



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	H	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	<i>Ability to understand client requirements and suggest solutions</i>
PSO - 2	<i>Ability to create innovative Software for business and service orientations</i>
PSO - 3	<i>Ability to utilize Logic & Reasoning Skills</i>

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				C
		L	T	P		
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

3. Engineering Science Courses (S)						
Course Code	Course Title	Hours/ Week				C
		L	T	P		
18EES161J	Principles of Electrical Engineering	2	0	2	3	
18EES162J	Principles of Electronics	2	0	2	3	
Total Learning Credits						6

5. Professional Elective Courses (E) (Any 5 Elective Courses)						
Course Code	Course Title	Hours/ Week				C
		L	T	P		
	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	

2. Basic Science Courses (B)						
Course Code	Course Title	Hours/ Week				C
		L	T	P		
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

4. Professional Core Courses (C)						
Course Code	Course Title	Hours/ Week				C
		L	T	P		
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

Open Elective Courses (O) (Any 1 Courses)						
Course Code	Course Title	Hours/ Week				C
		L	T	P		
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				C
		L	T	P		
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

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 and Business Systems

Semester - I					
Code	Course Title	Hours/ Week			C
		L	T	P	
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			C
		L	T	P	
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			C
		L	T	P	
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			C
		L	T	P	
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			C
		L	T	P	
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			C
		L	T	P	
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			C
		L	T	P	
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

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

Total Learning Credits	22	
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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):	<i>The purpose of learning this course is to:</i>	Learning			Program Learning Outcomes (PLO)															
CLR-1:	<i>Understand what life skills are and their importance in leading a happy and well-adjusted life</i>	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
CLR-2:	<i>Motivate students to look within and create a better version of self</i>	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-3:	<i>Introduce them to key concepts of values, life skills and business communication</i>																			
CLR-4:	<i>To recognise their own strength and opportunities</i>																			
CLR-5:	<i>Understand the basic skills in Business Communication</i>																			
CLR-6:	<i>Apply the learnt techniques in the business world.</i>																			
CLR-6:	<i>Apply the learnt techniques in the business world.</i>																			
Course Learning Outcomes	<i>At the end of this course, learners will be able to:</i>																			
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				

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) Post discussion	Life skill: Join a trek – Values to be learned: Dealing with ambiguity Activity
	SLO-2	Self-work with immersion – interview	Expressing self On stage activity	Practice: Toastmaster style Table	Introduction to life skills What are the	Life skill: Join a trek – Values to be

		a maid, watchman and Sweeper and narrate what you think are the values that drive them Report on interview		Topics speech with evaluation 2 Activity	critical life skills Current trend	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.
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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	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	40%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	30%	-	40%	-
	Analvze										
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

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)
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CLR-1 : Understand the concepts of periodic motion	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
CLR-2 : Create insights to the concepts of optical effects	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-3 : Identify the applications of lasers and optical fibers				H	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLR-4 : Identify the significance of quantum theory				H	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLR-5 : Analyze the principles of thermodynamics				H	-	-	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLR-6 : Utilize the concepts of physics for application in engineering and technology				H	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				H	-	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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 : Apply the periodic motion to different systems		2	85	75
CLO-2 : Apply ray propagation and optical effects		2	85	75
CLO-3 : Identify the applications of lasers and optical fiber		2	75	70
CLO-4 : Apply quantum mechanics to basic physical problems		2	85	80
CLO-5 : Analyze the thermodynamic process		2	85	75
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
	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
S-2	SLO-1	Vibration of simple springs mass system	Fresnel's prism	Characteristics of laser beams	Heisenberg Uncertainty principle
	SLO-2	Characteristic of mass-spring system	Newton's rings	Essential components of laser system and pumping mechanisms	Physical significance of wave function
S-3	SLO-1	Resonance-definition.	Diffraction-types of diffraction	Threshold population inversion	Time independent Schrödinger's wave equation
	SLO-2	Damped harmonic oscillator	Difference between interference and diffraction	CO2 Laser	Time dependent Schrödinger's wave equation
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
	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
	SLO-2	Energy decay in a damped harmonic oscillator	Fraunhofer diffraction at single slit-plane	Nd-YaG laser	Normalization and Eigen values
S-7	SLO-1	Quality factor	Plane diffraction grating	Application of Laser in engineering	Crystallography: Introduction, Basic terms-types of crystal systems
	SLO-2	Quality factor of Different oscillators	Temporal and Spatial Coherence	Holography	Bravais lattices, miller indices d spacing
S-8	SLO-1	Forced mechanical	Polarization	Optical fiber-physical structure	Crystal Symmetry
	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

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	3. David Halliday, Fundamentals of Physics, 7th Edition, John Wiley & Sons Australia, Ltd, 2015
	2. Ajay Ghatak, Optics, Tata McGraw Hill Education, 5th Edition, 2016	

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			Program Learning Outcomes (PLO)																		
CLR-1	CLR-2	CLR-3	CLR-4	CLR-5	CLR-6	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Apply Boolean algebra, truth table, logic gates, in computer science and communication.	Apply set theory, relations in storage, communication and manipulation of data. Learning about groups, rings and fields. Using them to solve engineering related problems	Using combinatory, counting problems, generating functions, recurrence relations in computer network. Apply principle of Mathematical induction and Pigeon hole principle.	Understand the basic concepts in Graph Theory	Understand the basic concepts in Logic	Utilize the concepts in Discrete Mathematics for the understanding of Engineering and Technology	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			
									M	H	L								M	L		H				
									M	H		M	M						M			H				
									M	H									M			H				
									M	H	L								M	L		H				
									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	Circuits in graphs and digraphs	Satisfiability

				<i>functions</i>		
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 and Sons
2	M. Morris Mano, "Digital Logic & Computer Design", Pearson
3	<i>Elements of Discrete Mathematics</i> , (Second Edition) C. L. Liu McGraw Hill, New Delhi.
4	<i>Graph Theory with Applications</i> , J. A. Bondy and U. S. R. Murty, Macmillan Press, London.
5	<i>Mathematical Logic for Computer Science</i> , L. Zhongwan, World Scientific, Singapore.
	Reference Book
1	<i>Introduction to linear algebra</i> . Gilbert Strang.

2	<i>Introductory Combinatorics</i> , R. A. Brualdi, North-Holland, New York.
3	<i>Graph Theory with Applications to Engineering and Computer Science</i> , N. Deo, Prentice Hall, Englewood Cliffs.
4	<i>Introduction to Mathematical Logic</i> , (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	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	<i>Dr.K.C.Sivakumar, IIT, Madras, kcskumar@iitm.ac.in</i>	<i>Dr.A.Govindarajan</i>
		<i>Dr.N.Parvathi</i>

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			Program Learning Outcomes (PLO)														
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.	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
CLR-2 :	To appropriately choose, define probability distributions such as the Binomial, Poisson and Normal etc to model and solve engineering problems.	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-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																					
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
CLO-2 :	Gain familiarity in deriving probability distributions such as the Binomial, Poisson and Normal etc and apply them in 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						

Duration (hour)		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
		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	Classification of Univariate data	Coefficient of variation	Problems based on reduction

			distribution			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	<ol style="list-style-type: none"> 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):	<i>The purpose of learning this course is to:</i>	Learning	Program Learning Outcomes (PLO)
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CLR-1 :	Analyze DC circuits using network theorems	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
CLR-2 :	Examine single phase AC series circuit and parallel circuits. Also understand the basics of three phase circuits	Level of Thinking(Bloom)	Expected Proficiency (%)	Expected Attainment(%)	Engineering Knowledge																	
CLR-3 :	Introduce the basic concepts of electrostatics and magnetostatics				Problem Analysis																	
CLR-4 :	Comprehend the construction, working and performance of transformers and DC machines				Design & Development																	
CLR-5 :	Outline the concepts of transducers, measuring devices, electrical wiring and illumination				Analysis, Design, Research																	
CLR-6 :	Enrich the concepts of electric circuits, flux distribution and electrical wiring				Modern Tool Usage																	
CLR-6 :	Enrich the concepts of electric circuits, flux distribution and electrical wiring				Society & Culture																	
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:				Environment & Ethics																	
					Individual & TeamWork																	
					Communication																	
					Project Mgt .& Finance																	
					Life Long Learning																	
					PSO-1																	
					PSO-2																	
					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
	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
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
	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
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
	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
	SLO-2	Network solutions using Mesh analysis	Star/Delta transformation	faraday's law - self and mutual inductance	Problems in EMF equation
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
	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.
SLO-1			Lab 8 : Simulation of Time domain		

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S-7 to 8	SLO-2	Lab 2:Circuit reduction and basic laws	Lab 5: Simulation of Time domain analysis of R-C transient circuit	analysis of R-L-C transient circuit for $X_L > X_C$, $X_L < X_C$ & $X_L = X_C$	Lab 11 : Demo on single phase transformer	Lab 14 :Determination of resistance temperature coefficient
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's theorem 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	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
	SLO-2					
	SLO-2					

Learning Resources	Dash.S.S,Subramani.C,Vijayakumar.K,BasicElectricalEngineering,1sted.,VijayNicole,2013.	4.S.K. Bhattacharya Basic Electrical and Electronics Engineering, Second edition, Pearson Education, 2017.
	Jegatheesan .R, Analysis of Electric Circuits, Tata McGraw-Hill,2014. Vincent.Del.Toro,“ElectricalEngineeringFundamentals”,SecondEdition,PrenticeHallIndia	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%
Level 2	Understand	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Apply										
Level 3	Analyze	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Evaluate										
	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):	<i>The purpose of learning this course is to:</i>	Learning	Program Learning Outcomes (PLO)
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CLR-1:	<i>Think and evolve a logically to construct an algorithm into a flowchart and a pseudocode that can be programmed</i>
CLR-2:	<i>Utilize the various operators ,expressions and programming constructs to solve problems in engineering and real-time</i>
CLR-3:	<i>Utilize custom designed functions and that can be used to perform tasks and can be repeatedly used in any application</i>
CLR-4:	<i>Store and retrieve data in a single and multidimensional array along with references</i>
CLR-5:	<i>Create storage constructs using structure and unions. Create and Utilize files to store and retrieve information</i>
CLR-6:	<i>Create a logical mindset to solve various engineering applications using programming constructs in C</i>

1	2	3
Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment(%)

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 & Ethics	Individual & TeamWork	Communication	Project Mgt .& Finance	Life Long Learning	Engineering Knowledge	PSO-2	PSO-3	

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:			
CLO-1 :	Identify methods to solve a problem through computer programming. List the basic data types and variables in	2	85	80
CLO-2 :	Apply the logic operators and expressions. Use loop constructs and recursion. Use array to store and retrieve	3	85	80
CLO-3 :	Analyze programs that need storage and form single and multi-dimensional arrays. Use pointer and preprocessor constructs in C	3	85	80
CLO-4 :	Create user defined functions for mathematical and other logical operations. Use pointer to address memory and data	3	85	80
CLO-5 :	Create structures and unions to represent data constructs. Use files to store and retrieve data	3	85	80
CLO-6 :	Apply programming concepts to solve problems. Learn about how C programming can be effectively used for solutions	3	85	80

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	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 MultiDimensional, Command line arguments	Lab 13: Structures & Unions
	SLO-2	Lab 1: Algorithm, Flow Chart, Pseudocode			
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, stdout 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: sprintf, sscanf, strcmp	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.Kernighan and D.M.Ritchi, "The C Programming Language", Second Edition, PHI. B.Gottfried, "Programming in C", Second Edition, Schaum Outline Series.	Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGrawHill. Yashavant Kanetkar, "Let Us C", BPB Publications
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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

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. 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	Program Learning Outcomes (PLO)
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CLR-1 :	Utilize rich Indian heritage and knowledge for self-healing and self-protection from diseases	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
CLR-2 :	Apply meditation for attaining happiness and balancing emotions and state of mind and body	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-3 :	Intellectually develop oneself by identifying oneness with divine state and transform towards absolute oneness in space				-	M	-	-	-	H	H	H	H	H	H	H	-	H	-	-	-	-
CLR-4 :	Socially transform into a meaningful and purposeful individual to both self and society				-	M	-	-	-	H	H	H	H	H	H	H	-	H	-	-	-	-
CLR-5 :	Spiritually enlighten oneself by purifying the body, soul and have a blissful existence				-	M	-	-	-	H	H	H	H	H	H	H	-	H	-	-	-	-
CLR-6 :	Achieve personal benefits of whole health and wellbeing by practicing yoga for physical, emotional and mental fitness				-	M	-	-	-	H	H	H	H	H	H	H	-	H	-	-	-	-
CLR-6 :	Achieve personal benefits of whole health and wellbeing by practicing yoga for physical, emotional and mental fitness				3	85	80	-	M	-	-	-	H	H	H	H	-	H	-	-	-	-
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																					
CLO-1 :	Identify Indian heritage, culture. Identify key anatomical structures in the human body and basic exercises for the same	2	80	75																		
CLO-2 :	Apply yoga meditation practices for emotional development and wellbeing	2	75	70																		
CLO-3 :	Identify educational and intellectual development methods using five sense realization and transformation	3	80	75																		
CLO-4 :	Demonstrate human values and emotions through thorough understanding about life, naturopathy and food habits	3	75	70																		
CLO-5 :	Impact self and society by peaceful coexistence with self-introspection and balanced diet charts	3	85	80																		
CLO-6 :	Demonstrate yoga exercises and postures to stretch and strengthen the body and mind	3	85	80																		

Duration (hour)	Physical Development	Emotional Development	Intellectual Development	Social Development	Spiritual Development
	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 (Kayakalpa Yoga)	Practice10: Kayakalpa, 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 (Agha) 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: Kayakalpa Yoga, Pranayama	Practice11: Kayakalpa Yoga, Krisya Yoga	Practice14: Project Submission
	SLO-2 Meditation (Self Realization) – Relaxation	Meditation (Agha) & Relaxation	Meditation (Agha) - Relaxation	Yoga Mudhras, Meditation (Santhi) & Relaxation	Meditation, Introspection, Sublimation
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	<i>digestive tract, stomach, lungs, spine, hip, neck. Pressure points in our body</i>	<i>Standing, Sitting, Prone & Supine Posture, Benefits of asanas</i>	<i>Five Senses (Panchendriya) Meditation, Consciousness and Law of nature</i>	<i>Indian Medical System: Naturopathy, Food, Nutrition, Diet Chart for Youthfulness</i>	<i>Yoga Practices for blissful existence</i>
S-6	SLO-1	<i>Practice3: Prone & Supine posture Exercises</i>	<i>Practice6: Surya Namaskar, Prone & Supine posture Asanas</i>	<i>Practice9: Kayakalpa, Mudhras, Self-introspection Practice (Thought Analysis)</i>	<i>Practice12: Balancing Asanas,</i>	<i>Practice15: Practical Exam</i>
	SLO-2	<i>Meditation (Self Realization) – Relaxation</i>	<i>Meditation (Shanathi) & Relaxation</i>	<i>Meditation (Santhi), & Relaxation</i>	<i>Meditation (Crown) & Relaxation</i>	<i>Meditation & Relaxation</i>

Learning Resources	<ol style="list-style-type: none"> 1. Sadhguru Jaggi Vasudev, <i>Inner Engineering – A yogi’s guide to joy</i>, 2016 2. Shri Shri Ravi Shankar, <i>The Art of stress-free Living</i>, 2011 3. Swami Ramdev Ji Yog Its Philosophy and Practice, 2008 4. Yogiraj Vethathiri Maharishi, <i>Yoga for Modern Age</i>, Tenth edition, Vethathiri Publications, 2007 5. Yogiraj Vethathiri Maharishi, <i>Simplified Physical Exercises</i>, Forty Second edition, Jan-2014 	<ol style="list-style-type: none"> 6. Vivekananda Kenthria Prkasan Trust, <i>Yogam</i>, 2006 7. Swami Chetanananda, <i>Meditation and Its Methods According to Swami Vivekananda</i>, Jan 2001 8. Dr. Lakshminarain Sharma, <i>Yoga for the cure of Common Diseases</i>, Mar 2016 9. Swami Satyananda Saraswati, <i>Asana Pranayama Mudra Bandha</i>, Bihar School of Yoga, 1993 10. Dr. Asana Andiappan, <i>Thirumoolar’s Astanga Yoga</i>, International Yoga Academy, 2017
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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	Theory	Practice
Level 1	Remember	-	40%	-	30%	-	30%	-	30%	-	-
	Understand	-	40%	-	30%	-	30%	-	30%	-	-
Level 2	Apply	-	40%	-	40%	-	40%	-	40%	-	-
	Analyze	-	40%	-	40%	-	40%	-	40%	-	-
Level 3	Evaluate	-	20%	-	30%	-	30%	-	30%	-	-
	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. Mr. K. Sivakumar, LIC of India, ksivalic1970@gmail.com	1. Dr. R. Elangovan, Tamilnadu Physical Education and Sports University, relangovantmpesu@yahoo.co.in	1. Dr. V. Nithyanathan, SRMIST
2. Mrs. R. Piramakutty, World Community Service Centre, piramakutty.gdvmvkm@gmail.com	2. Dr. N. Perumal, Vethathiri Maharishi Institute for Spiritual and Intuition Education, visionacademy@vethathiri.edu.in	2. Dr. S. Jahira Parveen, SRMIST

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	Program Learning Outcomes (PLO)
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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

	1	2	3
Level of Thinking (Bloom)			
Expected Proficiency (%)			
Expected Attainment (%)			

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	H	H	H	-	H	-	-	-
-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
-	-	-	-	-	-	H	H	H	H	-	H	-	-	-

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:			
CLO-1 :	Identify success habits	2	80	75
CLO-2 :	Acquire inter personal skills and be an effective goal oriented team player	2	75	70
CLO-3 :	Develop professionalism with idealistic, practical and moral values	2	80	75
CLO-4 :	Acquire communication and problem solving skills.	2	75	70
CLO-5 :	Re-engineer their attitude and understand its influence on behavior	2	85	80
CLO-6 :	Apply behavior changing elements to construct professionalism in character and behavior	2	85	80

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
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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. 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. Mr Ajay Zenner, Career Launcher, ajay.z@careerlauncher.com		2. Dr.DineshKhattar, Delhi University, dinesh.khattar31@gmail.com		3. Mr. P. Priyanand, SRMIST	
				4. Mrs. M. Kavitha,, SRMIST	

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
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Course Offering Department	MBA	Data Book / Codes/Standards	
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Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)
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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

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	Application of multidisciplinary knowledge comprising of finance, operations, system, marketing and human resources management to integrate business projects.	Usage of business metrics to evaluate business projects to develop growth strategies.	Authorize the student to innovate and execute the business idea during the challenging 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

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	I	2	3
		Level of Thinking	Expected Proficiency	Expected Attainment
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

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Duration (hour)	6	6	6	6	6
S-1 SLO-1	Icebreaker. 1) Participate in Joint Hands Movement of .Individual identification of social issues. 2)Each Individual chooses One particular social issue which the you would 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 participant Slam book to be used for capturing Individual learning	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) - Briefing 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

		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
	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
S-2	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). <i>Sharing of learning, written Practical and formative evaluation</i>	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	<i>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)</i> 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

						<p>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)</p> <p>Field work: Formative Evaluation</p>
S-4	SLO-1	<p>Lucid Writing: Encourage the students to go through the links given about Catherine Morris and Joanie McMahon's writing techniques. Theory and Discussion</p>	<p>Prepare and publish the Second episode of the EMagazine. (Part 2). Practical (Lab)</p>	<p>(2) Similar personality types to form groups (3) Groups present their traits. Presentation</p>	<p>Session on Diversity & Inclusion- Different forms of Diversity in our society. PPT, Theory, discussion</p>	<p>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</p>
	SLO-2	<p>Create the magazine Practical (Lab)</p>	<p>Speed Reading session: Introduction to skimming and scanning; practice the same. Theory and Practical</p>	<p>Prepare and publish the third episode of the EMagazine. Practical</p>	<p>Teams to video record interviews of people from diverse groups (Ask 5 questions). Share the recordings in FB Practical</p>	<p>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</p>

						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	<p>Launching an E Magazine. (Part 2). Practical (Lab)</p>	<p>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</p>	<p>Ten minutes of your time – a short film on diversity. Play the video.(Link to be attached in the FG). Video & discussion</p>	<p>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</p>	<p>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</p>
	SLO-2	<p>Quiz Time Summative Evaluation for Unit</p>	<p>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</p>	<p>Discuss key take away of the film. Theory to connect the key takeaway of the film to the concept of empathy. Practical</p>	<p>Discussion on TCS values, Respect for Individual and Integrity. PPT, Theory ,Practical and discussion</p>	<p>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</p>

Learning Resources	1. Guiding Souls : Dialogues on the purpose of life; Dr. A.P.J Abdul Kalam ;Publishing Year-2005; Co-author--ArunTiwari	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
	2. The Family and the Nation; Dr. A.P.J Abdul Kalam; Publishing year: 2015; Co-author: AcharyaMahapragya.	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	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

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
<i>Experts From TCS</i>	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			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 provide a brief understanding of basic principles in economics	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 :	Understand the concepts of demand and supply analysis				H	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLR-3 :	Acquire knowledge on the principles of costs and other concepts of production				H	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLR-4 :	Understand market structures				H	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLR-5 :	Introduction to macro economics				H	-	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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:																						
CLO-1 :	Able to assess and understand the firm and the industry basic framework	2	80	70																			
CLO-2 :	Able to gauge and incorporate consumers behavior in decision making by the firm and consumers	2	85	75																			
CLO-3 :	Able to understand production decisions	2	75	70																			
CLO-4 :	Able to understand and assess decisions of an economy and its working	2	85	80																			
CLO-5 :	Able to understand the relationship between world economy and Indian economy	2	85	75																			
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	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	<i>Microeconomics</i> , Pindyck, Robert S., and Daniel L. Rubinfeld	<i>Intermediate Microeconomics: A Modern Approach</i> , Hal R, Varian <i>Principles of Macroeconomics</i> , N. Gregory Mankiw.
	<i>Macroeconomics</i> , Dornbusch, Fischer and Startz.	
	<i>Economics</i> , Paul Anthony Samuelson, William D. Nordhaus.	

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
<i>Experts From TCS</i>		<i>Dr. Nisha Ashokan</i>
		<i>Dr. Padmaja M</i>

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):	<i>The purpose of learning this course is to:</i>
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 to solve 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.

Learning			
1	2	3	
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														
															M	H	L						M	L	H			
															M	H		M	M				M		H			
															M	H							M		H			
															M	H		M					M		H			
															M	H	L						M	L	H			
															M	H	L						M	L	H			

Course Learning Outcomes (CLO):	<i>At the end of this course, learners will be able to:</i>			
CLO-1:	Gaining knowledge in basic concepts of Matrix method to solve linear equations.	2	85	80
CLO-2:	Gaining knowledge in analytical concepts and numerical methods of Matrix to solve linear equations.	2	85	80
CLO-3:	Understanding the concepts of vector space and its properties related to engineering problems.	2	85	80
CLO-4:	Understanding the concepts of linear equations obtained from real world problems based on the characteristics of matrix.	2	85	80
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
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

		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 on dimension 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-4	SLO-1	Problem solving using tutorial sheet 1 in Matrices	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
	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	<i>Higher Engineering Mathematics</i> , B. S. Grewal
2	<i>Advanced Engineering Mathematics</i> , 7 th Edition, Peter V. O'Neil
3	<i>Advanced Engineering Mathematics</i> , 2 nd Edition, Michael. D. Greenberg
4	<i>Introduction to linear algebra</i> , 5 th Edition, Gilbert Strang
5	<i>Applied Mathematics</i> (Vol. I & II), by P. N. Wartikar & J. N. Wartikar
6	<i>Digital Image Processing</i> , 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%	-
Level 2	Understand	40%	-	40%	-	40%	-	40%	-	40%	-
	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
Level 3	Analyze	20%	-	30%	-	30%	-	30%	-	30%	-
	Evaluate	20%	-	30%	-	30%	-	30%	-	30%	-
	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.,

SLO – Session Learning Outcome

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

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):	<i>The purpose of learning this course is to:</i>	Learning			Program Learning Outcomes (PLO)														
CLR-1 :	To apply the sampling techniques in Engineering field to understand various sampling methods	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	To learn the procedure of correlation, regression and ANOVA	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-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):	<i>At the end of this course, learners will be able to:</i>																		
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	Run test	ARIMA Models Estimation and

				in estimation		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		<ol style="list-style-type: none"> 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 Grolemond, 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 				

	Level of Thinking	Continuous Assessment (50% weightage)								Final Examination (50%)	
		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 Category	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)
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CLR-1:	For the student to understands the use of Silicon based diode and transistor operations he can build complex circuits	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2:	BJT is the initial transistor made, by learning about it the use of multiple pn junction devices can be understood	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 (Knowing the basics)	PSO-2 (Applying learnt knowledge)	PSO-3 (Extending learnt theory)
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:																		
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	Multiplexers, demultiplexers 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	characteristics	biasing effects.	biasing	amplifier and analysis	using gates and digital ICs, measuring noise.
	SLO-2					
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	Designing FET amplifier networks	Inverting and non-inverting modes	Shift register – serial to parallel
	SLO-2	Rectifiers	Current amplification factor in CB	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	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
	SLO-2					

Learning Resources	1. Adel S. Sedra and Kenneth Carless Smith, "Microelectronic Circuits, Theory and applications", 7 th 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 Category	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

Learning		
1	2	3
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
L	H	-	H	L	-	-	-	L	L	-	H	-	-	-
M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
H	H	M	H	L	-	-	-	M	L	-	H	-	-	-
L	H	-	H	L	-	-	-	L	L	-	H	-	-	-

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:			
CLO-1 :	Identify linear and non-linear data structures. Create algorithms for searching and sorting	3	80	70
CLO-2 :	Create the different types of linked lists and evaluate its operations	3	85	75
CLO-3 :	Construct stack and queue data structures and evaluate its operations	3	75	70
CLO-4 :	Create tree data structures and evaluate its types and operations	3	85	80
CLO-5 :	Create graph data structure, evaluate its operations, implement algorithms to identify shortest path	3	85	75
CLO-6 :	Construct the different data structures and evaluate their types and operations	3	80	70

Duration	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	SLO-1	Lab 2: Implementation of Array –	Lab 5: Implementation of Doubly	Lab 8: Implementation of Binary	Lab 11:Implementation of Shortest	Lab 14 :Implementation of Graph

11-	SLO-2	Insertion, Deletion.	linked List	search tree	path Algorithm	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 using Pointers	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	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	Lab 15 :Implementation of File concepts
	SLO-2				Merge sort	

Learning Resources	1. Fundamentals of Data Structures, E. Horowitz and S. Sahni,1977. 2. Data Structures and Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman. 3. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2 nd ed., Pearson Education, 2015.	4. Reema Thareja, Data Structures Using C, 1 st ed., Oxford Higher Education, 2011 5. Thomas H Cormen, Charles E Leiserson, Ronald L Revest, Clifford Stein, Introduction to Algorithms 3 rd 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		I. 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:	Learning	Program Learning Outcomes (PLO)
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CLR-1 : Connect the learners to their potential, identify their potential to create a new positive world	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
CLR-2 : Analyze the merits and demerits of different educational systems. Identify the different systems of education	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-3 : Draw attention towards the weaknesses they are susceptible to and inspire them through positive models				L	M	-	M	H	-	H	H	H	H	H	H	H	-	H	-	-	-
CLR-4 : Instill a sense of professional ethics which help them develop a safe comfortable and prosperous society				M	H	M	-	H	H	M	M	H	M	M	H	H	-	H	-	-	-
CLR-5 : Cultivate a spirit of willing accommodation in an increasingly diverse world				M	-	-	-	M	H	M	M	H	M	M	H	H	-	H	-	-	-
CLR-6 : Strengthen, enhance the spirit of positivity and facilitate positive contribution in various spheres of life				H	M	-	-	H	H	H	H	H	H	H	H	H	-	H	-	-	-
				M	-	-	-	H	H	H	H	H	H	H	H	H	-	H	-	-	-
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																				
CLO-1 : Equipped with an awareness of their positive energy and power	2	80	75																		
CLO-2 : Identify the meaning of 'education'; have a clearer and better understanding in taking education to the masses	2	75	70																		
CLO-3 : Assess their weaknesses; understand risks involved and rectify them through learning from positive and negative instances	2	80	75																		
CLO-4 : Realize their professional responsibilities	2	75	70																		
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																		
CLO-6 : Equip with better understanding of themselves, society they live. Identify responsibilities in creating a peaceful world	2	80	75																		

	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	<i>Role play in a similar context</i>	<i>Students' Presentation based on write ups</i>	<i>Short videos followed by discussions</i>	<i>Group activity (oral and written)</i>	<i>Poster presentation on festivals of various religions</i>
S-6	SLO-1	<i>One song exhibiting the positive energy of youth</i>	<i>The pressing challenges in current educational system</i>	<i>Positive contribution by youth in promoting social welfare</i>	<i>Challenges in different sectors: sustainable development, cyber security</i>	<i>Success of pluralistic society, enliven the society, religious harmony through literary</i>
	SLO-2	<i>Discussion on the song</i>	<i>Collage Design</i>	<i>Short videos followed by discussions</i>	<i>Case Study – from Newspapers</i>	<i>Writing the aspects of pluralistic society based on the text</i>

Learning Resources	<p>1. Kalam, APJ Abdul. <i>Wings of Fire: AN Autobiography of APJ Abdul Kalam</i>. Ed. Sangam Books Ltd., 1999</p> <p>2. "Banaras Hindu University Speech" and "To Students". <i>The Voice of Truth</i>. General Editor Shriman Narayan. Navajivan Publishing House. pp. 3-13 and pp. 425-30. www.mkgandhi.org</p> <p>3. Piroda, Sam. "Challenges in Science and Technology". www.nfdindia.org/loc19.htm</p>	<p>4. Thomas A Address to VTU Students by Narayana Murthy. https://www.karnataka.com/personalities/narayana-murthy/vtu-address-2006/</p> <p>5. World Economic forum. "India's top 7 challenged from skills to water scarcity"</p>
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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. Mr. Durga Prasad Bokka, TCS, durgaprasad@tcs.com		2. Ms. Subashree, VIT, Chennai, subashree@vit.ac.in		2. Dr. B. Cauveri, SRMIST
				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):		Learning			Program Learning Outcomes (PLO)																															
CLR-1 :		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																	
The purpose of learning this course is 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																	
To help the students to know the pronunciation of the language, To make the students understand the basic concepts Chinese scripts, tones and greetings.																				-	-	M	-	M	H	L	M	H	L	-	H	-	-	-		
To make students understand the basic concept of grammar, to count numbers, Telling time and date, To make simple interrogative sentences and basic conversations.																				52	60	60	-	-	H	-	H	M	L	M	H	M	-	H	-	-
To ask about directions, Focus on class activities through conversation on orientation.																				55	65	62	-	-	M	-	M	L	L	M	L	M	-	H	-	-
Daily activities and asking about places and Chinese etiquette																				53	68	63	-	-	M	-	M	L	L	M	L	M	-	H	-	-
To learn the usage of different verbs and adjectives.																				60	69	65	-	-	H	-	H	H	L	M	H	H	-	H	-	-
This Chinese language course is designed for needs of beginners with no knowledge in Chinese language.		58	72	63	-	-	H	-	H	H	L	M	M	H	-	H	-	-																		
This course will develop basic knowledge of the language, gain the four language skills, learning, speaking, reading and writing Chinese scripts.		56	70	60	-	-	H	-	H	H	L	M	H	H	-	H	-	-																		
Course Learning Outcomes (CLO):		At the end of this course, learners will be able to:																																		
CLO-1 :		Pronounce Chinese Romanization , Get to know about China and the Chinese speaking countries, , Read basic characters																																		
CLO-2 :		To ask about the need, counting numbers , Greet each other, express time and date in daily conversations.																																		
CLO-3 :		To ask different kind of questions , to tell age with the help of Chinese words.																																		
CLO-4 :		To learn different usage of Chinese grammar and vocabulary and introduce own self.																																		
CLO-5 :		To learn about Chinese festivals and Chinese culture, to acquire conversational skills																																		
CLO-6 :		The Chinese language skills will help in career orientation ,to acquire writing ability and communicate with Chinese speaker.																																		

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 make comments.	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 Chinese currency.	Direction in Chinese.	Introduction of sentence with nominal predicate, Subjectverb construction as its predicate.	Famous Chinese festivals
	SLO-2	Basic greetings and phrases used in daily life (in pinyin)	Converse to greet others and express your need	Making question with 几, 多少	Fruit related vocabulary, application.	Major Chinese cities
S-3	SLO-1	Tables of combination of initials and finals in Putonghua(Mandarin)	Asking your need	Introducing one's nationality	Asking question with ma , wh words, affirmative -negative	Application and usage of construction
	SLO-2	Tables of combination of initials and finals in Putonghua(Mandarin)	Nominal measure word	Asking about nationality	Lianxi	lianxi
S-4	SLO-1	Pronunciation of Pinyin chart	Telling phone number in chinese	Asking price	Asking question with ma , wh words, affirmative -negative	Application and usage of construction
	SLO-2	Pronunciation of Pinyin chart	Converting numbers	Lianxi	Lianxi	lianxi

S-5	SLO-1	Introduction of FourTones in Chinese language.	Time & time related greetings,	Politely and formally asking names, Expressing apology.	Making Chinese sentences with verbal & Adjectival predicate.	Grammar related to 但是, 可是, 以前, 以后, 后来。
	SLO-2	Four Tones and related pronunciation.	Days & Seasons.	Introduction & Application of verbal Measure Word.	Introduction of 地	Introduction & Application of the basic optative verbs like 会, 能, 可以.
S-6	SLO-1	Tone sandhi (一, 不) in Chinese Tone discrimination in Chinese	The basic sentence patterns in Chinese, S-V-O sentences with detailed examples. Framing simple sentences.	Make sentences with 在, and few corelated location words like 这儿, 那儿 with example	Few basic verbs and adjectives.	conversation how to describe likes, dislikes, interest and hobbies
	SLO-2	Introduction of Chinese characters. The eight basic strokes of characters- Chinese characters with proper stroke orders.	Introduce 是 and 不是	Important locations used in daily life.	Opposite words.	Conduct conversation how to describe likes, dislikes, interest and hobbies
S-7	SLO-1	Pronounce word in proper tone	Vocabulary	Asking about places..	Usage of verbs	Usage of grammar
	SLO-2	Personal Pronouns and relations, Plural forms 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	Introducing each other	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 related vocabulary, application with examples.	Colour and vocabulary, application with examples.	conversation how to bargain and purchase products.
	SLO-2	Introduction of adverb 也, Interrogative particle 呢, application & Usages.	Introduction of verb 有 and its negative form. Nominal measure word.	Basic conversation about person's occupation	conversation how to describe your family members and talk about university and department	conversation how to bargain and purchase products.
S-10	SLO-1	Possessive/ Structural Particle 的, application of 的 with pronouns. Writing Chinese characters	Framing of basic interrogative sentences with modal particle 吗。	Introduction of interrogative phrase 多大, Telling one's age in Chinese.	Sports & Games related vocabulary, 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 past tense and aspect particle 了。	application with examples.	
S-11	SLO-1	Writing greetings in characters with proper stroke order	Asking simple question	Asking age	Asking about likes and dislikes	Asking about purchasing products
	SLO-2	练习	Asking date	lianxi	Asking about likes and dislikes	Asking about purchasing products
S-12	SLO-1	Basic Expression	birthday in Chinese	Asking about occupation	Asking about family members	Usage of conjugation
	SLO-2	练习	Grammar - has, have	lianxi	Asking about family members	Usage of conjugation

Learning Resources	<ol style="list-style-type: none"> 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
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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,	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	NA
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)																																		
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.			1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																				
CLR-2 :	To identify someone and ask for information. Physical description of people with adjectives. Focus of class activities through conversation			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-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 goûts 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 à 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 goûts	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'informer 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	L 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
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Mr. Durga Prasad Bokka, TCS	DR.S.P. Dhanavel Professor Dept of English IIT - Chennai	Ms. K.Sankari, Assistant Professor Dept of EFL SRMIST
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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			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 like Grammar, Self introduction and greetings.	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 learn how to introduce oneself and ask and give information about others and express simple terms like hobbies, Telephone numbers.				-	-	L	M	H	L	H	H	H	H	H	-	H	-	-	-	-
CLR-3 :	To ask and give directions, an overview of German cities, buildings and everyday life like Cuisine.				-	-	M	L	M	H	L	H	H	H	H	-	H	-	-	-	-
CLR-4 :	To develop the ability among the students to read, understand and initiate the conversation.				-	-	M	M	H	M	M	H	H	H	H	-	H	-	-	-	-
CLR-5 :	To enable the students to achieve basic conversational skills.				-	-	M	M	H	H	M	H	H	H	H	-	H	-	-	-	-
CLR-6 :	They can understand and use familiar everyday expressions and very simple sentences in German.				-	-	L	L	M	H	L	H	H	H	H	-	H	-	-	-	-
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, Grüßen und Verabschieden.	Umbestimmt Artikel im Nominativ.	T, N, Dverbkonjugationen und Satzschreiben.	Die Uezeiten verstehen und nennen.	Etwas gemeinsam planen, über Geburtstags sprechen.
	SLO-2	Über Länder und Sprachensprechen in Deutschland, Wichtige Städte in Deutschland.	Zahlen bis 1000 und Wortschatz.	Ordinal Zahlen und Tagezeiten	Zeitangaben machen.	Schreiben Sie: Einladung für Ihren Geburtstag.
S-2	SLO-1	Zahlen bis 20, Sich und andere vorstellen.	Plätze und Gebäude benennen, Fragen zu orten stellen.	Über Essen sprechen und verschiedene Gerichte in Deutschland durch PPT.	Um regelmäßige Verbenkonjugationen und Beispiele Satz.	Possessive Artikel im Akkusativ.
	SLO-2	Telefonnummer und E-mail Adressen nennen.	Negation und Übersetzung.	Buchstabieren und Wortschatz.	"ieren" Verbenkonjugation und Beispielsatz.	Beispielsätze.
S-3	SLO-1	Alphabet Aussprache und hört die Grüßen.	Hörübung: Die Telefonnummer.	Hörübung: Aussprache die Umlaute ä, ö, ü und Beispielsätze.	Hörübung: Dem Dialog zuhören und die Zeitschreiben.	E-mail schreiben: Einladung für Ihren Geburtstagsfeier.
	SLO-2	Verabschieden Wörtern.	Buchstabieren und Wortschatz.	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 Sehenswürdigkeiten in Deutschland.	Dialog: Über das Essen und seine Preispraktizieren.	Mit den Regelmäßigen und Unregelmäßigen Verben eigene Sätze schreiben	Das Gespräch hören und verstehen.
	SLO-2	Übungen.	Sprechen über den wichtigen Städte in Deutschland.	Übungen.	"ieren" Verbenkonjugationen.	Wortschatz und buchstabieren.

S-5	SLO-1	Über Länder und Sprachensprechen.	Himmelsrichtungen und Verkehrsmittelnennen.	Einen Einkauf Planen und sprechen	Über die Familiensprechen und sich verabreden.	Das Briefeschreibenerklären, eine Einladung verstehen und schreiben.
	SLO-2	Hören und buchstabieren.	Nachdem Wegfragen und einem Weg beschreiben	Gespräche beim Einkauf führen.	Sich für eine Verspätung entschuldigen.	Personalpronomen und Beispieleätze.
S-6	SLO-1	Aussagesatz und personalpronomen in Nominativ und Beispieleätze.	Texte mit internationalen Wörtern verstehen.	Gespräche beim Essen führen.	Einen Termin telefonisch vereinbaren.	Im Restaurant bestellen und bezahlen, über ein Ereignis sprechen,
	SLO-2	Über Arbeit, Berufe und Arbeitszeiten sprechen.	Artikel lernen.	W-Fragentexte verstehen.	Schreiben Sie die Uhrzeiten.	Bestimmte Informationen in Texten finden.
S-7	SLO-1	Übersicht und anderesprechen.	Hörübung: Schreiben Sie die Zahlen.	Kurzer Dialog über das Einkaufen.	Üben: Wie man den Termin festlegt.	Schreiben eines Briefes über jede Ebene situation.
	SLO-2	Fragen und antworten.	Events im Hamburg.	Übungen: Verbenkonjugationen.	Hören und buchstabieren.	Übungen: Trennbare Verbenkonjugationen.
S-8	SLO-1	Sich und andere vorstellen.	Fragen Sie die Wegbeschreibung indem sie die Bilder sehen.	Kurzer Dialog über das Essen.	Hörübung: Die Zeit durchhören des Dialogs schreiben.	Hörübung und Schreiben: Freizeitaktivitäten.
	SLO-2	W-Fragen.	Lesen und verstehen.	Hören: wie man bestellt.	Übungen.	Satz mit Hilfsverben.
S-9	SLO-1	Zahlen ab 20 nennen, über Jahreszeiten in Deutschland.	Imperativ mit Sie, Lesen und verstehen.	Wortschatz und Buchstabieren.	Umbestimmte Artikel im Akkusativ.	Trennbare Verbenkonjugationen. Beispieleätze.
	SLO-2	Wochentage und Monate.	Lange und Kurze Vokale.	Schreiben Sie die Sätze.	Zeitangaben mit am, um, von.... bis.	Beispieleätze.
S-10	SLO-1	Bestimmte Artikel in Nominativ.	Regelmäßige Verbenkonjugationen.	Positionen im Satz, Bestimmte Artikel im Akkusativ.	Erklärt die Grammatik Präpositionen im Akkusativ.	Präteritum von Hilfsverben und Konjugationen.
	SLO-2	Verwendungen von Hilfsverben.	Satzschreiben.	Akkusativ Verbenkonjugationen.	Beispieleätze im Präpositionen.	Modal Verbenkonjugationen und Beispieleätze.
S-11	SLO-1	Ja oder Nein Fragend durch PPT.	Der Imperativsätze und auch die Regelmäßige Verben	Essen im D-A-CH, Berufe und ums Essen.	Hören und sprechen: die Tagesablauf.	Übung für Modal Verben wie, Aussagesatz, Satzfrage.
	SLO-2	Typische Hobby's.	Lernen Sie die Sätze durch PPT.	Hören Sie den Dialog.	Schreiben: Die Tagesablauf.	W-Frage und Trennbare Verben.
S-12	SLO-1	Der Film: Über den Termin.	Der Film: Die Autofahrt und das Verkehrsmittel.	Der Film: Frühstück bei 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	Über deine Familie.	Claudia Berg in der Arbeit.	Einkaufen planen.	Der Termin und die Verabredung.	Schreiben Sie die Sätze mit Hilfsverben.

Learning Resources	<ol style="list-style-type: none"> 1. Netzwerk - Klett - Langeheide, München - 2015 2. Grundkurs Deutsch - Dept. of EFL - SRMIST
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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
Dr. UshaKodandaraman, ABK AOTS, Chennai . drushak@gmail.com	Ms.SubhashriVijaykumar, Assistant Professor VIT chennai,	Dr.K.Anbzhagan Prof & Head, Dept of EFL SRMIST
Mr. VivekRaghunathan Language Expert, Health care Vivek.raghunathan@waikatodhb.health.nz	DR.S.P. Dhanavel Professor Dept of English IIT - Chennai	Ms.Srilitha Srinivasan , Assistant Professor Dept of EFL SRMIST
		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			Program Learning Outcomes (PLO)																																
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	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																		
CLR-2 :	To identify someone and ask for information. Physical description of people with adjectives. Focus of class activities through conversation	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-3 :	to ask and give directions, Focus on class activities through conversation on orientation and an overview of the Japan educational system																			55	70	60	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M
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																			50	65	62	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M
CLR-5 :	to learn about the diverse , the food habits of the Japanese people. Alimentation isassociatedwith partitive articles.																			50	68	63	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M
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																			60	75	65	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M
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																			58	72	63	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M
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	58	72	63	M	L	L	L	M	H	M	H	H	M	L	H	M	M	M																		

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 :	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
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
CLO-3 :	Orient someone by giving directions, Express possession and conjugate 2nd group verbs. Draft their own curriculum vitae.	50	68	63
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
CLO-5 :	Paragraph on the food habits of the Japan people and also their own using particles.	58	72	63
CLO-6 :	The language skills coupled with technical skills help in career orientation and to communicate effectively with any Japanese speaker.	58	72	63

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, chisai, 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	<ol style="list-style-type: none"> 1. Minna no Nihon Go - 3A Corporation, Tokyo, Japan - 2002. 2. A Basic Course in Japanese-Department of EFL,SRMIST- 2017
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Learning Assessment					
Bloom's Level of	Continuous Learning Assessment (50% weightage)				Final Examination (50% weightage)
	CLA – 1 (10%)	CLA – 2 (15%)	CLA – 3 (15%)	CLA – 4 (10%)#	

	Thinking	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.,

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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):		Learning			Program Learning Outcomes (PLO)																
CLR-1 :		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
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.		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 : 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).					-	-	L	-	H	H	L	M	M	H	-	H	-	-	-	-	-
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.					-	-	L	-	H	M	L	M	H	H	-	H	-	-	-	-	-
CLR-4 : Tell time, to socialize: make appointments, phone calls					-	-	L	-	M	H	L	M	M	M	-	H	-	-	-	-	-
CLR-5 : Communicate about studying Korean and about future career or academic plans.					-	-	L	-	H	H	L	M	H	H	-	H	-	-	-	-	-
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.					-	-	L	-	H	H	L	M	H	H	-	H	-	-	-	-	-
Course Learning Outcomes (CLO):		At the end of this course, learners will be able to:																			
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)르거예요		
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-버니다/습니다,- 버니까/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	위치 location 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 practice	grammar point1- 나/저, 내/제
	SLO-2		grammar point2-에 있다/없다	reading/writing		grammar point2-‘ㄷ’ irregular verbs
S-7	SLO-1	자모 연습. (practices vowels and consonants)	dialogue1 & dialogue2 practice	어제 일과 yesterday's daily routine	listening & key sentences drilling	dialogue1 & dialogue2 practice
	SLO-2			new vocab (action, places)	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)르까요	계획(plan) -(으)르 거예요.
	SLO-2				reading/writing	
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	<ol style="list-style-type: none"> 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
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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
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

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			Program Learning Outcomes (PLO)																	
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
CLR-1	Importance of Financial Management to make good business decisions	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	Significance of Financial market and its linkage with business				H	M	M	H	M	L	H	M	L	M	M	M	L	H	1	60	50	
CLR-3	Long Term Sources available for a firm				H	L	M	H	L	L	H	L	M	L	L	H	2	80	75			
CLR-4	Application of tools and techniques for selection of projects				H	M	M	H	M	M	H	M	M	M	M	M	H	2	80	70		
CLR-5	Importance of Cost of Capital and Capital Structure for financing decisions				H	L	M	H	L	M	H	L	M	L	M	H	3	90	80			
CLR-6	Importance of Liquidity and Dividend decisions				H	H	M	M	H	M	M	H	M	H	M	H	M	M	3	90	80	
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	Indian 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	5. Brigham, Ehrhardt, Financial Management Theory and Practice, 12th edition, Cengage Learning 2010.
	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	6. Prasanna Chandra, Financial Management, 9th edition, Tata McGraw Hill, 2012.
	4. James C. Vanhorne –Fundamentals of Financial Management– PHI Learning, 11th Edition, 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			Program Learning Outcomes (PLO)																																							
CLR-1 :	To Understand the various standpoints prevailing in Human Resource Management			1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																									
CLR-2 :	Examine the best practices in Human Resource Planning and Forecasting.			Level of Thinking (Bloom) Expected Proficiency (%)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	M	H	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	L	M	H	L	2	60	50																		
CLR-3 :	Classify the need for training and its development practices.																												1	80	75	L	H	L	L	M	M	L	L	M	H	H	2	80	70	
CLR-4 :	Comprehend the employee interest to persuade motivation and develop Employee Engagement																												2	80	70	M	H	L	M	M	L	L	M	H	H	2	80	70		
CLR-5 :	Learn the technique of Performance Evaluation and control of process in the Organization																												3	90	80	M	H	L	M	M	L	L	L	M	H	L	3	90	80	
CLR-6 :	Understand the importance of Human Resource Management in Organizational effectiveness																												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. <i>Dessler Human Resource Management, Pearson Education Limited, 14th Edition, 2015</i>	4. <i>Bernadin , Human Resource Management ,Tata Mcgraw Hill ,8th edition 2012. Wayne Cascio, Managing Human Resource, McGraw Hill, 2007.</i>
	2. <i>Decenzo and Robbins, Fundamentals of Human Resource Management, Wiley, 11th Edition, 2013</i>	5. <i>Uday Kumar Haldar, Juthika Sarkar. Human Resource management. Oxford. 2012.</i>
	3. <i>Luis R.Gomez-Mejia, David B.Balkin, Robert L Cardy. Managing Human Resource. PHI Learning. 2012</i>	6. <i>K.ASWATHAPPA – HUMAN RESOURCE MANAGEMENT – The McGraw- Hill Companies</i>

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	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. SanthoshKumart, Head – Human Resources, SRMSOM
	Dr.Thenmozhi, Professor, University of Madras	Dr.S.Sujatha – Assistant Professor - SRMSOM

Course Code	I8CSC261T	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):		Learning			Program Learning Outcomes (PLO)																	
CLR-1 :		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
The purpose of learning this course is 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			
Present various computing models for formal language theory					L	H	H	H	L	-	-	-	L	L	-	H	-	-	-	-	-	-
Understand various language classification as specified by Chomsky					L	H	L	M	M	-	-	-	L	L	-	H	-	-	-	-	-	-
Utilize regular languages to represent lexical analyzer of compiler design					L	H	M	H	L	-	-	-	M	L	-	L	-	-	-	-	-	-
Understand how Context-Free grammar is used to represent programming constructs.					M	H	M	H	M	-	-	-	H	L	-	H	-	-	-	-	-	-
Analyze the use of Turing Machines and their applications in decidability theory					H	H	M	H	L	-	-	-	M	L	-	M	-	-	-	-	-	-
Represent a platform for higher level of Chomsky classification.		M	H	-	H	M	-	-	-	L	L	-	H	-	-	-	-	-	-			
CLR-2 :		3	80	70	L	H	H	H	L	-	-	-	L	L	-	H	-	-	-			
CLR-3 :		3	85	75	L	H	L	M	M	-	-	-	L	L	-	H	-	-	-			
CLR-4 :		3	75	70	L	H	M	H	L	-	-	-	M	L	-	L	-	-	-			
CLR-5 :		3	85	80	M	H	M	H	M	-	-	-	H	L	-	H	-	-	-			
CLR-6 :		3	85	75	H	H	M	H	L	-	-	-	M	L	-	M	-	-	-			
Represent a platform for higher level of Chomsky classification.		3	80	70	M	H	-	H	M	-	-	-	L	L	-	H	-	-	-			

Course Learning Outcomes (CLO):		At the end of this course, learners will be able		
CLO-1 :	To understand and design various Computing models like Finite State Machine, Pushdown Automata, and Turing Machine.	3	80	70
CLO-2 :	To understand the various types of grammar and the corresponding languages	3	85	75
CLO-3 :	To understand Decidability and Undecidability of various problems	3	75	70
CLO-4 :	To understand the computational complexity of various problems	3	85	80
CLO-5 :	To understand How compiler can be constructed with the help of formal models of computation theory?	3	85	75
CLO-6 :	Understand how formal language theory helps to understand Natural Language Processing	3	80	70

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 hierarchy of 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.	L_u 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 and CSG	Unrestricted grammars and equivalence with Turing machines	NP-Complete, NP-Hard Problems
	SLO-2	An example	Continued	-Continued -	-Continued-	Examples.
Learning Resources		<ol style="list-style-type: none"> John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, <i>Introduction to Automata Theory, Languages, and Computation</i>, Pearson; 3 edition (23 May 2008) Harry R. Lewis, Christos H. Papadimitriou, <i>Elements of the Theory of Computation</i>, Pearson; 3 edition (23 May 2008) Dexter C. Kozen, <i>Automata and Computability</i>, 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	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	1. Dr. G.Venkateswaran, 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 & ARCHITECTURE	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):		Learning			Program Learning Outcomes (PLO)															
The purpose of learning this course is to:		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
CLR-1 :	Utilize the functional units of a computer,analyzing the functions of arithmetic Units like adders, multipliers etc.	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 :	Study instruction set architecture and addressing modes .				H	H	-	-	-	-	-	-	-	M	L	-	M	-	-	-
CLR-3 :	Study of x86 architecture,design of control unit and memory organization.				H	H	H	-	H	-	-	-	-	M	L	-	M	-	-	-
CLR-4 :	Analysis of Input output systems ,I/O transfers and I/O device interfaces				H	-	-	H	-	-	-	-	-	M	L	-	M	-	-	-
CLR-5 :	Study about parallel processing and understanding the concepts of Pipelining .				H	-	H	H	-	-	-	-	-	M	L	-	M	-	-	-
CLR-6 :	Identify different types of memory,mapping functions and replacement algorithms.				H	H	H	H	-	-	-	-	-	M	L	-	M	-	-	-
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																			
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	-	-	-	-	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
	SLO-2	Combinational Circuits-Adders,subtractors	Ripple carry adder,	Addressing modes of 8086	I/O deviceinterface
S-2	SLO-1	Sequential circuits-Flip flops and its types.	Carry look ahead adder	Instruction sets of 8086	I/O transfers – program controlled
	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
S-3	SLO-1	Operational concepts -RTL interpretation of instructions,	Bit pair recoding of multipliers	Assembler Directives	DMA
	SLO-2	Addressing modes	Problem Solving	Problem solving	privileged and non-privileged instructions,
S-4-5	SLO-1	Lab 1: To recognize various components of PC- Input Output systems	Lab4:Study of TASM Addition and Subtraction of 8-bit number	Lab-7: Design of Half Adder Design of Full Adder	Lab-10: Study of Array Multiplier Design of Array Multiplier
	SLO-2	Processing and Memory units			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
	SLO-2	Problem solving	Integer division Restoring Non restoring	Micro-programmed control-	Role of Interrupts and process state transitions
S-7	SLO-1	Instruction set.	Integer division Restoring Non restoring	Microinstruction ,Micro-program Sequencing	I/O device interfaces SCSI

	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	Conditional instructions	Problem Solving	Semiconductor RAM memories	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	Introduction to parallel processing	Memory protection
	SLO-2	Complements	Solving Problems	Static memories, Asynchronous DRAM, 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 Comparison of RISC and CISC	Secondary storage
	SLO-2	Overflow, Decimal fixed point representation	Solving Problems	ROM, PROM, EPROM	Vector processing	Magnetic hard disks
S-13	SLO-1	Floating point representation	Arithmetic operations on Floating point numbers	EEPROM, Flash memory	Array processing	Optical Disks
	SLO-2	Character representation	Solving Problems	Problem solving	Cache coherence protocols	Magnetic Tape systems
S-14-15	SLO-1	Lab -3 To 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	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 3. Computer Organization and Embedded Systems, Carl Hamacher.. 4. Computer Architecture and Organization, John P. Hayes
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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. Prof. A.P. Shanthy, ANNA University Chennai, a.p.shanthy@cs.annauniv.edu	1. Dr. V. Ganapathy, SRMIST
		2. Dr. C. Malathy, SRMIST
		3. Mrs M.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			Program Learning Outcomes (PLO)																
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
CLR-1	Utilize the different data types and C concepts in applications	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	Utilize C++ Concepts in developing applications				L	H	-	H	L	-	-	-	L	L	-	H	-	H	-	-	-
CLR-3	Utilize member functions and error handling for real-time applications				M	H	L	M	L	-	-	-	M	L	-	H	-	H	-	-	-
CLR-4	Utilize Inheritance, Polymorphism applications				M	H	M	H	L	-	-	-	M	L	-	H	-	H	-	-	-
CLR-5	Utilize Generic Programming for real-time applications				M	H	M	H	L	-	-	-	M	L	-	H	-	H	-	-	-
CLR-6	Utilize the different types of UML operations for real-time programming applications				H	H	M	H	L	-	-	-	M	L	-	H	-	H	-	-	-
		L	H	-	H	L	-	-	-	L	L	-	H	-	H	-	-	-			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	3	80	70
		(Bloom)	(%)	(%)
CLO-1	Revise C Concepts. Create applications on command line arguments	3	80	70
CLO-2	Create the different types of applications using C++ classes and objects	3	85	75
CLO-3	Create applications using constructors, destructors and friend classes	3	75	70
CLO-4	Implement Inheritance and polymorphism concepts	3	85	80
CLO-5	Create class and function templates	3	85	75
CLO-6	Construct UML diagrams for real-time applications	3	80	70

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	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	error handling	parameter passing – value vs reference	this Keyword,	Class Hierarchy	Input and Output: Streams
S-7	SLO-1	Input and Output	passing pointer by value or reference, Operator new and delete	this Keyword	Pointers to Objects	Streams, Files
	SLO-2	Library Functions (string)	the typecasting operator, Inline Functions in contrast to macro	Constructors	Polymorphism through dynamic binding	Files, Library functions
S-8	SLO-1	Library Functions (math, stdlib)	default arguments	Constructors	Assignment of an Object to another Object	formatted output
	SLO-2	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
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		<ol style="list-style-type: none"> <i>The C++ Programming Language, Bjarne Stroustrup.</i> <i>C++ and Object-Oriented Programming Paradigm, Debasish Jana</i> 		<ol style="list-style-type: none"> <i>Programming – Principles and Practice Using C++, Bjarne Stroustrup.</i> <i>The Design and Evolution of C++, Bjarne Stroustrup.</i> 		

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%
Level 2	Understand	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Apply										
Level 3	Analyze	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Evaluate										
	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, IITDM, Kancheepuram, noor@iitdm.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)																															
CLR-1 :	Utilize the different data handling techniques			1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																	
CLR-2 :	Utilize Regression methods			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-3 :	Utilize clustering techniques for real-time applications																					L	H	-	H	L	-	-	-	-	-	L	L	-	H	-	-	-
CLR-4 :	Utilize various data sets for real-time applications																					M	H	L	M	L	-	-	-	-	-	M	L	-	H	-	-	-
CLR-5 :	Utilize algorithms to find optimal solutions to prediction problems																					M	H	M	H	L	-	-	-	-	-	M	L	-	H	-	-	-
CLR-6 :	Utilize the Python libraries to implement the techniques learnt in the course																					H	H	M	H	L	-	-	-	-	-	M	L	-	H	-	-	-
																						L	H	-	H	L	-	-	-	-	-	L	L	-	H	-	-	-
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																																					
CLO-1 :	Identify suitable algorithm to solve prediction problems			3	80	70																																
CLO-2 :	Implement Regression methods			3	85	75																																
CLO-3 :	Implement clustering techniques			3	75	70																																
CLO-4 :	Implement statistical analysis on the data			3	85	80																																
CLO-5 :	Analyze various evaluation techniques			3	85	75																																
CLO-6 :	Strong foundation in Python			3	80	70																																

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. <i>An Introduction to Multivariate Statistical Analysis</i> , T.W. Anderson.	5. <i>Introduction to Linear Regression Analysis</i> , D.C. Montgomery and E.A. Peck.
	2. <i>Applied Multivariate Data Analysis, Vol I & II</i> , J.D. Jobson.	
	3. <i>Beginning Python: From Novice to Professional</i> , Magnus Lie Hetland. Edition, 2005.	7. <i>Programming Python</i> , Mark Lutz.
	4. <i>The Foundations of Factor Analysis</i> , A.S. Mulaik.	8. <i>Python 3 for Absolute Beginners</i> , 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:			Learning			Program Learning Outcomes (PLO)																	
	CLR-1	Study the emergence of software engineering as a discipline			1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
	CLR-2	Study the effectiveness of Software Project Management			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-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:			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 of software 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 resources	FURPS	requirements documentation Template	quality of design	white box test coverage									
	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 software metrics	concepts of design patterns	Branch coverage									
S	SLO-1	Lab2:Implementation of lifecycle	Lab5:Implementation of software	Lab8: Implementation of requirements	Lab11:Implementation of CRC model	Lab14:Implementation of White box									

9-10	SLO-2	models	quality models	modelling methods		testing
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. <i>Software Engineering</i> , Ian Sommerville	5. <i>The Unified Development Process</i> , Ivar Jacobson, Grady Booch, James Rumbaugh 6. <i>Design Patterns: Elements of Object-Oriented Reusable Software</i> , Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides 7. <i>Software Metrics: A Rigorous and Practical Approach</i> , Norman E Fenton, Shari Lawrence Pfleeger
	2. <i>Object Oriented Software Engineering: A Use Case Driven Approach</i> --Ivar Jacobson 3. <i>Fundamentals of Software Engineering</i> , Carlo Ghezzi, Jazayeri Mehdi, Mandrioli Dino 4. <i>Software Requirements and Specification: A Lexicon of Practice, Principles and Prejudices</i> , Michael Jackson	

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
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			Program Learning Outcomes (PLO)														
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1 : enable students understand subtle meanings of words used in academic texts		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 : determine the grammatical, syntactical, and logical accuracy of sentences					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-3 : comprehend an argument's line of reasoning					L	H	-	M	-	-	-	-	M	H	-	H	-	-	-
CLR-4 : understand the structure, organization, tone, and main idea behind the passage					L	H	-	M	-	-	-	-	M	H	-	H	-	-	-
CLR-5 : recognize the logical coherence of ideas in a text					L	H	-	M	-	-	-	-	M	H	-	H	-	-	-
CLR-6 : give the right knowledge, skill and aptitude to face any competitive examination					L	H	-	M	-	-	-	-	M	H	-	H	-	-	-
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, <i>Verbal Advantage: Ten Easy Steps to a Powerful Vocabulary</i> , Random House Reference, 2002	6. <i>Manhattan Prep GRE : Reading Comprehension and Essays, 5th Edition</i>
	2. Merriam Webster's <i>Vocabulary Builder</i> , Merriam Webster Mass Market, 2010	7. Martin Hewings, <i>Advanced Grammar in Use</i> . Cambridge University Press, 2013
	3. Norman Lewis, <i>How to Read Better and Faster</i> , Goyal, 4 th Edition	8. <i>Manhattan GMAT – Critical Reasoning, GMAT Strategy Guide, 12th Edition</i>
	4. Franklin GRE Word List, 3861 GRE Words, Franklin Vocab System, 2014	9. Joern Meissner, <i>Manhattan Review, GRE Analytical Writing Guide</i> , Manhattan Review Inc, 2011
	5. <i>Wiley's GMAT Reading Comprehension Grail</i> , Wiley, 2016	10. <i>GRE Analytical Writing, Solutions to the Real Essay Topics (Test Prep. Series)</i> , 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 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. 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):		Learning			Program Learning Outcomes (PLO)																																			
CLR-1 :		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																					
The purpose of learning this course is 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																					
CLR-2 :																																								
CLR-3 :																																								
CLR-4 :																																								
CLR-5 :																																								
CLR-6 :																																								
Understand the trends in entrepreneurship`																																								

Course Learning Outcomes (CLO):		Learning		
At the end of this course, learners will be able to:		1	2	3
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

Duration (hour)	9	9	9	9	9
S-1	SLO-1	Scope – types –innovation	What is IP?	Introduction to management	Introduction to entrepreneurship
	SLO-2	Process of innovation	Introduction to IP	Principles of management	Recent trends in entrepreneurship
S-2	SLO-1	Different aspects of innovation	Importance of IP	Difference between management and administration	Scope and importance of entrepreneurship
	SLO-2	Forms of innovation	Role , scope of IP	Theories of management	Prospects of entrepreneurship
S-3	SLO-1	Innovation models	Kinds of intellectual property rights	Evolution of management	Entrepreneurial ecosystem
	SLO-2		Property rights needs and importance	Importance of management practices	Role of innovation in present scenario
S-4	SLO-1	Type of innovation models	Introduction to trademarks	Role of manager	Barriers in entrepreneurship process
	SLO-2		Trademarks and its importance	Difference between manager and a entrepreneur	Is entrepreneurs are made or born?
S-5	SLO-1	Innovation lifecycle	Registration procedure	Different forms of organization	Factors influencing entrepreneurship
	SLO-2	Sources of innovation	Procedure for cancellation	Function of management	Rural entrepreneurship
S-6	SLO-1	Forms of innovation	Copyright –	Different components of a business	Entrepreneurship ecosystem
	SLO-2	Strategy in innovation	Registration of copyrights	human resource management	Role of rural entrepreneurship
S-7	SLO-1	Steps in strategy formation	Applying for copyrights	Marketing management	Process of entrepreneurship
	SLO-2	Innovation and strategy in new format	Procedure for obtaining copy rights	Financial management	Entrepreneurial mindset
					Myths in entrepreneurship
					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	4. Entrepreneurship – second edition – Rajeev Roy – Oxford University Press 5. K.ASWATHAPPA – HUMAN RESOURCE MANAGEMENT – The McGraw- Hill Companies
	2. Entrepreneurship – theory and practice – Raj Shankar Vijay Nicole. 3. Joe Tidd, John Bessant. Managing Innovation: Integrating Technological, Market and Organizational Change	

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%	-
Level 2	Understand	40%	-	40%	-	40%	-	40%	-	40%	-
	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
Level 3	Analyze	20%	-	30%	-	30%	-	30%	-	30%	-
	Evaluate	20%	-	30%	-	30%	-	30%	-	30%	-
	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. 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	<i>H</i>	<i>Humanities & Social Sciences</i>				L	T	P	C
										2	0	0	2

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

Course Learning Rationale (CLR):	<i>The purpose of learning this course is to:</i>	Learning	Program Learning Outcomes (PLO)																
CLR-1 :	Understand the fundamentals of Research and literature reviewing	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	Differentiate sources of information and research approaches	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-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):	<i>At the end of this course, learners will be able to:</i>																		
CLO-1 :	Understand basic marketing concepts	1	60	50	H	M	H	M	L	L	M	H	L	H	M	L	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	L	H	L	L	M	M	H	H	M	M	H	M	1	50	70
CLO-3 :	Leverage marketing concepts for effective decision making	2	80	75	M	H	L	L	M	M	M	M	H	H	H	M	2	80	75
CLO-4 :	Understand basic concepts and application of statistical tools in Marketing research	2	80	70	M	H	H	H	M	M	M	L	H	H	M	M	2	80	70
CLO-5 :	Understand basic marketing concepts	2	90	80	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	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 et al, Pearson Publication
	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	

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	<i>Dr. N. Thamarai Selvan, Professor, DOMS, NIT, Trichy.</i>	<i>Dr.S.Senthilkumar Associate Professor,FOM/SRMIST</i>
	<i>Dr. Maran, Professor and Director, Sairam School of Management Studies</i>	<i>Dr. A.R.Krishanan Associate Professor,FOM/SRMIST</i>

Course Code	18M BH2 62J	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			Program Learning Outcomes (PLO)																																														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																																
CLR-1 :	Develop the skills, structures, and processes that generate value by driving valuable insights along the knowledge funnel.	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	H	M	H	M	L	M	M	M	L	L	M	H	H	L	2	60	50																	
CLR-2 :	Understand the well-known and new tools in the right context of the design thinking application																																		4	80	70	L	H	L	L	M	M	L	L	M	H	H	4	80	70
CLR-3 :	Examine how to visualize ideas, stories and prepare the organization for a new mindset																																		4	80	75	M	H	L	L	M	M	L	L	M	H	M	4	80	75
CLR-4 :	Classify systems thinking and digital transformation process.																																		1	80	70	M	H	M	L	M	M	L	L	M	H	H	1	80	70
CLR-5 :	Comprehend the applications of design thinking in politics & society, business, health & science and law.																																		5	90	80	M	H	H	L	M	M	L	L	M	H	L	5	90	80
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Overall	Gain Knowledge in the field of Design Thinking, Tools, Transform organizations, systems thinking and applications	1	90	80	H	L	H	M	H	M	H	M	L	H	M	H	1	90	80																														
CLO-1 :	Understand applying the skills, structures, and processes that generate value by driving valuable insights along the knowledge funnel.	2	60	50	H	M	H	M	L	M	M	M	M	L	M	H	L	2	60	50																															
CLO-2 :	Learned Analyzing the effectiveness of design thinking tools and able to suggest the appropriate tool.	4	80	70	L	H	L	L	M	M	L	L	M	H	H	4	80	70																																	
CLO-3 :	Envisage ideas & stories and prepare the organization for a new mindset.	4	80	75	M	H	L	L	M	M	L	L	M	H	M	4	80	75																																	
CLO-4 :	Gain knowledge on systems thinking and digital transformation process.	1	80	70	M	H	M	L	M	M	L	L	M	H	H	1	80	70																																	
CLO-5 :	Appreciate the applications of design thinking in politics & society, business, health & Science and law.	5	90	80	M	H	H	L	M	M	L	L	M	H	L	5	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	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
S-5	SLO-1	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
	SLO-2	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
S-6	SLO-1	Explanation on target activity	Idea on Six thinking hats	Create a value proposition statement	How design thinking and agile thinking complement each other to customer satisfaction	Design approach to treating cancer
	SLO-2	Activity Lab-II: Target activity	Activity Lab-II: Creating person a	Activity Lab-II: Million dollar idea	Activity Lab-II: Activity on	Activity Lab-II: Apply design

7-8	SLO-2	related to empathy	based on the immersion activity using A4 pages	game	prototyping	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	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
	SLO-2					

Learning Resources	<ol style="list-style-type: none"> Nir Eyal - “Hooked by” - URL https://www.youtube.com/watch?v=iw1x0zos8Jo Rod Judkins (2015) - “The Art of Creative Thinking” - Hachette Book Publishing Dan Senor and Saul singer (2011) - “Start-up Nation” - Twelve; Reprint edition Simon Sinek - “Start with why” - URL https://www.youtube.com/watch?v=u4ZoJKF_VuA Claude Diderich (2020) - “Design Thinking for Strategy Innovation Towards Competitive Advantage” - Springer International Publishing Kausik Kumar, DivyaZindani and J.PauloDavim (2020) - “Design Thinking to Digital Thinking” - Springer International Publishing Michael Lewrick, Patrick Link and Larry Liefer (2018) - “The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems” - Wiley Andrew Pressman (2018) - “Design Thinking: A Guide to Creative Problem Solving for Everyone”-Routledge Walter Brenner and Falk Uebernickel (2016) - “Design thinking for Innovation: Research and Practice” - Springer International Publishing 	<ol style="list-style-type: none"> (2015) - “The Field Guide to Human Centered Design” - IDEO.org - First Edition Roger L Martin (2009) - “The Design of Business: Why Design Thinking is the Next Competitive Advantage” - Harward Business School Press <p>Web References</p> <ol style="list-style-type: none"> What is Design Thinking? Interaction Design Foundation What are some of the good examples of design thinking? - Quora Design thinking 101: Principles, Tools & Examples to transform your creative process <p>Online Resources</p> <ol style="list-style-type: none"> Understanding Design thinking WF NEN Design Thinking and Innovation at Apple Wei Li Stanford Webinar- Design Thinking = Method, Not Magic Stanford Design Thinking Virtual Crash Course 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			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1	Apply basic concepts of Linear programming problems to solve engineering problems	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	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:																		
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
S-3 – S	SLO-1	To solve Linear Programming Practice using work sheet to solve Graphical Method with (i) Unbounded solution (ii) Infeasible solution (iii) Alternative or multiple solutions.	Practice using work sheet to solve transportation problems.	Practice using work sheet to perform Project scheduling of a given project (Deterministic case- PERT).	Practice using work sheet to solve Problems based on selective inventory classification (ABC analysis).	Practice using work sheet to determine the performance measures for M/M/1 queueing model.
	SLO-2					

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

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	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%

	Create								
	Total	100 %	100 %	100 %	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
<i>Expert from TCS</i>	<i>1. Dr.K.C.Sivakumar, IIT, Madras, kcskumar@iitm.ac.in</i>	<i>1. Dr.A.Govindarajan, hod.maths.ktr@srmist.edu.in</i>
		<i>2. Dr.N.Parvathi, parvathn@srmist.edu.in</i>

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:	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 :	Understand the structure, function and services of Operating systems	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 :	Learn about the process and threads				L	H	-	H	L	-	-	-	L	L	-	H	-	-	-	-	-	-
CLR-3 :	Learn the UNIX OS file system and its services				M	H	L	M	L	-	-	-	M	L	-	H	-	-	-	-	-	-
CLR-4 :	Understand the importance and principles of schedulers in operating system				M	H	M	H	L	-	-	-	M	L	-	H	-	-	-	-	-	-
CLR-5 :	Learn the concurrency problem and its solutions				M	H	M	H	L	-	-	-	M	L	-	H	-	-	-	-	-	-
CLR-6 :	Understand the different memory management schemes				H	H	M	H	L	-	-	-	M	L	-	H	-	-	-	-	-	-
CLR-7 :	Learn the Input, Output and file management paradigms used by operating system				L	H	-	H	L	-	-	-	L	L	-	H	-	-	-	-	-	-
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																					
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	Scheduling criteria: CPU utilization, Throughput, Turnaround Time	Semaphores, Strict Alternation	Memory allocation: Contiguous	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	Lab 4: Implementation of FCFS scheduling	Lab 7: Implementation of producer consumer problem	Lab 10: 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	Locality of reference	Directory implementation (linear list, hash table)
	SLO-2	Different states of a Process	Real Time scheduling	Deadlock Prevention, and Deadlock Avoidance	Page allocation	Efficiency and performance

S-8	SLO-1	Process State transitions	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	Context switching	Case study: UNIX OS file system	Concurrent Programming: Critical region	Working Set, Segmentation, Demand paging	SSTF
S-11	SLO-1	Threads: Definition	Shell	conditional critical region	Page Replacement algorithms: Optimal	SCAN
	SLO-2	Various states of threads	Filters	Monitors	First in First Out (FIFO)	C-SCAN
S-12	SLO-1	Benefits of threads	Shell programming	Concurrent languages	Second Chance (SC)	Disk reliability
	SLO-2	Types of threads	Programming with the standard I/O	Communicating sequential process (CSP)	Not recently used (NRU)	Disk formatting
S-13	SLO-1	Concept of multithreads	UNIX system calls	Deadlocks - prevention, avoidance, detection and recovery	Least Recently used (LRU)	Boot-block and Bad blocks
	SLO-2	Lab 3: Implement of thread creation and deletion	Lab 6: Implementation of Unix Commands	Lab 9: Applications of concurrent programming	Lab 12: Implementation of page replacement algorithms – FIFO and LRU	Lab 15 :Implementation of Disk scheduling algorithm – SSTF and SCAN

Learning Resources	3. Operating System Concepts Essentials. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne.	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
	4. Operating Systems: Internals and Design Principles. William Stallings. 5. Operating System: A Design-oriented Approach. Charles Patrick Crowley.	

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. 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:	Learning			Program Learning Outcomes (PLO)														
CLR-1:	Understand the fundamentals of Database Management Systems, Architecture and Languages	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2:	Conceive the database design process through ER Model and Relational Model	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-3:	Design Logical Database Schema and mapping it to implementation level schema through Database Language Features				H	M	L	L	-	-	-	-	L	L	L	H	-	-	-
CLR-4:	Familiarize queries using Structure Query Language (SQL) and PL/SQL				H	H	H	H	H	-	-	-	H	H	H	H	-	-	-
CLR-5:	Familiarize the Improvement of the database design using normalization criteria and optimize queries				H	H	L	M	L	-	-	-	M	M	M	L	-	-	-
CLR-6:	Understand the practical problems of concurrency control and gain knowledge about failures and recovery				H	L	L	L	L	-	-	-	H	L	L	L	-	-	-
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	3	80	70	H	M	L	L	-	-	-	-	L	L	L	H	-	-	-
CLO-1:	Acquire the knowledge on DBMS Architecture and Languages	3	80	70	H	H	H	H	H	-	-	-	H	H	H	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 SLO-2	Introduction : Introduction to data, database, database management system	Relational Algebra : Relational algebra operations	Relational database design : Introduction	Query processing and optimization : Introduction
S-2	SLO-1 SLO-2	Hierarchical and Network models	Tuple relational Calculus	Domain and data dependency	Evaluation of relational algebra expressions
S-3	SLO-1 SLO-2	Database system Architecture : Data abstraction	SQL : DDL and DML Constructs	Armstrong's axioms	Query equivalence
S-4	SLO-1 SLO-2	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
S-6	SLO-1 SLO-2	Data Independence	SQL Queries	Functional Dependencies	Join strategies
S-7	SLO-1 SLO-2	Data Definition Language	SQL, Operators and functions	Normal forms : First Normal form	Query optimization
S-8	SLO-1 SLO-2	Data Manipulation Language	SQL Joins	Second Normal form	Query optimization algorithms
S-9	SLO-1 SLO-2	Lab 2: SQL Data Manipulation Language	Lab 5: Construct a ER Model for the application to be constructed to a	Third normal form and Boyce Code Normal Form	Database Security : Authentication
S-10	SLO-1 SLO-2	Lab 2: SQL Data Manipulation Language	Lab 5: Construct a ER Model for the application to be constructed to a	Other Normal forms	Authorization and access control
S-10	SLO-1 SLO-2	Lab 2: SQL Data Manipulation Language	Lab 5: Construct a ER Model for the application to be constructed to a	Lab 8: Set Operators & Views	Lab 11: PL/SQL Functions
S-10	SLO-1 SLO-2	Lab 2: SQL Data Manipulation Language	Lab 5: Construct a ER Model for the application to be constructed to a	Lab 8: Set Operators & Views	Lab 14: PL/SQL Trigger

		Commands	Database			
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				
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	
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.	4. Serge Abiteboul, Richard Hull, Victor Vianu, Foundations of Databases, Pearson, 1994 5. C.J. Date, A. K. Korth, S. Swamyathan, An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.
	2. Jeffrey D. Ullman, Principles of Database Systems, Third Edition, Galgotia Publications Pvt. Ltd, 2008 3. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Sixth Edition, Pearson Education, 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 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. 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:			Learning			Program Learning Outcomes (PLO)																
CLR-1 :	CLR-2 :	CLR-3 :	CLR-4 :	CLR-5 :	CLR-6 :	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Utilize the software process model and select a suitable modeling method according to problem area and assignment, and can justify their choice	Utilize UML languages and its standards	Utilize use case diagram and relationships	Utilize sequence and collaboration diagrams	Utilize class diagram model	Utilize deployment models and model the software system and analyze its characteristics and correctness	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	CLO-2 : Create different types of software development process models	CLO-3 : Construct use case diagrams for real world applications and analyze the system requirements	CLO-4 : Create sequence and collaboration diagram for finding objects of the process involved	CLO-5 : Create class diagrams and analyze the characteristics and correctness of software system	CLO-6 : Implement the appropriate modeling method for the given problem	1	80	70	H	H	H	H	M	M	M	M	M	H	L	H	H	H	H	H
						2	85	75	H	H	H	H	M	M	M	M	M	H	L	H	H	H	H	H
						2	75	70	H	H	H	H	M	M	M	M	M	H	L	H	H	H	H	H
						2	85	80	H	H	H	H	M	M	M	M	M	H	L	H	H	H	H	H
						2	85	75	H	H	H	H	M	M	M	M	M	H	L	H	H	H	H	H
						3	80	70	H	H	H	H	M	M	M	M	M	H	L	H	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.	Lab 5: Description of the Activity Diagram.	Lab 8: Physical Aspect. Logical Aspect.	Lab 11: Deployment Model - Processors.	Lab 14: Threads.
	SLO-2	Interfaces.				

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 diagrams	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	<p>8. Object-Oriented Software Engineering: using UML, Patterns, and Java. Bernd Bruegge and Allen H. Dutoit.</p> <p>9. Design Patterns: Elements of Reusable Object-Oriented Software. Erich Gamma, Richard Helm, Ralph Johnson, and John M. Vlissides.</p>
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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	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	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):		Learning			Program Learning Outcomes (PLO)															
The purpose of learning this course is to:		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
CLR-1 :	identify problems	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 :	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:																			
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
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Learning Resources	1. <i>Dinesh Khattar-The Pearson Guide to Quantitative Aptitude for competitive examinations</i>	5. <i>Ellet William, The Case Study Handbook: How to read, discuss, and write persuasively about cases</i>	
	2. <i>Hari Mohan Prasad, Verbal Ability for Competitive Examinations, Tata McGraw Hill Publications</i>		6. <i>Manhattan GMAT – Critical Reasoning, GMAT Strategy Guide, 12th Edition</i>
	3. <i>Edgar Thrope, Test of Reasoning for Competitive Examinations, Tata McGraw Hill, 4th Edition, 2012</i>		7. <i>Wiley’s GMAT Reading Comprehension Grail, Wiley, 2016</i>
	4. <i>Norman Lewis, Word Power Made Easy, W.R. Goyal Publications, 2011</i>		8. <i>Manhattan Prep GRE : Reading Comprehension and Essays, 5th Edition</i>

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	-	40%	-	30%	-	30%	-	30%	-	-
Level 2	Apply	-	40%	-	40%	-	40%	-	40%	-	-
	Analyze	-	40%	-	40%	-	40%	-	40%	-	-
Level 3	Evaluate	-	20%	-	30%	-	30%	-	30%	-	-
	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. 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):		Learning			Program Learning Outcomes (PLO)														
The purpose of learning this course is to:		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1:	Acquire knowledge on various causes, effects and control measures of environmental air and water pollution	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:	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:																	
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 Process of 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, Opendingumping 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	<ol style="list-style-type: none"> Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses, 2nd ed., UGC Kamaraj. P, Arthanareeswari. M, Environmental Science–Challenges and Changes, 6th ed., Sudhandhira Publications, 2013 	<ol style="list-style-type: none"> R.Jeyalakshmi, Principles of Environmental Science, 2nd ed., Devi publications, 2008 Helen P Kavitha, Principles of Environmental Science, 1st ed., Shine Publications and Distributors, 2013
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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. 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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