CURRICULUM AND SYLLABUS

FOR

B.TECH. DEGREE (INFORMATION TECHNOLOGY) PROGRAMME

REGULATIONS 2020

CHOICE BASED CREDIT SYSTEM

1

WISDOM

FOR THE STUDENTS ADMITTED FROM THE

ACADEMIC YEAR 2020-2021 ONWARDS



COIMBATORE - 10

Sri Ramakrishna Institute of Technology

(An Autonomous Institution) Pachapalayam, Perur Chettipalayam, Coimbatore – 641 010 <u>www.srit.org</u> :: Phone – 0422-2605577

SRI RAMAKRISHNA INSTITUTE OF TECHNOLOGY, COIMBATORE – 641010

DEPARTMENT OF INFORMATION TECHNOLOGY

I) VISION

Our Vision is to develop the department as a centre of excellence in Information Technology comparable with best institutions in India by upgrading Hardware, Software and improving the quality of faculty

II) MISSION

Our Mission is to develop Quality IT professionals equipped with domain knowledge, analytical skills with creativity and high moral values for the advancement of technological excellence.

III) PROGRAMME EDUCATIONAL OBJECTIVES (PEO) FOR B.TECH,INFORMATION TECHNOLOGY PROGRAMME

- **PEO1.** Graduates who effectively demonstrate engineering knowledge and entrepreneurial skills by providing practical solutions in information technology.
- **PEO2.** Graduates who effectively demonstrate professionalism in multi-disciplinary engineering environment, leadership quality and teamwork.
- **PEO3.** Graduates who make contributions to knowledge and establish best engineering practice through research and development.
- **PEO4.** Graduates who demonstrate an ethical commitment to the community and the profession through involvement with professional organizations and society.
- **PEO5.** Graduates who engage in life-long learning as demonstrated through career advancement.

CONSISTENCY OF PEO WITH MISSION OF THE DEPARTMENT

PEOs	ELEMENTS OF MI	SSION STATEMENT OF	THE PROGRAMME
	domain knowledge,	creativity and high	advancement of
	analytical skills	moral values	technological excellence
PEO1	3	1	2
PEO2	-	2	3
PEO3	3	2	1
PEO4		3	2
PEO5	· 1N.	STITIT	3

IV) PROGRAM SPECIFIC OUTCOMES (PSO) FOR B.TECH.INFORMATION TECHNOLOGY PROGRAMME

- 1. An ability to use and apply current technical concepts and practices in the core information technologies of human computer interaction, information management, programming, networking, and web systems and technologies.
- 2. An ability to identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems.
- 3. An ability to effectively integrate IT-based solutions into the user environment.
- 4. An ability to assist in the creation of an effective project plan by applying the best practices and standards.

V) PROGRAM OUTCOMES (POS) SCIPLINE

PROSPER **CONSISTENCY OF PEOS WITH POS OF THE PROGRAMME**

	PO1	PO2	PO3	P04	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	1	1	7	~					\leq		1	
PEO2		\mathcal{V}							~	7	7	
PEO3			✓		~		\checkmark					
PEO4						\checkmark		\checkmark				
PEO5												\checkmark

CURRICULUM GUIDELINES (CASB, ACM & IEEE)



CREDIT DISTRIBUTION

S.	Cours <mark>e Work</mark> - Subject Area	Credits/Semester								Credits Total
110.	- \ 0 ⁻	Ι	П	ш	IV	V	VI	VII	VШ	Total
1	HumanitiesandSocialSciencesincludingManagementCourses(HSMC)	SC3IP	6		PF	205	PE	YR		9
2	Basic Sciences Courses (BS)	9.5	9.5	4			χ		ζ	23
3	Engineering Science Courses (ES)	10A	TÖR	- 3 -	10		\mathbb{N}	УV		20
4	Professional Core Courses (PC)			12	18	15	15	3	Λ	63
5	Professional Elective Courses (PE)					3	3	9	3	18
6	Open Electives (OE)			3	3	3		3		12
7	Employability Enhancement Courses (EC)						4	3	8	15
	Total	22.5	22.5	22	21	21	22	18	11	160

CURRICULUM ST RUCTURE

S.	COURSE	COURSE NAME	CATEGORY	PERIODS		DS	TOTAL	CREDITS
NO.	CODE			1	PER Vee	V	CONTACT	
				I.	лее Т	л Р	FERIODS	
THE	ORY			P		-		
1	20HSG01	Technical English	HS	2	0	2	4	3
2	20MHG01	Calculus and	BS	3	1	0	4	4
		Linear Algebra				\mathbf{Y}		
3	20CHG01	Engineering	BS	3	1	0	4	4
		Chemistry						
4	20ITG01	Programming for	ES	3	0	0	3	3
	マ	Problem Solving	F					1
		using C						
5	20EEG01	Basic Electrical	ES	3	0	0	3	3
		and Electronics						
		Engineering						
PRA	CTICALS				_	~		
6	20MEG01	Engineering	ES	0	0	4	5 4	2
		Graphics		/				
7	20CHG02	Engineering						
		Chemistry	BS	0	0	3	3	1.5
		Laboratory	CIPLINE	1	D			
8	20ITG02	Programming in	ES	0	0	4	ERI4	2
		C Laboratory					YII'	
			Total	14	2	13	29	22.5

SEMESTER – I

COIMBATORE - 10

SEMESTER – II

S.	COURSE	COURSE NAME	CATEGORY	PERIODS		DS	TOTAL	CREDITS		
NO.	CODE]	PER	2	CONTACT			
				W	VEE	K	PERIODS			
				L	Т	Р				
THE	THEORY									
1	20HSG02	Universal Human								
-	20115 002	Values – II	S HS	17						
		Understanding	110	3	0	0	3	3		
		Harmony				О,				
			3							
2	20MHG02	Differential	BS	3	1	0	4	4		
		Equations and								
		Complex								
		Variables					5			
3	2 <mark>0</mark> PHG01	Engineering	BS	3	1	0	4	4		
		Physics	1.00							
4	2 <mark>0CSG0</mark> 1	Object Oriented	ES	3	0	0	3	3		
		Programming								
		with C++								
5	20HMG01	Information	HM	3	0	0	3	3		
		Technology					512			
		Essentials and								
	204 0001	Ethics		_	0	0				
6	20AC001	Environmental	AC	3	0	0	3	0		
		Science and	CIPLINE							
	OTICALC	Engineering		_ <u> </u> -	R	7.81				
PKA	CTICALS	SUUM		_		10r	LRIT			
7	20MEG02	Engineering	ES	0	0	4	4	2		
	200011000	Workshop	DC	0	0			1.5		
8	20PHG02	Engineering	BABORE	-01	0	3	3	1.5		
		Physics								
0	2005000		EC	0	0	4				
9	2005602	Programming in	ES	U	U	4	4	2		
		C++ Laboratory	T-4-1	10	2	11	21			
Total 18 2							31	22.5		

SEMESTER – III

S.	COURSE	COURSE NAME	CATEGORY	PERIODS			TOTAL	CREDITS
NO.	CODE]	PER		CONTACT	
				W	/EE	K	PERIODS	
				L	Τ	Р		
THE	ORY							
1	20MHG06	Probability and	BS	3	1	0	4	4
		Statistics	SIIIU	7				
2	20IT001	Data Structures	PCC	3	0	0	3	3
3	20IT002	Java	PCC	3	0	0	3	3
		Programming					λ	
4	20CS001	Computer	PCC	3	0	0	3	3
		Organization and						
		Architecture			-	0		
5	20ECG02	Digital Principles	ES	3	0	0	3	3
		and System						
	ONVENY	Design	OF	2	0	0	2	2
0	ZUXXEXX	Open Elective - I	UE	3	0	0	3	3
PRA	CTICALS			1	1			
7	20IT003	Data Structures	PCC	0	0	3	3	1.5
		Laboratory	500	-	-	-	6	
8	2017004	Java	PCC	0	0	3	3	1.5
		Programming	F					
		Laboratory	TAL	10	1		25	22
		210	Total	18		0	25	22
		OM O DIS						
		SDUM					ERIT	
	14					-	NIY/	
	\sim	$ \rightarrow $						
		🔨 соім		- 1(\succ	

SEMESTER – IV

S.	COURSE	COURSE NAME	CATEGORY	PERIODS			TOTAL	CREDITS
NO.	CODE]	PER		CONTACT	
				W	/EE	K	PERIODS	
				L	Т	Р		
THE	ORY		OTITU					
1	20IT005	Discrete	PCC	3	0	0	3	3
		Structures		14				
2	20IT006	Computer	PCC	3	0	0	3	3
		Networks					λ	
3	20CS004	Software Software	PCC	3	0	0	3	3
		Engineering						
4	20IT007	Database	PCC	3	0	0	3	3
		Management						1
		Systems					2	
5	20IT008	Operating	PCC	3	0	0	3	3
		Systems						
6	20XXEXX	Open Elective - II	OE	3	0	0	3	3
PRA	CTICALS	L L				~		
7	2 <mark>0</mark> IT009	Database	PCC	0	0	3	3 9	1.5
	_ \ ´₽	Management		Ĩ.,				
		Systems	E					
		Laboratory						
8	20IT010	Operating	PCC	0	0	3	3	1.5
		Systems	CIPLINE		Dr		\sim	
		Laboratory			nι	IS4	ED	
	Ilar 2	200	Total	18	0	6	24	21

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SEMESTER – V

S.	COURSE	COURSE NAME	CATEGORY	PERIODS			TOTAL	CREDITS
NO.	CODE]	PER	2	CONTACT	
				W	/EE	K	PERIODS	
				L	Т	Р		
THE	ORY		OTITU					
1	20IT011	Compiler Design	PCC	3	0	0	3	3
2	20IT012	Design and	PCC	3	0	0	3	3
		Analysis of						
		Algorithms					$\boldsymbol{\lambda}$	
3	20CS007	Object Oriented	PCC	3	0	0	3	3
		Analysis and						
		Design						
4	20IT013	Web Technology	PCC	3	0	0	3	3
5	2 <mark>0ITPXX</mark>	Professional	PE	3	0	0	3	3
		Elective - I						
6	20XXEXX	Open Elective -	OE	3	0	0	3	3
		III				-		
PRA	CTICALS	5				_		
7	20CS011	CASE Tools	PCC	0	0	3	3 9	1.5
	<u> </u>	Laboratory						
8	20IT014	Web Technology	PCC	0	0	3	3	1.5
		Laboratory						
			Total	18	0	6	24	21
		ON O DIS						
		SDUM					ERIT	
	14					-	NI Y	
		$ \rightarrow $						
		COIM		- 1(\searrow	

SEMESTER – VI

S.	COURSE	COURSE NAME	CATEGORY	PERIODS			TOTAL	CREDITS	
NO.	CODE			PER		2	CONTACT		
				V	VEE	K	PERIODS		
				L	Т	Р			
THE	ORY								
1	20IT015	Machine Learning	PCC	3	0	0	3	3	
2	20IT016	Internet of Things	PCC	3	0	0	3	3	
3	20IT017	Data Analytics	PCC	3	0	0	3	3	
4	20IT018	Cloud Computing	PCC	3	0	0	3	3	
5	20ITPXX	Professional	PE	3	0	0	3	3	
		Elective - II							
6	20AC002	Constitution of	AC	3	0	0	3	0	
	ব	India	- ne	5	Ŭ	Ū	5	Ū	
PRA	CTICALS					1	Z		
7	20IT019	Data Analytics		-					
		and Cloud	PCC	0	0	3	3	1.5	
		Laboratory							
8	2017020	Internet of Things							
0	2011020	Laboratory	PCC	0	0	3	3 - 2	1.5	
		Laboratory			-				
9	2017901	Design Project	EC	_0	0	8	8	4	
			Total	18	0	14	32	22	
	DISCIPLINE DO								
COOM DIGGENERATING PRUSPED									
	NU Z	1200					-MITY/		
							- X		
		CON		. 1			$\langle \rangle$		

SEMESTER – VII

S. NO	COURSE	COURSE NAME	CATEGORY	PE	PERIODS PER		TOTAL CONTACT	CREDITS		
10.	CODE			W	WEEK		PERIODS			
				L	Т	Р				
THE	THEORY									
1	20IT021	Cryptography and	PCC	3	0	0	3	3		
		Network Security	$S \prod U$	T						
2	20ITPXX	Professional	PE	3	0	0	3	3		
		Elective - III				>				
3	20ITPXX	Professional	PE	3	0	0	3	3		
		Elective - IV					$\langle \wedge \rangle$			
4	20ITPXX	Professional	PE	3	0	0	3	3		
		Elective - V								
5	20XXEXX	Open Elective -	OE	3	0	0	3	3		
		IV								
PRA	PRACTICALS									
6	20IT902	Project Phase - I	EC	0	0	6	6	3		
			Total	15	0	6	21	18		

SEMESTER – VIII

S.	COURSE	COURSE NAME	CATEGORY	PE	RIO	DS	TOTAL	CREDITS	
NO.	CODE		CIPLINE		PER	2	CONTACT		
		DIN DIN	JOIL CHILL	V	VEE	K	PERIODS		
		ISDOM		L	Т	Р	ERITV7		
THE	ORY 🔪						X		
1	20ITPXX	Professional Elective - VI	(BAPE)RE	-31	0	0	3	3	
PRA	PRACTICALS								
2	20IT903	Final Year Project	EC	0	0	16	16	8	
			Total	3	0	16	19	11	

TOTAL NUMBER OF CREDITS: 160

PROFESSIONAL ELECTIVES

ELECTIVE – I [PROGRAMMING]

S.	COURSE	COURSE NAME	CATEGORY	PE	PERIODS		TOTAL	CREDITS
NO.	CODE				PER	2	CONTACT	
				V	WEEK		PERIODS	
				L	Т	P		
1	20ITP11	Python	PE	3	0	0	3	3
		Programming	5110	17	0			
2	20ITP12	Advanced Java	PE	3	0	0	3	3
		Programming	July .				\sim \sim	
3	20ITP13	Unix Internals	PE	3	0	0	3	3
4	20ITP14	C# and .Net	PE	3	0	0	3	3
		Framework	E TET				9	
5	20ITP15	Programming with	PE	3	0	0	3	3
		Open source					Z	
	5	Software						
6	2 <mark>0ITP16</mark>	Translators and	PE	3	0	0	3	3
		System Software						

ELECTIVE – II [NETWORKING]

S.	COURSE	COURSE NAME	CATEGORY	PE	RIO	DS	TOTAL	CREDITS
NO.	CODE				PER		CONTACT	
		nis	CIPLINE	V	VEE	K	PERIODS	
		MOM		L	Τ	Р	DEF	
1	20ITP21	Distributed	PE	3	0	0	CH 3	3
		Systems					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
2	20ITP22	Mobile	PE	3	0	0	3	3
		Computing	IDAIURE	-	0			
3	20ITP23	Communication	PE	3	0	0	3	3
	9	Switching					12	
		Techniques					2	
4	20ITP24	Ad-hoc and	PE	3	0	0	3	3
		Sensor Networks						
5	20ITP25	Software Defined	PE	3	0	0	3	3
		Networks						
6	20ITP26	Quantum	PE	3	0	0	3	3
		Computing						

S.	COURSE	COURSE NAME	CATEGORY	PE	RIO	DS	TOTAL	CREDITS
NO.	CODE				PER CONTACT			
				V	VEE	K	PERIODS	
				L	Т	Р		
1	20ITP31	Digital Image	PE	3	0	0	3	3
		Processing						
2	20ITP32	Pattern	PE	3	0	0	3	3
		Recognition	121110	17	0			
3	20ITP33	User Experience	PE	3	0	0	3	3
		Design	and the			\sim	\mathcal{O}	
4	20ITP34	Computer	PE	3	0	0	3	3
		Graphics and						
		Multimedia 📃 📃	E TRA				C I	
5	20 <mark>1</mark> TP35	Game	PE	3	0	0	3	3
		Programming					Z	
6	20ITP36	Introduction to	PE	3	0	0	3	3
		Augmented						
		Reality						

ELECTIVE – III [HUMAN COMPUTER INTERACTION]

ELECTIVE – IV [DATABASES]

S.	COURSE	COURSE NAME	CATEGORY	PE	RIO	DS	TOTAL	CREDITS
NO.	CODE				PER		CONTACT	
		DIS	CIPLINE	V	VEE	K	PERIODS	
		MAN		L	Т	Р	DEF	
1	20ITP41	Advanced	PE	3	0	0	CH 3	3
		Database						
	\sim	Technology	DATODE		0			
2	20ITP42	Data Mining and	PE	3	0	0	3	3
		Data Warehousing					$\langle \rangle$	
3	20ITP43	Predictive	PE	3	0	0	3	3
		Analytics					7	
4	20ITP44	Deep Learning	PE	3	0	0	3	3
5	20ITP45	Parallel	PE	3	0	0	3	3
		Computing						
6	20ITP46	Business	PE	3	0	0	3	3
		Intelligence						

ELECTIVE - V [WEB SYSTEMS]

S.	COURSE	COURSE NAME	CATEGORY	PE	RIO	DS	TOTAL	CREDITS
NO.	CODE				PER		CONTACT	
				V	VEE	K	PERIODS	
				L	Т	P		
1	20ITP51	Web Engineering	PE	3	0	0	3	3
2	20ITP52	Advanced Web	PE	3	0	0	3	3
		Programming	CTIT					
3	20ITP53	PHP and MySQL	D PE	3	0	0	3	3
4	20ITP54	Mobile	PE	3	0	0	3	3
		Application					\sim \sim	
		Development					\sim	
5	20ITP55	Service Oriented	PE	3	0	0	3	3
		Architecture						
6	20ITP56	Blockchains	PE	3	0	0	3	3
							2	

ELECTIVE – VI [INFORMATION ASSURANCE AND SECURITY]

S.	COURSE	COURSE NAME	CATEGORY	PE	RIO	DS	TOTAL	CREDITS
NO.	CODE				PER	PER CONTACT		1
				V	VEE	K	PERIODS	/
	_ \ U			L	Т	Р		
1	20ITP61	Management	PE	3	0	0	3	3
		Information						
		Systems	CIPLINE /		-			
2	20ITP62	Software Testing	PE	3	0	0	3	3
3	20ITP63	Software Quality	PE	3	0	0	57/3	3
		Assurance						
	\sim				~			
4	20ITP64	Principles of	BAPERE	-3	0	0	3	3
		Cyber Security						
5	20ITP65	IT Security and	PE	3	0	0	3	3
		Risk Management					7	
6	20ITP66	Secure Software	PE	3	0	0	3	3
		Development						

OPEN ELECTIVES

S.	COURSE	COURSE NAME	CATEGORY	PE	RIO	DS	TOTAL	CREDITS
NO.	CODE				PER	2	CONTACT	
				V	VEE	K	PERIODS	
				L	Т	Р		
OF	FERED BY E	LECTRICAL AND	ELECTRONIC	CS E	NG	INE	ERING PROC	GRAMME
1	20EEE01	Energy	OE	3	0	0	3	3
		Management	511103	Tr.				
	/	Systems		5	1	5.		
2	20EEE02	Medical	OE	3	0	0	3	3
		Instrumentation					\sim \sim	
3	20EEE03	PLC	OE	3	0	0	3	3
		Programming						
4	20EEE04	Renewable	OE	3	0	0	3	3
		Energy Systems				/	Z	
5	20EEE05	Virtual	OE	3	0	0	3	3
		Instrumentation					\sim	
		and Data			_			
		Acquisition						
6	20EEE06	Electric Vehicles	OE	3	0	0	3	3
	() () () () () () () () () ()						\sim /	
	OFFERED	BY ELECTRONICS	S AND COMM	UN	CA'	TIO	N ENGINEER	RING
			PROGRAMME	Dr				
1	20ECE01	Principles of	OE	3	0	0	3	3
	S WI	VLSI Systems				14	MITY/	
2	20ECE02	Introduction to	OE	3	0	0	3	3
		Embedded	ATORE					
		Systems	ATONE -	10			\sim	
3	20ECE03	Microcontrollers	OE	3	0	0	3	3
	9	and its					17	
		Applications					7	
4	20ECE04	Electronic	OE	3	0	0	3	3
		Measurements						
5	20ECE05	Nano Electronics	OE	3	0	0	3	3
		and Sensors						
			1					

	OFFERED BY MECHNAICAL ENGINEERING PROGRAMME							
1	20MEE01	Automotive	OE	3	0	0	3	3
		Fundamentals						
2	20MEE02	Computer Aided	OE	3	0	0	3	3
		Design						
3	20MEE03	Power Plant	OE	3	0	0	3	3
		Engineering						
4	20MEE04	Industrial	OE	3	0	0	3	3
		Engineering	STITUS					
5	20MEE05	Rapid Prototyping	OE	3	0	0	3	3





FIRST SEMESTER SYLLABUS

COIMBATORE - 10

WISDOM

PROSPERIT

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L	Т	Р	С
2	0	2	3

COURSE OBJECTIVE:

The primary objective of this course is enhancement of listening, speaking, reading, writing skills of students. It further enables them to develop corporate test-taking strategies as well as employability skills through various grammar exercises for academic and workplace context.

COURSE CONTENT:

Importance of Communication

Listening: Importance of listening in the corporate world. Exposure to structured talks

Speaking: Self-introduction, Peer introduction, Extempore

Reading: Skimming and Scanning, Note-Making

Writing: Parts of Speech, Tense, Subject-Verb Agreement, Prepositions, Instructions

Formal Letters (Quotations, Clarification, Placing orders & Complaint letter

Formal Communication

Listening: Listening to motivational talks / TED talks, Note-taking practice.

Speaking: Describing a product/place, Conversation practice, Telephonic Conversation. DISCIPLINE

Reading: Reading Comprehension, Reading for specific information.

Writing: Voices, Compound Nouns, Paragraph Writing, Recommendations, Email

writing, Analytical and issue based essays. E - 10

Writing Strategies

Listening: Listening to Announcements, Listening to Product description and Process Speaking: Role-Play, Picture description.

Reading: Cloze reading, Introduction to Blogs, Social media etiquette.

Writing: Cause and Effect, Gerunds and Infinitives, Tag Questions, Modal Verbs, Checklist.

Presentation Skills

Listening: Listening to Group Discussion and Interview Skills.

Speaking: Presentation on the technical topic, Sales talk.

Reading: Interpreting pictures of visual graphics.

Writing: If Conditional Clause, Use of sequence words, Process Description.

Technical Communication

Listening: Listening to talks of scientific nature, Listening for specific information.

Speaking: Giving impromptu talks, Giving a summary of an article.

Reading: Journals, Articles both general and technical.

Writing: Purpose and Function, extended definitions Wh- questions, Resume Writing, Report (Industrial visit reports, Accident report, Feasibility Reports) Proposals.

LIST OF LABORATORY EXERCISES

- 1. Speaking Self and Peer Introduction
- 2. Speaking General Conversation on Business Context
- 3. Listening to short recordings
- 4. Listening to conversation
- 5. Technical Presentation (PPT)

COURSE OUTCOMES:

- CO1: Ability to make use of listening skills in business and workplace environment
- CO2: Ability to relate in oral communication confidently
- CO3: Ability to infer reading skills in different genres of texts and graphics through extensive reading.
- CO4: Ability to utilize appropriate writing strategies in technical and business context.

REFERENCES:

- Ian wood, Anne Williams with Anna Cowper, "Pass Cambridge BEC Preliminary", 2nd Edition, Cengage Learning, 2015.
- 2. Whitby, Norman, "Business Benchmark Pre-intermediate to Intermediate Business preliminary", 1st Edition Cambridge University Press, 2014.
- Rizvi M.Ashraf, "Effective Technical Communication", Tata McGraw-Hill Publishing Company Limited, 4th Edition, 2010.

- Gerson Sharon J, Steven M.Gerson, "Technical Writing-Process and Product", Pearson Education Pvt. Ltd. 3rd Edition, 2009.
- Sanborn Pfeiffer, Padmaja, "Technical Communication, A Practical Approach" Pearson Publication, 6th Edition, 2007.



L	Т	Р	С
3	1	0	4

COURSE OBJECTIVE:

This course provides an understanding on various concepts of matrices, differential calculus, integral calculus and apply them in various Engineering fields.

COURSE CONTENT:

Matrices

Introduction – Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of eigenvalues and eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Stretching of an Elastic Membrane – Vibrating System of two masses on two springs.

Differential Calculus

Limit of function – One sided limit – Limit Laws – Continuity – left and right continuity – types of discontinuities – Intermediate Value Theorem – Derivatives of a function - Differentiation rules – Chain rule – Implicit differentiation – logarithmic differentiation – Maxima and minima – Mean value theorem

Functions of Several Variables

Partial derivatives – Total derivative – Differentiation of implicit functions – Change of variables – Jacobian – Partial differentiation of implicit functions – Taylor's series for functions of two variables Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

Integral Calculus

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

Multiple Integrals

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

COURSE OUTCOMES:

- **CO1**: Ability to solve practical problems that can be expressed as matrix algebra
- **CO2**: Ability to classify the theorems in differential calculus
- CO3: Ability to apply differential calculus on several variable functions
- **CO4**: Ability to apply integral calculus including multiple integrals to solve problems on area and volume

REFERENCES:

- Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India, 2016.
- Grewal. B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2017
- James Stewart, "Calculus, Early Transcendental", 7th Edition, Cengage learning, New Delhi, 2018.
- Joel Hass, Christopher Heil and Maurice D.Weir, Thomas "Calculus", Pearson, 14th Edition, New Delhi, 2018.
- Srimanta Paul and Subodh C. Bhunia, "Engineering Mathematics", Oxford University Press, 1st Edition, 2015.

20CHG01

L	Т	Р	С
3	1	0	4

COURSE OBJECTIVE:

The objective of the course is to provide knowledge on Electrochemistry, Battery Technology, Photochemistry, Spectroscopy, Water chemistry and Nanochemistry in the practice of engineering.

COURSE CONTENT:

Electrochemistry

Electrochemical cells – Nernst Equation (Problems), Electrode potential – Representation of a cell -Galvanic cell-Construction and working - Electrodes – Standard Hydrogen Electrode (SHE), Saturated Calomel Electrode (SCE) and Glass Electrode –Electrochemical Series and its applications - Conductometric titrations (Acid -Base Titration).

Batteries

Batteries – Characteristics – Current, Power, Capacity, Classification of batteries –
Primary (Dry and Alkaline battery) – Secondary batteries (Lead acid and Nickel –
Cadmium) and Flow batteries (Hydrogen – Oxygen and Methanol – Oxygen fuel cells)
– Modern batteries – Lithium Ion batteries – Applications.

Photochemistry and Spectroscopy

Photochemistry: Laws of photochemistry - Grotthuss-Draper law, Stark-Einstein law and Lambert-Beer Law. Photo physical processes – Jablonski diagram. Chemiluminescence, photo-sensitization and photoquenching– mechanism and examples. Spectroscopy: Electromagnetic spectrum - absorption of radiation electronic, vibrational and rotational transitions. Atomic absorption spectroscopy, UV-Vis and IR spectroscopy- principles, instrumentation (Block diagram) and applications.

Water Treatment

Importance of water – Water sources – Impurities – Carbonate and Non Carbonate Hardness (simple problems) – Potable water and its specifications, Steps involved in treatment of potable water – Disinfection methods – Internal Conditioning (Phosphate, Calgon, Carbonate and Colloidal conditioning method) - External Conditioning – Demineralisation process -Zeolite process– Desalination (Reverse Osmosis).

Nanochemistry

Basics-distinction between molecules, nanomaterials and bulk materials; sizedependent properties. Types –nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Characterization -Scanning Electron Microscope and Transmission Electron Microscope - Principle and instrumentation (block diagram). Properties (optical, electrical, mechanical and magnetic) and Applications of nanomaterials - medicine, agriculture, electronics and catalysis.

COURSE OUTCOMES:

CO1: Ability to discuss the concepts of electrochemistry

- CO2: Ability to compare the materials best suited for construction of battery
- CO3: Ability to understand the concepts of photo chemistry and spectroscopy techniques
- **CO4:** Ability to understand the basic properties of water and its quality improvement for domestic and industrial purposes
- **CO5**: Ability to apply basic concepts of Nanoscience and Nanotechnology as a key component for applications involving batteries, fuel cells and water treatment

REFERENCES:

- 1. Jain P. C. & Monica Jain., "Engineering Chemistry", 16th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2015.
- 2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 6th Edition, 2012.

- 3. Dara S. S, "A text book of Engineering Chemistry", Chand Publications, 2nd Edition, 2014.
- Vairam.S, Kalyani.P, Suba Ramesh, "Engineering Chemistry", John Wiley & Sons, 1st Edition, 2016.
- 5. Palanna O G, "Engineering Chemistry", Tata McGraw Hill Education, 1st Edition, 2009.
- Shikha Agarwal, "Engineering Chemistry Fundamentals and applications", Cambridge university press, 2nd Edition, 2019.



L	Т	Р	С
3	0	0	3

COURSE OBJECTIVE:

This course provides an introduction to computer hardware. The course further deals with problem solving techniques and their implementations through syntax and semantics of C language.

COURSE CONTENT:

Fundamentals of Computing

Basic concepts of computer organizations, Generation and classification of computers, Number System Representation, Fundamentals of algorithms, Pseudo code, Flow charts.

C Language Fundamentals

Introduction to C programming, Structure of a C program, Compilation and Linking Processes, Character Set, Identifiers, Keywords, Data Types, Constant and Variables, Statements, Expressions, Operators, Precedence of operators, Input-Output Operations, Control Structures, Decision Making, Branching & Looping. Application: Solving Simple Scientific and Mathematical Problems.

Arrays and Strings

Introduction to Arrays, One Dimensional Array, Multidimensional Array. Application: Matrix Operations, Sorting, Searching, Sum of Series and Statistical Problems. String Manipulation, String Arrays. Application: Solving problems using String Functions.

Functions and Pointers COIMBATORE - 10

User Defined and Standard Functions, Formal and Actual arguments, Function Prototypes, Parameter Passing, Call-by-Value, Call-by-Reference, Recursion. Application: Math Functions, Computation of Sine Series, Random Number Generation, Tower of Hanoi and Factorial using Recursive Functions. Pointers, Pointer Variables, Pointer Arithmetic, Passing Parameters by Reference, Pointer to Pointer, Pointers to Functions, Dynamic Memory Allocation. Application: Card shuffling and Dealing Simulation using Pointers.

Structures, Unions and File Handling

Declaration of Structures, Nested Structure, Pointer to Structure, Declaration of Unions, Pointer to Union, Application: Student Records. Storage Classes, Pre-Processor Directives. Files -Types of File Processing: Sequential Access, Random Access. Application: Transaction Processing Program.

COURSE OUTCOMES:

CO1: Ability to apply the concepts of algorithm, pseudo code and flow chart to solve problems

CO2: Ability to build control structures to solve problems

- CO3: Ability to choose data structures for managing user data
- CO4: Ability to apply memory and I/O management constructs of C

REFERENCES:

- 1. Behrouz A. Forouzan, Richard F. Gilberg, "Computer Science: A Structured Programming Approach Using C", 3rd Edition, Course Technology Inc, 2005.
- Byron Gottfried S. "Programming in C", 3rd Edition, (Indian Edition), Tata McGraw Hill, 2010.
- 3. Balagurusamy E. "Programming in ANSI C", 1st Edition, Tata McGraw Hill Education, 2014.
- Paul Deitel, Harvey Deitel "C How to Program", 7th Edition, Pearson Education Asia, 2012.
- Brian Kernighan, Dennis Ritchie "The 'C' programming language", 2nd Edition Prentice Hall Software Series.
- Greg Perry, Dean Miller, "C Programming Absolute Beginner's Guide", 3rd Edition, Pearson Education, 2014.

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L	Т	Р	С
3	0	0	3

COURSE OBJECTIVE:

The course aims to provide the basic principles of electric circuits, electron devices, electrical writing and AC/DC machines for applications in real time engineering problems.

COURSE CONTENT:

Electric circuits and Domestic Wiring

Ohm's Law and Kirchhoff's laws - series and parallel circuits, equivalent resistance- Mesh and Nodal Analysis (Analysis with only independent source and DC circuits)- Superposition theorem, Thevenin's theorem, Norton's theorem. Types of wiring- Domestic wiring - Specification of Wires – Importance of Earthing.

AC Circuits

Concepts of AC circuits –RMS value, average value, form and peak factors. Power relations in single phase and three phase circuits- real and reactive power – power factor, Star connection – Delta connection –Balanced Loads.

Electrical Machines

Construction, Principle of operation and characteristics of DC separately excited generator and DC Shunt and Series motor, EMF equation of DC separately excited generator and Torque equation of DC Shunt and Series motor- applications. Construction and Principle of operation of transformer, EMF Equation- applications. Construction and Principle of operation of synchronous Motor. Construction and Principle of operation of single phase Induction motor - applications.

Semiconductor Devices and Applications

Introduction to semiconductors- PN junction diode - forward and reverse bias characteristics -Zener diode and its characteristics. Operation of Half wave and Full wave rectifiers -Capacitive filters- Zener diode Voltage regulators

Current Controlled Devices

Operation of PNP and NPN transistors - Early effect – Input and Output Characteristics of CB, CE, CC Configurations, Working principle and characteristics of SCR, UJT.

COURSE OUTCOMES:

- **CO1**: Ability to understand the basic concepts of electric circuits, electronic devices & circuits and electric machines
- CO2: Ability to understand the concepts related with electrical domestic wiring

CO3: Ability to apply the concepts of electrical machines for industrial applications

CO4: Ability to analyze the characteristics of electronic devices and circuits

REFERENCES

- 1. A Fitzgerald, Charles Kingsley, Stephen Umans, "Electric Machinery", 7th Edition, McGraw-Hill, 2013.
- 2. Robert Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", Prentice Hall, 11th Edition 2015.
- 3. V K Mehta, Rohit Mehta, "Principles of Electronics", S Chand Publishing company, 11th Edition, 2016.
- 4. Mahmood Nahvi, Joseph A Edminister, "Electric Circuits", McGraw-Hill Education, 5th Edition, 2010.
- Bhattacharya.S.K, "Basic Electrical and Electronics Engineering", Pearson Education,1st Edition,2011.

COIMBATORE - 10

L	Т	Р	С
0	0	4	2

COURSE OBJECTIVE:

The objectives of this course are to impart knowledge to interpret engineering drawings and to enable the students to communicate the concepts, ideas, and basic designs through graphical representations as per related engineering conventions and standards.

COURSE CONTENT:

Curve Constructions and Orthographic Projection

Lettering – Types of lines – Dimensioning – Conics- Construction of ellipse, parabola and hyperbola by eccentricity method-Construction of cycloid- Construction of involutes of square and circle- Drawing of tangents and normal to these curves. Principles of Orthographic projection – Layout of views Orthographic projection of simple Engineering components using first angle Projection. Drawing of multiple views from pictorial views of objects

Projection of Points, Lines and Plane Surfaces

Projection of points – Projection of straight lines (only First angle projections) inclined to both the principal planes – Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces – Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method

Projection of Solids

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

Projection of Sectioned Solids and Development of Surfaces

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinder and cone. Development of lateral surfaces of solids with cut-outs and holes.

Isometric and Perspective Projections

Principles of isometric projection – isometric scale – isometric projections of simple solids and truncated solids – Prisms, pyramids, cylinders, cones – Perspective projection of simple solids prisms, pyramids and cylinder by visual ray method and vanishing point method.

COURSE OUTCOMES:

- **CO1:** Ability to interpret and construct geometric entities, orthographic projection of engineering components
- **CO2:** Ability to construct orthographic views of points and straight lines
- CO3: Ability to apply orthographic principles to construct views of planes and solids
- **CO4:** Ability to build orthographic projection of section of solids and develop the lateral surfaces of solids
- CO5: Ability to develop isometric and perspective projections of solids

REFERENCES

- Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.
- 2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 2017.
- 3. Jolhe, D. A., Engineering drawing, Tata McGraw Hill, 2017.
- 4. Shah, M. B. and Rana, B. C., Engineering Drawing, Pearson Education, 2009
- 5. K.V. Natarajan, A text book of Engineering Graphics, Dhanalakshmi Publishers, Chennai, 2016.

- Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2018.
- Luzzader, Warren.J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2015.
- 8. Sekkilar.S.M., "Engineering Graphics" Alpha Science International Ltd, 2018.



L	Т	Р	С
0	0	3	1.5

COURSE OBJECTIVE:

The objective of the course is to enable the students to gain exposure in various experimental skills based on corrosion studies, waste water treatment, electrochemistry, battery and fuel cells that are essential for engineering applications. Further, the students are exposed to various tools and instruments like conductivity meter, potentiometer, pH meter, colorimeter, spectrophotometer and flame photometer to demonstrate their practical applications.

COURSE CONTENT: LIST OF EXPERIMENTS

- 1. Estimation of acidity of industrial effluent by conductometric titration.
- 2. Determination of corrosion rate by weight loss method.
- 3. Determination of water of crystallization of CuSO ... 5H O
- 4. Estimation of hardness of water by complexometric method.
- 5. Determination of DO content of water sample by Winkler's method.
- 6. Determination of molecular weight of polyvinyl alcohol using Ostwald Viscometer.
- 7. Determination of strength of Hydrochloric acid using pH meter.
- 8. Determination of Alkalinity in the given water sample.
- 9. Estimation of iron content of the given solution using potentiometer.
- 10. Conductometric precipitation titration using Barium chloride and Sodium Sulphate
- 11. Determination of strength of acids in a mixture using conductivity meter.
- 12. Determination of Chloride content in the given water sample by Argentometric method.

COURSE OUTCOMES: COIMBATORE - 10

- **CO1:** Ability to apply analytical techniques for the quality assessment of domestic and industrial waste water.
- **CO2:** Ability to apply experimental chemistry for the investigation of corrosion related problems in industrial field.
- **CO3:** Ability to measure the molecular weight of polymeric materials so as to use them for various engineering applications.

CO4: Ability to estimate the amount of metal ions present in unknown substances using titrimetric and instrumental methods.

REFERENCES:

- 1. Beran J.A, "Laboratory Manual for Principles of General Chemistry", Wiley publications, 10th Edition, 2014.
- 2. Manoj Kumar Solanki, "Engineering Chemistry Laboratory Manual", Educreation publishing, 2019.
- 3. Jeffery G. H, and Basset J., "Vogel's text book of quantitative chemical analysis", Prentice Hall, 5th Edition, 2012.



L	Т	Р	С
0	0	4	2

COURSE OBJECTIVE:

This course provides guidance to find solutions for engineering problems by developing computer applications using C language.

COURSE CONTENT:

LIST OF EXPERIMENTS:

- 1. Problem Solving Techniques (Algorithm, Pseudo code, Flowcharts).
- 2. Program using Simple Statements and Expressions.
- 3. Scientific Problem Solving using Decision Making and Looping.
- 4. Program using Single and Multidimensional Array.
- 5. Program using String, Math Inbuilt Functions.
- 6. Program using User Defined Functions (string & array manipulation) and Storage Classes.
- 7. Program using Recursive Function.
- 8. Program using Dynamic Memory Allocation.
- 9. Program using Structures and Unions.
- 10. Program using Files.

COURSE OUTCOMES:

CO1: Ability to find solution methodology using different problem solving techniques

PROSPER

- **CO2:** Ability to use appropriate data types and control structures for solving a given problem
- **CO3:** Ability to apply the various concepts of C programming for solving engineering problems
- **CO4:** Ability to analyse the problem solving techniques which is appropriate for solving real world problems
- 1. Behrouz A. Forouzan, Richard F. Gilberg, "Computer Science: A Structured Programming Approach Using C", 3rd Edition, Course Technology Inc, 2005.
- 2. Byron Gottfried S. "Programming in C", 3rd Edition, (Indian Edition), Tata McGraw Hill, 2010.
- 3. Balagurusamy E. "Programming in ANSI C", 8th Edition, Tata McGraw Hill Education.
- 4. Paul Deitel, Harvey Deitel "C How to Program", 7th Edition, Pearson Education Asia, 2012.



SECOND SEMESTER SYLLABUS

COIMBATORE - 10

WISDOM

PROSPERIT

L	Т	Р	С
3	0	0	3

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

COURSE CONTENT:

Introduction

Need, Basic Guidelines, Content and Process for Value Education Purpose and motivation for the course, recapitulation from Universal Human Values-I, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation as the process for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority,5. Understanding Happiness and Prosperity correctly-A critical appraisal of the current scenario, Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Understanding Harmony in the Human Being RE - 10

Harmony in Myself! Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - happiness and physical facility, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health.

Understanding Harmony in the Family and Society

Harmony in Human-Human Relationship Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship, Understanding the meaning of Trust; Difference between intention and competence, Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Understanding Harmony in the Nature and Existence

Whole existence as Coexistence Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of naturerecyclability and self-regulation in nature, Understanding Existence as Co-existence of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

ISCIPLINE

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order

b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems,

c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b. At the level of society: as mutually enriching institutions and organizations, Sum up.

COURSE OUTCOMES:

- **CO1:** Ability to become more aware of themselves, and their surroundings (family, society, nature)
- **CO2:** Ability to become more responsible in life, and in handling problems with sustainable solutions, While keeping human relationships and human nature in mind.
- **CO3:** Ability to have better critical ability.
- **CO4:** Ability to become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- **CO5:** Ability to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

READINGS:

JISCIPLINE

1. R R Gaur, R Asthana A Foundation Course in Human Values and ProfessionalEthics, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1COIMBATORE - 10

2. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

REFERENCES:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

- 3. The Story of Stuff (Book).
- 4. The Story of My Experiments with Truth by Mohandas Karamchand Gandhi
- 5. Small is Beautiful E. F Schumacher.
- 6. Slow is Beautiful Cecile Andrews
- 7. Economy of Permanence J C Kumarappa
- 8. Bharat Mein Angreji Raj PanditSunderlal
- 9. Rediscovering India by Dharampal
- 10. Hind Swaraj or Indian Home Rule by Mohandas K. Gandhi
- 11. India Wins Freedom Maulana Abdul Kalam Azad
- 12. Vivekananda Romain Rolland (English)
- 13. Gandhi Romain Rolland (English)

RELEVANT CDS, MOVIES, DOCUMENTARIES & OTHER LITERATURE:

- 1. Value Education website, http://www.uptu.ac.in
- 2. Story of Stuff, http://www.storyofstuff.com

WISDOM

- 3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
- 4. Charlie Chaplin, Modern Times, United Artists, USA
- 5. IIT Delhi, Modern Technology the Untold Story



PROSPERI

This course provides knowledge on various concepts of differential equations, vector calculus, complex differentiation, complex integration, Laplace transforms and apply them in various engineering problems.

COURSE CONTENT:

Second and Higher Order Linear Differential Equations

Linear equations of second and higher order with constant coefficients – Homogenous equations of Euler's and Legendre's type – Method of variation of parameters – First order Simultaneous linear equations with constant coefficients – Simple Applications.

Vector Calculus

Gradient and directional derivative – Divergence and curl - Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's theorem, Gauss divergence theorem and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

Analytic Function

DISCIPLINE

Analytic functions – Necessary and sufficient conditions for analyticity– Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by functions w = c + z, az, $\frac{1}{z}$, z^2 – Bilinear transformation – Temperatures in a Quarter-plane metallic sheet.

Complex Integration

Line integral – Cauchy's Integral theorem– Cauchy's Integral formula – Taylor's and Laurent's series – Singularities – Residues – Cauchy Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.

9 + 3

9 + 3

Laplace Transform

Laplace transform – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions – Derivatives and integrals of transforms – Transforms of unit step function and impulse function – Transform of periodic functions. Inverse Laplace transform – Convolution theorem – Initial and final value theorems – Application to solution of linear ordinary differential equations with constant coefficients.

COURSE OUTCOMES:

CO1: Ability to apply higher order linear differential equations in simple applications

- **CO2:** Ability to solve problems in the domain of fluid dynamics using vector calculus
- **CO3:** Ability to construct analytic functions and use their conformal mapping property in application problems.
- **CO4:** Ability to apply the Cauchy's integral formula and residue theorem to evaluate real and complex integrals.

CO5: Ability to apply Laplace transform for solving linear differential equations.

- Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India, 2016.
- Grewal. B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publications, Delhi, 2016.
- Ravish R Singh and Mukul Bhatt, "Engineering Mathematics", 1st Edition, Tata McGraw Hill Education, New Delhi, 2016.
- 4. Srimanta Paul and Subodh C. Bhunia, "Engineering Mathematics", Oxford University Press, 1st Edition, 2015.
- Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, 7th Edition, New Delhi, 2012.

L	Т	Р	С
3	1	0	4

This course imparts knowledge in basic concepts and advances in Acoustics, Mechanics, Optics and Electromagnetic waves and develops an intuitive understanding of Physics by emphasizing Quantum computing for engineering applications.

COURSE CONTENT:

Acoustics, Ultrasonics and Thermal Insulation

Classification of Sound - decibel - Weber - Fechner law - Sabine's formula - derivation using growth and decay method - Absorption Co efficient and its determination factors affecting acoustics of buildings and their remedies - Production of ultrasonic– Piezoelectric generator – Detection of ultrasonic waves – Applications – NDT – pulse echo system through transmission and reflection mode - thermal insulation of buildings.

Introduction to Mechanics and applications

Moment of inertia (M.I) - Radius of gyration - M.I of circular disc, solid cylinder, diatomic molecule - K.E of a rotating body — centre of mass – conservation of linear momentum – Relation between Torque and angular momentum - Torsional pendulum - The concept of gravity – Law of universal gravitation –weigh and weightlessness – Projectile motion – range – height – time.

Quantum Mechanics COIMBATORE - 10

Photons and light waves - Electrons and matter waves - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function -Normalization - particle in an infinite potential well - Introduction to quantum computing - History of quantum computation and quantum information - Quantum bits - Quantum Physics and Computation Global perspectives - Future directions.

Oscillations, Optics and Lasers

Simple harmonic motion - resonance - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect - reflection and

9+3

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refraction of light waves - total internal reflection - interference – Michelson interferometer - air wedge experiment. Laser - characteristics - Spontaneous and stimulated emission - population inversion - CO_2 laser, semiconductor laser - applications - holography.

Electromagnetic Waves

9+3

Gauss's law – Faraday's law - Ampere's law - The Maxwell's equations (qualitative only) - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves.

COURSE OUTCOMES:

- **CO1:** Ability to understand the basic concepts of physics and their relevant applications in acoustics, non-destructive testing and thermal insulation
- **CO2:** Ability to illustrate the fundamental concepts in rigid bodies and gravitation
- CO3: Ability to apply the concepts of quantum computations
- CO4: Ability to understand the working principle of lasers and its applications.
- **CO5:**Ability to apply the knowledge of oscillations and propagation of electromagnetic waves in solving engineering problems

REFERENCES:

COIMBATORE - 10

- D. Halliday, R. Resnick and J. Walker. Principles of Physics. John Wiley & Sons, 10th Edition, 2015.
- 2. D. Kleppner, R. J. Kolenkow, An Introduction to Mechanics, Tata Mc Graw Hill, 10th Edition, 2005.
- 3. D. J. Griffiths. Introduction to Electrodynamics. Pearson Education, 3rd Edition 2015.
- 4. S. Mani Naidu, Engineering Physics, Pearson Publications, 2014.

- 5. A. Marikani, Engineering Physics, PHI Publications, 2nd Edition, 2014.
- Larry .D Kirkpatrick, Gregory E. Francis, Physics: A Conceptual World View, 7th Edition, Cengage Learning, 2010.
- Paul G. Hewitt, John Suchocki, Leslie A. Hewitt, Conceptual Physical Science Pearson, 6th Edition, 2017.
- 8. Michael Nielsen, Isaac Chuang, Quantum Computation and Quantum Information, Cambridge, 10th Anniversary Edition, 2010.



		L	Т	Р	С
20CSG01	OBJECT ORIENTED PROGRAMMING WITH C++	3	0	0	3

This course provides an insight on the basic principles of Object Oriented Programming using C++ and its applications in real world scenarios.

COURSE CONTENT: Fundamentals of OOP and C++

Structural versus object-oriented Programming - Elements of object oriented programming- benefits of OOP - Structure of C++ program - Variables - Tokens - Keywords - Identifiers -Type modifiers - Type casting - Input and Output - Data Types and Expressions - Operators - Flow of control - Arrays, Strings and Pointers.

Classes and **Objects**

Classes and Objects - Class specification: Class Members, Access Specifier, Scope resolution operator- Class Instantiation - Accessing class members- Passing and returning objects - Array of objects - Constructors: Parameterized constructors - Default arguments - Copy Constructor - Constructor overloading, Destructors - new, delete operators - "this" pointer - Friend classes and friend functions.

PROSPE

Overloading and Inheritance

Function overloading - Operator overloading: Overloadable operators - Unary operator overloading - Binary operator overloading, Overloading the Operator Using Friend Function - Inheritance: Base class and derived class relationship - Derived class declaration - Types of inheritance - Member accessibility - Constructors in derived class.

Virtual functions and Generic Programming

Virtual Functions: Need for virtual function - Pointer to derived class objects - Pure virtual functions - Abstract classes – Virtual Destructors, Generic programming with templates: Function templates - class templates

I/O Streams and Exception handling

Streams: Formatted and unformatted data – Manipulators - Files: Opening and Closing a file - File modes - File pointers and their manipulation, Sequential access to a file - Random access to a file - Reading and Writing files, Exception handling: Exception handling constructs - Handling exceptions.

COURSE OUTCOMES:

- CO1: Ability to understand the concepts of Object Oriented Programming
- CO2: Ability to choose appropriate Object Oriented features for solving various problems
- **CO3:** Ability to develop C++ application for real world scenarios
- **CO4**: Ability to apply the concepts of Exception handling, generic programming and file handling in programmes using C++

- Herbert Schildt, "C++ The Complete Reference", 5th Edition, Tata McGraw Hill, New Delhi,2
- Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley, 2013.
- 3. Deitel and Deitel, "C++ How to Program", 10th Edition, Prentice Hall India Learning Private Limited, 2018.
- Robert Lafore, "Object Oriented Programming in C++", 4th edition, Pearson India, 2002.
 COIMBATORE - 10
- 5. Stanley B. Lippman and Josee Lajoie, "C++ Primer", 5th Edition, Pearson Education, New Delhi, 2013.
- 6. E.Balagurusamy, "Object Oriented Programming with C++", 6th Edition, Tata McGraw Hill, 2013.

This course provides a basic understanding of essentials concepts, terminologies, recent trends, roles, issues and ethical practices for Information Technology professionals.

COURSE CONTENT:

Introduction

Definition of Information Technology –Role of IT Professional in society – Driving forces through IT Innovations –IT graduate profile and professional readiness – Competencies– Industry perspectives on Information technology – Current trends and IT terminologies.

Ethics in Information Technology

Overview of Ethics – Ethics for IT workers and IT users – Computer and Internet crime – Privacy.

Ethical Key Issues in Information Technology

Freedom of Expression – Intellectual property: Copyrights – Patents –Key Intellectual property Issues – Software development: Strategies for Engineering Quality Software – Key Issues in Software development.

Ethical and legal Implication COIMBATORE - 10

The impact of Information Technology on productivity and quality of life – Social Networking - Ethics of IT organizations.

Code of Ethics and other Case Studies

ACM code of ethics and professional conduct – Association of Information Technology Professionals (AITP) code of ethics and standard of conduct – Institute of Electrical and Electronics Engineers Computer Society Code – Project Management Institute code of ethics and professional conduct, SysAdm, Audit, Network, Security (SANS) IT code of ethics – Case Study: Bank fraud detection – Wells Fargo case – John Deere case.

COURSE OUTCOMES:

- **CO1:** Ability to understand the roles and responsibilities of Information Technology professional in the society
- **CO2:** Ability to understand the impact of Information Technology on society and ethics
- **CO3:** Ability to interpret ethical issues under various ethical codes and standards
- **CO4:** Ability to analyse the ethical issues in Information Technology domain

REFERENCES:

- 1. "Information Technology Curricula 2017", Association for Computing Machinery, 2017.
- 2. George W. Reynolds, "Ethics in Information Technology", 5th Edition, Cengage Learning, 2015.
- 3. Eric Frick, "Information Technology Essentials Volume 1: Introduction to Information Systems", Kindle edition, 2019.

COIMBATORE - 10

- 4. https://www.ethics.acm.org
- 5. https://www.casehero.com/the-wells-fargo-banking-scandal
- 6. https://bernardmarr.com/default.asp?contentID=1387

L	Т	Р	С
3	0	0	0

To understand the basic knowledge about environment and their chemistry, to apply the knowledge in environmental pollution control and management, to create awareness about various technologies to control/ reduce all environmental related problems.

COURSE CONTENT:

Fundamentals of Environmental Science

Introduction- Definition-environment, Environmental science, Environmental engineering-Components of environment - Atmosphere, lithosphere, hydrosphere and biosphere - types of environment – Natural – man – made - Environmental education-objectives, importance and scope - Need for public awareness.

Chemistry of the Environment

Hydrological cycle- concept of DO, BOD and COD - chemical and photochemical reactions in the atmosphere - ozone chemistry - formation and depletion of ozone layer - acid rain mechanism of formation and effects - Photochemical smog and sulfurous smog. Greenhouse effect, global warming- causes, effects and control measures.

Renewable energy and environment

Introduction - Renewable and non - renewable energy sources - Principles of generation of hydro - power, tidal energy, ocean thermal energy conversion, wind power - wind mill - wind farm geothermal energy and solar energy (solar collectors, photovoltaic modules, solar ponds) - Bioenergy: methods to produce energy from biomass - impact of renewable and non - renewable energy sources on the environment.

Environmental Pollution and control

Introduction - Air pollution – sources - major air pollutants – effects and control - Air Pollution control technologies - cyclone separator and electrostatic precipitator –water pollution – sources - major water pollutants - effects and control of water pollution waste water treatment - Noise pollution –sources- effects and control- Solid waste management – sources, classification, causes and effects -management and control measures of solid wastes - Hazardous waste management - role of an individual in prevention of pollution.

Human population and the Environment

Population growth - variation among nations - Population explosion – Family Welfare Programme -Environment and human health - Human Rights - Value Education -HIV/AIDS - Women and Child Welfare - Role of Information Technology in Environment and human health.

COURSE OUTCOMES:

- **CO1:** Ability to understand the basic knowledge about environment and their chemistry.
- **CO2:** Ability to select suitable renewable resources for domestic and industrial applications to meet the growing energy demand.
- CO3: Ability to apply the knowledge in environmental pollution control and management.

- George Tchobanoglous, Howard S. Peavy, Donald R. Rowe., "Environmental Engineering", McGraw Hill Education, 1st Edition, 2013.
- Henry J.G. and Heinke G.W., "Environmental Science and Engineering", Prentice Hall, 2nd Edition, 2007.
- Masters G.B., "Introduction to Environmental Engineering and Science", Pearson Education, 3rd Edition, 2008.
- 4. Tyler Miller G., "Environmental Science", Cengage Learning, 11th Edition, 2015

 Smriti Srivastava., "Energy Environment & Ecology", S.K.Kataria & Sons, 2nd Edition, 2013.



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This course aims to make the students understand about various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering by providing practical experience

COURSE CONTENT:

I. Civil Engineering Practice Lab

Buildings: Study of plumbing and carpentry components of residential and industrial buildings.

PLUMBING WORKS

- a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, and elbows in household fittings.
- b) Study of pipe connections requirements for pumps and turbines.
- c) Preparation of plumbing line sketches for water supply and sewage works.

Hands-on-exercise:

- a) Basic pipe connections Mixed pipe material connection Pipe connections with different joining components.
- b) Demonstration of plumbing requirements of high-rise buildings.

WOOD WORK

Study of the joints in roofs, doors, windows and furniture.

Studying common industrial trusses using models.

Hands-on-exercise:

Wood work, joints by sawing, planning and cutting.

II. Mechanical Engineering Practice Lab

Welding & Sheet metal

1. Preparation of arc welding of butt joints, lap joints, tee joints and corner joints.

- 2. Sign board fabrication by the application of knowledge gained through welding process
- 3. Forming of simple objects using sheet metal Trays.

Machining practices

Metal Hammer fabrication using Simple turning, taper turning, drilling taping practice.

Study

Assembling a centrifugal pump

Assembling a blower

Assembling an air conditioner

Demonstration

1. Demonstration on foundry operations.

III. Electrical Engineering Practice Lab

- 1. Familiarization of wiring tools, lighting accessories of CFL and incandescent lamps, types and selection of Fuse and MCB.
- 1. Study of various types of wiring systems
 - a. Wiring of one lamp controlled by one switch.
 - b. Wiring of one lamp controlled by two SPDT Switch and one 3 pin plug socket independently.
 - c. Wiring of fluorescent lamp controlled by one switch from panel with MCB.
- 2. Study of wiring of different household appliances
 - a. Iron-Box wiring.
 - b. Fan Regulator wiring.
 - c. Emergency Lamp wiring.
- 3. Familiarization with measuring instruments to measure current, voltage and power in AC/DC circuits.

IV. Electronics Engineering Practice Lab

- 1. Study of Electronic Components and instruments- Resistors, Capacitors, Inductors, Diodes and multimeter.
- 2. Measurement of AC signal parameters (voltage, period, frequency) using CRO.
- 3. Measurement of ripple factor of half wave rectifier and full wave rectifier.
- 4. Study of logic gates AND, OR, XOR and NOT.
- 5. Soldering practice using general purpose PCB Components, Devices and Circuits.

COURSE OUTCOMES:

- CO1: Ability to make various joints in carpentry and select suitable tools for plumbing
- **CO2:** Ability to fabricate products by selecting suitable tools for machining, metal joining and sheet metal processes
- **CO3:** Ability to understand the fundamental electrical parameters, protective devices, domestic wiring and accessories
- **CO4:** Ability to understand the basic principles of electronic components and to apply them in the design of simple electronic circuits on PCB

REFERENCES:

DISCIPLINE

- Bawa H.S., "Workshop Practice", Tata McGraw Hill Publishing Company Limited, New Delhi, 2009.
- 2. Chapman, William. Workshop Technology Part 1, Part 2. Routledge, 2019.
- 3. Uppal S. L., Electrical Wiring & Estimating, Khanna Publishers 5th edition, 2003.
- 4. John H. Watt, Terrell Croft: American Electricians' Handbook: A Reference Book for the Practical Electrical Man McGraw-Hill, 2002.
- Thomas L. Floyd and Steve Wetterling, "Laboratory Exercises for Electronic Devices", Pearson Education Limited, 10th Edition, 2017.

L	Т	Р	С
0	0	3	1.5

The students will be provided with an insight to handle optical instruments like microscope, spectrometer, laser and fibre optic kit. The course also provides an outline of modern instruments such as Ultrasonic interferometer, band gap instruments and CRO.

COURSE CONTENT:

List of Experiments

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.

2. Determination of thermal conductivity of a bad conductor using Lee's Disc method.

3. Determination of Young's modulus by non - uniform bending method.

4. Determination of Young's modulus by uniform bending method.

5. Determination of rigidity modulus of a wire and moment inertia of a disc – Torsional pendulum.

6. Determination of dispersive power of prism using spectrometer.

7. Determination of wavelength of a spectral lines using spectrometer grating.

8. Determination of thickness of thin sheet / wire - Air wedge.

9. Determination angle of divergence and wavelength using laser.

10. Determination of Particle size using laser. E - 10

11. Determination of acceptance angle and numerical aperture of an optical fiber.

Determination of energy band gap of a semiconductor by using p-n junction diode.

COURSE OUTCOMES:

- **CO1:** Ability to select appropriate materials for the thermal insulation of structures using Lee's disc experiment.
- **CO2:** Ability to use Interferometer to measure compressibility of the liquid and velocity of ultrasonic waves.
- **CO3:** Ability to analyze the elastic nature of materials and compute elastic moduli of different materials.
- **CO4:** Ability to distinguish silicon and germanium semiconducting materials using forbidden energy gap experiment.
- **CO5:** Ability to apply the principle of interference, diffraction and refraction to calculate the thickness of an insulation of a wire, micro-particle size and wavelength of spectral lines.

REFERENCES

WISDOM

- 1. Dr. S. Vijayakumar, Engineering Physics I, John Wiley Publications, 2014.
- 2. Dr. S. Vijayakumar, Engineering Physics II, John Wiley Publications, 2015.

COIMBATORE - 10

PROSPER

L	Т	Р	С
0	0	4	2

This course provides an practical experience on the concepts of Object Oriented Programming using C++ programming language.

COURSE CONTENT:

LIST OF EXPERIMENTS

- 1. Programs using Objects and Classes
- 2. Programs using Constructors and Destructors
- 3. Programs using friend function & friend class
- 4. Programs using Function Overloading
- 5. Programs to overload unary & binary operators as member function & nonmember function
- 6. Programs using types of inheritance
- 7. Programs using virtual functions
- 8. Programs using Function and class templates
- 9. Programs using Files and Streams
- 10. Programs using Exception handling

COURSE OUTCOMES:

CO1: Ability to apply the concept related to Classes and Objects in simple programs

PROSPE

CO2: Ability to apply the concepts of polymorphism to achieve enhanced functionalities of functions and operator.

CO3: Ability to deploy inheritance in simple C++ programs

CO4: Ability to design simple applications that support File Processing

CO5: Ability to develop programs that are capable of handling Exceptions

REFERENCES:

 Herbert Schildt, "C++ The Complete Reference", 5th Edition, Tata McGraw Hill, New Delhi,

- Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley, 2013.
- 3. Deitel and Deitel, "C++ How to Program", 10th Edition, Prentice Hall India Learning Private Limited, 2018.
- 4. Robert Lafore, "Object Oriented Programming in C++", 4th edition, Pearson India, 2002.
- Stanley B. Lippman and Josee Lajoie, "C++ Primer", 5th Edition, Pearson Education, New Delhi, 2013.
- 6. E.Balagurusamy, "Object Oriented Programming with C++", 6th Edition, Tata McGraw Hill, 2013.



THIRD SEMESTER SYLLABUS

COIMBATORE - 10

WISDOM

PROSPERIT

L	Т	Р	С
3	0	0	3

The course will enable the student to learn basic and advanced concepts related to linear data structures such as lists, stack, queue and non-linear data structures like trees and graphs. It also provides an outline of various sorting, searching and storage techniques.

COURSE CONTENT:

Introduction and Preliminaries of Data Structures

Basic Terminology- Elementary Data Organization-Data Structures- Data Structure Operations -Algorithms: Complexity, Time-Space tradeoff – Mathematical Notation and Functions – Algorithmic Notations – Complexity of Algorithms – Asymptotic Notations- String Operations – Word Processing – Pattern Matching Algorithms.

Arrays and Linked Lists

Linear Arrays – Traversing Linear Arrays – Inserting and Deleting – Multidimensional Arrays – Pointers – Records, Representation – Matrices – Sparse Matrices – Linked Lists, Memory Representation- Traversal-Search-Memory Allocation, Garbage Collection – Insertion, Deletion – Header Linked List – Twoway Lists.

COIMBATORE - 10

Stacks, Queues and Recursion

Stacks: Array Representation, Linked Representation – Arithmetic Expressions – Polish Notation – Applications: Quicksort, Recursion, Tower of Hanoi – Implementation of Recursive procedures by stacks – Queues – Linked Representation of Queues – Dequeues – Priority Queues.

Trees and Graphs

Tree Terminology - Binary Trees: Representation, Traversal – Traversal algorithms using stacks – Header Nodes; Threads – Binary Search Trees: Search, Insertion, Deletion – AVL Search Trees: Insertion, Deletion – *m*-way Search Trees: Search, Insertion, Deletion – B-Trees: Search, Insertion, Deletion – Heap – Heapsort – Path Lengths – Huffman's Algorithm – Graph Terminology – Graph Representations : Adjacency Matrix, Path Matrix – Warshall's Algorithm – Shortest Paths (Dijkstra's Algorithm)- Linked Representation – Operations – Traversal – Posets – Topological Sort – Minimum Spanning Trees (Prim's Algorithm and Kruskal's Algorithm).

Sorting and Searching

Sorting – Insertion Sort – Selection Sort – Merging – Merge Sort – Radix Sort – Searching and Data Modification – Hashing.

COURSE OUTCOMES:

- **CO1:** Ability to describe a simple hash function.
- **CO2:** Ability to determine appropriate ADTs and data structures for various sorting and searching algorithms.
- **CO3:** Ability to determine time and space requirements of common sorting and searching algorithms.
- **CO4:** Ability to apply appropriate data structures and abstract data types (ADT) such as lists, stacks, queues, trees and graphs in problem solving.
- **CO5:** Ability to analyze the performance of different implementations of data structures.

- 1. Seymour Lipschutz, "Data Structures with C", McGraw Hill, 1st Edition, 2017.
- 2. John Hubbard, "Data Structures with C++", McGraw Hill, 1st Edition, 2017.
- Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2nd Edition, 2014.

- Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, "Data Structures using C and C++", Pearson, 2nd Edition, 2015.
- 5. Venkatesan R and Lovelyn Rose S, "Data Structures", Wiley, 2nd Edition, 2019.



L	Т	Р	С
3	0	0	3

The course will enable the students to learn about the syntax and semantics of Java programming language to write programs using concepts such as variables, conditional and iterative execution methods, Java standard API library, Applets, Event Handling, AWT and helps to understand the underlying principles of inheritance, packages and interfaces.

COURSE CONTENT:

Introduction to Java, Classes and Objects

History and Evolution of Java – Overview – Data Types - Variables - Arrays – Operators - Control Statements – Classes – Fundamentals – Declaring Objects -Assigning Object Reference Variables - Methods – Constructors - this keyword -Garbage collection - finalize method - Stack Class.

Reusability, Packages, Interfaces and Exception Handling

Overloading Methods - Objects as Parameters - Argument Passing - Returning Objects – Recursion - Access Control – Static – Nested and Inner Classes - Command-Line Arguments – Variable Length Arguments. Inheritance – Basics – Super keyword -Multilevel Hierarchy - Method Overriding - Dynamic Method Dispatch - Abstract Classes - final with Inheritance. Packages - Access Protection - Importing Packages – Interfaces. Exception Handling – Multiple catch Clauses- Nested try Statements -Java's Built-in Exceptions –User defined Exception – Chained exceptions.

Multithreading, I/O, Applet and String Handling

Java Thread Model - Creating a Thread - Priorities – Synchronization – Inter thread Communication – Suspending - Resuming, and Stopping Threads – Multithreading -Deadlocks. Enumerations - Wrappers – Auto boxing – Annotations. I/O Basics -Reading and Writing Console I/O - PrintWriter Class - Reading and Writing Files - Applet – Architecture – Skeleton – Display methods - Repainting – Applet tag – Passing parameters - transient and volatile modifiers. String Handling – String Class – methods – String Buffer Class – Methods – String Builder.

Generics, Collections and Event Handling

Generics – Example – Parameters - General Form- Bounded Types - Wildcard Arguments - Generic Method and Interfaces – Raw Types and Legacy Code - Generic Class Hierarchies. Collection Classes – Array List – Linked List – Hash Set and Maps. Event Handling – Mechanisms -Delegation Event Model - Event Classes - Sources of Events - Event Listener Interfaces – Mouse and Keyboard events - Adapter Classes -Inner Classes.

AWT

AWT Classes - Window Fundamentals - Frame Windows - Frame Window in an Applet – Graphics – Color – Fonts - FontMetrics. AWT Controls - Layout Managers -Menu Bars and Menus -Dialog Boxes - FileDialog - Handling Events by Extending AWT Components.

COURSE OUTCOMES:

CO1: Ability to apply the concepts of classes and objects to solve specific problems.CO2: Ability to write programs using thread, packages and exception handling.CO3: Ability to write web-based programs using applets.CO4: Ability to construct the GUI based applications with AWT controls.

- Herbert Schildt, "Java: The Complete Reference", McGraw Hill Professional, 11th Edition, 2018.
- Cay S. Hortmann, "Core Java Volume I Fundamentals", Pearson Education, 11th Edition, 2018.
- Deitel and Deitel, "Java How to Program", Pearson Education India, 10th Edition 2016.

- 4. Joshua Bloch, "Effective Java", Pearson Education India, 3rd Edition, 2018.
- 5. Ken Arnold, David Holmes, James Gosling and Prakash Goteti, "The Java Programming Language", Pearson Education India, 2nd Edition, 2009.



L	Т	Р	С
3	0	0	3

The course will enable the student to learn the basic structure, operations, addressing modes of the digital computer. It also gives an insight of the concepts like pipelining, memory organization and parallel processing in a digital computer.

COURSE CONTENT:

Architecture: An Overview

Functional units of a Digital Computer – Translation from a High level language to Hardware Language – Technology – Performance – Power wall – Uniprocessor to multiprocessor – Instructions: Operations and Operands – Instruction Set: RISC and CISC - Representing Instructions – Logical Operations – ARM Addressing for 32-bit Immediate and more complex addressing modes.

Computer Arithmetic

Addition and Subtraction – Arithmetic for Multimedia - Multiplication – Multiplication Algorithm and Hardware – Signed Multiplication - Faster Multiplication in ARM -Division – Division Algorithm and Hardware - Signed Division – Faster Division in ARM - Floating Point Representation – Floating Point Operations: Addition -Multiplication – Floating point instructions in ARM.

Processor Design

COIMBATORE - 10

An abstract view of implementation - Logic design Conventions - Building a datapath – Simple implementation scheme – Pipelining – Pipelined Datapath and Control - Hazards – Data Hazards – Control Hazards – Exceptions.

Memory and I/O Interfacing

Memory Technologies – Basics of Caches – Measuring and Improving Cache Performance – Virtual Memory – Transaction- Look aside Buffer (TLB) - Memory Hierarchy - Input/output system, programmed I/O, DMA and interrupts, I/O processors.

Parallel Processing

Parallelism - Instruction-level-parallelism – Parallel processing challenges - Hardware multithreading – SISD, MIMD, SIMD, SPMD and Vector - Multicore processors – Shared memory Multiprocessors – Graphical Processing Units – Multiprocessor Network Topologies.

COURSE OUTCOMES:

- **CO1:** Ability to describe the functioning of computer hardware and instruction set.
- **CO2:** Ability to perform fixed point and floating point arithmetic operations.
- **CO3:** Ability to formulate solutions using data path, pipelining and parallelism concepts.
- CO4: Ability to compare the performances of caches and I/O devices.

- David A. Patterson and John L. Hennessey, "Computer Organization and Design: The Hardware / Software Interface", Morgan Kaufman / Elsevier, ARM Edition, 2017.
- 2. V. Carl Hamacher, Zvonko G Vranesic and Safwat G Zaky, "Computer Organization", McGraw-Hill Inc, 6th Edition, 2012
- William Stallings, "Computer Organization and Architecture Designing for Performance", PHI Learning, 9th Edition, 2012.
- Morris Mano M, "Computer System Architecture", Pearson Education, 1st Edition, 2011.
- Andrew S. Tanenbaum,"Structured Computer Organization", Pearson Education, 6th Edition, 2013.

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L	Т	Р	С
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COURSE OBJECTIVE:

The course will enable the student to undergo a hands-on experience with the concepts related to lists, stack, queue, trees, graphs and over the various sorting, searching and storage techniques.

COURSE CONTENT:

List of Experiments

- 1. Array implementation of list ADT.
- 2. Implementation of linked list ADT.
- 3. Array implementation of stack ADT.
- 4. Linked list implementation of stack ADT.
- 5. Array implementation of Queue ADT.
- 6. Linked list implementation of Queue ADT.
- 7. Implementation of heaps using priority queues.
- 8. Implementation of Binary Tree.
- 9. Implementation of Binary Search Tree.
- 10. Implementation of AVL Tree.
- 11. Implementation of Dijkstra's Algorithm.
- 12. Implementation of Warshall's Algorithm
- 13. Construction of Minimum Spanning Tree using (i) Prim's Algorithm and (ii) Kruskal's Algorithm OIMBATORE - 10

PROSPER

- Implementation of Sorting techniques Quick Sort, Insertion Sort, Selection Sort, Merge Sort, Radix Sort (any two)
- 15. Implementation of Hash table.

COURSE OUTCOMES:

- **CO1:** Ability to implement stack and queue data structures using array and pointer implementation of lists.
- **CO2:** Ability to implement tree-based data structures.

- **CO3:** Ability to deploy appropriate algorithms to find the shortest path and minimum spanning tree in a graph.
- **CO4:** Ability to apply appropriate sorting technique to sort a given set of values.
- **CO5:** Ability to implement hash tables for effective storage of data.

- 1. Seymour Lipschutz, "Data Structures with C", McGraw Hill, 1st Edition, 2017.
- 2. John Hubbard, "Data Structures with C++", McGraw Hill, 1st Edition, 2017.
- Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2nd Edition, 2014.
- 4. Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, "Data Structures using C and C++", Pearson, 2nd Edition, 2015.
- 5. Venkatesan R and Lovelyn Rose S, "Data Structures", Wiley, 2nd Edition, 2019.


L	Т	Р	С
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The course will enable the students to learn the design, implementation, testing, debugging, and documenting of programs using basic data types, I/O statements, conditional and control structures, objects, classes, arrays, strings and functions. It also discuss the principles of inheritance, interface, multithreading, exception handling and packages.

COURSE CONTENT:

List of Experiments

- 1. Simple java programs using operators, arrays and control statements
- 2. Develop a stack data structure using class and object
- 3. Program to demonstrate inheritance & polymorphism
- 4. Develop an application using interfaces
- 5. Develop an application using packages
- 6. Program to illustrate exception handling in java and creation of user defined exception
- 7. Program to illustrate multithreads and Inter thread Communication
- 8. Program to implement Deadlock
- 9. Program to copy the contents of one file into another file.
- 10. Develop and configure a simple banner applet
- 11. Program to demonstrate the features of generics types
- 12. Program to demonstrate the use of ArrayList, LinkedList, HashSet and Map classes.
- 13. Program to capture the various keyboard and mouse events.
- 14. Develop a scientific calculator using event-driven programming paradigm of Java
- 15. Develop a simple text editor with basic file and edit functionalities

COURSE OUTCOMES:

- **CO1**: Ability to write, debug and document well-structured java applications.
- **CO2**: Ability to implement inheritance and polymorphism to solve programming problems.
- **CO3**: Ability to implement the interfaces, exception handling, file operations and multithreading to solve problems.

CO4: Ability to create applets and event driven programming applications

- Herbert Schildt, "Java The Complete Reference", McGraw Hill Professional, 11th Edition, 2018.
- Cay S.Hortmann, "Core Java Volume I Fundamentals", Pearson Education, 11th Edition, 2018.
- Deitel and Deitel, "Java How to Program", Pearson Education India, 10th Edition 2016.
- 4. Joshua Bloch, "Effective Java", Pearson Education India, 3rd Edition, 2018.
- Ken Arnold, David Holmes, James Gosling and Prakash Goteti, "The Java Programming Language", Pearson Education India, 2nd Edition, 2009.



FOURTH SEMESTER SYLLABUS

COIMBATORE - 10

WISDOM

PROSPERIT

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3	0	0	3

The course will enable the student to learn the layered protocol approach used for communication and to learn the functionalities of various protocols.

COURSE CONTENT:

Introduction and Physical Layer

Networks – Network Model – Protocol Layering – OSI Model – TCP/IP Protocol suite – Addressing - Physical Layer: Performance – Transmission media – Guided – Unguided - Switching – Circuit-switched Networks – Packet Switching.

Data-Link Layer & Media Access

Error Detection and Correction – Error types – Cyclic Codes – Checksum – Data Link Control: Framing – Flow and Error Control – Data-Link Layer Protocols – HDLC – PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs –IEEE 802.11, Bluetooth – Connecting Devices.

Network Layer

NSCIPLINE

Logical Addressing – Internetworking - IPV4 Addresses – Classful Addressing – Classless Addressing - IPV6 Addressing – Transition from IPv4 to IPv6 – Address mapping – ICMP – IGMP – ICMPv6 – Unicast Routing Protocols – Multicast Routing Protocols.

Transport Layer

Process to process delivery – Port Numbers - User Datagram Protocol – Transmission Control Protocol – SCTP – Congestion - Congestion Control - Quality of Service – Techniques to improve QoS.

Application Layer

Domain Name Space – Telnet - Electronic Mail - FTP - WWW and HTTP – SNMP – RTP – RTCP – VOIP – Basics of Cryptography.

COURSE OUTCOMES:

CO1: Ability to understand the basic layers and functions in computer networks.

CO2: Ability to apply the networking concepts in real time applications.

CO3: Ability to analyze various routing algorithms.

CO4: Ability to evaluate the performance of a network.

REFERENCES:

- 1. Behrouz A. Forouzan, "Data Communications and Networking", McGraw Hill Education, 5th Edition, 2013.
- Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Morgan Kaufmann Publishers Inc., 5th Edition, 2012.
- William Stallings, "Data and Computer Communications", Pearson Education, 10th Edition, 2013.
- 4. James F. Kurose, Keith W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet", Pearson Education, 6th Edition, 2013.
- 5. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill Publisher, 2011.

L	Т	Р	С
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The course will enable the students to learn the basic software engineering concepts, agile software development process and various testing measures.

COURSE CONTENT:

Software Process and Agile Development:

Introduction to Software Engineering - Software Process - Perspective and Specialized Process Models - Introduction to Agility - Agile process-Extreme programming.

Requirements Analysis and Specification:

Software Requirements: Functional and Non-Functional - User requirements -System requirements - Software Requirements Document - Requirement Engineering - Process: Feasibility Studies - Requirements elicitation and analysis - requirements validation - requirements management.

Software Design:

Design process - Design Concepts - Design Model - Design Heuristic - Architectural Design - Architectural styles, Architectural Design - Architectural Mapping using Data Flow - User Interface Design: Interface analysis - Interface Design - Component level Design: Designing Class based components - traditional Components.

Software Testing Techniques:

Software testing fundamentals -Internal and external views of Testing - white box testing - basis path testing - control structure testing - black box testing - Regression Testing - Unit Testing - Integration Testing - Validation Testing - System Testing and Debugging.

Project Management:

Software Project Management: Estimation – LOC - FP Based Estimation - Make/Buy Decision COCOMO I & II Model - Project Scheduling - Earned Value Analysis Planning - Project Plan - Planning Process - RFP Risk Management – Identification -Projection - Risk Management -Risk Identification - RMMM Plan - CASE TOOLS.

COURSE OUTCOMES:

- **CO1:** Understand various software process models
- **CO2:** Apply the appropriate software design methodology for a given scenario
- CO3: Compare and contrast various testing measures.
- **CO4:** Develop the system in agile based mode.
- **CO5:** Estimate the cost for the scheduled project.

- 1. Pressman R S, Bruce R.Maxim, "Software Engineering A Practitioner's Approach" McGraw-Hill Education, 8th Edition, 2019.
- Ian Sommerville, "Software Engineering", Pearson Education Asia, 10th Edition, 2017.
- Rajib Mall, "Fundamentals of Software Engineering", PHI Learning, 4th Edition, 2014.
- 4. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.
- Shari Lawrence Pfleeger, "Software Engineering Theory and Practice", Pearson Education, 4th Edition, New Delhi, 2009.

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The course will enable the students to learn the fundamentals of data models, ER diagrams and to get familiarized with the concepts of transaction processing, concurrency control techniques, recovery procedures, file indexing techniques and advanced databases.

COURSE CONTENT:

Introduction to DBMS

Overview of DBMS- Data Models- Database Languages- Database Administrator-Database Users- Three Schema architecture of DBMS: Basic concepts- Design Issues-Mapping Constraints- Keys- Entity-Relationship Diagram- Weak Entity Sets- and Extended E-R features.

Relational Model and SQL

Structure of relational Databases- Relational Algebra- Relational Calculus- Extended Relational Algebra Operations- Views- Modifications of the Database- Concept of DDL-DML- TCL - DCL: Basic Structure- Set Operations- Aggregate Functions- Null Values-Domain Constraints- Referential Integrity Constraints- Assertions- Views- Nested Sub Queries- Stored Procedures and Triggers.

Functional Dependency and Normalization

Functional Dependency- Different Anomalies in designing a Database.- Normalization using Functional Dependencies- Decomposition- Boyce-Code Normal Form- 3NF-Normalization using Multi-Valued Dependencies- 4NF- 5NF- Query Processing and Optimization.

Transaction Processing

Transaction Processing- Concurrency Control and Recovery Management - Transaction Model Properties- State Serializability- Lock Based Protocols- Two Phase Locking.

File Organization and Advanced DBMS

Files and Records- Placing File Records on Disk- Fixed and Variable Sized Records-Types of Single-Level Index- Multilevel Indexes- Dynamic Multilevel Indexes using B Tree and B+ Tree – Advanced Database Management – NoSQL – XMLDB – Mobile Databases-Databases for Social media.

COURSE OUTCOMES:

- **CO1:** Ability to describe the components of a database system and give examples of their use.
- **CO2:** Ability to understand the various transaction processing and transaction models.
- CO3: Ability to understand the advanced databases that are specific to various domains.

CO4: Ability to describe the properties of BCNF, 4NF, 5NF

CO5: Ability to use a declarative query language to elicit information from a database.

CO6: Ability to distinguish between a non-dense index and a dense index.

- Abraham Silberschatz- Henry F. Korth, S. Sudharshan, "Database System Concepts", Tata McGraw Hill, 9th Edition, 2018.
- Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Pearson Education, 7th Edition, 2017.
- C.J. Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Pearson Education, 8th Edition, 2006.
- Raghu Ramakrishnan, "Database Management Systems", McGraw-Hill College Publications, 4th Edition, 2015.
- 5. G.K.Gupta, "Database Management Systems", Tata McGraw Hill, 1st Edition, 2018.

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The course will enable the students to learn the basic components of an operating system, and the interactions among various components in the operating system. The course will cover the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems.

COURSE CONTENT:

Operating System Overview

Introduction - Computer System Overview - Basic Elements - Instruction Execution – Interrupts - Memory Hierarchy - Cache Memory - Direct Memory Access -Multiprocessor and Multicore Organization. Operating system overview : objectives and functions - Evolution of Operating System.- Computer System Structure – Operating System Structures : System Components – Operating System Services -System Calls - System Programs – System Structure - OS Generation and System Boot.

Process Management

Process concept – Process Scheduling – Operations on Processes – Inter Process Communication – CPU scheduling – Scheduling criteria – Scheduling algorithms – multi processor scheduling – real time scheduling – Threads overview – multithreading models – threading issues – windows, solaris, linux, android process and thread management – process synchronization – the critical section problem – synchronization hardware – mutex locks – semaphores – classic problems of synchronization – critical regions – monitors- deadlock – system model – deadlock characterization – methods for handling deadlocks – deadlock prevention – deadlock avoidance – deadlock detection – recovery from deadlock.

Storage Management

Main memory : Memory management requirement – Memory Partitioning -Contiguous memory allocation – paging – segmentation – segmentation with paging – 32 and 64 bit architecture examples-Virtual memory: Hardware and Control structures – Operating System software – demand paging – page replacement algorithms – thrashing – Memory management for UNIX, Solaris, Linux, Windows, Android.

File System

Mass storage system : overview of mass storage structure – disk structure – disk scheduling and management – swap space management – file system interface – file concept – access methods – directory structure – directory organization – file system mounting – file sharing and protection – file system implementation - file system structure – directory implementation – allocation methods – free space management – efficiency and performance –Recovery.

I/O Systems, Protection and Security

I/O systems: I/O hardware – application I/O interface – Kernel I/O subsystem – streams – performance- Protection: Goals – Domain of Protection – Access Matrix – Implementation of Access Matrix – Revocation of Access Rights – Capability based systems – Language based Protection-Security: The security problem – User authentication – Program threats- System threats – Securing system and facilities.

COURSE OUTCOMES: COIMBATORE - 10

- **CO1**: Ability to describe the difference between processes and threads.
- **CO2**: Ability to describe the concept of virtual memory and main memory.
- CO3: Ability to explain the mechanisms in an OS to control access to resources.
- **CO4:** Ability to summarize techniques for achieving synchronization in an operating system.
- **CO5**: Ability to compare and contrast the algorithms used for scheduling of tasks.
- CO6: Ability to compare and contrast different approaches of file organization.

- Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley and Sons Inc., 8th Edition, 2017.
- William Stallings, "Operating Systems Internals and Design Principles", Pearson Education India 9th Edition, 2018.
- 3. Andrew S Tanenbaum, "Modern Operating Systems", PHI, 4th Edition, 2016.
- 4. Ramaz Elmasri, A.Gil Carrick, David Levine, "Operating Systems A spiral approach", Tata McGraw Hill, 2010.
- Achyut S.Godbole, Atul Kahate, "Operating Systems", McGraw Hill Education, 3rd Edition 2010.



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The course will enable the students to design and maintain tables using SQL, PL/SQL, triggers and functions.

COURSE CONTENT:

- 1. Creation of a database and write SQL queries to retrieve information from the database.
- 2. Perform Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
- 3. Creation of a database using views, synonyms, sequences and indexes
- 4. Creation of a database using Commit, Rollback and Save point.
- 5. Creation of a database to set various constraints.
- 6. Creating relationship between the databases.
- 7. Write PL/SQL block to by accepting input from the user and handling exceptions.
- 8. Creation of Procedures.
- 9. Creation of database triggers and functions.
- 10. Mini project (Application Development using Oracle/ MySQL)
 - a) Inventory Control System.
 - b) Material Requirement Processing.
 - c) Hospital Management System.
 - d) Railway Reservation System.
 - e) Personal Information System.
 - f) Web Based User Identification System.
 - g) Timetable Management System.
 - h) Hotel Management System

COURSE OUTCOMES:

- **CO1:** Ability to build a database schema for a given problem.
- CO2: Ability to perform transactions in a database.

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- **CO3:** Ability to build and maintain tables using PL/SQL.
- **CO4:** Ability to develop an application and generate reports.

REFERENCES:

- Abraham Silberschatz- Henry F. Korth, S. Sudharshan, "Database System Concepts", Tata McGraw Hill, 9th Edition, 2018.
- Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Pearson Education, 7th Edition, 2017.
- C.J. Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Pearson Education, 8th Edition, 2006.
- Raghu Ramakrishnan, "Database Management Systems", McGraw-Hill College Publications, 4th Edition, 2015.
- 5. G.K.Gupta, "Database Management Systems", Tata McGraw Hill, 1st Edition, 2018.

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The course will enable the students to learn about UNIX commands and shell programming. It also covers the concepts of various CPU Scheduling Algorithms, Processes, Inter-process Communication, Deadlock avoidance and detection, Page Replacement Algorithms, File Organization and File Allocation Strategies

COURSE CONTENT:

List of Experiments:

- 1. Basics of UNIX commands
- 2. Write programs using system calls of UNIX operating system.
- 3. Write C programs to simulate UNIX commands.
- 4. Shell Programming.
- 5. Implementation of various CPU Scheduling Algorithms.
- 6. Implementation of Semaphores.
- 7. Implementation of Shared memory and IPC.
- 8. Implementation of Bankers Algorithm for Deadlock Avoidance.
- 9. Implementation of Deadlock Detection Algorithm.
- 10. Program to Implement Threading and Synchronization Applications.
- 11. Implementation of various Memory Allocation Methods for fixed partition.
- 12. Implementation of Paging Technique of Memory Management.
- 13. Implementation of the various Page Replacement Algorithms.
- 14. Implementation of the various File Organization Techniques.
- 15. Implementation of the various File Allocation Strategies.

COURSE OUTCOMES:

CO1: Ability to compare the performance of various CPU Scheduling Algorithms

CO2: Ability to implement semaphores, deadlock detection and avoidance algorithms.

- **CO3:** Ability to analyze the performance of the various Page Replacement Algorithms.
- **CO4:** Ability to Implement File Organization and File Allocation Strategies.

REFERENCES:

WISDOM

- Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley and Sons Inc., 8th Edition, 2014.
- William Stallings, "Operating Systems Internals and Design Principles", Pearson Education India 9th Edition, 2018.
- 3. Andrew S Tanenbaum, "Modern Operating Systems", PHI, 4th Edition, 2015.
- 4. Ramaz Elmasri, A.Gil Carrick, David Levine, "Operating Systems A spiral approach", Tata McGraw Hill, 2010.
- Achyut S.Godbole, Atul Kahate, "Operating Systems", McGraw Hill Education, 3rd Edition 2010.

FIFTH SEMESTER SYLLABUS

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The course will enable the student to learn the functions of various phases of a compiler, the intermediate code generation and run-time environment. It also helps to get an insight on Lexical Analyzer Phase, Syntax Analyzer Phase and Intermediate Code Generation.

COURSE CONTENT:

Introduction to Compilers

Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering –Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA.

Syntax Analysis

Role of Parser – Grammars – Error Handling – Context-free grammars – Writing a grammar –Top Down Parsing – General Strategies Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser – LR(0) Item Construction of SLR Parsing Table –Introduction to LALR Parser – Error Handling and Recovery in Syntax Analyzer-YACC.

COIMBATORE - 10

Intermediate Code Generation

Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking.

Run-time Environment and Code Generation

Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management – Issues in Code Generation – Design of a simple Code Generator.

Code Optimization

Principal Sources of Optimization – Peep-hole optimization – DAG – Optimization of Basic Blocks – Global Data Flow Analysis – Efficient Data Flow Algorithm.

COURSE OUTCOMES:

- **CO1:** Ability to understand the functionalities of the different phases of compiler.
- **CO2:** Ability to understand syntax-directed translation and run-time environment.
- **CO3:** Ability to implement code optimization techniques.
- CO4: Ability to apply different parsing algorithms to develop the parsers for a given grammar.
- **CO5:** Ability to design a scanner and a parser using LEX and YACC tools.

- Alfred V Aho, Monica S Lam, Ravi Sethi and Jeffrey D Ullman, "Compilers -Principles, Techniques and Tools", Pearson Education, 2nd Edition, 2018.
- Dick Grune, Henri E Bal, Ceriel J H Jacobs, Koen G. Langendoen, "Modern Compiler Design", Springer, 1st Edition, 2012.
- 3. Allen I. Holub," Compiler Design in C", Pearson Education, 1st Edition, 2015.
- 4. Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2008.
- Randy Allen, Ken Kennedy, "Optimizing Compilers for Modern Architectures: A Dependence-based Approach", Morgan Kaufmann Publishers, 2003.

20IT012

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COURSE OBJECTIVE:

The course will enable the student to learn the various algorithm design techniques and provides an understanding on the problems that are categorized as NP-class problems and their approximate solutions.

COURSE CONTENT:

Introduction to Algorithm Analysis and Divide-and-Conquer

Introduction to Algorithms – Growth of functions – Solving recurrence equations: Substitution method Iteration method and Master method – Finding Maximum and Minimum – Selection – Strassen's Matrix Multiplication – Convex Hull.

Greedy Approach and Dynamic Programming

Greedy Approach: General Method – Knapsack problem – Minimum cost spanning trees – Single source shortest path problem. Dynamic Programming: Principle of optimality – All pairs shortest path problem – Longest common subsequence – Traveling salesperson problem.

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Backtracking and Branch-and-bound

Backtracking: General method – 8 Queens Problem – Graph coloring – Sum of subset problem – Hamiltonian cycle. Branch and Bound – Knapsack problem – Traveling salesman problem.

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String Matching and Parallel Algorithms

Simple string matching – KMP String matching algorithm – Boyer Moore String matching algorithm. Parallel algorithms: PRAM models – Prefix computation –List ranking – Finding the maximum – Odd-Even merge sort – Sorting on a mesh – Bitonic sort.

NP-Problems and Approximation Algorithms

NP-completeness – Polynomial time verification – Theory of reducibility – Circuit satisfiability - NP-completeness proofs – NP-complete problems: Vertex cover, Hamiltonian cycle and Traveling Salesman problems – Approximation Algorithms – Approximation algorithms to vertex-cover and traveling salesman problems.

COURSE OUTCOMES:

- **CO1:** Ability to illustrate ways to manage algorithmic execution using parallel algorithms.
- **CO2:** Ability to use divide-and-conquer method, greedy approach, dynamic programming, backtracking and branch-and-bound method to solve real-time problems.
- CO3: Ability to apply appropriate heuristics in the context of addressing intractable problems.
- CO4: Ability to determine the time complexity and the space complexity of simple algorithms.
- **CO5:** Ability to determine an appropriate algorithmic approach to a problem.

REFERENCES:

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- Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", University Press, 2nd Edition, 2018.
- Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Education, 3rd Edition, 2017.
- Sridhar S, "Design and Analysis of Algorithms", Oxford University Press, 1st Edition, 2014.
- Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", PHI Learning, 3rd Edition, 2010.
- 5. Kleinberg, "Algorithm Design", CRC Press, 1st Edition, 2013.

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The course will enable the students to learn the fundamentals of object modeling, UML diagrams, software design and requirement specification.

COURSE CONTENT

Introduction

An overview of Object Oriented Systems Development- Unified Approach – Object basics – Object state and properties – Behavior – Methods – Messages – Encapsulation - Information hiding – Class hierarchy – Relationships – Associations – Aggregations- Identity – Dynamic binding – Persistence – Meta classes – Object oriented system development life cycle – Software development process- Building high quality Software -Object Oriented System Development: A Use case driven approach- Reusability.

Object-Oriented Methodologies

Rumbaugh Methodology – Booch Methodology – Jacobson Methodology – Patterns – Frameworks – Unified Approach – Unified Modeling Language – Use case – class diagram – Interactive Diagram – Package Diagram – Collaboration Diagram – State Diagram – Activity Diagram.

Object-Oriented Analysis

Identifying use cases – Object Analysis – Classification – Noun phrase approach-Common class pattern approach- use case driven approach- Classes, responsibilities and Collaborators-Naming classes-Identifying Object relationships, Attributes and Methods.

Object-Oriented Design

Object oriented Design process and Design axioms – Micro level process-purpose of view layer interface-Prototyping the user interface.

Software Quality and Reusability

Software Quality assurance – Testing strategies – Object orientation testing – Test cases – Test Plan – Debugging principles – Usability – Satisfaction – Usability testing – Satisfaction testing.

COURSE OUTCOMES:

- **CO1:** Ability to decompose a problem domain into classes of objects having related state and behavior.
- CO2: Ability to draw UML diagrams for applications.
- CO3: Ability to write code from design.
- **CO4:** Ability to employ a UML to illustrate a simple class hierarchy that allows re-use of code for different subclasses
- **CO4:** Ability to apply appropriate design patterns.
- CO5: Ability to compare and contrast various testing techniques

- 1. Ali Bahrami, "Object Oriented System Development", Tata McGraw Hill Edition, 2017.
- Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education, 2nd Edition, 2015.
- Craig Larman, "Applying UML and Patterns: An Introduction to Object Oriented Analysis and Design and Iterative Development", Pearson Education, 3rd Edition, 2017.
- 4. Martin Fowler, "UML Distilled A Brief Guide to Standard Object Modeling Language", 3rd Edition, Pearson Education, 2015.
- Russ Miles, Kim Hamilton, "Learning UML 2.0: A Pragmatic Introduction to UML", O'Reilly, 2008.

L	Т	Р	С
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This course will enable the students to understand the fundamentals of HTML5 and CSS and learn the fundamentals of client side and server side programming. The students will be exposed to various website frame works.

COURSE CONTENT:

Introduction to HTML5

Web Essentials: History of Internet & WWW - Web System Architecture – Basic Internet Protocols – Markup Language: HTML5 - Introduction - Basic Tags- Lists-Tables -Images - Forms - Links & Navigation - Image Maps – Input and Data List and Page Structure Elements – Canvas.

CSS and Client Side Programming

Style Sheets: CSS - Introduction to Cascading Style Sheets – Features - Core Syntax - Style Sheets and HTML Style Rule Cascading and Inheritance - Text Properties -Box Model - Normal Flow Box Layout - Beyond the Normal Flow - Other Properties. Client Side Programming: The Java Script Language - Basics - Control structures - Functions - Arrays - Objects – DOM - Event Handling

XML

Representing Web Data: XML - Documents and Vocabularies - Versions and Declaration - Namespaces - JavaScript and XML: Ajax - DOM based XML processing - Event-oriented Parsing: SAX - Transforming XML Documents-Selecting XML Data: XPATH - Template based Transformations: XSLT -Displaying XML Documents in Browsers.

Server Side Programming

Introduction to PHP: syntax, variables, print, data types, strings, constants, operators. Handling HTML form with PHP: Form Handling, Form Validation, Form Required, Form URL/E-mail, Form Complete. Decisions and Loops: Making Decisions, Repetitive tasks with looping, If else, else if, switch, While loops, for loops. Functions: Definition, Call by value and call by reference, Recursive function. String, Array, Working with files.

Building Website using Frameworks

Introduction to Word press, Joomla, Flask, Django, Angular JS, ASP.NET, Bootstrap.

COURSE OUTCOMES:

CO1: Ability to represent web data using XML.

- **CO2:** Ability to express the constraints involved in state management (cookies, query strings, sessions) in the web.
- **CO3:** Ability to compare and contrast various web framework concepts.
- CO4: Ability to develop web based application using suitable client side and server side web technologies.
- **CO5:** Ability to evaluate the design and architecture of a web system.
- CO6: Ability to design and implement a simple web pages using HTML, CSS and Javascript.

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REFERENCES:

 Jeffrey C. Jackson, "Web Technologies - A Computer Science Perspective", Pearson Education, 1st Edition, 2007.

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- Thomas A Powell, "HTML and CSS: The Complete Reference", 5th Edition, Tata Mc Graw Hill, 2017.
- Paul Deitel, Harvey Deitel, Abbey Deitel, "Internet & World Wide Web How to Program", Pearson Higher Education, 5th Edition, 2018.
- Robert. W. Sebesta, "Programming the World Wide Web", 8th Edition, Pearson Education, 2020.
- Steven Holzner,"PHP: The complete Reference", McGraw-Hill Publications, 1st Edition, 2017.

The course will enable the students to learn the basics of object-oriented analysis and design, UML design diagrams and various testing techniques.

COURSE CONTENT:

List of Experiments/

- 1. To develop a mini-project by following the exercises listed below.
- 2. Formulate a problem statement.
- 3. Identify Use Cases and develop the Use Case model.
- 4. Identify the conceptual classes and develop a domain model with UML Class diagram.
- 5. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence diagrams.
- 6. Draw relevant state charts, activity diagrams, component and deployment diagrams.
- 7. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, Logical architecture diagram with UML package diagram notation.

BATORE - 10

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- 8. Develop and test the Technical services layer.
- 9. Develop and test the Domain objects layer.
- 10. Develop and test the User interface layer.

Suggested domains for Mini-Project

- Passport automation system
- Book bank
- Exam Registration
- Stock maintenance system.
- Online course reservation system
- E-ticketing
- Software personnel management system
- Credit card processing
- E-book management system

- Recruitment system
- Foreign trading system
- Conference Management System
- BPO Management System
- Library Management System
- Student Information System

COURSE OUTCOMES:

CO1: Ability to write software requirement specification.

CO2: Ability to implement projects using OO concepts.

CO2: Ability to use the UML analysis and design diagrams.

CO3: Ability to apply appropriate design patterns.

CO4: Ability to create code from design.

- Ali Bahrami, "Object Oriented System Development", Tata McGraw Hill Edition, 2017.
- Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education, 2nd Edition, 2015.
- Craig Larman, "Applying UML and Patterns: An Introduction to Object Oriented Analysis and Design and Iterative Development", Pearson Education, 3rd Edition, 2017.
- 4. Martin Fowler, "UML Distilled A Brief Guide to Standard Object Modeling Language", 3rd Edition, Pearson Education, 2015.
- Russ Miles, Kim Hamilton, "Learning UML 2.0: A Pragmatic Introduction to UML", O'Reilly, 2008.

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This course will enable the students to obtain a hands-on experience about the development of web pages with HTML5/CSS and development of web applications using client side and server side programming. It also provides an exposure to various web development frameworks.

COURSE CONTENT:

List of Experiments

- 1. Create a Survey Form using HTML5
- 2. Create a webpage using CSS which displays the class time table and apply the following effects on the table:
 - For the table header apply blue as the background colour and white for the colour of the text in the table header.
 - Display day names (Mon, Tue etc...) in bold format with the first letter in the day name in uppercase.
 - Display lunch slightly in bigger font other than the remaining text.
- 3. Create a webpage to manage personal details like name, class, qualifications, photo, address etc., using tables and other suitable HTML tags. Apply the following style information:
 - Display the heading of the page in Times New Roman font and with 24px size.
 - Align all the field names like Name, Class, Photo etc to right in the table.
 - Apply light blue as background colour for the left side cells in the table which contains field names like Name, Class, etc...
 - Display your college logo as background image in the top right position of the web page.
- 4. Program using java script

- Write a JavaScript program to create a new string adding "Py" in front of a given string. If the given string begins with "Py" then return the original string.
- Write a JavaScript program to remove a character at the specified position of a given String and return the new string.
- Write a JavaScript program to find a value which is nearest to 100 from two different given integer values.
- Write a JavaScript program to check the total marks of a student in various examinations. The student will get A+ grade if the total marks are in the range 89..100 inclusive, if the examination is "Final-exam." the student will get A+ grade and total marks must be greater than or equal to 90. Return true if the student get A+ grade or false otherwise.

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- 5. Implementation of basic list operation using java script.
- 6. Given a number from 0 to 999. Spell out that number in English using java script.
- 7. Write a program to create Chess board in PHP.
- 8. Write a program to calculate Electricity bill in PHP
 - For first 50 units Rs. 3.50/unit
 - For next 100 units Rs. 4.00/unit
 - For next 100 units Rs. 5.20/unit
 - For units above 250 Rs. 6.50/unit
- 9. Write PHP program for
 - Sum of digits
 - Even or odd COIMBATORE 10
 - Table number
 - Factorial
 - Reverse number and String
 - Swap two numbers
 - Area of triangle
 - Star triangle

10. Develop a simple web page using Wordpress

- 11. Develop a simple web page using Bootstrap
- 12. Create a navigation menu using Angular js.
- 13. Develop a simple web page using Joomla
- 14. Build a Feedback form Using Flask
- 15. Build a Personal Portfolio Web page Using Django

COURSE OUTCOMES:

CO1: Ability to design interactive web pages.

CO2: Ability to build web applications to solve problems

CO3: Ability to develop dynamic web pages.

CO4: Ability to use a web framework to develop web applications.

REFERENCES

- Jeffrey C. Jackson, "Web Technologies A Computer Science Perspective", Pearson Education, 1st Edition, 2007.
- Thomas A Powell, "HTML and CSS: The Complete Reference", 5th Edition, Tata Mc Graw Hill, 2017.
- Paul Deitel, Harvey Deitel, Abbey Deitel, "Internet & World Wide Web How to Program", Pearson Higher Education, 5th Edition, 2018.
- Robert. W. Sebesta, "Programming the World Wide Web", 8th Edition, Pearson Education, 2020.
- Steven Holzner,"PHP: The complete Reference", McGraw-Hill Publications, 1st Edition, 2017.

SIXTH SEMESTER

SYLLABUS

20IT015

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COURSE OBJECTIVE:

The course will enable the student to learn the various types of machine learning techniques namely supervised, unsupervised and reinforcement learning by providing an insight on the variants of learning techniques and by correlating them with real-time applications.

COURSE CONTENT:

Introduction

Introduction – Models of Neuron- Directed Graphs – Feedback – Network Architectures – Knowledge Representation – Learning Processes - Learning Tasks – Perceptron – Convergence Theorem – Batch Perceptron Algorithm - Linear Regression Model – Minimum-description-length principle –Instrumental variables method – Pattern classification using Rosenblatt's Perceptron and Linear Regression

Least-Mean-Square Algorithm and Multilayer Perceptron

Introduction – filtering structure of LMS Algorithm – Unconstrained Optimization – Wiener Filter – the Least-Mean-Square Algorithm - Markov Model – Langevin Equation – Kushner's Direct-Averaging Method – Statistical LMS – Limitations – Batch Learning and On-line Learning – Back-Propagation – Optimal Annealing – Generalization – Approximations of Functions – Cross-validation – Complexity Regularization - Network Pruning – Limitations – Convolutional Networks – Nonlinear Filtering

Kernel Methods, Radial-Basis Function Networks and Support Vector Machines

Cover's Theorem – Radial-Basis-Functional Networks – K-means Clustering – Recursive Least-Squares Estimation of Weight Vector – Hybrid Learning– Gaussian Hidden Units – Kernel Regression – Optimal Hyperplane – Kernel Machine representation – Design of Support Vector machines – XOR Problem – Regression in SVM – The representer theorem - Pattern Classification using RBF Networks and SVM

Regularization Theory and Principal-Components Analysis

Hadamard's Conditions– Tikhonov's Regularization Theory – Regularization Networks – Generalized RBF Networks –Regularization Parameter – Semisupervised Learning - Manifold Regularization – Generalized Regularization Theory – Spectral Graph Theory – Generalized Representer Theorem – Laplacian regularized LS Algorithm – Principles of Self-organization – Self-organized Feature Analysis – Principal Component Analysis– Hebbian-based PCA – Kernel PCA – Kernel Hebbian Algorithm – Case Study: Image Coding

Self-Organizing Maps, Stochastic Methods and Recurrent Networks

Two basic feature-mapping models – Self-organizing Maps – Properties – Contextual Maps – Hierarchical Vector Quantization – Kernel Self-organizing Maps – Statistical Mechanics – Markov Chains – Metropolis Algorithm – Simulated Annealing – Gibb's Sampling – Boltzmann Machine – Logistic Belief Nets – Deep Belief Nets – Deterministic Annealing – Recurrent Network Architectures – Universal Approximation Theorem – Learning Algorithms – Real-time recurrent learning – Vanishing Gradients

COURSE OUTCOMES:

- **CO1:** Ability to explain the differences among the three main styles of learning: supervised, reinforcement, and unsupervised.
- **CO2:** Ability to identify examples of classification tasks, including the available input features and output to be predicted.
- **CO3:** Ability to implement simple algorithms for supervised learning, reinforcement learning, and unsupervised learning.
- **CO4:** Ability to compare and contrast neural networks and belief networks.

- **CO5:** Ability to apply the simple statistical learning algorithm such as Naive Bayesian Classifier to a classification task and measure the classifier's accuracy.
- **CO6:** Ability to evaluate the performance of a simple learning system on a real-world dataset.

REFERENCES:

WISDOM

- Simon Haykin, "Neural Networks and Learning Machines", Pearson Education India, 3rd Edition, 2016.
- Rajasekaran S and Vijayalakshmi Pai G A, "Neural Networks, Fuzzy Systems and Evolutionary Algorithms: Synthesis and Applications", PHI Learning, 2nd Revised Edition, 2017.
- Sivanandam SN and Sumathi S, "Introduction to Neural Networks Using Matlab 6.0", McGraw Hill Education, 1st Edition, 2017.
- Saikat Dutt, Subramanian Chandramouli and Amit Kumar Das, "Machine Learning", Pearson, 1st Edition, 2018.
- Abhijit S Pandya and Robert B. Macy, "Pattern Recognition with Neural Networks in C++", CRC Press, 1st Edition, 2020.

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The course will enable the student to learn the fundamental concepts of Internet of Things and an exposure towards the development of low-cost embedded systems which could interact with cloud based applications.

COURSE CONTENT:

Introduction to IoT

IoT Definition: Characteristics. Sensing – Actuation - Networking Basics – Communication Protocols - Physical & Logical Design of IoT - Communication models & APIs. IoT enabling technologies – IoT Levels and Deployment Templates – IoT Functional Blocks.

M2M and IoT Architecture

Building Architecture – An IoT Architecture Outline – M2M and IoT Technology Fundamentals: Devices and Gateways, Local and Wide Area Networking - Data Management - M2M and IoT Analytics - Knowledge Management - IoT Reference Model.

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Developing IoT Applications

IoT Platforms Design Methodology – IoT Physical Devices and Endpoints: Introduction to Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – IoT Physical Servers and Cloud Offerings.

Cloud for IoT

Introduction – IoT with Cloud Challenges – Selection of Cloud service providers for IoT Applications: An overview. Introduction to Fog Computing – Cloud Computing: Security Aspects.

Security Issues and Case Studies

IoT Security issues and Challenges - Real Time Applications of IoT: Weather Monitoring System – Smart Lighting - Air pollution Monitoring System – Smart Plant irrigation System – Forest Fire Detection System.

COURSE OUTCOMES:

- CO1: Ability to understand operating principles of IoT Devices.
- CO2: Ability to understand the integration of Cloud and IoT, Fog computing.
- CO3: Ability to describe an IoT architecture with respect to M2M Communications.
- **CO4:** Ability to demonstrate several security issues and challenges of collaborative data acquisition in IoT.

CO4: Ability to develop IoT based solutions for various real time problems.

CO5: Ability to design an architectural framework for an IoT environment.

- Arshdeep Bahga and Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 1st Edition, 2015.
- Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
- 3. Shriram K Vasudevan, Abhishek S N and Sundaram R M D, "Internet of Things, First Edition", Wiley India, 2019.
- 4. Raj Kamal, "Internet of Things", 1st Edition, Mc Graw Hill Education, 2017.
- Simon Monk, "Programming the Raspberry Pi: Getting Started with Python", 2nd Edition, McGraw-Hill Education, 2016.
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COURSE OBJECTIVES:

This course will enable the students to learn different kinds and sources of big data and to learn about the different data analytics techniques.

COURSE CONTENT:

Introduction to Big Data

Characteristics of Data- Evolution of Big Data- Definition of Big Data- Challenges with Big Data-Traditional Business Intelligence (BI) versus Big Data-A Typical Data Warehouse Environment- A Typical Hadoop Environment.

Big Data Analytics

Classification of Analytics-Top Challenges Facing Big Data-Importance of Big Data Analytics-Data Science-Terminologies Used in Big Data Environments-Challenges Facing Big Data-Few Analytics Tools: Apache Spark-Tableau public-Excel-KNIME, Rapid Miner-QlikView- R Programming-Python.

Data Collection, Sampling and Preprocessing

Types of Data Source-Types of Data Elements-Visual data exploration-Exploratory statistical analysis-Missing values-Outlier detection and Treatment-Standardizing data- Categorization-Variable Selection- Data Analytics Lifecycle Overview: Discovery - Data Preparation - Model Planning - Model Building Sampling.

Predictive Analytics Applications

Simple Linear Regression-Salary Forecasting-Lasso Regression - Analyze multiple stress scenarios-Logistic Regression- predict house values in real estate business-Multivariate Regression - find the best combination of factors to increase footfalls in the store. Multiple Regression - determine claim worthiness for insurance industry-Support Vector Machines –Face Detection.

Descriptive Analytics and Social Network Analytics

Association Rules- Market basket analysis- Sequence Rules- Restaurant recommendation- Segmentation-Market Segmentation-Social network metrics-Social Network Learning- Relational Neighbor Classifier- Probabilistic Relational Neighbor Classifier-Relational Logistic Regression-Collective Inferencing- Egonets- Bigraphs.

COURSE OUTCOMES:

- **CO1:** Ability to describe large-scale data challenges of volume, variety, velocity, and veracity.
- CO2: Ability to compare different data platforms.
- **CO3:** Ability to use a statistical programming language such as R or Python.
- **CO4:** Ability to apply appropriate data analysis methods to solve real-world problems.
- **CO5:** Ability to apply a data analytics lifecycle to a case study scenario.
- **CO6:** Ability to perform data preprocessing techniques

REFERENCES

- Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publication, 1st Edition, 2014.
- 2. Subhashini Chellappan, Seema Acharya, "Big Data and Analytics", Wiley Publication, 2nd Edition, 2019.
- Walter W. Piegorsch, "Statistical Data Analytics Foundations for Data Mining, Informatics, and Knowledge Discovery", Wiley Publication, 1st Edition, 2015.
- Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2nd Edition, 2014.
- 5. Bill Franks," Taming the Big Data Tidal Wave: Finding opportunities in Huge data Streams with Advanced Analytics", John Wiley & Sons, 2012.

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COURSE OBJECTIVE:

The course will enable the students to learn the basic concepts, architecture of cloud computing and techniques of virtualization and also get familiarized with the cloud platforms.

COURSE CONTENT:

Introduction to Cloud Computing

Cloud computing at a glance- Historical Developments: Distributed Systems – Virtualization – Web 2.0 – Service-oriented Computing – Utility-oriented Computing – Building cloud computing environments: Application Development – Infrastructure and system development – Computing platforms and technologies.

Virtualization

Introduction – Characteristics of virtualized environments: Increased Security – Managed Execution – Portability – Taxonomy of virtualization techniques – virtualization and cloud computing – Pros and cons of virtualization – Technology examples: Xen – VMware – Microsoft Hyper-V.

Cloud Computing Architecture

Introduction – The cloud reference model- Types of clouds: Public clouds – Private clouds – Hybrid clouds – Community clouds – Economics of the cloud –Open challenges: Cloud interoperability and standards – scalability and fault-tolerance – security, trust and privacy – organizational aspects.

Cloud Platforms in Industry and Research

Amazon Web Services: computer services – storage services – communication services – additional services – Google AppEngine: Architecture – Application life

cycle – Cost Model – Observations – Microsoft Azure: Azure core concepts – SQL Azure – Windows Azure platform appliance – Openstack – OpenNebula.

Applications and Advances in Cloud Computing

Scientific Applications – Business and consumer applications – Energy efficiency in clouds – market-based managements of clouds – Federated clouds/ InterCloud-Third-party cloud services.

COURSE OUTCOMES:

- **CO1:** Ability to demonstrate the conceptual terms of cloud computing.
- **CO2:** Ability to categorize the different service types within cloud service delivery.
- **CO3:** Ability to compare the infrastructure differences between public cloud computing, private cloud computing, and hybrid models.
- **CO4:** Ability to explain the advantages and disadvantages of using virtualized infrastructure.
- CO5: Ability to contrast the advantages and disadvantages of cloud applications.

CO6: Ability to contrast the different categories of cloud computing services

REFERENCES:

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing". McGraw Hill Education, 1st Edition, 2017

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- 2. Rajiv Misra, Yashwant Singh Patel, "Cloud and Distributed Computing: Algorithms and Systems", Wiley, 1st Edition. 2020.
- Rajkumar Buyya, James Broberg, Andrzej Goscinski, "Cloud Computing: Principles and Paradigms". Wiley, 1st Edition, 2013.
- 4. Sandeep Bowmik, "Cloud Computing", Cambridge University Press, 1st Edition. 2017.
- 5. Dr Gautam Shroff, "Enterprise Cloud Computing: Technology, Architecture, Applications", Cambridge University Press, USA, 2010.

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COURSE OBJECTIVES

The course will enable the students to obtain practical experience with data analytics algorithms and get familiarized with the development of web services and applications in the cloud framework.

COURSE CONTENT:

List of Experiments

- 1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
- 2. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
- 3. Install a C compiler in the virtual machine and execute a sample program.
- 4. Show the virtual machine migration based on the certain condition from one node to the other.
- 5. Find procedure to install storage controller and interact with it.
- 6. Find procedure to set up the one node Hadoop cluster.
- 7. Mount the one node Hadoop cluster using FUSE.
- 8. Write a word count program to demonstrate the use of Map and Reduce tasks.
- 9. Implementation of Regression Techniques (Linear, Multiple and Logistic).
- 10. Implementation of Decision Tree learning.
- 11. Implementation of Random Forest. ATORE 10
- 12. Implementation of Clustering (K-Means, Hierarchical).
- 13. Implementation of Association Rule Mining.
- 14. Implementation of k-nearest neighbour's algorithm.
- 15. Implementation of classification using SVM.

COURSE OUTCOMES:

- **CO1**: To develop the ability to build and assess data-based models.
- **CO2:** Data analyses with professional statistical software.
- CO3: Demonstrate skill in data management.
- **CO4:** To use the cloud tool kits.

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CO5: To design and implement applications on the Cloud.

REFERENCES:

- 1. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publication, 1st Edition, 2014.
- Subhashini Chellappan, Seema Acharya, "Big Data and Analytics", Wiley Publication, 2nd Edition, 2019.
- 3. Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2nd Edition, 2014.
- 4. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing". McGraw Hill Education, 1st Edition, 2017
- 5. Rajiv Misra, Yashwant Singh Patel, "Cloud and Distributed Computing: Algorithms and Systems", Wiley, 1st Edition. 2020.

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COURSE OBJECTIVE:

The course will enable the students to avail a hands-on experience on the various development kits, components and sensors used with respect to the deployment of IoT.

COURSE CONTENT:

List of Experiments

- 1. Introduction to various sensors and various actuators & its Application (Students have to prepare the report for the same).
 - i. PIR Motion Sensor.
 - ii. Moisture Sensor.
 - iii. <u>Temperature Sensor.</u>
 - iv. Touch Sensor.
 - v. Infrared Sensor.
 - vi. **RFID** Sensor.
 - vii. Bluetooth Module.
 - viii. Wi-Fi Module.
- 2. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
- To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
- 4. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
- 5. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
- 6. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
- 7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.

- 8. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud.
- 9. To install MySQL database on Raspberry Pi and perform basic SQL queries.
- 10. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
- 11. Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.
- 12. Measurement and transmission of room temperature with date and time to the web server using Wi-Fi module.
- 13. Detection of ethanol and carbon-dioxide in the air using Gas sensors.
- 14. Detection of obstacles using infrared sensor and measure the distance using ultrasonic sensor.
- 15. Tracking the location of a particular object through GPS module and to find the speed of a moving object using accelerometer sensor.

COURSE OUTCOMES:

CO1: Ability to configure IoT development kits (Arduino/ Raspberry Pi)CO2: Ability to interface various sensors and actuators with development kits.CO3: Ability to interface with development kits with communication modules.CO4: Ability to interface the IoT components with a cloud environment.

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REFERENCES:

- Arshdeep Bahga and Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 1st Edition, 2015.
- Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
- Shriram K Vasudevan, Abhishek S N and Sundaram R M D, "Internet of Things, First Edition", Wiley India, 2019.
- 4. Raj Kamal, "Internet of Things", 1st Edition, Mc Graw Hill Education, 2017.
- Simon Monk, "Programming the Raspberry Pi: Getting Started with Python", 2nd Edition, McGraw-Hill Education, 2016.

SEVENTH SEMESTER SYLLABUS

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COURSE OBJECTIVE:

The course will enable the student to learn the measures that protect and defend information and information systems by ensuring the various security services related to them. It also provides a deeper insight on the recent techniques and procedures used to safeguard information.

COURSE CONTENT:

Symmetric Ciphers

The OSI Security Architecture – Attacks – Services – Security Mechanisms – Model for Network Security – Basic Concepts of Number Theory and Finite Fields -Symmetric Cipher Model: Cryptography, Cryptanalysis – Substitution Cipher: Caesar Cipher, Monoalphabetic Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Cipher, One-time Pad – Transposition techniques – Rotor Machines – Steganography – Stream Ciphers and Block Ciphers – The Feistel Cipher – Data Encryption Standard – Block Cipher Design Principles – Advanced Encryption Standard – Multiple Encryption and Triple DES – Block cipher modes of operation.

Asymmetric Ciphers

Prime Numbers – Fermat's and Euler's Theorem – Test for Primality – Chinese Remainder Theorem – Principles of Public Key Encryption – the RSA Algorithm – Diffie Hellman key exchange – Elgamal Cryptographic System – Elliptic Curve Arithmetic – Elliptic Curve Cryptography

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Cryptographic Data Integrity Algorithms

Hash Functions based on Cipher Block Chaining – Secure Hash Algorithm – SHA-3 – Message Authentication Requirements – Message Authentication Functions – Requirements for Message Authentication Codes – Security of MACs – MACs based on Hash functions: HMAC – MACs based on Block ciphers: DAA, CMAC – Authentication Encryption: CCM, GCM – Digital Signature: Properties, Attacks and Forgeries, Requirements – Elgamal Digital Signature Scheme – Schnorr Digital Signature Scheme – NIST Digital Signature Algorithm – Elliptic Curve Digital Signature Algorithm

Mutual Trust

Symmetric key distribution using Symmetric and Asymmetric encryption – Distribution of Public keys – X.509 Certificates – Public-key infrastructure - Remote User-Authentication Principles - Remote User-Authentication Using Symmetric Encryption – Kerberos - Remote User-Authentication using asymmetric encryption -Federated Identity Management - Personal Identity Verification

Network and Internet Security

Network Access Control - Extensible Authentication Protocol - Cloud Security Risks and Countermeasures – Data Protection in Cloud - Cloud Security as a Service - Web Security Considerations - Secure Sockets Layer - Transport Layer Security – HTTPS - Secure Shell (SSH) - Wireless Security - Mobile Device Security - IEEE 802.11i Wireless LAN Security - Pretty Good Privacy - S/MIME – IP Security

COURSE OUTCOMES:

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- **CO1:** Ability to describe the concepts of risk, threats, vulnerabilities and attack vectors.
- CO2: Ability to describe the architecture for public and private key cryptography and role of public key infrastructure (PKI) in network security.
- **CO3:** Ability to identify the appropriate defense mechanisms and their limitations given a network threat.
- **CO4:** Ability to identify the threats faced by non-wired networks.
- **CO5:** Ability to apply appropriate known cryptographic techniques for a given scenario.
- **CO6:** Ability to deploy data protection and security in a cloud environment.

REFERENCES:

- William Stallings, "Cryptography and Network Security Principles and Practice", Pearson Education India, 7th Edition, 2017.
- 2. Behrouz A Forouzan and Debdeep Mukhopadhyay, "Cryptography and Network Security", McGraw Hill, 3rd Edition, 2015.
- 3. Atul Kahate, "Cryptography and Network Security", McGraw Hill Education, 4th Edition, 2019.
- 4. Bernard L. Menezes and Ravinder Kumar, "Cryptography, Network Security, and Cyber Laws", Cengage Learning India Pvt. Ltd., 1st Edition, 2018.
- Jonathan Katz and Yehuda Lindell, "Introduction to Modern Cryptography", CRC Press, 2nd Edition, 2014.

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