-	-	-
CLO-3 :	Talk about past activities (past tense), the weather and use the Korean currency.	50	65	63	-	-	L	-	M	H	L	M	M	M	-	H	-	-	-
CLO-4 :	Tell time, to socialize: make appointments, phone call etiquettes	60	70	64	-	-	L	-	H	H	L	M	H	H	-	H	-	-	-
CLO-5 :	Communicate about studying Korean and about future career or academic plans.	65	70	67	-	-	L	-	H	M	L	M	H	H	-	H	-	-	-
CLO-6 :	Read, write and converse effectively in basic Korean, making it easy to even live in the country.	60	65	60	-	-	L	-	H	H	L	M	H	H	-	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to Korea and Korean - 한글소개, 한국 소개	일상 생활daily life, new vocab (action, places)	listening &key sentences drilling	dialogue1& dialogue2	grammar point 1-그래서
	SLO-2			reading/writing		grammar point1-(으)ㄹ거예요
S-2	SLO-1	single vowels (단모음)	grammar point1-아요/ 어요&grammar point2-에 가다	new vocab (counter noun)	listening &key sentences drilling	dialogue1& dialogue2
	SLO-2				reading/writing	
S-3	SLO-1	이중모음과 자음 double vowels & basic consonants	dialogue1& dialogue2	grammar point1-ㅂ니다/습니다,-ㅂ니까/습니까&	시간 time new vocab (time)	listening & reading
	SLO-2					
S-4	SLO-1	쌍 자음과 음절double consonants & syllables	listening & reading/writing	teaching money	Teaching date & weeks	writing for weekend activities
	SLO-2					
S-5	SLO-1	받침과 음절1 Batchim & syllables	위치location new vocab(object /location)	dialogue1& dialogue2 practice	grammar point1-에	한국어 공부(studying Korean) new vocab(pronouns)
	SLO-2				grammar point2-시-분	
S-6	SLO-1	받침과 음절2 Batchim & syllables	grammar point1-이/가	listening &key sentences drilling	dialogue1& dialogue2	grammar point1- 나/저, 내/제

	SLO-2		grammar point2-에 있다/없다	reading/writing	practice	grammar point2-'ㄷ' irregular verbs
S-7	SLO-1	자모 연습. (practices vowels and consonants)	dialogue1& dialogue2 practice	어제 일과yesterday's daily routine new vocab (action, places)	listening &key sentences drilling	dialogue1& dialogue2 practice
	SLO-2				reading/writing	
S-8	SLO-1	듣기. 교실 표현(listening & class terms)	listening &key sentences drilling	grammar point1-았/었	약속 appointment new vocab(location& plan	listening &key sentences drilling
	SLO-2		reading/writing	grammar point2-에서		reading/writing
S-9	SLO-1	자기소개self –introduction , new vocab(nationality, occupation	쇼핑1shopping1 new vocab (items to shop)	dialogue1& dialogue2 practice	grammar point1- (으)ㄹ까요	계획(plan) –(으)ㄹ 거예요.
	SLO-2				grammar point2-아요/어요	
S-10	SLO-1	grammar point1-이에요/예요	shopping1teaching numbers	listening &key sentences drilling	dialogue1& dialogue2 practice	grammar point1- pro nouns이/그/저 +것(things)
	SLO-2	grammar point2-은/는		reading/writing		grammar point2- 'ㅡ' irregular verbs & dialogue2
S-11	SLO-1	dialogue1& dialogue2 practice	grammar point1-을/를	날씨 weather new vocab(season& weather)	listening &key sentences drilling	dialogue1& dialogue2 practice
	SLO-2		grammar point2-(으)세요		reading/writing	
S-12	SLO-1	listening &key sentences drilling	dialogue1& dialogue2 practice	grammar point1-그리고	Phone Call new vocab and expressions, key sentences	listening &key sentences drilling
	SLO-2	reading/writing		grammar point2-안		reading/writing

Learning Resources	1. ACTIVE KOREAN 1 – Language Education Institute, Seoul National University – Moonjin Media – 2006 2. ACTIVE KOREAN 1 WORKBOOK – Language Education Institute, Seoul National University – Moonjin Media – 2010 3. SEJONG KOREAN 1 – The National Institute of Korean Language – Hawoo - 2013

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	-	-
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	-	-
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	-	-
	Create										
	Total	100%		100%		100%		100%		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1 Dr. USHA KOTHANDARAMAN, Faculty of Japanese, ABK AOTS DOSOKAI, Chennai, Tamilnadu.	1. Ms.Subhashri Vijaykumar , Assistant Professor VIT chennai,	1Jang kyung A V isiting faculty Korean SRMIST
2. Mr. PAUL DAS. Senior Manager, NEC, Chennai	2 Dr. P.DHANAVEL Professor, IIT, Chennai.	2. Ms.Cho Seul Hee Visiting faculty Korean SRMIST

Semester - III

Course Code	18MBH461T	Course Name	FINANCIAL MANAGEMENT	Course Category	H	Humanities & Social Sciences	L	T	P	C
							2	0	0	2

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	
Course Offering Department	*Faculty of Management*	**Data Book / Codes/Standards**		Nil	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Importance of Financial Management to make good business decisions			
CLR-2 :	Significance of Financial market and its linkage with business			
CLR-3 :	Long Term Sources available for a firm			
CLR-4 :	Application of tools and techniques for selection of projects			
CLR-5 :	Importance of Cost of Capital and Capital Structure for financing decisions			
CLR-6 :	Importance of Liquidity and Dividend decisions			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning			Program Learning Outcomes (PLO)															
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	To learn the importance of financial management for financial decision making	1	60	50	H	M	M	H	M	L	H	M	M	M	L	H	1	60	50
CLO-2 :	To learn the concepts of financial market	2	80	75	H	L	M	H	L	L	H	L	M	L	L	H	2	80	75
CLO-3 :	To learn the pros and cons of various sources of finance	2	80	70	H	M	M	H	M	M	H	M	M	M	M	H	2	80	70
CLO-4 :	To apply the tools and techniques for investment decisions	3	90	80	H	L	M	H	L	M	H	L	M	L	M	H	3	90	80
CLO-5 :	To apply Cost of Capital and Capital Structure for financing decisions	3	90	80	H	H	M	M	H	M	M	H	M	H	M	M	3	90	80
CLO-6 :	To apply working capital concepts to maintain liquidity and to learn the aspects of dividend decisions	1	50	70	H	M	H	H	M	H	H	M	H	M	H	H	1	50	70

Duration (hour)		6	6	6	6	6
S-1	SLO-1	**Introduction to Finance** – meaning, traditional versus modern approach	**Introduction to Financial Markets**	**Investment Decision:** Meaning of Capital Budgeting; Examples of Capital Expenditure	**Financing Decision:** Cost of Capital – meaning and significance; Risk-return relationship of various securities with diagram	**Liquidity Decision:** Working Capital Management – meaning and objectives
	SLO-2	Major financial decisions	Components of Financial Markets	Nature of Capital Budgeting; Types of Investments	Overall versus Specific cost of capital	Types of Working Capital and Factors affecting Working Capital
S-2	SLO-1	Scope of Finance function; Key activities of financial management	Indian Capital Market	Evaluation Techniques – types, formula, decision rule, merits and demerits	Determination of cost of debt – issued at par, premium or discount for redeemable and irredeemable debt	Determination of working capital requirements of a firm
	SLO-2	Risk-return tradeoff		Payback period		
S-3	SLO-1	Financial Objectives of a firm	New Issues Market	Accounting Rate of Return	Determination of cost of equity using Gordon dividend growth model and Capital Asset Pricing Model (CAPM)	Operating Cycle – concept and estimation
	SLO-2	Functions of Modern Finance Manager				
S-4	SLO-1	Time value of money - Future value versus Present value of Uneven cash flow and Annuity – simple problems	Indian Stock Market	Net Present Value	Determination of cost of preference – redeemable and irredeemable shares	Short term sources of finance
	SLO-2					

S-5	SLO-1	Concept of Risk and Return of individual asset - Simple problems	ndian Money Market	Profitability Index	Determination of Overall / Weighted Average Cost of Capital (WACC)	**Dividend Decision** – meaning of dividend and dividend policy Factors affecting dividend policy
	SLO-2					
S-6	SLO-1	Risk and return of a portfolio - Simple problems	Long term sources of finance	Internal Rate of Return	Concept of Capital Structure Factors affecting capital structure	Forms of Dividend Concept of Bonus issue, Rights issue, Share split and Share buyback with examples
	SLO-2					

Learning Resources	*1.* M. Pandey Financial Management, Vikas Publishing House Pvt. Ltd., 10th edition, 2012 *2.* M.Y. Khan and P.K.Jain Financial management, Text, Problems and cases Tata McGraw Hill, 6th edition, 2011 *3.* Aswat Damodaran, Corporate Finance Theory and practice, John Wiley & Sons, 2011 *4.* James C. Vanhorne –Fundamentals of Financial Management– PHI Learning, 11th Edition, 2012	*5.* Brigham, Ehrhardt, Financial Management Theory and Practice, 12th edition, Cengage Learning 2010. *6.* Prasanna Chandra, Financial Management, 9th edition, Tata McGraw Hill, 2012. *7.* Srivatsava, Mishra, Financial Management, Oxford University Press, 2011

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	40%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	20%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Expert from TCS	Dr. Siva Sankaran, IIM Ranchi	Dr. Kavitha Shanmugam
	Dr. Narasiman, IIM Bangalore	Dr. T. Vijay Kumar

Course Code	18MBH462T	Course Name	HUMAN RESOURCE MANAGEMENT	Course Category	H	Humanities & Social Sciences	L	T	P	C
							2	0	0	2

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	
Course Offering Department	*Faculty of Management*	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	To Understand the various standpoints prevailing in Human Resource Management			
CLR-2 :	Examine the best practices in Human Resource Planning and Forecasting.			
CLR-3 :	Classify the need for training and its development practices.			
CLR-4 :	Comprehend the employee interest to persuade motivation and develop Employee Engagement			
CLR-5 :	Learn the technique of Performance Evaluation and control of process in the Organization			
CLR-6 :	Understand the importance of Human Resource Management in Organizational effectiveness`			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning			Program Learning Outcomes (PLO)															
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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	
CLO-1 :	Apply the conceptual knowledge of Human Resource Management in managing the work force	2	60	50	*H*	*M*	*H*	*M*	*L*	*M*	*M*	*M*	*L*	*M*	*H*	*L*	2	60	50	
CLO-2 :	Analyze the gap between the demand and supply of Human Resource.	2	80	70	*L*	*H*	*L*	*L*	*M*	*M*	*M*	*L*	*L*	*M*	*H*	*H*	2	80	70	
CLO-3 :	Analyze the training models and its effective delivery methodology	1	80	75	*M*	*H*	*L*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*M*	1	80	75	
CLO-4 :	Learn the techniques of Employee motivation and engagement.	2	80	70	*M*	*H*	*M*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*H*	2	80	70	
CLO-5 :	Implement, evaluate and control the process in an organization	3	90	80	*M*	*H*	*H*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*L*	3	90	80	
Overall	Gain Knowledge in the field of HR to Plan, Organize, Coordinate and control the Human Resource	3	90	80	H	L	H	M	H	M	H	M	L	H	M	H	3	90	80	

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Introduction to Human Resource Management	Human Resource Planning	Definition of Training	Wage and salary administration objectives	Labour relations
	SLO-2	Importance of HRM	Objectives of HRP	Nature of Training	Principles of wage and salary administration	Employee security
S-2	SLO-1	Evolution of human resource management	HRP Process	Importance of Training	Components of Salary and wage administration	Industrial Relation
	SLO-2	Operative functions of HR	Manpower Estimation	Types of Training method	Methods of payments	Collective bargaining
S-3	SLO-1	Human Resource Era	Job analysis	Training process	Wage legislation in India	trade unionism
	SLO-2	Conceptual between Personnel Management and HRM	Job Description	Purpose and Benefits of Training	Incentives	Discipline administration
S-4	SLO-1	Strategic HRM	Job Specification	Career Planning - Definition & objectives	Benefits	Grievances handling
	SLO-2	Role of human resource manager	Sources of Recruitment	Process of career planning	Motivation – Meaning and definition	Managing dismissals and separation
S-5	SLO-1	Computer applications in human resource management	Selection Process	Benefits of career planning	Importance of motivation	Labour Welfare
	SLO-2	Challenges of the Human Factor	Placement	Problems in career planning	Theories of motivation	Importance & Implications of labour legislations

S-6	SLO-1	Human Factor-Inclusive growth Human Factor -affirmative action	Induction Retention of Employees	Succession planning features Scope of succession planning	Workers participation in management (WPM) Objectives Forms of WPM	Employee health , Safety Future of HRM function
	SLO-2					

Learning Resources	1. *Dessler Human Resource Management, Pearson Education Limited, 14th Edition, 2015* 2. *Decenzo and Robbins, Fundamentals of Human Resource Management, Wiley, 11th Edition, 2013* 3. *Luis R.Gomez–Mejia, David B.Balkin, Robert L Cardy. Managing Human Resource. PHI Learning. 2012*	4. *Bernadin , Human Resource Management ,Tata Mcgraw Hill ,8th edition 2012. Wayne Cascio, Managing Human Resource, McGraw Hill, 2007.* 5. *Uday Kumar Haldar, Juthika Sarkar. Human Resource management. Oxford. 2012.* 6. *K.ASWATHAPPA – HUMAN RESOURCE MANAGEMENT – The McGraw- Hill Companies*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	40%	-	30%	-	30%	-	30%	-	30%	-
Level 2	Apply Analyze	40%	-	40%	-	40%	-	40%	-	40%	-
Level 3	Evaluate Create	20%	-	30%	-	30%	-	30%	-	30%	-
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Expert from TCS	Dr.K.Latha, Chandasekara University, Kanchipuram	Dr.N. SanthoshKumart, Head – Human Resources, SRMSOM
	Dr.Thenmozhi, Professor, University of Madras	Dr.S.Sujatha – Assistant Professor - SRMSOM

Course Code	18CSC261T	Course Name	FORMAL LANGUAGE& AUTOMATA THEORY	Course Category	C	Professional Core	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Present various computing modelsfor formal language theory			
CLR-2 :	Understand various language classification as specified by Chomsky			
CLR-3 :	Utilize regular languages to represent lexical analyzer of compiler design			
CLR-4 :	Understand how Context-Free grammar is used to represent programming constructs.			
CLR-5 :	Analyze the use of Turing Machines and their applications in decidability theory			
CLR-6 :	Represent a platform for higher level of Chomsky classification.			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able	Learning			Program Learning Outcomes (PLO)															
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	To understand and design various Computing models like Finite State Machine, Pushdown Automata, and Turing Machine.	3	80	70	L	H	H	H	L	-	-	-	L	L	-	H	-	-	-
CLO-2 :	To understand the various types of grammar and the corresponding languages	3	85	75	L	H	L	M	M	-	-	-	L	L	-	H	-	-	-
CLO-3 :	To understand Decidability and Undecidability of various problems	3	75	70	L	H	M	H	L	-	-	-	M	L	-	L	-	-	-
CLO-4 :	To understand the computational complexity of various problems	3	85	80	M	H	M	H	M	-	-	-	H	L	-	H	-	-	-
CLO-5 :	To understand How compiler can be constructed with the help of formal models of computation theory?	3	85	75	H	H	M	H	L	-	-	-	M	L	-	M	-	-	-
CLO-6 :	Understand how formal language theory helps to understand Natural Language Processing	3	80	70	M	H	-	H	M	-	-	-	L	L	-	H	-	-	-

Duration (hour)		9	9	9	9	9
S-1	SLO-1	Introduction- Alphabet, languages .	Context Free Grammars-	Pushdown Automata	Turing machines	Un-decidability and Decidability
	SLO-2	Grammars, productions and derivation	Examples	Example	Formal definition	Examples
S-2	SLO-1	Chomsky hierarchyof languages.	Various derivations-Leftmost, Right most. ambiguity	Deterministic Pushdown Automaton	Variants of Turing machines,	Church-Turing thesis
	SLO-2	Regular languages and finite automata	Context free languages- Relation between derivation and Derivation tree.	Non-Deterministic Push down automaton	Simple examples.	Proof
S-3	SLO-1	Regular languages and finite automata	Various Normal forms	Acceptance by emptying stack	Nondeterministic TMs and equivalence withdeterministic TMs	The diagonalization language L_d
	SLO-2	Deterministic finite automata (DFA)	Chomsky Normal form- Definition Useless symbol elimination	Acceptance by final state	Turing machine for palindromes, monus subtraction	L_d is not a recursively enumerable
S-4	SLO-1	Non-Deterministic finite automata (DFA)	An example	Equivalence of CFG to Pushdown automata	Turing machine for multiplication using subroutine copy.	The universal TM L_u
	SLO-2	Kleene's theorem	Unit production elimination-epsilon production elimination	An example	-Contd-	L_u construction
S-5	SLO-1	Equivalence of FA, regular expression and regular grammar	Chomsky normal form properties	Equivalence of PDA to CFG	Closure properties of Turing machines.	Lu is recursively enumerable but not recursive
	SLO-2	-Continued--	CFG to Chomsky normal form a complete example	An example	Computable function	Proof

S-6	SLO-1	*Pumping lemma for regular languages*	*-Continued-*	*Closure properties of CFL*	*Recursive language Recursively enumerable languages*	*Rice theorem*
	SLO-2	*Simple examples*	*Griebach Normal form definition.*	*Continued*	*Recursively enumerable languages*	*Un-decidable problems*
S-7	SLO-1	*Myhill-Nerode theorem*	*Rules to convert Griebach normal form*	*Context Sensitive Grammar*	*Turing machine codes*	*PCP Problem-Undecidable*
	SLO-2	*and its uses,*	*Example*	*Context sensitive Language*	*Various examples*	*Complexity Classes-Using Deterministic and Non deterministic turing machines.*
S-8	SLO-1	*Myhill-Nerode theorem-An example*	*Pumping lemma for Context free grammar*	*Linear bounded automata*	*-Contd--*	*P-type, NP-Type problems*
	SLO-2	*Minimization of finite automata*	*Proof*	*An example*	*TM's as enumerators.*	*Examples*
S-9	SLO-1	*Table Filling algorithm*	*An example*	*Equivalence between linear bounded automata anf CSG*	*Unrestricted grammars and equivalence with Turing machines*	*NP-Complete, NP-Hard Problems*
	SLO-2	*An example*	*Continued*	*-Continued -*	*-Continued-*	*Examples.*
Learning Resources		1. *John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman,Introduction to Automata Theory, Languages, and Computation,Pearson; 3 edition (23 May 2008)* 2. *Harry R. Lewis, Christos H. Papimitriou, Elements of the Theory of Computation,Pearson; 3 edition (23 May 2008)*		3. *Dexter C. Kozen, Automata and Computability,*Springer *2012.*		

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*40%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*	-
Level 2	Apply Analyze	*40%*	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-
Level 3	Evaluate Create	*20%*	-	*305%*	-	*305%*	-	*305%*	-	*305%*	-
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Expert from TCS	*1. Dr. G.Venkiteswaran, Associate Professor,BITS Pilani,gvenki@pilani.bits-pilani.ac.in*	*1. Mr. K. Senthil Kumar*
	*2.*Dr. Masilamani V,Associate Professor, *IIITDM* ,masila@iiitdm.ac.in	

Course Code	18CSC262J	Course Name	COMPUTER ORGANIZATION &ARCHITECHTURE	Course Category	C	Professional Core	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	PCC-CS 402
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Utilize the functional units of a computer,analyzing the functions of arithmetic Units like adders, multipliers etc.			
CLR-2 :	Study instruction set architecture and addressing modes .			
CLR-3 :	Study of x86 archtecture,design of control unit and memory organization.			
CLR-4 :	Analysis of Input output systems ,I/O transfers and I/O device interfaces			
CLR-5 :	Study about parallel processing and understanding the concepts of Pipelining .			
CLR-6 :	Identify different types of memory,mapping functions and replacement algorithms.			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Identify the computer hardware and how software interacts with computer hardware	2	80	70	H	H	-	-	-	-	-	-	M	L	-	M	-	-	-
CLO-2 :	Demonstrate how to add and multiply integers and floating-point numbers using two's complement and IEEE floating point representation	3	85	75	H	H	H	-	H	-	-	-	M	L	-	M	-	-	-
CLO-3 :	Understand the principles and the implementation of computer arithmetic.	2	75	70	H	H	H	H	-	-	-	-	M	L	-	M	-	-	-
CLO-4 :	Program using x86 instruction sets.	3	85	80	H	-	-	H	-	-	-	-	M	L	-	M	-	-	-
CLO-5 :	Identify the memory technologies, input-output systems and evaluate the performance of memory system	3	85	75	H	-	H	H	-	-	-	-	M	L	-	M	-	-	-
CLO-6 :	State and compare properties of shared memory and distributed multiprocessor systems and cache coherency protocols.	3	85	75	H	H	H	H	H	-	-	-	M	L	-	M	-	-	-

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Introduction to Boolean logic,	Integer addition and Subtraction	Introduction to 8086 architecture.	Input-output subsystems	Memory hiearchy
	SLO-2	Combinational Circuits-Adders,subtractors	Ripple carry adder,	Addressing modes of 8086	I/O deviceinterface	Memory inerleaving Higher order
S-2	SLO-1	Sequential circuits-Flip flops and its types.	Carry look ahead adder	Instruction sets of 8086	/O transfers – program controlled	Memory inerleaving lower order
	SLO-2	Functional Units of a computer ,Operational concepts Instruction sets, Addressing modes Addressing modes types	Signed operand multiplication-Booths multiplication	Instruction sets of 8086	interrupt driven	Cache memory-Mapping function
S-3	SLO-1	Operational concepts -RTL interpretation of instructions,	Bit pair recoding of multipliers	Assembler Directives	DMA	Replacement algorithms
	SLO-2	Addressing modes	Problem Solving	Problem solving	privilegedand non-privileged instructions,	Performance considerations
S	SLO-1	Lab 1: To recognize various	Lab4:Study of TASM	Lab-7: Design of Half Adder	Lab-10: Study of Array Multiplier	Lab-13: Study of Carry Save

4-5	**SLO-2**	*components of PC- **Input Output systems** Processing and Memory units*	*Addition and Subtraction of 8-bit number*	*Design of Full Adder*	*Design of Array Multiplier*	*Multiplication Program to carry out Carry Save Multiplication*
S-6	**SLO-1**	*Addressing modes types*	*Carry save addition of summands*	*Hardwired control unit designMicro-programmed control-*	software interrupts and exceptions	*Hit rate and Miss penalty*
	SLO-2	*Problem solving*	*Integer division Restoring Non restoring*	*Micro-programmed control-*	*Role of Interrupts and process state transititions*	*Caches on processor chip*
S-7	**SLO-1**	*Instruction set.*	*Integer division Restoring Non restoring*	*Microinstruction ,Micro-program Sequencing*	I/O device interfaces SCSI	*Problem Solving*
	SLO-2	*Data transfer,arithmetic instructions*	*Problem Solving*	*Micro-program Sequencing*	I/O device interfaces-USB	*Virtual Memory*
S-8	**SLO-1**	*Logical instructions*	*IEEE standard for floating point numbers*	*Micro instruction with Next address field*	Basic concepts of pipelining	*Address space and memory space*
	SLO-2	*Condtiional instructions*	*Problem Solving*	*Semiconductor RAM memorie*	*Arithmetic and instruction pipeline*	*Address mapping using pages*
S 9-10	**SLO-1**	*Lab-2:To understand how different components of PC are connected to work properly*	*Lab 5: Addition of 16-bit number Subtraction of 16-bit number*	*Lab-8: Study of Ripple Carry Adder Design of Ripple Carry Adder*	*Lab-11: Study of Booth Algorithm*	*Lab-14: Understanding Processing unit Design of primitive processing unit*
	SLO-2	*Assembling of System Components*				
S-11	**SLO-1**	*Data representation*	*Guard bit and Truncation*	*Internal organization of memory chips*	*Inroduction to parallel processing*	*Memory protection*
	SLO-2	*Complements*	*Solving Problems*	*Static memories,AsynchronousDram,Synchronous DRAM*	*RISC processors*	*Memory management Requirements*
S-12	**SLO-1**	*Fixed point Representation,Integer,Arithmetic addition and subtraction*	*Implementing floating point operations*	*Read Only memories*	*CISC processors Comparision of RISC and CISC*	*Secondary storage*
	SLO-2	*Overflow,Decimal fixed poin representation*	*Solving Problems*	*ROM,PROMEPROM*	*Vector processing*	*Magnetic hard disks*
S-13	**SLO-1**	*Floating point represntation*	*Arithmetic operations on Floating point numbers*	*EEPROM,Flash memory*	*Array processing*	*Optical Disks*
	SLO-2	*Character representation*	*Solving Problems*	*Problem solving*	*Cache coherence protocols*	*MagneticTape systems*
S 14-15	**SLO-1**	*Lab -3To understand how different components of PC are connected to work properly*	*Lab-6: Multiplication of 8-bit number Factorial of a given number*	*Lab-9: Study of Carry Look-ahead Adder Design of Carry Look-ahead Adder*	*Lab-12: Program to carry out Booth Algorithm*	*Lab-15: Understanding Pipeline concepts Design of basic pipeline.*
	SLO-2	*Disassembling of System Components*				

Learning Resources	1. *Computer System Architecture* M. M. Mano:, 3rd ed., Prentice Hall of India, New Delhi, 1993. 2. *Computer Organization and Design: The Hardware/Software Interface*, David A. Patterson and John L. Hennessy.	*3. Computer Organization and Embedded Systems*, Carl Hamacher.. *4. Computer Architecture and Organization*, John P. Hayes

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										

Level 3	Evaluate Create	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Experts from TCS	*1. Prof. A.P. Shanthi, ANNA University Chennai, a.p.shanthi@cs.annauniv.edu*	*1.Dr. V. Ganapathy, SRMIST*
		2. Dr. C. Malathy, SRMIST
		3. MrsM.S.Abirami, SRMIST

Course Code	18CSC263J	Course Name	OBJECT ORIENTED PROGRAMMING	Course Category	C	Professional Core	L	T	P	C
							2	0	4	4

Pre-requisite Courses	18CSC161J	Co-requisite Courses	Nil	Progressive Courses	18CSC268J
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Utilize the different data types and C concepts in applications			
CLR-2 :	Utilize C++ Concepts in developing applications			
CLR-3 :	Utilize member functions and error handling for real-time applications			
CLR-4 :	Utilize Inheritance, Polymorphism applications			
CLR-5 :	Utilize Generic Programming for real-time applications			
CLR-6 :	Utilize the different types of UML operations for real-time programming applications			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Revise C Concepts. Create applications on command line arguments	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-
CLO-2 :	Create the different types of applications using C++ classes and objects	3	85	75	M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
CLO-3 :	Create applications using constructors, destructors and friend classes	3	75	70	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-4 :	Implement Inheritance and polymorphism concepts	3	85	80	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-5 :	Create class and function templates	3	85	75	H	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-6 :	Construct UML diagrams for real-time applications	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Procedural programming, An Overview of C:Types Operator and Expressions, Scope and Lifetime, Constants	Some difference between C and C++: Single line comments	More extensions to C in C++ to provide OOP Facilities: Scope of Class	Essentials of Object-Oriented Programming: Operator Overloading	Generic Programming: Template concept
	SLO-2	Control Flow, Program Structure	Local variable declaration within function scope, function declaration	Scope Resolution Operator	Operator Overloading	class template, function template
S-2	SLO-1	Arrays, and References, Namespaces, Functions	function overloading	Member Function of a Class, private	Single Inheritance, Multiple Inheritance	function template
	SLO-2	Pointers	stronger type checking, Reference variable	protected and public Access Specifiers,protected and public Access Specifiers	Single Inheritance, Multiple Inheritance	template specialization
S 3-6	SLO-1	Lab 1: Implementation of Functions and pointers	Lab4:Implementation Function overloading	Lab 7:Implementation of Private, protected, public access specifiers	Lab10: Implementation of Operator overloading, Single and multiple inheritance	Lab 13: Implementation of Templates
	SLO-2					
S-7	SLO-1	error handling	parameter passing – value vs reference	this Keyword,	Class Hierarchy	Input and Output: Streams
	SLO-2	Input and Output	passing pointer by value or reference, Operator new and delete	this Keyword	Pointers to Objects	Streams, Files
S-8	SLO-1	Library Functions (string)	the typecasting operator, Inline Functions in contrast to macro	Constructors	Polymorphism through dynamic binding	Files, Library functions
	SLO-2	Library Functions (math, stdlib)	default arguments	Constructors	Assignment of an Object to another Object	formatted output
S 9-12	SLO-1	Lab 2: Implementation of Library functions	Lab 5: Implementation parameter passing, Inline and default arguments	Lab 8: Implementation of Constructors and this keyword	Lab 11: Implementation of Pointers, polymorphism	Lab 14:Implementation of Files and formatted output
	SLO-2					

S-13	SLO-1	*Command line arguments*	*The Fundamentals of Object-Oriented Programming: Necessity for OOP*	*Destructors*	*Overloading*	*UML Concept, use case for requirement capturing*
	SLO-2	*Command line arguments*	*Data Hiding, Data Abstraction*	*Friend class*	*Virtual Functions*	*Class diagram, Activity diagram*
S-14	SLO-1	*Preprocessor Directive*	*Encapsulation, Procedural Abstraction*	*error handling (exception)*	*overriding and hiding*	*Sequence Diagram for design*
	SLO-2	*Preprocessor Directive*	*Class and Object*	*error handling (exception)*	*Error Handling*	*Corresponding C++ code from design*
S 15-18	SLO-1	*Lab 3: Implementation of command line arguments, Preprocessor directive*	*Lab 6: Implementation of Classes and objects*	*Lab9: Implementation of error handling, Friend class, Destructors*	*Lab 12:Implementation of Error Handling, Overloading,Overriding, Virtual functions*	*Lab 15:Implementation UML concept*
	SLO-2					

Learning Resources	1. *The C++ Programming Language, Bjarne Stroustrup.* 2. *C++ and Object-Oriented Programming Paradigm, Debasish Jana*	3. *Programming – Principles and Practice Using C++, Bjarne Stroustrup.* 4. *The Design and Evolution of C++, Bjarne Stroustrup.*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Experts from TCS	*1. Dr. Srinivasa Rao Bakshi, IITM, Chennai, sbakshi@iitm.ac.in*	*1. Dr.T.Y.J Naga Malleswari*
	2. Dr. Ramesh Babu, N , nrbabu@iitm.ac.in	
	3.Dr.Noor Mahammad, IIITDM, Kancheepuram,noor@iiitdm.ac.in	

Course Code	18CSC264J	Course Name	COMPUTATIONAL STATISTICS	Course Category	C	Professional Core	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	18CSC204J
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLR-1 :	Utilize the different data handling techniques																		
CLR-2 :	Utilize Regression methods																		
CLR-3 :	Utilize clustering techniques for real-time applications																		
CLR-4 :	Utilize various data sets for real-time applications																		
CLR-5 :	Utilize algorithms to find optimal solutions to prediction problems																		
CLR-6 :	Utilize the Python libraries to implement the techniques learnt in the course																		
CLO-1 :	Identify suitable algorithm to solve prediction problems	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-
CLO-2 :	Implement Regression methods	3	85	75	M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
CLO-3 :	Implement clustering techniques	3	75	70	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-4 :	Implement statistical analysis on the data	3	85	80	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-5 :	Analyze various evaluation techniques	3	85	75	H	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-6 :	Strong foundation in Python	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Multivariate Normal Distribution: Multivariate Normal Distribution Functions	linear discriminant function analysis	Functions	Data Ranges	Congruential Methods
	SLO-2	Conditional Distribution	Estimating linear discriminant functions and their properties	Numeric Types	Frequencies	Other `Better?' Methods
S-2	SLO-1	Conditional Distribution and its relation to regression model	linear discriminant functions properties	Sequences	Shifting	Random Number Generation- other than Uniform
	SLO-2	Estimation of parameters	Principal components	Class Definition	Visualization in Python: Matplotlib package	Inversion Method
S-3	SLO-1	Standard multiple regression models	Algorithm for conducting principal component analysis	Text & Binary Files - Reading and Writing	Plotting Graphs	Rejection Methods
	SLO-2	Standard multiple regression models with emphasis on detection of collinearity	deciding on how many principal components to retain	Text & Binary Files – Writing	Adding Text	Table Lookup
S 4-5	SLO-1	Lab 1: Getting Started with Python	Lab4 : Implementation principal Component Analysis for finding Important texts in a Corpus	Lab 7 :Exercises on handling files	Lab10: Exercises Using Matplotlib	Lab 13: Implementation of Graph using Array
	SLO-2					
S-6	SLO-1	Outliers	Factor analysis model	Combining Datasets	More Graph Types	Specialized Methods

	SLO-2	*non-normality*	*Extracting common factors*	*Merging Datasets*	*Getting values*	*Polar methods for the Normal*
S-7	SLO-1	*Autocorrelation*	*determining number of factors*	*Reshaping*	*Setting values*	*Importance Sampling*
	SLO-2	*Validation*	Transformation of factor analysis solutions	*Pivoting*	*EM algorithm*	*The bootstrap : the univariate context*
S-8	SLO-1	*Validation of model assumptions*	*Factor scores*	*Data Transformation*	*Implementation*	*The Bootstrap, Permutation Tests,*
	SLO-2	*Assumptions of Multivariate Regression Models*	*Clustering and Segmentation Analysis: Introduction*	*String Manipulation*	*Estimating Mixture Proportions*	*Motivation*
S 9-10	SLO-1	*Lab 2: Prediction Exercises*	*Lab 5: Exercises on Factor Analysis*	*Regular Expressions* *Data Aggregation, Group Operations, Time series: Group By Mechanics*	*Lab 11:* *Implementing EM algorithms*	*Lab 14:* *Implementing Bootstrapping*
	SLO-2					
S-11	SLO-1	*Multivariate Regression Models*	*Types of clustering* *Correlations Distances*	*Data Aggregation*	*EM for exponential families*	*Simulation*
	SLO-2	*Assumptions of Multivariate Regression Models*	*clustering by partitioning methods*	*Groupwise Operations*	*Monte Carlo Simulations*	*S examples for simple bootstraps*
S-12	SLO-1	*Parameter estimation*	*K means*	*Transformations*	*Monte Carlo methods*	*Parametric bootstrap*
	SLO-2	*Multivariate Analysis of variance*	*Bayesian*	*Pivot Tables*	*Antithetic Resampling*	*Smoothed Bootstrap*
S-13	SLO-1	*Multivariate Analysis of covariance*	*Graph Clustering*	*Cross Tabulations*	*Importance Sampling*	*Quality of Estimates*
	SLO-2	*Statistical background*	*Spectral Clustering*	*Time Series Basics*	*Random Number Generation-Uniform[0, 1]*	*Enhancements* *Bootstrap-t : Studentizing*
S 14-15	SLO-1	*Lab 3: Performance Analysis of Regression Analysis*	*Lab 6: Clustering of Images and Text documents*	*Lab9: Exercises on Regular Expressions*	*Lab 12:Implementation of EM algorithm*	*Lab 15 :Implementation of Minimal Spanning Tree*
	SLO-2					

Learning Resources	1. *An Introduction to Multivariate Statistical Analysis*, T.W. Anderson. 2. *Applied Multivariate Data Analysis, Vol I & II*, J.D. Jobson. 3. *Beginning Python: From Novice to Professional*, Magnus Lie Hetland. *Edition, 2005*. 4. *The Foundations of Factor Analysis*, A.S. Mulaik.	5. *Introduction to Linear Regression Analysis*, D.C. Montgomery and E.A. Peck. 6. *Python for Data Analysis*, Wes Mc Kinney. 7. *Programming Python*, Mark Lutz. 8. *Python 3 for Absolute Beginners*, Tim Hall and J-P Stacey.

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Experts from TCS		*Dr.C.N.Subalalitha*

Course Code	18CSC265J	Course Name	SOFTWARE ENGINEERING	Course Category	C	Professional Core	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Study the emergence of software engineering as a discipline
CLR-2 :	Study the effectiveness of Software Project Management
CLR-3 :	Understand the metrics and models of Software Quality and Reliability
CLR-4 :	Implement Software Requirements Analysis, Design and Construction
CLR-5 :	Understand the Object Oriented approach towards software development
CLR-6 :	Use the various Software Testing methods

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Utilize engineering approach to software development	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-
CLO-2 :	Practice the various software development life cycle models	3	85	75	M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
CLO-3 :	Practice the software quality models	3	75	70	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-4 :	Analyze the techniques of requirement gathering and modelling	3	85	80	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-5 :	Implement Class Responsibility Collaborator model	3	85	75	H	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-6 :	Do effective white and black box testing coverage	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Programming in the small vs Programming in the large	Internal qualities	Software Requirements Analysis, Design and Construction	Object Oriented Analysis, Design and Construction	Software Testing
	SLO-2	software project failures	external qualities	Introduction to Software Requirements Specifications (SRS)	Object Oriented Concepts	Introduction to faults and failures
S-2	SLO-1	Importance of software quality and Timely availability	process quality	requirement elicitation techniques	the principles of abstraction	basic testing concepts
	SLO-2	Engineering approach to software development	product quality	techniques for requirement modeling	modularity	basic testing concepts
S-3	SLO-1	role ofsoftware engineering towards successful execution of large software projects	principles to achieve software quality	decision tables	specification, encapsulation	concepts of verification
	SLO-2	emergence of software engineering as a discipline	introduction to different software quality models	event tables	information hiding	concepts of validation
S 4-5	SLO-1	Lab1:Case study on Software engineering principles	Lab4:Software quality metrics	Lab7:Implementation of requirements gathering techniques	Lab10:Study on object oriented concepts	Lab13:Implementation of verification and validation procedures
	SLO-2					
S-6	SLO-1	Software Project Management	McCall	state transition tables	concepts of abstract data type	black box tests
	SLO-2	Basic concepts of life cycle models – different models and milestones	Boehm	Petri nets	Class Responsibility Collaborator (CRC) model	white box tests
S-7	SLO-1	software project planning – identification of activities and	FURPS	requirements documentation Template	quality of design	white box test coverage

		resources				
	SLO-2	*concepts of feasibility study*	*FURPS+*	*Through use cases*	*design measurements*	*code coverage*
S-8	SLO-1	*techniques for estimation of schedule and effort*	*Dromey*	*introduction to UML*	*Design metrics*	*condition coverage*
	SLO-2	*software cost estimation models*	*ISO – 9126*	*introduction to softwaremetrics*	*concepts of design patterns*	*Branch coverage*
S 9-10	SLO-1	*Lab2:Implementation of lifecycle models*	*Lab5:Implementation of software quality models*	*Lab8: Implementation of requirements modelling methods*	*Lab11:Implementation of CRC model*	*Lab14:Implementation of White box testing*
	SLO-2					
S-11	SLO-1	*concepts of software engineering economics*	*introduction to Capability Maturity Models -CMM*	*metrics based control methods*	*concepts of design patterns*	*basic concepts of black-box tests – equivalence classes*
	SLO-2	*techniques of software project control and reporting*	*CMMI*	*metrics based control methods*	*Refactoring*	*boundary value tests*
S-12	SLO-1	*introduction to measurement of software size*	*introduction to software reliability*	*measures of code*	*object oriented construction principles*	*usage of state tables, testing use cases*
	SLO-2	*introduction to the concepts of risk and its mitigation*	*reliability models*	*measures of code*	*object oriented construction principles*	*transaction based testing*
S-13	SLO-1	*configuration management*	*reliability models and estimation*	*measures of design quality*	*object oriented metrics*	*testing for non-functional requirements – volume, performance and efficiency*
	SLO-2	*configuration management*	*Software estimation*	*measures of design quality*	*object oriented metrics*	*Concepts of inspection.*
S 14-15	SLO-1	*Lab3:Risk assessment tools and configuration management*	*Lab6:Implementation of Reliability models*	*Lab9:Usage of metrics of code and design quality*	*Lab12:Implementation of object oriented approach for software development*	*Lab15:Implementation of black box testing*
	SLO-2					

Learning Resources	1. *Software Engineering*, Ian Sommerville 2. *Object Oriented Software Engineering: A Use Case Driven Approach* --Ivar Jacobson 3. *Fundamentals of Software Engineering*, Carlo Ghezzi, Jazayeri Mehdi, Mandrioli Dino 4. *Software Requirements and Specification: A Lexicon of Practice, Principles and Prejudices*, Michael Jackson	5. *The Unified Development Process*, Ivar Jacobson, Grady Booch, James Rumbaugh 6. *Design Patterns: Elements of Object-Oriented Reusable Software*, Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides 7. *Software Metrics: A Rigorous and Practical Approach*, Norman E Fenton, Shari Lawrence Pfleeger

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Experts from TCS		*Mrs.K.RJansi*

Course Code	18PDM201L	Course Name	COMPETENCIES IN SOCIAL SKILLS	Course Category	*M*	*Mandatory*	L	T	P	C
							0	0	2	0

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Career Development Centre*	**Data Book / Codes/Standards**	*Nil*		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	**Learning**		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*enable students understand subtle meanings of words used in academic texts*			
CLR-2 :	*determine the grammatical, syntactical, and logical accuracy of sentences*			
CLR-3 :	*comprehend an argument's line of reasoning*			
CLR-4 :	*understand the structure, organization, tone, and main idea behind the passage*			
CLR-5 :	*recognize the logical coherence of ideas in a text*			
CLR-6 :	*give the right knowledge, skill and aptitude to face any competitive examination*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	**Learning**			**Program Learning Outcomes (PLO)**														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	*build vocabulary through methodical approaches and nurture passion for enriching vocabulary*	*3*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*H*	-	*H*	-	-	-
CLO-2 :	*detect and correct any grammatical, syntactical, and logical fallacies*	*2*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*H*	-	*H*	-	-	-
CLO-3 :	*hone critical thinking skills by analyzing arguments with explicit and implicit premises to validate the author's point of view*	*3*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*H*	-	*H*	-	-	-
CLO-4 :	*analyze and evaluate texts critically in multifarious ways*	*3*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*H*	-	*H*	-	-	-
CLO-5 :	*identification of relationships between sentences based on their function, usage and characteristics*	*2*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*H*	-	*H*	-	-	-
CLO-6 :	*ace competitive examinations*	*2*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*H*	-	*H*	-	-	-

Duration (hour)		**6**	**6**	**6**	**6**	**6**
S-1	SLO-1	*Synonyms in Isolation and Context*	*Spotting Errors – Level I*	*Critical Reasoning – Weakening*	*Reading Comprehension – Main Idea*	*Para Jumble-Type I*
	SLO-2	*Practice*	*Practice*	*Practice*	*Practice*	*Practice*
S-2	SLO-1	*Antonyms in Isolation and Context*	*Spotting Errors – Level II*	*Critical Reasoning – Inference*	*Reading Comprehension – Tone*	*Para Jumble-Type II*
	SLO-2	*Practice*	*Practice*	*Practice*	*Practice*	*Practice*
S-3	SLO-1	*Common Confusables*	*Spotting Errors – Level II*	*Critical Reasoning – Conclusion*	*Reading Comprehension – Inference*	*Para Jumble-Type III*
	SLO-2	*Practice*	*Practice*	*Practice*	*Practice*	*Practice*
S-4	SLO-1	*Cloze Passage*	*Sentence Correction-Type I & II*	*Critical Reasoning - Explain the paradox*	*Reading Comprehension – Summary*	*Para Completion*
	SLO-2	*Practice*	*Practice*	*Practice*	*Practice*	*Practice*
S-5	SLO-1	*Word Analogy*	*Sentence Correction-Type III & IV*	*Critical Reasoning – Miscellaneous*	*Reading Comprehension – Conclusion*	*Para Completion*

	SLO-2	*Practice*	*Practice*	*Practice*	*Practice*	*Practice*
S-6	SLO-1	*Sentence Completion*	*Sentence Correction-Type V& VI*	*Critical Reasoning – Miscellaneous*	*Reading Comprehension – Miscellaneous*	*Para Summary*
	SLO-2	*Practice*	*Practice*	*Practice*	*Practice*	*Practice*

Learning Resources	1. *Charles Harrington Elstor, Verbal Advantage: Ten Easy Steps to a Powerful Vocabulary, Random House Reference, 2002* 2. *Merriam Webster's Vocabulary Builder, Merriam Webster Mass Market, 2010* 3. *Norman Lewis, How to Read Better and Faster, Goyal, 4th Edition* 4. *Franklin GRE Word List, 3861 GRE Words, Franklin Vocab System, 2014* 5. *Wiley's GMAT Reading Comprehension Grail, Wiley, 2016*	6. *Manhattan Prep GRE : Reading Comprehension and Essays, 5th Edition* 7. *Martin Hewings, Advanced Grammar in Use. Cambridge University Press, 2013* 8. *Manhattan GMAT – Critical Reasoning, GMAT Strategy Guide, 12th Edition* 9. *Joern Meissner, Manhattan Review, GRE Analytical Writing Guide, Manhattan Review Inc, 2011* 10. *GRE Analytical Writing, Solutions to the Real Essay Topics (Test Prep. Series), Vibrant Publishers, 2011*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)								Final Examination	
		CLA – 1 (20%)		CLA – 2 (30%)		CLA – 3 (30%)		CLA – 4 (20%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	-	*40%*	-	*30%*	-	*30%*	-	*30%*	-	-
	Understand										
Level 2	Apply	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-	-
	Analyze										
Level 3	Evaluate	-	*20%*	-	*30%*	-	*30%*	-	*30%*	-	-
	Create										
	Total	100 %		100 %		100 %		100 %		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts	
1. Mr. Vijay Nayar, Director, Education Matters, vijayn@edumat.com	*1. Dr. Dinesh Khattar, Delhi University, dinesh.khattar31@gmail.com*	*1. Dr. M. Snehalatha, SRMIST*	*3. Dr. P. Madhusoodhanan, SRMIST*
2. Mr. Ajay Zenner, Career Launcher, ajay.z@careerlauncher.com	*2. Mr. Nishith Sinha, dueNorth India Academics LLP, nsinha.alexander@gmail.com*	*2. Mr Jayapragash J., SRMIST*	*4. Mr. Clement A, SRMIST*

Semester - IV

Course Code	18MBH261T	Course Name	INTRODUCTION TO INNOVATION, INTELLECTUAL PROPERTY RIGHTS, MANAGEMENT AND ENTREPRENEURSHIP	Course Category	*H*	***Humanities & Social Sciences***	L	T	P	C
							3	0	0	3

Pre-requisite Courses	*Nil*	**Co-requisite Courses**	*Nil*	**Progressive Courses**	
Course Offering Department	*Faculty of Management*	**Data Book / Codes/Standards**		Nil	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	To Understand the Innovation – What it is and why it matters
CLR-2 :	Examine the IP
CLR-3 :	To know the need management practices
CLR-4 :	To understand about entrepreneurship
CLR-5 :	Learn the technique of Performance process in entrepreneurship
CLR-6 :	Understand the trends in entrepreneurship`

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	**Learning**		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Apply the conceptual knowledge of innovation	2	60	50
CLO-2 :	Analyze the importance of IP	2	80	70
CLO-3 :	Analyze the training models and the management practices	1	80	75
CLO-4 :	Learn the techniques of entrepreneurship	2	80	70
CLO-5 :	Implement, evaluate and control the process of entrepreneurship	3	90	80
Overall	Gain Knowledge in the field of entrepreneurship and update with recent trends	3	90	80

Program Learning Outcomes (PLO)															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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
H	*M*	*H*	*M*	*L*	*M*	*M*	*M*	*L*	*M*	*H*	*L*			
L	*H*	*L*	*L*	*M*	*M*	*M*	*L*	*L*	*M*	*H*	*H*			
M	*H*	*L*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*M*			
M	*H*	*M*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*H*			
M	*H*	*H*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*L*			
H	L	H	M	H	M	H	M	L	H	M	H			

Duration (hour)		9	9	9	9	9
S-1	SLO-1	Scope – types –innovation	What is IP?	Introduction to management	Introduction to entrepreneurship	Recent trends in entrepreneurship
	SLO-2	Process of innovation	Introduction to IP	Principles of management	Scope and importance of entrepreneurship	Importance of innovation
S-2	SLO-1	Different aspects of innovation	Importance of IP	Difference between management and administration	Prospects of entrepreneurship	Role of innovation in present scenario
	SLO-2	Forms of innovation	Role , scope of IP	Theories of management	Entrepreneurial ecosystem	Creativity and innovation - meaning
S-3	SLO-1	Innovation models	Kinds of intellectual property rights	Evolution of management	Entrepreneurship process	Popularity of creativity and innovation in modern world
	SLO-2		Property rights needs and importance	Importance of management practices	Kinds of entrepreneurship	Role and responsibilities of different entrepreneurs in present trends
S-4	SLO-1	Type of innovation models	Introduction to trademarks	Role of manager	Barriers in entrepreneurship process	Women entrepreneurship
	SLO-2		Trademarks and its importance	Difference between manager and a entrepreneur	Is entrepreneurs are made or born?	Role of women entrepreneurs
S-5	SLO-1	Innovation lifecycle	Registration procedure	Different forms of organization	Factors influencing entrepreneurship	Rural entrepreneurship

	SLO-2	Sources of innovation	Procedure for cancellation	Function of management	Entrepreneurship ecosystem	Role of rural entrepreneurship
S-6	SLO-1	Forms of innovation	Copyright –	Different components of a business	Process of entrepreneurship	Social entrepreneur
	SLO-2	Strategy in innovation	Registration of copyrights	human resource management	Entrepreneurial mindset	Role of social entrepreneurs
S-7	SLO-1	Steps in strategy formation	Applying for copyrights	Marketing management	Myths in entrepreneurship	Technology driven entrepreneurship
	SLO-2	Innovation and strategy in new format	Procedure for obtaining copy rights	Financial management	Idea generation to business - meaning	Impact of technology driven entrepreneurs
S-8	SLO-1	New strategy	Copy right protection	Operations management.	Sources of idea generation	family business
	SLO-2	Implementation of new strategy	Ways of getting a copy rights	Systems management.	Business plan	First generation entrepreneurs
S-9	SLO-1	Importance of innovation	Patents	General management process	Steps for business model canvas	Sustainability of family business
	SLO-2	Steps for developing strategy	Criteria for patentability	Importance of all management process	Importance of business plan.	Climate change and entrepreneurship.

Learning Resources	1. Managing Innovation – integrating technological, market and organizational change – Wiley India edition 2. Entrepreneurship – theory and practice – Raj Shankar Vijay Nicole. 3. Joe Tidd, John Bessant. Managing Innovation: Integrating Technological, Market and Organizational Change	4. Entrepreneurship – second edition – Rajeev Roy – Oxford University Press 5. *K.ASWATHAPPA – HUMAN RESOURCE MANAGEMENT – The McGraw- Hill Companies*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	40%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	20%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Expert from TCS	Dr.K.Latha, Chandasekara University, Kanchipuram	Dr.N. SanthoshKumar, Head – Human Resources, SRMSOM
	Dr.Thenmozhi, Professor, University of Madras	Dr.M.Chitra – Assistant Professor - SRMSOM

Course Code	18MBH465T	Course Name	MARKETING RESEARCH AND MARKETING MANAGEMENT	Course Category	H	*Humanities & Social Sciences*	L	T	P	C
							2	0	0	2

Pre-requisite Courses	*Nil*	**Co-requisite Courses**	*Nil*	**Progressive Courses**	
Course Offering Department	*Faculty of Management*	**Data Book / Codes/Standards**	Nil		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	Understand the fundamentals of Research and literature reviewing
CLR-2 :	Differentiate sources of information and research approaches
CLR-3 :	Do qualitative and quantitative research, sample, survey, design, develop, code data collection forms, data entry, screen and analyze
CLR-4 :	Adopt different analytic techniques to report findings
CLR-5 :	Practice research report writing and presentation
CLR-6 :	Read, discuss, debate, comprehend and conclude cases

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	**Learning**		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Understand basic marketing concepts	1	60	50
CLO-2 :	Comprehend the dynamics of marketing and analyze how its various components interact with each other in the real world	1	50	70
CLO-3 :	Leverage marketing concepts for effective decision making	2	80	75
CLO-4 :	Understand basic concepts and application of statistical tools in Marketing research	2	80	70
CLO-5 :	Understand basic marketing concepts	2	90	80

Program Learning Outcomes (PLO)															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
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	
H	M	H	M	L	L	M	H	L	H	M	L	1	60	50	
L	H	L	L	M	M	H	H	M	M	H	M	1	50	70	
M	H	L	L	M	M	M	M	H	H	H	M	2	80	75	
M	H	H	H	M	M	M	L	H	H	M	M	2	80	70	
M	H	M	L	M	H	H	M	M	M	H	M	2	90	80	

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Marketing Concepts and Applications	Product Management	Pricing	Marketing Research	Internet Marketing, Introduction to Internet Marketing.
	SLO-2	Introduction to Marketing & Core Concepts	Product Life cycle concept	Promotion and Distribution Strategy	Introduction, Type of Market Research	1.Advertising 2.Word of mouth referrals 3.Passing Traffic
S-2	SLO-1	Marketing of Services	Product life cycle strategies	Policies & Practices	Scope, Objectives & Limitations	Benefits of Online Business, Brand awareness Ease of access Competitive advantage Effectiveness
	SLO-2	Importance of marketing in service sector	New Product development	Pricing Methods	Marketing Research Techniques	Channels, Self-regulation, Stages of planning, Mapping fundamental concepts of Marketing (7Ps, STP)
S-3	SLO-1	Marketing Planning & Environment	New Product development & strategy	State the nature of Quantitative research and its purpose Price determination Policies	Survey Questionnaire design & drafting	Developments and strategies, Strategy and Planning for Internet Marketing

	SLO-2	Elements of Marketing Mix Analyzing needs trends in Environment Macro, Economic Political, Technical & Social	Stages in New Product development	Marketing Communication	Survey Questionnaire design & drafting	Ineffective forms of digital marketing
S-4	SLO-1	Understanding the consumer	Product classification	The promotion mix	Media Research, Qualitative Research	Fundamental of business markets.
	SLO-2	Determinants of consumer behavior	Product decision	Advertising & Publicity	Data Analysis: Use of various statistical tools	Organizational buying process. Business buyer needs.
S-5	SLO-1	Factors influencing consumer behavior Market Segmentation	Product extension strategies Branding	5 M's of Advertising Management Marketing Channels	Descriptive & Inference Statistics Statistical Hypothesis Testing, Multivariate Analysis	Market and sales potential. Product in business markets. Price in business markets. Place in business markets.
	SLO-2					
S-6	SLO-1	Basis of segmentation, selection of segments, Market Segmentation strategies,	Branding strategies	Retailing	Discriminant Analysis, Cluster Analysis	Promotion in business markets. Relationship. Networks.
	SLO-2	Target Marketing, Product Positioning	Packaging	Marketing Communication, Advertising	Segmenting and Positioning, Factor Analysis	customer relationship management. Business to Business marketing strategy

Learning Resources	1. Marketing Management (Analysis, Planning, Implementation & Control) – Philip Kotler 2. Fundamentals of Marketing – William J. Stanton & Others 3. Marketing Management – V.S. Ramaswamy and S. Namakumari 4. Marketing Research – Rajendra Nargundkar 5. Market Research – G.C. Beri 6. Market Research, Concepts, & Cases – Cooper Schindler	7. Marketing Management – Rajan Saxena 8. Marketing Management – S.A. Sherlekar 9. Service Marketing – S.M. Zha 10. Journals – The IUP Journal of Marketing Management, Harvard Business Review 11. Research for Marketing Decisions by Paul Green, Donald, Tull 12. Business Statistics, A First Course, David M Levine at al, Pearson Publication

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	40%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	20%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Expert from TCS	*Dr. N. Thamarai Selvan, Professor, DOMS, NIT, Trichy.*	*Dr.S.Senthilkumar Associate Professor,FOM/SRMIST*
	Dr. Maran, Professor and Director, Sairam School of Management Studies	*Dr. A.R.Krishanan Associate Professor,FOM/SRMIST*

Course Code	18MBH262J	Course Name	DESIGN THINKING	Course Category	H	Humanities & Social Sciences	L	T	P	C
							2	0	2	3

Pre-requisite Courses	NA	Co-requisite Courses	NA	Progressive Courses	NA
Course Offering Department	MBA	*Data Book / Codes/Standards*		NA	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	**Learning**		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Develop the skills, structures, and processes that generate value by driving valuable insights along the knowledge funnel.*			
CLR-2 :	*Understand the well-known and new tools in the right context of the design thinking application*			
CLR-3 :	*Examine how to visualize ideas, stories and prepare the organization for a new mindset*			
CLR-4 :	*Classify systems thinking and digital transformation process.*			
CLR-5 :	*Comprehend the applications of design thinking in politics & society, business, health & science and law.*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*Understand applying the skills, structures, and processes that generate value by driving valuable insights along the knowledge funnel.*	*2*	*60*	*50*
CLO-2 :	*Learned Analyzing the effectiveness of design thinking tools and able to suggest the appropriate tool.*	*4*	*80*	*70*
CLO-3 :	*Envisage ideas & stories and prepare the organization for a new mindset.*	*4*	*80*	*75*
CLO-4 :	*Gain knowledge on systems thinking and digital transformation process.*	*1*	*80*	*70*
CLO-5 :	*Appreciate the applications of design thinking in politics & society, business, health & Science and law.*	*5*	*90*	*80*
Overall	Gain Knowledge in the field of Design Thinking, Tools, Transform organizations, systems thinking and applications	*1*	*90*	*80*

Program Learning Outcomes (PLO)															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
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	
H	*M*	*H*	*M*	*L*	*M*	*M*	*M*	*L*	*M*	*H*	*L*	*2*	*60*	*50*	
L	*H*	*L*	*L*	*M*	*M*	*M*	*L*	*L*	*M*	*H*	*H*	*4*	*80*	*70*	
M	*H*	*L*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*M*	*4*	*80*	*75*	
M	*H*	*M*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*H*	*1*	*80*	*70*	
M	*H*	*H*	*L*	*M*	*M*	*L*	*L*	*L*	*M*	*H*	*L*	*5*	*90*	*80*	
H	*L*	*H*	*M*	*H*	*M*	*H*	*M*	*L*	*H*	*M*	*H*	*1*	*90*	*80*	

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Recognize the importance of Design Thinking	Explanation on personas creation	Importance of prototype phase in design thinking	Introduction to testing phase	Expanding the politics of civic engagement
	SLO-2	Design thinking and business	Create personas in design phase	How to create prototype	Recognize the best practices of the testing phase	Managing Gridlocked Debates
S-2	SLO-1	Design thinking and product	Importance of problem statements	Examples on prototype	Define Functional work	Implementing a Strategic Technology Creativity in the Culinary Arts
	SLO-2	Design thinking process	Recognize the steps to create problem statements	Explanation on development of prototype	Recognize how design thinking can help in function work	Empathy as a means to innovate in a pharmaceutical company Visioning, listening and diagramming at a university
S 3-4	SLO-1	Activity Lab-I: Experimental activity on the products they like and dislike based on their experience	Activity Lab-I: Immersion activity by groups	Activity Lab-I: Six thinking hats game	Activity Lab-I: Story telling activity	Activity Lab-I: Reflection activity using Satori moments
	SLO-2					
S-5	SLO-1	Identify the steps in the Design thinking process	Define the problem statements	Combining immersion and persona creation to create prototype	Agile thinking definition	Fast-Fail and Iterative
	SLO-2	Explanation of Stanford Model	Define the key problem statements	Defining problem statement and ideating to create prototypes	Define customer perception and expectations	Dinner conversation as a model for effective interviews
S-6	SLO-1	Steps in empathize phase of design thinking	Recognize the steps in the ideate phase of Design thinking	Define service value proposition	Define Product and customer satisfaction	Health care delivery
	SLO-2	Explanation on target activity	Idea on Six thinking hats	Create a value proposition statement	How design thinking and agile thinking complement each other to	Design approach to treating cancer

					customer satisfaction	
S 7-8	SLO-1 SLO-2	Activity Lab-II: Target activity related to empathy	Activity Lab-II: Creating person a based on the immersion activity using A4 pages	Activity Lab-II: Million dollar idea game	Activity Lab-II: Activity on prototyping	Activity Lab-II: Apply design thinking to create a prototype to improve any existing product or service
S-9	SLO-1	Steps in immersion activity	Recognize how decoding can help to express ideas	Visualization of the personnel	Learn the elements of systems thinking, Actual level and desired level	Problem definition
	SLO-2	Explanation on Moccasin walk	Learn doodle	Understand Lean AEIOU	Review, gap and corrective action	Alternatives and the big idea
S-10	SLO-1	Steps in immersion activity	Importance of Story telling	Know what is problem space	Working of systems thinking & mindset of a system thinker	Draft as prototype
	SLO-2	Flow charts and handouts	Importance of presenting ideas	Know what is solution space	Differentiate system thinking and design thinking	Writing prose for writing pros
S 11-12	SLO-1 SLO-2	Activity Lab-III: Moccasin walk activity on stepping in to the shoes of another person	Activity Lab-III: Peer review activity	Activity Lab-III: Activity on doodling	Activity Lab-III: Test the prototype	Activity Lab-III: Groups need to complete all phases of Stanford design thinking model

Learning Resources

1. Nir Eyal - "Hooked by" – URL https://www.youtube.com/watch?v=iw1x0zos8Jo
2. Rod Judkins (2015) – "The Art of Creative Thinking" - Hachette Book Publishing
3. Dan Senor and Saul singer (2011) – "Start-up Nation" - Twelve; Reprint edition
4. Simon Sinek – "Start with why" – URL https://www.youtube.com/watch?v=u4ZoJKF_VuA
5. Claude Diderich (2020) – "Design Thinking for Strategy Innovation Towards Competitive Advantage" – Springer International Publishing
6. Kausik Kumar, DivyaZindani and J.PauloDavim (2020) – "Design Thinking to Digital Thinking" – Springer International Publishing
7. Michael Lewrick, Patrick Link and Larry Liefer (2018) – "The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems" – Wiley
8. Andrew Pressman (2018) – "Design Thinking: A Guide to Creative Problem Solving for Everyone"–Routledge
9. Walter Brenner and Falk Uebernickel (2016) – "Design thinking for Innovation: Research and Practice" – Springer International Publishing
10. (2015) - "The Field Guide to Human Centered Design" – IDEO.org – First Edition
11. Roger L Martin (2009) – "The Design of Business: Why Design Thinking is the Next Competitive Advantage" – Harward Business School Press

Web References

12. What is Design Thinking? Interaction Design Foundation
13. What are some of the good examples of design thinking? - Quora
14. Design thinking 101: Principles, Tools & Examples to transform your creative process

Online Resources

15. Understanding Design thinking WF NEN
16. Design Thinking and Innovation at Apple Wei Li
17. Stanford Webinar- Design Thinking = Method, Not Magic
18. Stanford Design Thinking Virtual Crash Course
19. So Many Uses- activity to spark creativity and design

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
Level 2	Apply Analyze	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
Level 3	Evaluate Create	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Expert from TCS	Dr.Hansa Lysander Manohar, Professor, School of Management, Anna University Chennai	Dr..V.M.Shenbagaraman, Professor & HOD – SRMSOM
	Dr.Thenmozhi, Professor, University of Madras	Dr.P.Saravanan – Associate Professor & Head – Systems , SRMSOM

Course Code	18MAB261J	Course Name	OPERATIONS RESEARCH	Course Category	B	*Basic Sciences*	L	T	P	C
							2	0	2	3

Pre-requisite Courses	*18MAB161T*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	***Mathematics***	**Data Book / Codes/Standards**	*Nil*		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	**Learning**		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Apply basic concepts of Linear programming problems to solve engineering problems			
CLR-2 :	Appropriately choose, Transport and assignment problems and various solution methods for distinct situations			
CLR-3 :	To comprehend the fundamentals of project scheduling techniques			
CLR-4 :	Understand the EOQ, POQ models and sensitivity analysis			
CLR-5 :	Learn the concept of QUEUEING models and its applications in scheduling and Inventory systems			
CLR-6 :	Acquire the knowledge of Linear programming, Transportation /Assignment models, project scheduling techniques, inventory control and queuing models with its applications			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	**Learning**			**Program Learning Outcomes (PLO)**														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Obtain the knowledge of Linear programming and using it to get optimal solutions for different real life situations of optimization	2	85	80	M	H	L						M	L		H			
CLO-2 :	Pertain the idea of transportation/assignment problems and its applications using different methods	2	85	80	M	H		M	M				M			H			
CLO-3 :	Acquire the knowledge of project scheduling techniques	2	85	80	M	H							M			H			
CLO-4 :	Understand the concept of inventory control and EOQ under probabilistic situations	2	85	80	M	H		M					M			H			
CLO-5 :	Gain familiarity in Queuing models and simulation methods	2	85	80	M	H	L						M	L		H			
CLO-6 :	Able to solve optimization and queuing models using simulation technique	2			M	H							M			H			

		Learning Unit / Module 1	**Learning Unit / Module 2**	**Learning Unit / Module 3**	**Learning Unit / Module 4**	**Learning Unit / Module 5**
Duration (hour)		**12**	**12**	**12**	**12**	**12**
S-1	SLO-1	Linear programming – Examples from industrial cases, formulation & definitions, Matrix form. Implicit assumptions of LPP	TP - Examples, Definitions – decision variables, supply & demand constraints, formulation, Balanced & unbalanced situations	Project scheduling -Basic definition.	Functions of inventory and its disadvantages, ABC analysis	Definitions – queue (waiting line), waiting costs, characteristics (arrival, queue, service discipline) of queueing system, queue types (channel vs. phase) Poisson's Process & queue
	SLO-2	Some basic concepts and results of linear algebra – Vectors, Matrices, Linear Independence / Dependence of vectors	Solution methods – NWCR	Project scheduling techniques – Gantt chart	Concept of inventory costs, Basics of inventory policy (order, lead time, types)	Kendall's notation, Little's law, steady state behaviour
S-2	SLO-1	Rank, Basis, System of linear equations, Hyper plane, Convex set, Convex polyhedron, Extreme points, Basic feasible solutions	Minimum cost method	Project Evaluation Review Technique (PERT)	Fixed order-quantity models – EOQ	M/M/1 and its performance measures; brief description about some special models
	SLO-2	Rank, Basis, System of linear equations, Hyper plane, Convex set, Convex polyhedron, Extreme points, Basic feasible solutions	Minimum cost method	Project Evaluation Review Technique (PERT)	Fixed order-quantity models – EOQ	M/M/1 and its performance measures; brief description about some special models
	SLO-1	To solve Linear Programming	Practice using work sheet to solve	Practice using work sheet to	Practice using work sheet to solve	Practice using work sheet to

S-3 – S -4	SLO-2	Practice using work sheet to solve Graphical Method with (i) Unbounded solution (ii) Infeasible solution (iii) Alternative or multiple solutions.	transportation problems.	perform Project scheduling of a given project (Deterministic case-PERT).	Problems based on selective inventory classification (ABC analysis).	determine the performance measures for M/M/1 queueing model.
S-5	SLO-1	Geometric method: 2-variable case, Special cases – infeasibility, unboundedness, redundancy &degeneracy	VAM, test for optimality (MODI method)	Critical path method (CPM)	POQ & Quantity discount models	M/M/m and its performance measures; brief description about some special models
	SLO-2	Geometric method: 2-variable case, Special cases – infeasibility, unboundedness, redundancy &degeneracy	VAM, test for optimality (MODI method)	Critical path method (CPM)	EOQ models for discrete units	M/M/m and its performance measures; brief description about some special models
S-6	SLO-1	Simplex Algorithm – slack, surplus & artificial variables, computational details	Degeneracy and its resolution	Determination of critical paths	Sensitivity analysis and Robustness	Definition and steps of simulation, random number, random number generator
	SLO-2	Big-M method, identification and resolution of special cases through simplex iterations	Degeneracy and its resolution	Determination of critical paths	Sensitivity analysis and Robustness	Definition and steps of simulation, random number, random number generator
S-7 - S-8	SLO-1	Practice using work sheet to find Solution of LPP with simplex method using statistical OR or statistical packages	Practice using work sheet to solve assignment problem	Practice using work sheet to perform Project scheduling of a given project (Probabilistic case-CPM).	Practice using work sheet to find optimal inventory policy for EOQ model.	Practice using work sheet to determine the performance measures for M/M/1/N queueing model
	SLO-2					
S-9	SLO-1	Duality – formulation and results, fundamental theorem of duality	AP - Examples, Definitions – decision variables, constraints, formulation Balanced &unbalanced situations	Estimation of Project time and its variance in PERT using statistical principles	Special cases of EOQ models for safety stock with known/unknown stock out situations	Discrete Event System Simulation – clock, event list
	SLO-2	Dual-simplex and Primal-dual algorithms	Balanced &unbalanced situations	Concept of project crashing/time-cost trade-off	Special cases of EOQ models for safety stock with known/unknown stock out situations	Discrete Event System Simulation – clock, event list
S-10	SLO-1	Sensitivity analysis	Solution method – Hungarian, test for optimality (MODI method)	Concept of project crashing/time-cost trade-off	Models under prescribed policy	Application in Scheduling
	SLO-2	Sensitivity analysis	Solution method – Hungarian, test for optimality (MODI method) Degeneracy & its resolution	Concept of project crashing/time-cost trade-off	Models under prescribed policy	Application in Queueing systems and Inventory systems
S-11 - S-12	SLO-1	Practice using work sheet to solve Charnes-M method problem solving using OR/statistical packages. Dual Simplex method -Problem solving using OR/statistical packages.	Practice using work sheet to solve travelling salesman problems.	Practice using work sheet to perform Project scheduling of a given project (Probabilistic case-PERT) with crashing.	Practice using work sheet to find optimal inventory policy for Probabilistic inventory model with discrete demand	Practice using work sheet measures for M/M/C/∞ queueing model
	SLO-2					

Learning Resources	*1. Operations Research: An Introduction.H.A. Taha* *2. Linear Programming. K.G. Murthy* *3. Linear Programming. G. Hadley* *4. Principles of OR with Application to Managerial Decisions. H.M. Wagner* *5. Introduction to Operations Research. F.S. Hiller and G.J. Lieberman.*	*6. Elements of Queueing Theory. Thomas L. Saaty* *7. Operations Research and Management Science, Hand Book: Edited By A. Ravi Ravindran* *8. Management Guide to PERT/CPM. Wiest& Levy* *9. Modern Inventory Management. J.W. Prichard and R.H. Eagle* *10. Wayne L. Winston and M. Venkataramanan: Introduction to Mathematical Programming: Applications and Algorithms, 4th edition, Duxbury Press, 2002.*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Expert from TCS	*1. Dr.K.C.Sivakumar, IIT, Madras, kcskumar@iitm.ac.in*	*1. Dr.A.Govindarajan, hod.maths.ktr@srmist.edu.in*
		2. Dr.N.Parvathi, parvathn@srmist.edu.in

Course Code	18CSC266J	Course Name	OPERATING SYSTEMS	Course Category	C	Professional Core	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Understand the structure, function and services of Operating systems
CLR-2 :	Learn about the process and threads
CLR-3 :	Learn the UNIX OS file system and its services
CLR-4 :	Understand the importance and principles of schedulers in operating system
CLR-5 :	Learn the concurrency problem and its solutions
CLR-6 :	Understand the different memory management schemes
CLR -7 :	Learn the Input, Output and file management paradigms used by operating system

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Create process and threads using system commands	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-
CLO-2 :	Execute UNIX OS file commands	3	85	75	M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
CLO-3 :	Implement pre-emptive and Non pre-emptive schedulers	3	75	70	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-4 :	Implement mutual exclusion using semaphores to avoid concurrency problems	3	85	80	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-5 :	Implement algorithms of various memory management schemes	3	85	75	H	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-6 :	Implement algorithms used for disk scheduling	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Concept of Operating Systems (OS), Generations of OS	Foundation and Scheduling objectives	Concurrent processes, precedence graphs,Critical Section, Race Conditions	Basic concept of memory management	I/O devices and Device controllers
	SLO-2	Types of OS, OS Services	Types of Schedulers	Mutual Exclusion,Hardware Solution	Logical and Physical address maps	Direct Memory Access and Principles of I/O
S-2	SLO-1	Interrupt handling	Schedulingcriteria: CPU utilization, Throughput, Turnaround Time	Semaphores, Strict Alternation	Memoryallocation: Contiguous Memory allocation	Concept of File, Access methods
	SLO-2	System Calls and its types	Waiting Time, Response Time	Peterson's Solution	Fixed and variable partition	File types and File operations
S-3	SLO-1	Basic architectural concepts of an OS	Pre-emptive and non-pre-emptive scheduling	The Producer/ Consumer Problem, Event Counters	Internal and External fragmentation	Directory structure
	SLO-2	Concept of Virtual Machine	FCFS	Monitors, Message Passing	Compaction	File System structure
S 4-5	SLO-1	**Lab 1: Study of system calls , services and its commands**	**Lab4 :Implementation of FCFS scheduling**	**Lab 7 :Implementation of producer consumer problem**	**Lab10: Implementation of memory partitioning, fragmentation and compaction**	**Lab 13: Simulation of file organization techniques using single directory and hierarchical structure.**
	SLO-2					
S-6	SLO-1	Resource Manager view	SJF	Classical IPC Problems: Reader's & Writer Problem,	Basics of Virtual Memory	Allocation methods (contiguous, linked, indexed)

	SLO-2	*Process view and hierarchical view of an OS*	*RR*	*Dinning Philosopher Problem,Barber's shop problem*	*Hardware and control structures*	*Free-space management (bit vector, linked list, grouping)*
S-7	SLO-1	*Process: Definition, Process Relationship*	*Multiprocessor scheduling*	*Necessary and sufficient conditions for Deadlock*	*Localityof reference*	*Directory implementation(linear list, hash table)*
	SLO-2	*Different states of a Process*	*Real Time scheduling*	*DeadlockPrevention, and Deadlock Avoidance*	*Page allocation*	*Efficiency and performance*
S-8	SLO-1	*Process Statetransitions*	*RM*	*Banker's algorithm*	*Partitioning*	*Disk structure*
	SLO-2	*Process Control Block (PCB)*	*EDF*	*Deadlock detection and Recovery*	*Paging and Page fault*	*Disk scheduling – FCFS*
S 9-10	SLO-1	***Lab 2: Implementation of new process creation and its communications***	***Lab 5: Implementation of SJF and RR Scheduling***	***Lab 8: Implementation of Banker's algorithm for Deadlock avoidance***	***Lab 11: Implementation of paging and calculation of page fault***	***Lab 14:Implementation of Disk scheduling algorithm - FCFS***
	SLO-2					
S-11	SLO-1	*Context switching*	***Case study:** UNIX OS file system*	*Concurrent Programming:Critical region*	*Working Set, Segmentation, Demandpaging*	*SSTF*
	SLO-2	*Threads: Definition*	*Shell*	*conditional critical region*	*PageReplacement algorithms: Optimal*	*SCAN*
S-12	SLO-1	*Various states of threads*	*Filters*	*Monitors*	*First in First Out (FIFO)*	*C-SCAN*
	SLO-2	*Benefits of threads*	*Shell programming*	*Concurrent languages*	*Second Chance (SC)*	*Disk reliability*
S-13	SLO-1	*Types of threads*	*Programming with the standard I/O*	*Communicating sequential process (CSP)*	*Notrecently used (NRU)*	*Disk formatting*
	SLO-2	*Concept ofmultithreads*	*UNIX system calls*	*Deadlocks - prevention, avoidance, detection and recovery*	*Least Recently used (LRU)*	*Boot-block and Bad blocks*
S 14-15	SLO-1	***Lab 3: Implement of thread creation and deletion***	***Lab 6: Implementation of Unix Commands***	***Lab9: Applications of concurrent programming***	***Lab 12:Implementation of page replacement algorithms – FIFO and LRU***	***Lab 15 :Implementation of Disk scheduling algorithm – SSTF and SCAN***
	SLO-2					

Learning Resources	3. *Operating System Concepts Essentials.AbrahamSilberschatz, Peter Baer Galvin and Greg Gagne.* 4. *Operating Systems: Internals and Design Principles. William Stallings.* 5. *Operating System: A Design-oriented Approach. Charles Patrick Crowley.*	6. *Operating Systems: A Modern Perspective. Gary J. Nutt.* 7. *Design of the UNIX Operating Systems. Maurice J. Bach.* 8. *Understanding the Linux Kernel, Daniel Pierre Bovet, Marco Cesati*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
Level 2	Apply Analyze	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
Level 3	Evaluate Create	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Experts from TCS		*1. Ms.A.Jackulin Mahariba, SRMIST, Kattankulathur*

Course Code	18CSC267J	Course Name	DATABASE MANAGEMENT SYSTEMS	Course Category	C	Professional Core	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Understand the fundamentals of Database Management Systems, Architecture and Languages
CLR-2 :	Conceive the database design process through ER Model and Relational Model
CLR-3 :	Design Logical Database Schema and mapping it to implementation level schema through Database Language Features
CLR-4 :	Familiarize queries using Structure Query Language (SQL) and PL/SQL
CLR-5 :	Familiarize the Improvement of the database design using normalization criteria and optimize queries
CLR-6 :	Understand the practical problems of concurrency control and gain knowledge about failures and recovery

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Acquire the knowledge on DBMS Architecture and Languages	3	80	70	H	M	L	L	-	-	-	-	L	L	L	H	-	-	-
CLO-2 :	Apply the fundamentals of data models to model an application's data requirements using conceptual modeling tools like ER diagrams	3	85	75	H	H	H	H	H	-	-	-	H	H	H	H	-	-	-
CLO-3 :	Apply the method to convert the ER model to a database schemas based on the conceptual relational model	3	75	70	H	H	H	H	H	-	-	-	H	H	H	H	-	-	-
CLO-4 :	Apply the knowledge to create, store and retrieve data using Structure Query Language (SQL) and PL/SQL	3	85	80	H	H	H	H	H	-	-	-	H	H	H	H	-	-	-
CLO-5 :	Apply the knowledge to improve database design using various normalization criteria and optimize queries	3	85	75	H	H	L	M	L	-	-	-	M	M	M	L	-	-	-
CLO-6 :	Appreciate the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.	3	80	70	H	L	L	L	L	-	-	-	H	L	L	L			

Duration (hour)		15	15	15	15	15
S-1	SLO-1	**Introduction** : Introduction to data, database, database management system	**Relational Algebra** : Relational algebra operations	**Relational database design :** Introduction	**Query processing and optimization :** Introduction	**Transaction Management :** ACID Property
	SLO-2					
S-2	SLO-1	Hierarchical and Network models	Tuple relational Calculus	Domain and data dependency	Evaluation of relational algebra expressions	Serializability
	SLO-2	Relational Model	Domain Relational Calculus			
S-3	SLO-1	**Database system Architecture:** Data abstraction	**SQL:** DDL and DML Constructs	Armstrong's axioms	Query equivalence	Locking based and Time stamp based scheduling
	SLO-2					
S 4-5	SLO-1	Lab 1: SQL Data Definition Language Commands on sample exercise	Lab 4 : Inbuilt functions in SQL on sample Exercise.	Lab 7 : Join Queries on sample exercise.	Lab10: PL/SQL Procedures on sample exercise	Lab 13: PL/SQL Exception Handling
	SLO-2					
S-6	SLO-1	Data Independence	SQL Queries	Functional Dependencies	Join strategies	Multi-version and optimistic Concurrency Control schemes
	SLO-2					

S-7	*SLO-1*	*Data Definition Language*	*SQL, Operators and functions*	***Normal forms:*** *First Normal form*	*Query optimization*	*Database recovery*
	SLO-2			*Second Normal form*		
S-8	*SLO-1*	*Data Manipulation Language*	*SQL Joins*	*Third normal form and Boyce Code Normal Form*	*Query optimization algorithms*	***Database Security****: Authentication*
	SLO-2		*Sub Queries*	*Other Normal forms*		*Authorization and access control*
S 9-10	*SLO-1*	*Lab 2: SQL Data Manipulation Language Commands*	*Lab 5: Construct a ER Model for the application to be constructed to a Database*	*Lab 8: Set Operators & Views*	*Lab 11: PL/SQL Functions*	*Lab 14: PL/SQL Trigger*
	SLO-2					
S-11	*SLO-1*	***Data Models:*** *Entity Relationship model*	*Open source and Commercial DBMS*	*Closure of attributes*	***Storage strategies*** *: Types of storage*	*DAC, MAC and RBAC models*
	SLO-2	*Attributes, Keys, Relationships*		*Closure of functional dependency*		
S-12	*SLO-1*	*Integrity Constraints*	*MYSQL,ORACLE, DB2, SQL server*	*Dependency preservation*	*Indices*	*Intrusion detection, SQL injection*
	SLO-2	*ER Diagram*			*B tree Indexing*	
S-13	*SLO-1*	*Network and Relational data models*	***PL/SQL:*** *Introduction to PL/SQL, Cursors, Triggers*	*Lossless design*	*Hashing*	***Introduction to advanced topics :*** *Object oriented and Object relational databases, Logical databases*
	SLO-2	*Object oriented data models*			*Hashing techniques*	*Web databases, Distributed databases, Data warehousing and data mining*
S 14-15	*SLO-1*	*Lab 3: SQL Data Control Language Commands and Transaction control commands to the sample exercises*	*Lab 6: Nested Queries on sample exercises*	*Lab9: PL/SQL Conditional and Iterative Statement*	*Lab 12: PL/SQL Cursors*	*Lab 15 : Mini Project Review*
	SLO-2					

Learning Resources	1. *Abraham Silberschatz, Henry F. Korth, S. Sudharshan, Database System Concepts‖, Sixth Edition, Tata McGraw Hill,2011.* 2. *Jeffrey D. Ullman, Principles of Database Systems, Third Edition, Galgotia Publications Pvt. Ltd, 2008* 3. *RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems‖, Sixth Edition, Pearson Education,2011.*	4. *Serge Abiteboul, Richard Hull, VictorVianu, Foundations of Databases, Pearson, 1994* 5. *CJ Date,AKannan,SSwamynathan, An Introduction to Database Systems, Eight Edition, Pearson Education,2006.*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
*1.*Experts from TCS		*1. Dr.E.Poovammal, SRMIST*

		2. Mr.M.Eliazer, SRMIST

Course Code	18CSC268J	Course Name	SOFTWARE DESIGN WITH UML	Course Category	C	Professional Core	L	T	P	C
							2	0	2	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Utilize the software process model and select a suitable modeling method according to problem area and assignment, and can justify their choice
CLR-2 :	Utilize UML languages and its standards
CLR-3 :	Utilize use case diagram and relationships
CLR-4 :	Utilize sequence and collaboration diagrams
CLR-5 :	Utilize class diagram model
CLR-6 :	Utilize deployment models and model the software system and analyze its characteristics and correctness

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	Identify the characteristics of quality software	1	80	70	H	H	H	H	M	M	M	M	M	H	L	H	H	H	H
CLO-2 :	Create different types of software development process models	2	85	75	H	H	H	H	M	M	M	M	M	H	L	H	H	H	H
CLO-3 :	Construct use case diagrams for real world applications and analyze the system requirements	2	75	70	H	H	H	H	M	M	M	M	M	H	L	H	H	H	H
CLO-4 :	Create sequence and collaboration diagram for finding objects of the process involved	2	85	80	H	H	H	H	M	M	M	M	M	H	L	H	H	H	H
CLO-5 :	Create class diagrams and analyze the characteristics and correctness of software system	2	85	75	H	H	H	H	M	M	M	M	M	H	L	H	H	H	H
CLO-6 :	Implement the appropriate modeling method for the given problem	3	80	70	H	H	H	H	M	M	M	M	M	H	L	H	H	H	H

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to on Object Oriented Technologies	Introduction to the UML Language.	Requirements Analysis Using Case Modeling	Transfer from Analysis to Design in the Characterization Stage	The Logical View Design Stage
	SLO-2	Introduction to UML Methods and software process.	Standards.	Analysis of system requirements.	Interaction Diagrams.	Logical architecture view
S-2	SLO-1	Software development process: The Waterfall Model vs. The Spiral Model.	Elements of the language.	Actor definitions.	Description of goal.	The Static Structure Diagrams.
	SLO-2	The Software Crisis, description of the real world using the Objects Model.	Case study on using state diagram and activity diagram	Description of component model	Defining UML Method, Operation.	The Class Diagram Model.
S 3-4	SLO-1	Lab 1: Package Diagram Model. Description of the model.	Lab4: Dynamic Model: State Diagram / Activity Diagram.	Lab 7: Component Diagram Model.	Lab10: Initial DB design in a UML environment.	Lab 13: Deployment Model. Tasks.
	SLO-2					
S-5	SLO-1	Classes, inheritance	General description of various models.	Writing a case goal.	Object and Interface	Attributes descriptions.
	SLO-2	Multiple configurations	Examples on each model	Use case modelling to describe functional requirements	Comparison on interface and class	Operations descriptions.
S-6	SLO-1	Quality software characteristics	The process of Object-Oriented software development.	Comparing use case and use case diagrams	Sequence Diagram.	Connections descriptions in the Static Model.

	SLO-2	*Description of packages*	*Characteristics of software development*	*Use Case Diagrams.*	*Finding objects from Flow of Events.*	*Description of Threads*
S 7-8	SLO-1	*Lab 2: Connections between packagers. Interfaces.*	*Lab 5: Description of the Activity Diagram.*	*Lab 8: Physical Aspect. Logical Aspect.*	*Lab 11: Deployment Model - Processors.*	*Lab 14: Threads.*
	SLO-2					
S-9	SLO-1	*Description of the Object-Oriented Analysis process and the Structure Analysis Model.*	*Description of Design Patterns.*	*Use Case Relationships.*	*Describing the process of finding objects using a Sequence Diagram.*	*Association, Generalization*
	SLO-2	*Comparison of analysis models*	*Technological Description of Distributed Systems.*	*Case study on requirements analysis*	*Examples on sequence diagrms*	*Aggregation.*
S-10	SLO-1	*White box*	*Description of the State Diagram.*	*Examples on Use case diagrams*	*Describing the process of finding objects using a Collaboration Diagram.*	*Dependency, Interfacing.*
	SLO-2	*Black box*	*Events Handling.*	*User interface*	*Examples on collaboration diagrams*	*Multiplicity.*
S 11-12	SLO-1	*Lab 3: Create Package Diagram. Drill Down.*	*Lab 6: Exercise in State Machines.*	*Lab9: Connections and Dependencies. User Interface.*	*Lab 12: Connections. Components.*	*Lab 15: Signals and Events.*
	SLO-2					

Learning Resources	1. *Object-Oriented Software Engineering: using UML, Patterns, and Java. Bernd Bruegge and Allen H. Dutoit.* 2. *Design Patterns: Elements of Reusable Object-Oriented Software. Erich Gamma, Richard Helm, Ralph Johnson, and John M. Vlissides.*	

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Expert from TCS	*1. Dr. Srinivasa Rao Bakshi, IITM, Chennai, sbakshi@iitm.ac.in*	*1. Ms.A.NithyaKalyani, SRMIST*
	2. Dr. Ramesh Babu, N , nrbabu@iitm.ac.in	
	3.Dr.Noor Mahammad, IIITDM, Kancheepuram,noor@iiitdm.ac.in	

Course Code	18PDM202L	Course Name	CRITICAL AND CREATIVE THINKING SKILLS	Course Category	*M*	*Mandatory*	L	T	P	C
							0	0	2	0

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Career Development Centre*	**Data Book / Codes/Standards**	*Nil*		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	*identify problems*
CLR-2 :	*recognize the logical coherence of ideas*
CLR-3 :	*understand the structure and principles of writing*
CLR-4 :	*interpret the structure, organization, tone, and main idea of the content*
CLR-5 :	*hone comprehension skills*
CLR-6 :	*give the right knowledge, skill and aptitude to face any competitive examination*

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	**Learning**			**Program Learning Outcomes (PLO)**														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	*solve problems*	*3*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*L*	-	*H*	-	-	-
CLO-2 :	*grasp the approaches and strategies to find solutions*	*2*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*L*	-	*H*	-	-	-
CLO-3 :	*organize and articulate ideas clearly*	*2*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*L*	-	*H*	-	-	-
CLO-4 :	*analyze and evaluate contents critically in multifarious ways*	*2*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*L*	-	*H*	-	-	-
CLO-5 :	*understand, comprehend and provide logical conclusions*	*2*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*H*	-	*H*	-	-	-
CLO-6 :	*gain appropriate skills to succeed in preliminary selection process for recruitment*	*3*	*80*	*75*	*L*	*H*	-	*M*	-	-	-	-	*M*	*H*	-	*H*	-	-	-

Duration (hour)		**6**	**6**	**6**	**6**	**6**
S-1	SLO-1	*Ages*	*Permutations-Types*	*Probability-Intro*	*Logical Reasoning – Blood relations, Directions*	*Information Ordering - Analogy*
	SLO-2	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Series completion*	*Math operations*
S-2	SLO-1	*Case Study*	*Statement Completion*	*Principles of Writing*	*Reading Comprehension – Bold Faced*	*Para Completion*
	SLO-2	*Discussion*	*Practice*	*Practice*	*Practice*	*Practice*
S-3	SLO-1	*Quadratic Equations*	*Combination-Concepts*	*Probability theory -Applications*	*Logical Reasoning- Cubes*	*Analytical Reasoning-Intro*
	SLO-2	*In-equations*	*Solving Problems*	*Solving Problems*	*Logical Reasoning-syllogism*	*Analytical Reasoning - Level I*
S-4	SLO-1	*Case Study*	*Statement Completion*	*Principles of Writing*	*Reading Comprehension – Bold Faced*	*Para Completion*
	SLO-2	*Discussion*	*Practice*	*Practice*	*Practice*	*Practice*
S-5	SLO-1	*Permutations-Concepts*	*Combination- Miscellaneous*	*Logical Reasoning – Coding and Decoding*	*Information Ordering - Arrangements*	*Analytical Reasoning-Level II*
	SLO-2	*Solving Problems*	*Solving Problems*	*Practice*	*Practice*	*Analytical Reasoning - Level III*

S-6	SLO-1	*Case Study*	*Statement Completion*	*Principles of Writing*	*Reading Comprehension – Miscellaneous*	*Para Completion*
	SLO-2	*Discussion*	*Practice*	*Practice*	*Practice*	*Practice*

Learning Resources	1. *Dinesh Khattar-The Pearson Guide to Quantitative Aptitude for competitive examinations* 2. *Hari Mohan Prasad, Verbal Ability for Competitive Examinations, Tata McGraw Hill Publications* 3. *Edgar Thrope, Test of Reasoning for Competitive Examinations, Tata McGraw Hill, 4th Edition, 2012* 4. *Norman Lewis, Word Power Made Easy, W.R. Goyal Publications, 2011*	5. *Ellet William, The Case Study Handbook: How to read, discuss, and write persuasively about cases* 6. *Manhattan GMAT – Critical Reasoning, GMAT Strategy Guide, 12th Edition* 7. *Wiley's GMAT Reading Comprehension Grail, Wiley, 2016* 8. *Manhattan Prep GRE : Reading Comprehension and Essays, 5th Edition*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)								Final Examination	
		CLA – 1 (20%)		CLA – 2 (30%)		CLA – 3 (30%)		CLA – 4 (20%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	-	*40%*	-	*30%*	-	*30%*	-	*30%*	-	-
	Understand										
Level 2	Apply	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-	-
	Analyze										
Level 3	Evaluate	-	*20%*	-	*30%*	-	*30%*	-	*30%*	-	-
	Create										
	Total	100 %		100 %		100 %		100 %		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts	
1. Mr. Vijay Nayar, Director, Education Matters, vijayn@edumat.com	*1. Dr. Dinesh Khattar, Delhi University, dinesh.khattar31@gmail.com*	*1. Dr. M. Snehalatha, SRMIST*	*3. Dr. P. Madhusoodhanan, SRMIST*
2. Mr. Ajay Zenner, Career Launcher, ajay.z@careerlauncher.com	*2. Mr. Nishith Sinha, dueNorth India Academics LLP, nsinha.alexander@gmail.com*	*2. Mr Jayapragash J., SRMIST*	*4. Mr. Clement A, SRMIST*

Course Code	18CYM101T	Course Name	ENVIRONMENTAL SCIENCE	Course Category	*M*	*Mandatory*	L	T	P	C
							1	0	0	0

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Chemistry*	Data Book / Codes/Standards	*Nil*		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Acquire knowledge on various causes, effects and control measures of environmental air and water pollution*			
CLR-2 :	*Analyze causes, effects and control measures of soil, thermal and radiation pollution*			
CLR-3 :	*Utilize processes involved in waste water treatment and study the cause of a local polluted site*			
CLR-4 :	*Analyze impacts, disposal methods and treatments involved in solid waste management*			
CLR-5 :	*Identify impacts, disposal methods, treatments involved in biomedical waste management*			
CLR-6 :	*Analyze the environmental issues and identify appropriate solutions*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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
CLO-1 :	*Analyze the sources, effects and control measures of environmental air pollution*	*1*	*80*	*70*	*H*	*H*	*H*	*H*	-	-	*H*	-	-	-	-	-	-	-	-
CLO-2 :	*Acquire knowledge on the treatment of soil, thermal and radiation management*	*1*	*75*	*65*	*H*	*H*	*H*	*H*	-	-	*H*	-	-	-	-	-	-	-	-
CLO-3 :	*Acquire knowledge on various process involved in the treatment of wastewater*	*1*	*80*	*70*	*H*	*H*	*H*	*H*	-	-	*H*	-	*H*	-	-	-	-	-	-
CLO-4 :	*Identify sources, disposal and treatment methods of solid waste management*	*1*	*80*	*75*	*H*	*H*	*H*	*H*	-	-	*H*	-	*H*	-	-	-	-	-	-
CLO-5 :	*Identify sources, disposal and treatment methods of biomedical waste management*	*1*	*75*	*65*	*H*	*H*	*H*	*H*	-	-	*H*	-	*H*	-	-	-	-	-	-
CLO-6 :	*Utilize the concepts learnt in protecting the environment towards sustainable development*	*1*	*80*	*70*	*H*	*H*	*H*	*H*	-	-	*H*	-	*H*	-	-	-	-	-	-

Duration (hour)		**3**	**3**	**3**	**3**	**3**
S-1	SLO-1	*Environmental segments Structure of atmosphere*	*Determination of BOD, COD*	*Waste water treatment- Introduction*	*Solid waste management: Types*	*Biomedical Waste Management Definition and Effects*
	SLO-2	*Composition of atmosphere*	*Determination of TDS and trace metals*	*Primary treatment*	*Effects Processof waste management*	*Categories of biomedical waste*
S-2	SLO-1	*Air Pollution Sources*	*Sources, effects and control measures of Soil pollution*	*Secondary treatment*	*Disposal methods, Opendumping Engineered land filling*	*Process of biomedical waste management*
	SLO-2	*Effects – acid rain, ozone layer depletion and greenhouse effect*	*Sources, effects and control measures of Thermal pollution*	*Tertiary treatment*	*Composting Incineration*	*Treatment and disposal methods*
S-3	SLO-1	*Control measures of air pollution*	*Sources and effects of: Radiation pollution*	*Activity: Visit to a local polluted site-Urban/Rural/Industrial/Agricultural*	*Activity: Monitoring solid waste management in local areas*	*Activity: Visit a hospital to understand the biomedical waste management*
	SLO-2	*Sources, Effects and control measures of Water pollution*	*Control measures of Radiation pollution*	*Activity: Visit to a local polluted site-Urban/Rural/Industrial/Agricultural*	*Activity: Monitoring solid waste management in local areas*	*Activity: Visit a hospital to understand the biomedical waste management*

Learning Resources	1. *Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses, 2nd ed., UGC* 2. *Kamaraj. P, Arthanareeswari. M, Environmental Science–Challenges and Changes, 6th ed., Sudhandhira Publications, 2013*	*3. R.Jeyalakshmi, Principles of Environmental Science, 2nd ed., Devi publications, 2008* *4. Helen P Kavitha, Principles of Environmental Science, 1st ed., Shine Publications and Distributors,2013*

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)								Final Examination	
		CLA – 1 (20%)		CLA – 2 (30%)		CLA – 3 (30%)		CLA – 4 (20%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*40%*	-	*30%*	-	*30%*	-	*30%*	-	-	-
	Understand										
Level 2	Apply	*40%*	-	*40%*	-	*40%*	-	*40%*	-	-	-
	Analyze										
Level 3	Evaluate	*20%*	-	*30%*	-	*30%*	-	*30%*	-	-	-
	Create										
	Total	100 %		100 %		100 %		100 %		-	

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Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Dr. Sudarshan Mahapatra, Encube Ethicals Pvt. Ltd, sudarshan.m@encubeethicals.com	*1. Prof. G. Sekar, IIT Madras, gsekar@iitm.ac.in*	*1. Prof. M. Arthanareeswari, SRMIST*
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