DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ANNA UNIVERSITY, CHENNAI – 600 025.

Vision of the Department

The vision of the Department is to create computing professionals, researchers, and entrepreneurs, with high technical competency and communication skills by setting high standards in academic excellence and meeting the future needs of the society.

Mission of the Department

The mission of the Department is to

- Provide motivated faculty and state of the art facilities for education and research, both in foundational aspects and emerging computing trends.
- Develop knowledgeable, industry-ready students with pertinent competencies such as problem solving, leadership, and interpersonal skills.
- Inculcate responsibility through sharing of knowledge and innovative computing solutions that benefit the society-at-large.
- Engage in collaborative research with academia and industry for seamless transfer of knowledge resulting in patents, products and commercialization.
- Generate adequate resources for research activities from sponsored projects and consultancy.

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PROGRAMME EDUCATIONAL OBJECTIVES:

The objectives of the programme can be broadly defined on three counts:

- To comprehend the fundamental concepts in Computer Science and Engineering and apply the interaction between theory and practice for problem solving.

- To critically analyze current systems and trends, and to develop innovative solutions that cater to the dynamic nature of the computer industry, and lead to entrepreneurial initiatives.

- To pursue lifelong multidisciplinary learning as professional engineers, researchers and scientists and effectively communicate technical information, function effectively on teams, and apply computer engineering solutions within a global, societal, and environmental context.

PROGRAMME OUTCOMES:

Students will be able to:

a) Engineering Knowledge: Apply mathematical foundations, algorithmic principles, and Computer Science theory in the modeling and design of computer based systems of varying complexity

b) Problem Analysis: Critically analyze a problem, identify, formulate and solve problems in the field of Computer Science and Engineering, considering current and future trends

c) Design/Development of Solutions: Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, and sustainability in the field of computer engineering

d) Conduct Investigations of Complex Problems: Perform experiments and organize, analyze, and interpret data.

e) Modern Tool Usage: Use current techniques, skills, and tools necessary for computing practice

f) Engineer and Society: Apply knowledge and reasoning to assess issues related to social, ethical, legal, economical, health and safety and apply them to professional engineering practice

g) Environment and Sustainability: Analyze the local and global impact of computing on individuals, organizations, and society and look at sustained development

h) Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice

i) Individual and Team Work: Function effectively on teams to accomplish a common goal

j) Communication: Communicate effectively with a range of audiences and prepare technical documents and make effective oral presentations

k) Project Management and Finance: Demonstrate knowledge of engineering and management principles to develop innovative solutions and manage projects effectively, both as a member and a leader in a team

l) Life-long Learning: Recognize the need for and possess an ability to engage in life-long learning, leading to continuing professional development

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES									
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**
1.	√	√	√					√		
2.	√	√	√	√	√	√		√	√	√
3.	√	√	√			√	√	√	√	√
4.			√	√	√	√	√	√	√	√
5.		√	√			√	√	√	√	√

			a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**
YEAR I	**SEMESTER I**	Foundational English				√	√	√				
		Mathematics I	√	√	√					√		
		Engineering Physics		√	√					√		
		Engineering Chemistry		√	√					√		
		Computing Techniques	√	√	√					√		
		Basic Sciences Laboratory	√	√	√	√						
		Computer Practices Laboratory	√	√	√					√		√

	SEMESTER II	Technical English				√	√	√				
		Mathematics II	√	√	√					√		
		Environmental Science and Engineering			√			√				
		Engineering Graphics	√									√
		Electronic Devices and Circuits for Computer Engineers	√	√	√					√		
		Programming and Data Structures I	√	√	√					√		
		Engineering Practices Laboratory	√	√	√					√		
		Programming and Data Structures Laboratory I	√	√	√					√		
YEAR II	SEMESTER III	Object Oriented Programming	√	√	√					√		
		Algebra and Number Theory	√	√	√					√		
		Digital Principles and Design	√	√	√					√		
		Electrical Engineering and Control Systems	√	√	√					√		
		Programming and Data Structures II	√	√	√					√		
		Software Engineering	√	√	√					√		
		Digital Laboratory	√	√	√					√		
		Programming and Data Structures Laboratory II	√	√	√					√		
	SEMESTER IV	Probability and Queuing Theory	√	√	√					√		
		Design and Analysis of Algorithms	√	√	√				√	√		
		Database Management Systems	√	√	√				√	√		
		Computer Architecture	√	√	√	√			√	√		
		Operating Systems	√	√	√				√	√		
		Principles of				√	√	√				

		Management										
		Database Management Systems Laboratory	√	√	√				√	√		
		Operating Systems Laboratory	√	√	√				√	√		
YEAR III	SEMESTER V	Data Communication and Computer Networks	√	√	√				√	√		
		Object Oriented Analysis and Design	√	√	√					√		
		Embedded System Design	√	√	√				√	√		
		Digital Signal Processing	√	√	√				√	√		
		Theory of Computation	√	√	√				√	√		
		Professional Elective-I										
		Computer Networks Laboratory	√	√	√				√	√		
		Case Tools Laboratory	√	√	√				√	√		
	SEMESTER VI	Compiler Design	√	√	√				√	√	√	
		Machine Learning Techniques	√	√	√				√	√	√	
		Web Programming	√	√	√				√	√	√	
		Parallel and Distributed Computing	√	√	√				√	√	√	
		Professional Elective-II										
		Professional Elective-III										
		Compiler Laboratory	√	√	√				√	√	√	
		Web Technology Laboratory	√	√	√				√	√	√	
YEAR IV	SEMESTER VII	Security in Computing	√	√	√				√	√	√	
		Cloud Computing Techniques	√	√	√				√	√	√	
		Wireless Networks	√	√	√				√	√	√	
		Professional Elective-IV										
		Professional Elective-V										
		Open Elective-I										

		Security Laboratory	√	√	√				√	√	√	
		Comprehension and Technical Report					√		√		√	√
		Creative and Innovative Project	√	√	√	√	√	√	√	√	√	√
	SEMESTER VIII	Professional Elective-VI										
		Open Elective-II										
		Project Work	√	√	√	√	√	√	√	√	√	√

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CURRICULA AND SYLLABI FOR I - VIII SEMESTERS

SEMESTER I

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS7151	Foundational English	HS	4	4	0	0	4
2.	MA7151	Mathematics I	BS	4	4	0	0	4
3.	PH7151	Engineering Physics	BS	3	3	0	0	3
4.	CY7151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE7151	Computing Techniques	ES	3	3	0	0	3
PRACTICAL								
6.	BS7161	Basic Sciences Laboratory	BS	4	0	0	4	2
7.	GE7161	Computer Practices Laboratory	ES	4	0	0	4	2
			TOTAL	**25**	**17**	**0**	**8**	**21**

SEMESTER II

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS7251	Technical English	HS	4	4	0	0	4
2.	MA7251	Mathematics II	BS	4	4	0	0	4
3.	GE7251	Environmental Science and Engineering	HS	3	3	0	0	3
4.	GE7152	Engineering Graphics	ES	5	3	2	0	4
5.	EC7253	Electronic Devices and Circuits for Computer Engineers	ES	3	3	0	0	3
6.	CS7251	Programming and Data Structures I	PC	3	3	0	0	3
PRACTICAL								
7.	GE7162	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	CS7211	Programming and Data Structures Laboratory I	PC	4	0	0	4	2
			TOTAL	**30**	**20**	**2**	**8**	**25**

SEMESTER III

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	CS7301	Object Oriented Programming	PC	3	3	0	0	3
2.	CS7302	Programming and Data Structures II	PC	3	3	0	0	3
3.	CS7351	Software Engineering	PC	3	3	0	0	3
4.	EE7306	Electrical Engineering and Control Systems	ES	3	3	0	0	3
5.	IT7351	Digital Principles and Design	ES	3	3	0	0	3
6.	MA7359	Algebra and Number Theory	BS	4	4	0	0	4
PRACTICAL								
7.	CS7311	Digital Laboratory	ES	4	0	0	4	2
8.	CS7312	Programming and Data Structures Laboratory II	PC	4	0	0	4	2
			TOTAL	**27**	**19**	**0**	**8**	**23**

SEMESTER IV

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	CS7401	Database Management Systems	PC	3	3	0	0	3
2.	CS7402	Design and Analysis of Algorithms	PC	3	3	0	0	3
3.	CS7451	Computer Architecture	PC	4	4	0	0	4
4.	CS7452	Operating Systems	PC	3	3	0	0	3
5.	MA7355	Probability and Queueing Theory	BS	4	4	0	0	4
6.	MG7451	Principles of Management	HS	3	3	0	0	3
PRACTICAL								
7.	CS7411	Database Management Systems Laboratory	PC	4	0	0	4	2
8.	CS7412	Operating Systems Laboratory	PC	4	0	0	4	2
			TOTAL	**28**	**20**	**0**	**8**	**24**

SEMESTER V

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	CS7501	Data Communication and Computer Networks	PC	3	3	0	0	3
2.	CS7502	Embedded System Design	PC	4	4	0	0	4
3.	CS7503	Object Oriented Analysis and Design	PC	3	3	0	0	3
4.	CS7504	Theory of Computation	PC	3	3	0	0	3
5.	CS7551	Digital Signal Processing	PC	3	3	0	0	3
6.		Professional Elective-I	PE	3	3	0	0	3
PRACTICAL								
7.	CS7511	Case Tools Laboratory	PC	4	0	0	4	2
8.	CS7512	Computer Networks Laboratory	PC	4	0	0	4	2
			TOTAL	**27**	**19**	**0**	**8**	**23**

SEMESTER VI

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	CS7601	Compiler Design	PC	3	3	0	0	3
2.	CS7602	Machine Learning Techniques	PC	3	3	0	0	3
3.	CS7603	Parallel and Distributed Computing	PC	3	3	0	0	3
4.	CS7604	Web Programming	PC	3	3	0	0	3
5.		Professional Elective-II	PE	3	3	0	0	3
6.		Professional Elective-III	PE	3	3	0	0	3
PRACTICAL								
7.	CS7611	Compiler Laboratory	PC	4	0	0	4	2
8.	CS7612	Web Technology Laboratory	PC	4	0	0	4	2
			TOTAL	**26**	**18**	**0**	**8**	**22**

SEMESTER VII

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	CS7701	Cloud Computing Techniques	PC	4	4	0	0	4
2.	CS7702	Security in Computing	PC	3	3	0	0	3
3.	CS7703	Wireless Networks	PC	3	3	0	0	3
4.		Professional Elective-IV	PE	3	3	0	0	3
5.		Professional Elective-V	PE	3	3	0	0	3
6.		Open Elective-I *****	OE	3	3	0	0	3
PRACTICAL								
7.	CS7711	Creative and Innovative Project #	EEC	4	0	0	4	2
8.	CS7712	Security Laboratory	PC	4	0	0	4	2
9.	CS7713	Comprehension and Technical Report	EEC	2	0	0	2	1
			TOTAL	**29**	**19**	**0**	**10**	**24**

SEMESTER VIII

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Professional Elective-VI	PE	3	3	0	0	3
2.		Open Elective-II*	OE	3	3	0	0	3
PRACTICAL								
3.	CS7811	Project Work	EEC	20	0	0	20	10
			TOTAL	**26**	**6**	**0**	**20**	**16**

TOTAL NO. OF CREDITS:178

*** Course from the curriculum of other UG Programmes**

 # The Contact periods will not appear in the slot time table

HUMANITIES AND SOCIAL SCIENCES (HS)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS7151	Foundational English	HS	4	4	0	0	4
2.	HS7251	Technical English	HS	4	4	0	0	4
3.	GE7251	Environmental Science and Engineering	HS	3	3	0	0	3
4.	MG7451	Principles of Management	HS	3	3	0	0	3

BASIC SCIENCES (BS)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA7151	Mathematics I	BS	4	4	0	0	4
2.	PH7151	Engineering Physics	BS	3	3	0	0	3
3.	CY7151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS7161	Basic Sciences Laboratory	BS	4	0	0	4	2
5.	MA7251	Mathematics II	BS	4	4	0	0	4
6.	MA7359	Algebra and Number Theory	BS	4	4	0	0	4
7.	MA7355	Probability and Queueing Theory	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

S. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	GE7151	Computing Techniques	ES	3	3	0	0	3
2.	GE7161	Computer Practices Laboratory	ES	4	0	0	4	2
3.	GE7152	Engineering Graphics	ES	5	3	2	0	4
4.	EC7253	Electronic Devices and Circuits for Computer Engineers	ES	3	3	0	0	3
5.	GE7162	Engineering Practices Laboratory	ES	4	0	0	4	2
6.	IT7351	Digital Principles and Design	ES	3	3	0	0	3
7.	EE7306	Electrical Engineering and Control Systems	ES	3	3	0	0	3
8.	CS7311	Digital Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS7251	Programming and Data Structures I	PC	3	3	0	0	3
2.	CS7211	Programming and Data Structures I Laboratory	PC	4	0	0	4	2
3.	CS7301	Object oriented Programming	PC	3	3	0	0	3
4.	CS7302	Programming and Data Structures II	PC	3	3	0	0	3
5.	CS7351	Software Engineering	PC	3	3	0	0	3
6.	CS7312	Programming and Data Structures II Laboratory	PC	4	0	0	4	2
7.	CS7402	Design and Analysis of Algorithms	PC	3	3	0	0	3
8.	CS7401	Database Management Systems	PC	3	3	0	0	3
9.	CS7451	Computer Architecture	PC	4	4	0	0	4
10.	CS7452	Operating Systems	PC	3	3	0	0	3
11.	CS7411	Database Management Systems Laboratory	PC	4	0	0	4	2
12.	CS7412	Operating Systems Laboratory	PC	4	0	0	4	2
13.	CS7501	Data Communication and Computer Networks	PC	3	3	0	0	3
14.	CS7503	Object Oriented Analysis and Design	PC	3	3	0	0	3
15.	CS7502	Embedded System Design	PC	4	4	0	0	4
16.	CS7551	Digital Signal Processing	PC	3	3	0	0	3
17.	CS7504	Theory of Computation	PC	3	3	0	0	3
18.	CS7512	Computer Networks Laboratory	PC	4	0	0	4	2
19.	CS7511	Case Tools Laboratory	PC	4	0	0	4	2
20.	CS7601	Compiler Design	PC	3	3	0	0	3
21.	CS7602	Machine Learning Techniques	PC	3	3	0	0	3
22.	CS7604	Web Programming	PC	3	3	0	0	3
23.	CS7603	Parallel and Distributed Computing	PC	3	3	0	0	3

24.	CS7611	Compiler Laboratory	PC	4	0	0	4	2
25.	CS7612	Web Technology Laboratory	PC	4	0	0	4	2
26.	CS7702	Security in Computing	PC	3	3	0	0	3
27.	CS7701	Cloud Computing Techniques	PC	4	4	0	0	4
28.	CS7703	Wireless Networks	PC	3	3	0	0	3
29.	CS7712	Security Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS7001	Adhoc and Sensor Networks	PE	3	3	0	0	3
2.	CS7002	Advanced Topics on Databases	PE	3	3	0	0	3
3.	CS7003	Agile Methodologies	PE	3	3	0	0	3
4.	CS7004	Artificial Intelligence	PE	3	3	0	0	3
5.	CS7005	Big Data Analytics	PE	3	3	0	0	3
6.	CS7006	Computer Graphics Theory and Practice	PE	3	3	0	0	3
7.	CS7007	Cyber Forensics	PE	3	3	0	0	3
8.	CS7008	Database Tuning	PE	3	3	0	0	3
9.	CS7009	Game Theory	PE	3	3	0	0	3
10.	CS7010	GPU Architecture and Programming	PE	3	3	0	0	3
11.	CS7011	Green Computing	PE	3	3	0	0	3
12.	CS7012	Information Retrieval Techniques	PE	3	3	0	0	3
13.	CS7013	Information Visualization Techniques	PE	3	3	0	0	3
14.	CS7014	Microprocessors and Interfacing	PE	3	3	0	0	3
15.	CS7015	Mobile Communications	PE	3	3	0	0	3
16.	CS7016	Natural Language Processing	PE	3	3	0	0	3
17.	CS7017	Programming Paradigms	PE	3	3	0	0	3
18.	CS7018	Project Management	PE	3	3	0	0	3
19.	CS7019	Python Programming	PE	3	3	0	0	3
20.	CS7020	Software Agents	PE	3	3	0	0	3
21.	CS7021	Software Defined Networks	PE	3	3	0	0	3
22.	CS7022	Software Quality and Testing	PE	3	3	0	0	3
23.	CS7071	Data Warehousing and Data Mining	PE	3	3	0	0	3
24.	CS7072	Graph Theory	PE	3	3	0	0	3
25.	CS7073	Multimedia Tools and Techniques	PE	3	3	0	0	3
26.	CS7074	Soft Computing	PE	3	3	0	0	3
27.	CS7075	Web Design and Management	PE	3	3	0	0	3
28.	GE7071	Disaster Management	PE	3	3	0	0	3
29.	GE7072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3
30.	GE7074	Human Rights	PE	3	3	0	0	3
31.	GE7351	Engineering Ethics and Human Values	PE	3	3	0	0	3
32.	GE7652	Total Quality Management	PE	3	3	0	0	3
33.	IT7071	Digital Image Processing	PE	3	3	0	0	3
34.	IT7072	TCP/IP Design and Implementation	PE	3	3	0	0	3

35.	IT7551	Unix Internals	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS7713	Comprehension and Technical Report	EEC	2	0	0	2	1
2.	CS7711	Creative and Innovative Project	EEC	4	0	0	4	2
3.	CS7811	Project Work	EEC	20	0	0	20	10

SUMMARY

S.NO.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL
		I	II	III	IV	V	VI	VII	VIII	
1.	HS	4	7		3					14
2.	BS	12	4	4	4					24
3.	ES	5	9	8						22
4.	PC		5	11	17	20	16	12		81
5.	PE					3	6	6	3	18
6.	OE							3	3	6
7.	EEC							3	10	13
	Total	**21**	**25**	**23**	**24**	**23**	**22**	**24**	**16**	**178**
8.	Non Credit / Mandatory									

HS7151 FOUNDATIONAL ENGLISH L T P C
4 0 0 4

COURSE DESCRIPTION:
This course aims at developing the language skills necessary for the first year students of Engineering and Technology.

OBJECTIVES:

- To identify the language structure needed for various rhetoric functions in a formal context
- To interpret various types of visual materials found in authentic language contexts
- To develop students' writing skills so that they are able to express their thoughts and ideas using appropriate word forms in their writing
- To develop speaking skills of students so that they are able to build up on their interpersonal skills to work as a team.
- To critically analyse any kind of reading materials available in authentic contexts

CONTENTS

UNIT I GREETING AND INTRODUCING ONESELF 12
Listening- Types of Listening – Listening to Short Talks, conversations; **Speaking** – Speaking about One's Place, Important Festivals etc. – Introducing oneself, one's family/ friend; **Reading** – Skimming a Passage– Scanning for specific information; **Writing**- Guided Writing - Free writing on any given topic (My Favorite Place/ Hobbies/ School Life, Writing about one's Leisure Time Activities, hometown, etc.); **Grammar** – Tenses (present and present continuous) -Question types - Regular and Irregular Verbs; **Vocabulary** – Synonyms and Antonyms.

UNIT II GIVING INSTRUCTIONS AND DIRECTIONS 12
Listening – Listening and Responding to instructions; **Speaking** – Telephone Etiquette - Giving Oral Instructions/ Describing a Process – Asking and Answering Questions; **Reading** – Reading and Finding Key Information in a Given Text - Critical Reading - **Writing –** Process Description (non-technical)- **Grammar** – Tense (simple past& past continuous) - Use of Imperatives – Subject – verb agreement – Active and Passive Voice; - **Vocabulary** – Compound Words – Word Formation – Word Expansion (root words).

UNIT III READING AND UNDERSTANDING VISUAL MATERIAL 12
Listening- Listening to Lectures/ Talks and Completing a Task; **Speaking** –Role play/ Simulation – Group interaction; **Reading** – Reading and Interpreting Visual Material; **Writing**- Jumbled Sentences – Discourse Markers and Cohesive Devices – Essay Writing (cause & effect/ narrative);**Grammar** – Tenses (perfect), Conditional Clauses –Modal verbs; **Vocabulary** –Cause and Effect Words; Phrasal Verbs in Context.

UNIT IV CRITICAL READING AND WRITING 12
Listening- Watching Videos/ Documentaries and Responding to Questions based on them; **Speaking** Informal and Formal Conversation; **Reading** –Critical reading (prediction & inference);**Writing**–Essay writing (compare & contrast/ analytical) – Interpretation of Visual Materials; **Grammar** – Tenses (future time reference);**Vocabulary** – One Word Substitutes (with meanings) – Use of Abbreviations & Acronyms – Idioms in Sentences.

UNIT V LETTER WRITING AND SENDING E-MAILS 12
Listening- Listening to Programs/Broadcast/ Telecast/ Podcast; **Speaking** – Giving impromptu Talks, Making Presentations on given Topics- Discussion on the Presentation; **Reading** – Extensive Reading; **Writing**- Poster Making – Letter Writing (Formal and E-mail) ;**Grammar** – Direct and Indirect Speech – Combining Sentences using Connectives; **Vocabulary** –Collocation;

TEACHING METHODS:
Interactive sessions for the speaking module.

Use of audio – visual aids for the various listening activities.
Contextual Grammar Teaching.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Students will improve their reading and writing skills
- Students will become fluent and proficient in communicative English
- Students will be able to improve their interpersonal communication
- The capacity to discuss texts, verbally and in written form, with an independent intellectual perspective
- Generate skills in communication through visual imagery and media

TEXTBOOK:

1. Richards, Jack. C with Jonathan Hull and Susan Proctor," New Interchange : English for International Communication. (level2, Student's Book)", Cambridge University Press, 2010.

REFERENCES:

1. Bailey, Stephen, "Academic Writing: A practical guide for students", 2011.
2. Morgan, David and Nicholas Regan, "Take-Off: Technical English for Engineering", London: Garnet Publishing, 2008.
3. Redston, Chris and Gillies Cunningham, "Face2Face (Pre-intermediate Student's Book& Workbook)", Cambridge University Press, 2005
4. Comfort, Jeremy, et al., "Speaking Effectively : Developing Speaking Skills for Business English" Cambridge University Press, Reprint 2011.

MA7151	MATHEMATICS – I	L	T	P	C
	(Common to all branches of B.E. / B.Tech. Programmes in I Semester)	**4**	**0**	**0**	**4**

OBJECTIVES:

- The goal of this course is for students to gain proficiency in calculus computations. In calculus, we use three main tools for analyzing and describing the behavior of functions:limits, derivatives, and integrals. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand and familiarize various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.

UNIT I DIFFERENTIAL CALCULUS 12

Representation of Functions - New Functions from Old Functions - Limit of a Function - Limits at Infinity - Continuity - Derivatives - Differentiation Rules - Polar Coordinate System - Differentiation in Polar Coordinates - Maxima and Minima of Functions of One Variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial Derivatives – Homogeneous Functions and Euler's Theorem – Total Derivative – Differentiation of Implicit Functions – Change of Variables – Jacobians – Partial Differentiation of Implicit Functions – Taylor's Series for Functions of Two Variables – Errors and Approximations – Maxima and Minima of Functions of Two Variables – Lagrange's Method of Undetermined Multipliers.

UNIT III INTEGRAL CALCULUS 12

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.

UNIT IV MULTIPLE INTEGRALS 12

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.

UNIT V DIFFERENTIAL EQUATIONS 12

Method of Variation of Parameters – Method of Undetermined Coefficients – Homogenous Equation of Euler's And Legendre's Type – System of Simultaneous Linear Differential Equations with Constant Coefficients.

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Assimilate ideas of limits and continuity and an ability to calculate with them and apply them.
- Improved facility in algebraic manipulation.
- Fluency in differentiation.
- Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
- Familiarize the ideas of differential equations and facility in solving simple standard examples.

TEXTBOOKS:

1. James Stewart, "Calculus with Early Transcendental Functions", Cengage Learning, 2008.
2. Narayanan S. and Manicavachagom Pillai T. K., "Calculus" Volume I and II, S. Viswanathan Publishers, 2007.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, Ninth Edition, New Delhi, 2014.
4. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Forty Third Edition, 2014.

REFERENCES:

1. Ramana. B.V., "Higher Engineering Mathematics", Tata Mc Graw Hill, Reprint, 2010.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, Third Edition, 2007.
3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), Seventh Edition, 2009.
4. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, Second Edition, 2009.
5. Peter V. O'Neil, "Advanced Engineering Mathematics", Cengage Learning India, 2007.

PH7151 **ENGINEERING PHYSICS** **L T P C**

(Common to all branches of B.E / B.Tech Programmes) **3 0 0 3**

OBJECTIVE:

- To introduce the concept and different ways to determine moduli of elasticity and applications.
- To instill the concept of sound, reverberation, noise cancellation, and ultrasonic generation, detection and applications
- To inculcate an idea of thermal properties of materials, heat flow through materials and quantum physics
- To promote the basic understanding of interferometers, principles and applications of lasers, optical fibers and sensors
- To establish a sound grasp of knowledge on the basics, significance and growth of single crystals

UNIT I PROPERTIES OF MATTER 9

Elasticity – Poisson's Ratio and Relationship Between Moduli (Qualitative) - Stress-Strain Diagram for Ductile and Brittle Materials, Uses - Factors Affecting Elastic Modulus and Tensile Strength - Bending of Beams - Cantilever - Bending Moment - Young's Modulus Determination - Theory and Experiment - Uniform and Non-Uniform Bending - I Shaped Girders - Twisting Couple - Hollow Cylinder - Shaft - Torsion Pendulum - Determination of Rigidity Modulus- Moment of Inertia of a Body (Regular and Irregular).

UNIT II ACOUSTICS AND ULTRASONICS 9

Classification of Sound - Loudness and Intensity - Weber-Fechner Law - Standard Intensity and Intensity Level - Decibel - Reverberation - Reverberation Time - Calculation of Reverberation Time for Different Types of Buildings – Sound Absorbing Materials - Factors Affecting Acoustics of Buildings: Focussing, Interference, Echo, Echelon Effect, Resonance - Noise and Their Remedies. Ultrasonics: Production - Magnetostriction and Piezoelectric Methods - Detection of Ultrasound - Acoustic Grating – Ultrasonic Interferometer - Industrial Applications – Non-Destructive Testing - Ultrasonic Method: Scan Modes and Practice.

UNIT III THERMAL AND MODERN PHYSICS 9

Thermal Expansion - Thermal Stress - Expansion Joints - Bimetallic Strips - Thermal Conductivity- Heat Conductions in Solids – Flow of Heat Through Compound Media - Forbe's and Lee's Disc Method: Theory and Experiment- Black Body Radiation – Planck's Theory (Derivation) – Compton Effect – Wave Model of Radiation and Matter – Schrödinger's Wave Equation – Time Dependent and Independent Equations – Physical Significance of Wave Function – Particle in a One Dimensional Box.

UNIT IV APPLIED OPTICS 9

Interference - Michelson Interferometer: Construction, Working, Determination of Wave Length and Thickness - Anti-Reflection Coating - Air Wedge and Its Applications - Lasers – Principle and Applications – Einstein's Coefficients – CO_2 and Nd:YAG Laser - Semiconductor Lasers: Homo Junction and Hetro Junction - Construction and Working – Applications. Optical Fibres - Classification (Index & Mode Based) - Principle and Propagation of Light In Optical Fibres - Acceptance Angle and Numerical A.perture - Fibre Optic Communication System - Active and Passive Sensors.

UNIT V CRYSTAL PHYSICS 9

Single Crystalline, Polycrystalline and Amorphous Materials – Single Crystals: Unit Cell, Crystal Systems, Bravais Lattices, Directions and Planes in a Crystal, Miller Indices - Interplanar Distance for a Cubic Crystal - Coordination Number and Packing Factor for SC, BCC, FCC, HCP and Diamond Structures - Structure and Significance of Nacl, Cscl, Zns and Graphite - Crystal Imperfections: Point Defects, Line Defects – Burger Vectors, Dislocations and Stacking Faults – Growth of Single Crystals: Bridgman and Czochralski Methods.

TOTAL: 45 PERIODS

OUTCOME:

Upon Completion of the course, the students will be able to:

- Understand different moduli of elasticity, their determination and applications.
- To Understand fundamental physical principles underlying the generation and propagation of sound waves in gas and liquid
- Apply the knowledge of basic quantum mechanics, to set up one dimensional Schrodinger's wave equation and its application to matter wave system
- Describe the basic laser physics, working of lasers, holography and principle of propagation of light in optical fibers
- Recognize various planes in a crystal and describe the structure determination using x-rays. growing single crystals

TEXTBOOKS:

1. Gaur R.K. and Gupta S.L., "Engineering Physics", Dhanpat Rai Publications, 2013.
2. Palanisamy P.K, "Engineering Physics", Scitech Publications, 2006.
3. Arumugam. M, "Engineering Physics", Anuradha Publications, 2000.

REFERENCES:

1. Serway R.A. and Jewett, J.W. "Physics for Scientists and Engineers with Modern Physics". Brooks/cole Publishing Company, 2010.
2. Tipler P.A. and Mosca, G.P., "Physics for Scientists and Engineers with Modern Physics". W.H.Freeman, 2007.
3. Markert J.T., Ohanian, H. and Ohanian, M. "Physics for Engineers and Scientists". W. W.Norton and Company, 2007.

CY7151	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To develop an understanding about fundamentals of polymer chemistry.
- Brief elucidation on surface chemistry and catalysis.
- To develop sound knowledge photochemistry and spectroscopy.
- To impart basic knowledge on chemical thermodynamics.
- To understand the basic concepts of nano chemistry.

UNIT I POLYMER CHEMISTRY 9

Introduction: Functionality-Degree of Polymerization. Classification of Polymers- Natural and Synthetic, Thermoplastic and Thermosetting. Types and Mechanism of Polymerization: Addition (Free Radical, Cationic, Anionic and Living); Condensation and Copolymerization. Properties of Polymers: Tg, Tacticity, Molecular Weight-Weight Average, Number Average and Polydispersity Index. Techniques of Polymerization: Bulk, Emulsion, Solution and Suspension.

UNIT II SURFACE CHEMISTRY AND CATALYSIS 9

Adsorption-Types of Adsorption-Adsorption of Gases on Solids- Adsorption from Solutions-Types of Isotherms – Frendlich Adsorption Isotherm, Langmuir Adsorption Isotherm. Industrial Applications of Adsorption. Catalysis: Characteristics and Types of Catalysts-Homogeneous and Heterogeneous, Auto Catalysis. Enzyme Catalysis -Factors Affecting Enzyme Catalysis, Michaelis - Menton Equation. Industrial Applications of Catalysts.

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photochemistry: Laws of Photochemistry - Grotthuss-Draper Law, Stark-Einstein Law and Lambert-Beer Law. Photo Processes - Internal Conversion, Inter-System Crossing, Fluorescence, Phosphorescence, Chemiluminescence and Photo-Sensitization. Spectroscopy: Electromagnetic Spectrum-Absorption of Radiation-Electronic, Vibrational and Rotational Transitions. Width and Intensities of Spectral Lines. Spectrophotometric Estimation Of Iron.UV-Vis and IR Spectroscopy- Principles, Instrumentation (Block Diagram) and Applications.

UNIT IV CHEMICAL THERMODYNAMICS 9

Second Law: Entropy-Entropy Change for an Ideal Gas, Reversible and Irreversible Processes; Entropy of Phase Transitions; Free Energy and Work Function: Helmholtz and Gibbs Free Energy Functions; Criteria of Spontaneity; Gibbs-Helmholtz Equation; Clausius Clapeyron Equation; Maxwell Relations-Van't Hoff Isotherm and Isochore. Chemical Potential; Gibbs-Duhem Equation- Variation of Chemical Potential with Temperature and Pressure.

UNIT V NANOCHEMISTRY 9

Basics-Distinction between Molecules, Nanoparticles and Bulk Materials; Size-Dependent Properties. Preparation of Nanoparticles – Sol-Gel and Solvo - thermal. Preparation of Carbon Nanotube by Chemical Vapour Deposition and Laser Ablation. Preparation of Nanowires by VLS Growth, Electrochemical Deposition and Electro Spinning. Properties and Uses of Nanoparticles, Nanoclusters, Nanorods, Nanotubes and Nanowires.

TOTAL: 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Will be familiar with polymer chemistry, surface chemistry and catalysis.
- Will know the photochemistry, spectroscopy and chemical thermodynamics.
- Will know the fundamentals of nano chemistry.
- Understand the modified chemical or physical properties of the nano structured material
- Comprehend the concept pf structure and concept of polymers

TEXTBOOKS:

1. Jain P. C. and Monica Jain., "Engineering Chemistry", Dhanpat Rai, 2014.
2. Kannan P and Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hitech Publishing, 2014

REFERENCES:

1. Pahari A., Chauhan B., "Engineering Chemistry", Firewall Media, 2012.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill, 2012.
3. Ashima Srivastava. Janhavi N N, Concepts of Engineering Chemistry", ACME Learning, 2010.
4. Vairam S., Kalyani P., Suba Ramesh., "Engineering Chemistry", Wiley India, 2011.

GE7151	COMPUTING TECHNIQUES	L	T	P	C
	(Common to all branches of Engineering and Technology)	**3**	**0**	**0**	**3**

OBJECTIVES:

- To learn the basics of computer hardware and software.

- To learn programming using a structured programming language.
- To provide C programming exposure.
- To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.
- To develop among students the problem solving skills through C programming.

UNIT I INTRODUCTION 9

Introduction to Computers – Computer Software – Computer Networks and Internet - Need for logical thinking – Problem formulation and development of simple programs - Pseudo code - Flow Chart and Algorithms.

UNIT II C PROGRAMMING BASICS 9

Introduction to C programming – Fundamentals – Structure of a C program – Compilation and linking processes - Constants, Variables – Data Types – Expressions - Operators –Decision Making and Branching – Looping Statements – Solving Simple Scientific and Statistical Problems.

UNIT III ARRAYS AND STRINGS 9

Arrays – Initialization – Declaration – One Dimensional and Two Dimensional Arrays - Strings- String Operations – String Arrays - Simple Programs - Sorting- Searching – Matrix Operations.

UNIT IV POINTERS 9

Macros - Storage Classes – Basic Concepts of Pointers– Pointer Arithmetic - Example Problems - Basic File Operations

UNIT V FUNCTIONS AND USER DEFINED DATA TYPES 9

Function – Definition of Function – Declaration of Function – Pass by Value – Pass by Reference – Recursion – Enumerators – Structures - Unions

TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Write C program for simple applications
- Formulate algorithm for simple problems
- Analyze different data types and arrays
- Perform simple search and sort.
- Use programming language to solve problems.

TEXTBOOKS:

1. Pradip Dey, Manas Ghosh, “Computer Fundamentals and Programming in C”, Second Edition, Oxford University Press, 2013
2. Ashok N. Kamthane, “Computer programming”, Pearson Education, 2007.
3. Yashavant P. Kanetkar. “Let Us C”, BPB Publications, 2011.

REFERENCES:

1. Kernighan.B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2006
2. Byron S Gottfried, “Programming with C”, Schaums Outlines, Second Edition, Tata McGraw-Hill, 2006.
3. R.G. Dromey, “How to Solve it by Computer”, Pearson Education, Fourth Reprint, 2007

BS7161 BASIC SCIENCES LABORATORY L T P C
(Common to all branches of B.E. / B.Tech Programmes) 0 0 4 2

OBJECTIVES:

- To inculcate experimental skills to test basic understanding of physics of materials including properties of matter.
- To inculcate experimental skills to test basic understanding of thermal and optical properties.
- To induce the students to familiarize with experimental determination of velocity of ultrasonic waves, band gap determination.
- To induce the students to familiarize with experimental determination of viscosity of liquids.

PHYSICS LABORATORY: (Any Seven Experiments)

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of young's modulus
3. Uniform bending – Determination of young's modulus
4. Lee's disc Determination of thermal conductivity of a bad conductor
5. Potentiometer-Determination of thermo e.m.f of a thermocouple
6. Laser- Determination of the wave length of the laser using grating
7. Air wedge - Determination of thickness of a thin sheet/wire
8. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
   b) Compact disc- Determination of width of the groove using laser.
9. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Post office box -Determination of Band gap of a semiconductor.
12. Spectrometer- Determination of wavelength using gating.
13. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille"s flow

TOTAL: 30 PERIODS

(CHEMISTRY LABORATORY) (Minimum of 8 experiments to be conducted)

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline/thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
11. Determination of molecular weight of poly vinyl alcohol using Ostwald viscometer.
12. Pseudo first order kinetics-ester hydrolysis.
13. Corrosion experiment-weight loss method.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 30 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Use the different measuring devices and meters to record the data with precision
- Identify the properties of liquids by applying various methods
- Identify the properties of materials using the principles of optics and thermal physics
- Apply different methods to record the contents of water sample
- Record the phase changes of solid

TEXTBOOKS:

1. "Vogel's Textbook of Quantitative Chemical Analysis" ,8TH edition, 2014
2. Laboratory Manual- Department of Chemistry, CEGC, Anna University, 2014.

GE7161	COMPUTER PRACTICES LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To search, generate and manipulate data.
- To analyze, present and visualize data.
- To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
- To articulate where computer programs fit in the provision of computer-based solutions to real world problems.
- To learn to use data structures.

LIST OF EXPERIMENTS

1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function
10. Program using structures and unions.

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Write and compile programs using C programs.
- Write program with the concept of Structured Programming
- Identify suitable data structure for solving a problem
- Demonstrate the use of conditional statement.
- Create applications using user defined data structures and string functions

HS7251	TECHNICAL ENGLISH	L	T	P	C
		4	0	0	4

OBJECTIVES:

- To illustrate the appropriate register of Technical English used in academic and workplace contexts.

- To apply reading strategies like summarising, reviewing etc while reading technical content like journal articles, reports, manuals etc.
- To describe and interpret the data given in one linguistic format and try to explain the same data in another format.
- To listen and speak in formal contexts using appropriate language forms and tone.
- To identify and compare different language characteristics and structures of various types of technical documents like job application, business letters, user manual and reports and apply this knowledge in writing these documents.

CONTENTS:

UNIT I ANALYTICAL READING 12

Listening - Listening to Informal and Formal Conversations; **Speaking** – Conversation Skills(opening, turn taking, closing) - Explaining How Something Works-Describing Technical Functions and Applications; **Reading** – Analytical Reading, Deductive and Inductive Reasoning; **Writing**- Vision Statement – Structuring Paragraphs.

UNIT II SUMMARISING 12

Listening- Listening to Lectures/ Talks on Science & Technology; **Speaking** – Summarizing/ Oral Reporting, **Reading** – Reading Scientific and Technical Articles; **Writing**- Extended Definition – Lab Reports – Summary Writing.

UNIT III DESCRIBING VISUAL MATERIAL 12

Listening- Listening to a Panel Discussion; **Speaking** – Speaking at Formal Situations; **Reading** –Reading Journal Articles - Speed Reading; **Writing**-Data Commentary-Describing Visual Material-Writing Problem-Process- Solution-The Structure of Problem-Solution Texts- Writing Critiques

UNIT IV WRITING/ E-MAILING THE JOB APPLICATION 12

Listening- Listening to/ Viewing Model Interviews; **Speaking** –Speaking at Different Types of Interviews – Role Play Practice (Mock Interview); **Reading** – Reading Job Advertisements and Profile of the Company Concerned; **Writing**- Job Application – Cover Letter – Résumé Preparation.

UNIT V REPORT WRITING 12

Listening- Viewing a Model Group Discussion; **Speaking** –Participating in a Discussion - Presentation; **Reading** – Case Study - Analyse -Evaluate – Arrive at a Solution; **Writing**– Recommendations- Types of Reports (Feasibility Report)- Designing and Reporting Surveys- – Report Format.- Writing Discursive Essays.

TEACHING METHODS:

Practice writing
Conduct model and mock interview and group discussion.
Use of audio – visual aids to facilitate understanding of various forms of technical communication.
Interactive sessions.

EVALUATION PATTERN:

Internals – 50%
End Semester – 50%

TOTAL:60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Students will learn the structure and organization of various forms of technical communication
- Students will be able to listen and respond to technical content.

- Students will be able to use different forms of communication in their respective fields.
- Communicate well during job interview
- Demonstrate writing skills for technical reports and job application

TEXTBOOK:

1. Craig, Thaine**.,** "Cambridge Academic English: An Integrated Skills Course for EAP (Student's Book) Level: Intermediate", Cambridge University Press, 2012.

REFERENCES:

1. Laws, "Anne. Presentations", Hyderabad: Orient Blackswan, 2011.
2. Ibbotson, Mark, "Cambridge English for Engineering", Cambridge University Press, Cambridge, 2008.
3. Naterop, Jean B. and Rod Revell, "Telephoning in English. Cambridge", Cambridge University Press, 2004.
4. Rutherford, Andrea J, "Basic Communication Skills for Technology", Pearson Education, 2001.
5. Bailey, Stephen," Academic Writing A practical Guide for Students", Routledge, 2004.
6. Hewings, Martin "Cambridge Academic English: An Integrated Skills Course for EAP (Student's Book) Level: Intermediate", Cambridge University Press, 2012.

MA7251	MATHEMATICS - II (Common to all branches of B.E. / B.Tech. Programmes in II Semester)	L	T	P	C
		4	0	0	4

OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property.
- To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals.
- To acquaint the students with Differential Equations which are significantly used in Engineering problems.
- To make the students appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I MATRICES 12

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.

UNIT II VECTOR CALCULUS 12

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, Gauss Divergence and Stoke's Theorems – Verification and Application in Evaluating Line, Surface and Volume Integrals.

UNIT III ANALYTIC FUNCTION 12

Analytic Functions – Necessary and Sufficient Conditions for Analyticity - Properties – Harmonic Conjugates – Construction of Analytic Function - Conformal Mapping – Mapping by Functions $w = z + c$, az, $\frac{1}{z}$, z^2 - Bilinear Transformation.

UNIT IV COMPLEX INTEGRATION 12

Line Integral - Cauchy's Integral Theorem – Cauchy's Integral Formula – Taylor's and Laurent's Series – Singularities – Residues – Residue Theorem – Application of Residue Theorem for Evaluation of Real Integrals – Use of Circular Contour and Semicircular Contour with No Pole on Real Axis.

UNIT V LAPLACE TRANSFORMS 12

Existence Conditions – Transforms of Elementary Functions – Transform of Unit Step Function and Unit Impulse Function – Basic Properties – Shifting Theorems -Transforms of Derivatives and Integrals – Initial and Final Value Theorems – Inverse Transforms – Convolution Theorem –– Transform of Periodic Functions – Application to Solution of Linear Ordinary Differential Equations with Constant Coefficients.

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:

- Evaluate real and complex integrals using the Cauchy integral formula and the residue Theorem
- Appreciate how complex methods can be used to prove some important theoretical results.
- Evaluate line, surface and volume integrals in simple coordinate systems
- Calculate grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting the sequantities
- Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.

TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, Ninth Edition, 2014.
2. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Forty Third Edition, 2014.

REFERENCES:

1. Ramana, B.V. "Higher Engineering Mathematics", Tata McGraw Hill, 2010.
2. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, 2007.
3. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, Third Edition, 2007.
4. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media, Seventh Edition, 2009.
5. Peter V. O'Neil, "Advanced Engineering Mathematics", Cengage Learning India, 2007.

GE7251 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To the study of nature and the facts about environment.
- To find and implement scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth's interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, Scope and Importance of Environment – Need for Public Awareness - Concept of an Ecosystem – Structure and Function of an Ecosystem – Producers, Consumers and Decomposers – Energy Flow in the Ecosystem – Ecological Succession – Food Chains, Food Webs and Ecological Pyramids – Introduction, Types, Characteristic Features, Structure and Function of the (A) Forest Ecosystem (B) Grassland Ecosystem (C) Desert Ecosystem (D) Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Estuaries) – Introduction to Biodiversity Definition: Genetic, Species and Ecosystem Diversity – Bio geographical Classification of India – Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values – Biodiversity at Global, National and Local Levels – India as a Mega-Diversity Nation – Hot-Spots of Biodiversity – Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts – Endangered and Endemic Species of India – Conservation of Biodiversity: In-Situ and Ex-Situ Conservation of Biodiversity.

Field Study of Common Plants, Insects, Birds

Field Study of Simple Ecosystems – Pond, River, Hill Slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – Causes, Effects and Control Measures of: (A) Air Pollution (B) Water Pollution (C)Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution (G) Nuclear Hazards – Soil Waste Management: Causes, Effects and Control Measures of Municipal Solid Wastes – Role of an Individual in Prevention of Pollution – Pollution Case Studies – Disaster Management: Floods, Earthquake, Cyclone and Landslides.

Field Study of Local Polluted Site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest Resources: Use and Over-Exploitation, Deforestation, Case Studies - Timber Extraction, Mining, Dams and Their Effects on Forests and Tribal People – Water Resources: Use and Over-Utilization of Surface and Ground Water, Floods, Drought, Conflicts Over Water, Dams-Benefits and Problems – Mineral Resources: Use and Exploitation, Environmental Effects of Extracting and Using Mineral Resources, Case Studies – Food Resources: World Food Problems, Changes Caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer-Pesticide Problems, Water Logging, Salinity, Case Studies – Energy Resources: Growing Energy Needs, Renewable and Non Renewable Energy Sources, Use of Alternate Energy Sources. Case Studies – Land Resources: Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification – Role of an Individual in Conservation of Natural Resources – Equitable Use of Resources for Sustainable Lifestyles.

Field Study of Local Area to Document Environmental Assets – River / Forest / Grassland / Hill / Mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From Unsustainable to Sustainable Development – Urban Problems Related to Energy – Water Conservation, Rain Water Harvesting, Watershed Management – Resettlement and Rehabilitation of People; its Problems and Concerns, Case Studies – Role of Non-Governmental Organization- Environmental Ethics: Issues and Possible Solutions – Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust, Case Studies. – Wasteland Reclamation – Consumerism and Waste Products – Environment Production Act– Air (Prevention And Control Of Pollution) Act – Water (Prevention And Control Of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Enforcement Machinery Involved in Environmental Legislation- Central and State Pollution Control Boards- Public Awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

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 – Case Studies.

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:

- Public awareness of environment at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions.
- Development and improvement in standard of living has lead to serious environmental disasters.
- Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

TEXT BOOKS:

1. Gilbert M. Masters, “Introduction to Environmental Engineering and Science”, Second Edition, Pearson Education 2004.
2. Benny Joseph, “Environmental Science and Engineering”, Tata McGraw-Hill, 2006.

REFERENCES:

1. R.K. Trivedi, “Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards”, Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, ‘Environmental Encyclopedia’, Jaico Publishing, 2001.
3. Dharmendra S. Sengar, “Environmental law”, Prentice Hall, 2007.
4. Rajagopalan.R, “Environmental Studies-From Crisis to Cure”, Oxford University Press 2005.

GE7152	ENGINEERING GRAPHICS	L	T	P	C
		3	2	0	4

OBJECTIVES

- To draw free hand sketches of basic geometrical shapes and multiple views of objects.
- To draw orthographic projections of lines and planes.
- To draw orthographic projections of solids.
- To draw the development of surfaces of objects.
- To draw isometric and perspective views of simple solids.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) 1

Importance of Graphics in Engineering Applications – Use of Drafting Instruments – BIS Conventions and Specifications – Size, Layout and Folding of Drawing Sheets – Lettering and Dimensioning.

UNIT I PLANE CURVES AND FREE HANDSKETCHING 14

Basic Geometrical Constructions, Curves used in Engineering Practices - 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 the above Curves. Visualization Concepts and Free Hand Sketching: Visualization Principles – Representation of Three Dimensional Objects – Layout of Views - Free Hand Sketching of Multiple Views from Pictorial Views of Objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 14

Orthographic Projection- Principles - Principal Planes - First Angle Projection - 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.

UNIT III PROJECTION OF SOLIDS 14

Projection of Simple Solids like Prisms, Pyramids, Cylinder, Cone and Truncated Solids when the Axis is Inclined to both the Principal Planes by Rotating Object Method and Auxiliary Plane Method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 14

Sectioning of 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 Cylinders and Cones. Development of Lateral Surfaces of Solids with Cut-Outs and Holes.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 15

Principles of Isometric Projection – Isometric Scale – Isometric Projections of Simple Solids and Truncated Solids - Prisms, Pyramids, Cylinders, Cones - Combination of Two Solid Objects in Simple Vertical Positions and Miscellaneous Problems.

Perspective Projection of Simple Solids - Prisms, Pyramids and Cylinders by Visual Ray Method and Vanishing Point Method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY) 3

Introduction to Drafting Packages and Demonstration of their use.

L=45+T=30, TOTAL: 75 PERIODS

OUTCOMES:

Upon Completion of the course, the student will be able to:

- Perform free hand sketching of basic geometrical shapes and multiple views of objects.
- Draw orthographic projections of lines, planes and solids
- Obtain development of surfaces.
- Prepare isometric and perspective views of simple solids.
- comprehend the different methods of Engineering drawing and apply suitably

TEXT BOOK:

1. N.D.Bhatt and V.M.Panchal, “Engineering Drawing”, Charotar Publishing House, Fifty Edition, 2010.

REFERENCES:

1. K.R.Gopalakrishna., “Engineering Drawing” (Vol I&II combined), 2007

2. 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 , 2005
3. M.B.Shah and B.C.Rana, "Engineering Drawing", Pearson Education, Second Edition, 2009
4. K. Venugopal and V. Prabhu Raja, "Engineering Graphics", New Age International, 2008.
5. K. V. Natarajan, "A Text Book of Engineering Graphics", Twenty Eighth Edition, Dhanalakshmi Publishers, 2015.
6. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill, 2008.
7. N.S. Parthasarathy and Vela Murali, "Engineering Drawing", Oxford University Press, 2015.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

EC7253	ELECTRONIC DEVICES AND CIRCUITS FOR COMPUTER ENGINEERS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic Electrical and Electronic abstractions on which analysis and design of electrical and electronic circuits and systems are based, including lumped circuit, digital and operational amplifier abstractions.
- To enhance the capability to use abstractions to analyze and design simple electronic circuits.
- To understand how complex devices such as semiconductor diodes and field-effect transistors are modeled and how the models are used in the design and analysis of useful circuits.
- To introduce the basic concepts of DC circuits with Kirchoff's laws
- To introduce different methods of circuit analysis using Network theorems and topology.

UNIT I VOLTAGE AND CURRENT LAWS 9

Nodes, Paths, Loops, and Branches- Kirchoff's Current Law - Kirchoff's Voltage Law, Single Loop Circuit, Single Node-Pair Circuit, Series and Parallel Connected Independent Sources, Resistors in Series, and Parallel Voltage and Current Division

UNIT II CIRCUIT ANALYSIS TECHNIQUES 9

Linearity and Superposition, Sources Transformation, Thevinin and Norton Equivalent Circuits, Maximum Power Transfer, Delta - Wye Conversion, Single Phase and 3 Phase Circuits - Power Factor – Power - Concept of Phasor Diagrams.

UNIT III SEMICONDUCTOR DEVICES 6

PN-Junction Diode - Drift and Diffusion Current - Zener Diode - Zener Regulator - BJT- VI Characteristics - CE Configuration - Current Equation h-Parameter Model. JFET- VI Characteristics - Current Equation - Transconductance MOSFET-Types DMOS, EMOS – V-I Characteristics - Moll Current Equation.

UNIT IV RECTIFIERS, AMPLIFIERS AND OSCILLATORS 9

FWR - Filter - Capacitance Input Filter - Choke Input Filter – CE Amplification with and without feedback – Analysis and Frequency Response – CS MOSFET Amplifier – Analysis

UNIT V OPERATION AMPLIFIER 12

Introduction of an Inverting Amplifier, Non Inverting Amplifier, Basic Application of Operation Amplifier: Subractor, Summing Amplifier, Analog to Digital Converter, Digital to Analog Convertor, Low Pass Filter, First Order Low Pass Filter, First Order High Pass Filter, Integrator, Differentiator

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student will be able to:

- Perform circuit analysis using various laws and theorems.
- Provide the characteristics and operation of PN junction diode, zener diode, laser diode and tunnel diode.
- Plot the V-I characteristics of BJT and MOSFET devices.
- Analyze the behavior of various amplifiers and oscillators.
- Point out the operation of operational amplifier and perform different applications using it.

TEXT BOOKS:

1. David A.Bell, "Electronic Devices and Circuit", Oxford press, 2008.
2. Robert T. Paynter, "Introductory Electronic Devices and Circuits", Pearson Education, 2008.

REFERENCES:

1. Donald A. Neamen, "Electronic Circuit Analysis and Design" Third Edition Tata MC Graw Hill, 2011.
2. Adel S. Sedra Kenneth C. Smith, "Micro Electronic Circuit" Sixth Edition, Oxford University Press, 2009.

CS7251 PROGRAMMING AND DATA STRUCTURES I L T P C
3 0 0 3

OBJECTIVES:

- To be exposed to pointers in C programming.
- To design, analyze and implement of basic data structures and algorithms using C.
- To solve problems using linear and Non-linear data Structures.
- To judge efficiency trade-offs among alternative data structure implementations or combinations.
- To increase the student‘s intuitive understanding of sorting techniques.

UNIT I C POINTERS 9

Pointers – Arrays and Pointers - Pointers and strings - Pointer and Address Arithmetic - Two-Dimensional Arrays and Pointers - Pointers to Functions - Dynamic Memory Allocation - Unions - Enumeration Types - Bit fields - Files.

UNIT II ARRAY BASED LINEAR DATA STRUCTURES 9

Data abstraction - Abstract Data Types (ADT) - Array ADT - Linear List ADT (Polynomials) - Stack ADT - Queue ADT - Evaluation of expressions.

UNIT III LINKED LIST BASED LINEAR DATA STRUCTURES 9

Singly Linked Lists - Linked Stacks and Queues - Polynomial ADT - Circularly Linked Lists - Doubly Linked Lists

UNIT IV NON LINEAR DATA STRUCTURES 9

Trees - Binary Trees - Traversals - Operations - Threaded Binary Trees - Binary Search Trees - Disjoint Sets

UNIT V SORTING 9

Insertion Sort – Shell Sort – Heap Sort - Merge Sort – Bucket Sort – External Sorting – Multiway Merge – Polyphase Merge – Replacement Selection

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student will be able to:

- To apply advance C programming techniques such as pointers, dynamic memory allocation, structures to develop solutions for particular problems.
- To explain how to choose the appropriate data structure to solve a programming problem
- To compare and contrast the benefits of dynamic and static data structures implementations
- Discuss the computational efficiency of the principal algorithms for sorting and searching
- Choose efficient data structures and apply them to solve problems

TEXT BOOKS:

1. Pradip Dey and Manas Ghosh, “Programming in C”, Second Edition, Oxford University Press, 2011.
2. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008.

REFERENCES:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 1996
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, 1983.
3. Robert Kruse, C.L.Tondo, Bruce Leung, Shashi Mogalla , “ Data Structures and Program Design in C”, Second Edition, Pearson Education, 2007
4. Jean-Paul Tremblay and Paul G. Sorenson, “An Introduction to Data Structures with Applications”, Second Edition, Tata McGraw-Hill, 1991.

GE7162	ENGINEERING PRACTICES LABORATORY (Common to all Branches of B.E. / B.Tech. Programmes)	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Civil Engineering.
- To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Mechanical Engineering.
- To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Electrical Engineering.

- To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICES **15**

PLUMBING

Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.

• Laying pipe connection to the suction side of a pump.
• Laying pipe connection to the delivery side of a pump.
• Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK

- Sawing, planning and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.

STUDY

• Study of joints in door panels and wooden furniture
• Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICES **15**

• Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
• Stair case light wiring
• Tube – light wiring
• Preparation of wiring diagrams for a given situation.
• Study of Iron-Box, Fan Regulator and Emergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS) **15**

3. MECHANICAL ENGINEERING PRACTICES

WELDING

• Arc welding of Butt Joints, Lap Joints, and Tee Joints
• Gas welding Practice.
• Basic Machining - Simple turning, drilling and tapping operations..
• Study and assembling of the following:
    a. Centrifugal pump
    b. Mixie
    c. Air Conditioner.

DEMONSTRATION ON FOUNDRY OPERATIONS.

4. ELECTRONIC ENGINEERING PRACTICES **15**

• Soldering simple electronic circuits and checking continuity.
• Assembling electronic components on a small PCB and Testing.
• Study of Telephone, FM radio and Low Voltage Power supplies.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the student will be able to:

- Ability to fabricate carpentry components and to lay pipe connections including plumbing works.
- Ability to use welding equipments to join the structures
- Ability to do wiring for electrical connections and to fabricate electronics circuits
- Comprehend the types of the wooden joints and industrial trusses

- Determine the different wiring requirements and prepare the wiring diagram

CS7211 PROGRAMMING AND DATA STRUCTURES LABORATORY I

L	T	P	C
0	0	4	2

OBJECTIVES:

- To learn the basic concepts of C.
- To understand and implement basic data structures using C
- To apply linear and non-linear data structures in problem solving.
- To implement programs using File processing
- To be exposed to Sorting algorithms

LIST OF EXPERIMENTS

1. Programs using Arrays and Functions
2. Programs using Structures
3. Array Implementation of Stack and Queue ADTs.
4. Array Implementation of List ADT
5. Programs using Pointers and Dynamic Memory Allocation
6. Linked list Implementation of List, Stack and Queue ADTs.
7. Applications of List, Stack and Queue ADTs.
8. Programs using File Processing
9. Implementation of Binary Trees, Traversal
10. Operations on Binary Trees

11. Operations on Binary Search Trees.
12. Implementation of Sorting Algorithms

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Implement data structures using C
- Develop applications based on data structures
- Implement programs using files
- Differentiate between the array and list implementation of data structures
- Choose the appropriate sorting algorithm for any application

CS7301 OBJECT ORIENTED PROGRAMMING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To familiarize the Object Oriented Programming (OOP) concepts, such as abstraction, encapsulation, instances, initializations, polymorphism, overloading, inheritance and generic programming.
- To learn the OOP specific programming languages such as C++ and Java.
- To write programs to solve problems using the OOP language constructs rather than structural programming.
- To understand and know the importance of OOP in real-world problems.
- To familiarize students to create UI applications
- To expose the usage of streams to store and retrieve data

UNIT I INTRODUCTION TO OBJECT ORIENTED PROGRAMMING AND JAVA **9**

Introduction to OOP – Thinking Object Oriented - Object Oriented Design. Introduction to Java – JVM - Classes and methods – Varieties of Classes – Messages, Instances and Initialization - Constructors and Destructors – Object and Class in java.lang.class - Namespaces – Scope – Method Overloading – Arrays – Type Casting - Constant Objects and Member Functions – Composition - this Pointer – Static Instances.

UNIT II INHERITANCE AND EXCEPTION HANDLING IN JAVA **9**

Package Access - Java API Packages – Inheritance - Sub Classes and Subclass Types - – Replacement and Refinement – Implications of Inheritance - Exception Handling- Java Exception Hierarchy - Declaring New Exception Types – Assertions - Garbage Collection and Method finalize – String Class - Converting between Types - Inheritance – an Intuitive Description of Inheritance - Subclass, Subtype, and Substitutability - Forms of Inheritance, “is-a” and “has-a” rule – Multiple Inheritance

UNIT III POLYMORPHISM IN JAVA **9**

Polymorphism - Abstract Classes and Methods - Varieties of Polymorphism - Polymorphic Variables – Overloading and Overriding – Pure Polymorphism - Polymorphic Processing, Operator instance of and Down Casting - final Methods and Classes – Clone Class - Interface – Implementation – Multithreading.

UNIT IV FILES AND STREAMS IN JAVA **9**

Files and Streams – Formatted Output - Object Concurrency - Serialization - Generic Collections - Generic Classes and Methods - Visibility and Dependency – Reflection and Introspection - Java Utility Packages and Bit Manipulation – Java Collections.

UNIT V GUI, MULTIMEDIA AND DATABASE IN JAVA **9**

GUI Components – Graphics, 2D and 3D - Introduction to Java Applets – Frameworks - Multimedia: Applets and Applications – Example Frameworks: Swing and AWT - Accessing Databases with JDBC – Case Study: ATM System, Payroll System.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Understand the fundamentals of object-oriented programming in Java
- Understand the appropriate roles of subtyping and inheritance, and use them effectively.
- Implement polymorphic code and handle run time errors using exception handling
- Implement concurrent applications using threads.
- Create user-interface applications using GUI components and to understand the event handling principles.
- To identify the generic classes and methods to implement an application
- Use streams to store and retrieve data from database / files

TEXT BOOKS:

1. Timothy Budd, “An Introduction to Object-Oriented Programming”, Third Edition, Pearson Education, 2008.
2. Paul Deitel and Harvey Deitel, “Java How to Program (Early Objects)”, Tenth Edition, Pearson Prentice Hall 2014.

REFERENCES:

1. Patrick Niemeyer, Daniel Leuck, “Learning Java”, Fourth Edition, Shroff/O'Reilly, 2013.
2. Joshua Bloch, “Effective Java: A Programming Language Guide”, Second Edition, Pearson, 2008.

CS7302 PROGRAMMING AND DATA STRUCTURES II

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn features of C++
- To learn generic data structures using templates
- To increase the student‘s intuitive understanding of search trees
- To learn advanced tree data structures
- To learn to represent data using graph data structure
- To implement graph algorithms using appropriate data structures

UNIT I INTRODUCTION TO C++ 9

Object Oriented Programming – Native Types and Statements – Functions and Pointers Data Hiding and Member Functions- Object Creation and Destruction.

UNIT II POLYMORPHISM AND GENERIC PROGRAMMING 9

Adhoc Polymorphism – Templates, Generic Programming and STL – Inheritance - Exceptions.

UNIT III PRIORITY QUEUES AND SEARCH TREES 9

Priority Queues – Binary Heap – Applications of Priority Queues – d-Heaps – Leftist Heaps – Skew Heaps - AVL Trees- Splay Trees - B-Trees – B+ Trees – Red Black Trees -2-3-4 trees – Tries.

UNIT IV GRAPHS 9

Representation of Graphs – Traversals- Breadth First Search – Depth First Search – Minimum Spanning Tree – Prim’s – Kruskal’s Algorithm – Applications of Depth First Search – Biconnectivity – Euler Circuits – Finding Strong Components

UNIT V HASHING AND SEARCHING 9

Hash Function – Separate Chaining - Linear Probing – Quadratic Probing – Double Hashing - Rehashing – Extendible Hashing - Linear Search – Binary Search.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Upon completion of the course, the students will be able to:
- Analyze the significance of C++.
- Apply appropriate C++ features for problem solving
- Analyze and apply efficient data structures required for an application
- Identify appropriate graph algorithms for solving real time problems Optimize searching by applying hashing techniques

TEXT BOOKS:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Pearson Education India, Third Edition, 2008.
2. Ira Pohl, “Object Oriented Programming Using C++”, Pearson Education India, Second Edition, 2009.

REFERENCES:

1. Ellis Horowitz, Satraj Sahni and Susan Anderson-Freed, “Fundamentals of Data Structures in C++”, Universities Press, Second edition, 2008.
2. Gregory L. Heilman, “Data Structures, Algorithms and Object Oriented Programming”, Tata Mcgraw-Hill, 2002.
3. Jean-Paul Tremblay and Paul G. Sorenson, “An Introduction to Data Structures with Applications”, Second Edition, Tata McGraw-Hill, 1991.

4. Alfred V. Aho, John E. Hopcroft and Jeffry D. Ullman, “Data Structures and Algorithms”, Pearson Education India, 2006.
5. Paul Deitel and Harvey Deitel, “C++ How to Program”, Ninth Edition, Prentice Hall of India, 2014.

CS7351 SOFTWARE ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To be aware of generic models to structure the software development process.
- To understand fundamental concepts of requirements engineering and requirements specification.
- To understand different notion of complexity at both the module and system level.
- To be aware of some widely known design methods.
- To understand the role and contents of testing activities in different life cycle phases

UNIT I SOFTWARE PROCESS MODELS 9

The Evolving Role of Software – Software – The changing Nature of Software – Legacy software — A generic view of process– A layered Technology – A Process Framework – The Capability Maturity Model Integration (CMMI) – Process Assessment –Personal and Team Process Models – Product and Process – Process Models – The Waterfall Model – Incremental Process Models – Incremental Model – The RAD Model – Evolutionary Process Models – Prototyping – The Spiral Model – The Concurrent Development Model – Specialized Process Models – The Unified Process.

UNIT II REQUIREMENT ENGINEERING 9

Software Engineering Practice – Communication Practice – Planning Practice - Modeling Practice– Construction Practice –Deployment. Requirements Engineering - Requirements Engineering Tasks – Initiating the Requirements Engineering Process - Eliciting Requirements – Developing Use Cases – Building the Analysis Models –Elements of the Analysis Model – Analysis Pattern – Negotiating Requirements – Validating Requirements.

UNIT III ANALYSIS MODELLING 9

Requirements Analysis – Analysis Modeling Approaches – Data Modeling Concepts – Object Oriented Analysis – Scenario Based Modeling – Flow Oriented Modeling – Class Based Modeling – Creating a Behaviour Model.

UNIT IV DESIGN AND TESTING 9

Design Engineering – Design Process -Design Quality - Design Model - User Interface Design – Testing Strategies - Testing Tactics - Strategies Issues for Conventional and Object Oriented Software - Validation Testing – System Testing – Art of Debugging – Project Management

UNIT V QUALITY AND MAINTENANCE 9

Software Evolution - Verification and Validation -Critical Systems Validation – Metrics for Process, Project and Product-Quality Management - Process Improvement – Risk Management - Configuration Management – Software Cost Estimation

TOTAL: 45PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly define software engineering activities.
- Translate requirements specification into an implementable design, following structured and organized process.
- Design a solution for a given problem using one or more design patterns and implement

the design
- Compile the function on multi-disciplinary teams, to review, document and baseline.
- Analyze testing requirements and perform suitable testing.

TEXT BOOKS:

1. Roger S. Pressman, “Software Engineering: A Practitioner’s Approach”, McGraw Hill International edition, Seventh edition, 2009.
2. Ian Sommerville, “Software Engineering” Ninth Edition, Pearson Edition, 2008

REFERENCES:

1. Stephan Schach, “Software Engineering”, Tata McGraw Hill, 2007
2. Pfleeger and Lawrence “Software Engineering: Theory and Practice”, Pearson Education, Second edition, 2001

EE7306 ELECTRICAL ENGINEERING AND CONTROL SYSTEMS L T P C
3 0 0 3

OBJECTIVES:
- To give exposure in the basics of electrical systems
- To understand the concepts behind direct current machines.
- Working principles of alternating current electrical machines are to be studied.
- To know and build mathematical models, block diagrams and signal flow graphs for electrical and mechanical systems.
- To study the time response analysis, frequency response analysis and state models.

UNIT I INTRODUCTION TO ELECTRICAL ENGINEERING 9
Electric Potential, Current, Power and Energy - Renewable and Non Renewable - Power Generation: Thermal, Hydro, Nuclear, Solar and Wind Power plants - Structure of Electric Power System - Electrical Safety Aspects: Need for Earthing and Types - Energy Conservation and Sustainability - Introduction to Battery - UPS - Circuit Breakers.

UNIT II DC MACHINES 9
DC Generator: Construction - Theory and Operation - EMF Equation - Characteristics. DC Motor: Operating Principle - Types - Characteristics - Speed Control.

UNIT III AC MACHINES 9
Single Phase Transformers : Operating Principle - EMF equation - transformation ratio - Three Phase Induction Motors : Operation - Speed versus Torque Characteristics - Operation and Types of Single Phase Induction Motors - Principle of Synchronous Machines - EMF equation - Introduction to Stepper Motors

UNIT IV MATHEMATICAL MODELS OF PHYSICAL SYSTEMS 9
Open Loop and Closed Loop Systems - Linear and Non-Linear Systems - Effects of Feedback - Structure of Feedback Control Theory - Differential Equation of Electrical Circuits – Use of Block Diagram and Signal Flow Graphs

UNIT V TRANSFER FUNCTION AND STATE VARIABLE ANALYSIS 9
Time Response of Second Order System - Frequency Response - Bode Plots - Concept of State Variable - State Models.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to:

- Discuss the basics of electric circuits, machines and transformers
- Derive mathematical models of electrical systems
- Identify transfer function and state variables
- Perform analysis on simple real time physical systems.
- Perform state variable analysis

TEXT BOOKS:

1. Smarajit Ghosh, “Fundamentals of Electrical and Electronics Engineering”, Second Edition (Sixth Printing), Prentice-Hall, 2010.
2. M. Gopal, “Control Systems: Principle and Design”, Third Edition, Tata McGraw-Hill, 2008.

REFERENCES:

1. Vincent Del Toro, “Electrical Engineering Fundamentals”, Second Edition, Prentice Hall, 2007.
2. John Bird, “Electrical and Electronic Principles and Technology”, Fourth Edition, Elsevier, 2010.
3. Stephen J. Chapman, “Electric Machinery Fundamentals”, Fourth Edition, Tata McGraw-Hill Edition, 2010.
4. Richard C Dorf and Robert H Bishop, “Modern Control Systems”, Second Edition (reprint), Prentice Hall, 2008.
5. Katsuhiko Ogata, “Modern Control Engineering”, Prentice Hall, 2010.

IT7351 DIGITAL PRINCIPLES AND DESIGN L T P C
3 0 0 3

OBJECTIVES:

- Learn how to design digital circuits, by simplifying the Boolean functions.
- Learn to design combinational and sequential circuits.
- To study about asynchronous sequential logic.
- Give an idea about designs using PLDs.
- To write code in hardware definition languages for designing larger digital systems.

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 9

Review of Number Systems – Arithmetic Operations – Binary Codes – Boolean Algebra and Theorems – Boolean Functions – Simplification of Boolean Functions using Karnaugh Map – Logic Gates – NAND and NOR Implementations.

UNIT II COMBINATIONAL LOGIC 9

Combinational Circuits – Analysis and Design Procedures – Circuits for Arithmetic Operations, Code Conversion – Decoders and Encoders – Multiplexers – Real Time Application of Combinational Circuits- Introduction to HDL – HDL Models of Combinational circuits.

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC 9

Sequential Circuits – Latches and Flip Flops – Shift Registers – Counters- State Reduction and State Assignment - Analysis and Design Procedures – HDL for Sequential Logic Circuits.

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC 9

Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.

UNIT V MEMORY AND PROGRAMMABLE LOGIC 9

RAM and ROM – Memory Decoding – Error Detection and Correction –PROM- Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices – Application Specific Integrated Circuits.

TOTAL: 45 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

- Design and analyze combinational digital circuits.
- Simplify complex Boolean functions.
- Implement design using MSI chips and PLDs.
- Build digital systems involving combinational & sequential logic and also use HDL to design it.
- Design and analyze asynchronous sequential logic circuits.

TEXT BOOK:

1. M. Morris Mano and Michael D. Ciletti, “Digital Design”, V Edition, Pearson Education, 2012.

REFERENCES:

1. G. K. Kharate, “Digital Electronics”, Oxford University Press, 2010.
2. John F. Wakerly, “Digital Design Principles and Practices”, Fourth Edition, Pearson Education, 2007.
3. Charles H. Roth Jr, “Fundamentals of Logic Design”, Fifth Edition – Jaico Publishing House, Mumbai, 2003.
4. Donald D. Givone, “Digital Principles and Design”, Tata Mc Graw Hill, 2003.

MA7359 ALGEBRA AND NUMBER THEORY L T P C
4 0 0 4

OBJECTIVES:

- To introduce the basic notions of groups, rings, fields which will then be used to solve related problems.
- To introduce the basic notions of polynomial rings, Finite Fields and factorization techniques which will then be used to solve related problems.
- To understand the key points in the theory of numbers.
- To understand the concepts involved in congruence and Diophantine equations.
- To understand classical theorems in Number Theory

UNIT I GROUPS AND RINGS 12

Groups: Definition - Properties - Homomorphism - Isomorphism - Cyclic groups - Cosets - Lagrange's Theorem. Rings: Definition - Sub Rings - Integral Domain - Field - Integer modulo n - Ring Homomorphism.

UNIT II FINITE FIELDS AND POLYNOMIALS 12

Polynomial Rings - Irreducible Polynomials over Finite Fields - Factorization of Polynomials over Finite Fields.

UNIT III DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS 12

Division Algorithm- Base-b Representations – Number patterns – Prime and Composite Numbers – GCD – Euclidean Algorithm – Fundamental Theorem of Arithmetic – LCM.

UNIT IV DIOPHANTINE EQUATIONS AND CONGRUENCES 12

Linear Diophantine Equations – Congruence’s – Linear Congruence’s - Applications: Divisibility tests - Modular Exponentiation - Chinese Remainder Theorem – 2x2 Linear Systems.

UNIT V CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS 12

Wilson’s Theorem – Fermat’s Little Theorem – Euler’s Theorem – Euler’s Phi Functions – Tau and Sigma Functions.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the student will be able to:

- Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
- Demonstrate accurate and efficient use of advanced algebraic techniques.
- demonstrate their mastery by solving non-trivial problems related to the concepts, and by proving simple theorems about the, statements proven by the text
- Solve a linear system of equations using direct and iterative methods
- Formulate linear equations for real life problems and solve them

TEXT BOOKS:

1. Grimaldi. R.P and Ramana, B.V., "Discrete and Combinatorial Mathematics", Pearson Education, Fifth Edition, 2007.
2. Thomas Koshy, “Elementary Number Theory with Applications”, Elsevier Publications, 2002.

REFERENCES:

1. San Ling and Chaoping Xing, “Coding Theory – A first Course”, Cambridge Publications, 2004.
2. Niven.I, Zuckerman.H.S and Montgomery. H.L., “An Introduction to Theory of Numbers”, John Wiley and Sons, 2004.
3. Lidl. R and Pitz. G, "Applied Abstract Algebra", Springer-Verlag, Second Edition, 2006.

CS7311	DIGITAL LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To study the pin details and internal logic of standard ICs and test them.
- To learn to construct digital circuits using standard ICs and testing boards.
- To understand the design and implementation of combinational circuits.
- To learn to design and implement sequential circuits like shift registers and counters.
- To expose the students to HDL programming.
- To learn to design and implement a digital system for a given problem (Mini Project).

LIST OF EXPERIMENTS:

1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters
3. Design and implement a 4-bit binary adder / subtractor
4. Design and implement Parity generator / checker
5. Design and implement Magnitude Comparator
6. Design and implement an application using multiplexers
7. Design and implement shift –registers
8. Design and implement synchronous counters
9. Design and implement asynchronous counters
10. Coding combinational circuits using HDL.
11. Coding sequential circuits using HDL.
12. Design and implementation of a simple digital system (Mini Project).

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Use theorems and K-maps to simplify Boolean functions
- Design and Implement combinational circuits like arithmetic circuits, decoder and Encoder
- Analyze a given digital circuit – combinational and sequential
- Design synchronous sequential circuits like registers and counters
- Design asynchronous circuits
- Design and Implement a simple digital system for a given specifications

CS7312	PROGRAMMING AND DATA STRUCTURES LABORATORY II	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To learn programming constructs of C++.
- To implement the linear and non-linear data structure using STL
- To Understand different operations of search trees
- To Implement graph traversal and searching algorithms
- Be exposed to searching and sorting algorithms

LIST OF EXPERIMENTS:

1. Array and list implementation of Stack ADT
2. To implement Queue ADT
3. To implement an application of stack /Queue
4. Implement data abstraction by separate compilation of implementation (.h & .cpp) and application (main.cpp)
5. Implement List ADT and use operator overloading to implement functions in List ADT
6. Use inheritance to implement Stack ADT and Queue ADT from List ADT
7. Implement lists using generic classes
8. To implement priority queues – Insert, Delete, FindMin / Max
9. To implement the search trees - Insert, Delete, search
10. Graph representation and traversal
11. Prim's Algorithm, Kruskal's algorithm and applications of Depth First Search.
12. Hashing – any two collision resolution techniques-java

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Apply generic programming technique to implement any data structure
- Apply appropriate search trees for an application
- Use graphs in problem solving
- Design and implement an appropriate hashing function for an application
- Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

CS7401	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamentals and issues in database systems
- To appreciate the design of databases using relational models
- To learn data definition and query languages
- To understand the importance of transaction management in databases
- To emphasize the need for sorting and indexing in databases
- To learn advanced representations of databases suited for real-time applications

UNIT I INTRODUCTION TO DATABASE SYSTEMS 9

Data - Database Applications - Evolution of Database - Need for Database Management – Data models - Database Architecture - Key Issues and Challenges in Database Systems

UNIT II ER AND RELATIONAL MODELS 9

ER Models – ER to Relational Mapping –Object Relational Mapping - Relational Model- Constraints - Keys - Dependencies - Relational Algebra - Normalization - First, Second, Third & Fourth Normal Forms - BCNF – Join Dependencies.

UNIT III DATA DEFINITION AND QUERYING 8

Basic DDL - Introduction to SQL - Data Constraints - Advanced SQL - Views - Triggers - Database Security – Embedded & Dynamic SQL

UNIT IV TRANSACTIONS AND CONCURRENCY 10

Introduction to Transactions - Transaction Systems - ACID Properties - System & Media Recovery - Need for Concurrency - Locking Protocols – SQL for Concurrency – Log Based Recovery - Two Phase Commit Protocol - Recovery with SQL- Deadlocks & Managing Deadlocks

UNIT V ADVANCED TOPICS IN DATABASES 9

Indexing & Hashing Techniques - Query Processing & Optimization - Sorting & Joins – Database Tuning - Introduction to Special Topics - Spatial & Temporal Databases – Data Mining and Warehousing.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Understand and evaluate the role of database management systems in information technology and applications.
- Analyse the data requirements and apply ER modelling, derive the database schema using conceptual modelling.
- Analyse the issues involved in the design and implementation of a database system.
- Recognise and use contemporary logical design methods and tools for databases and Implement a database solution to an information technology problem.
- Identify and Recommend strategies for managing data security, privacy, audit/control, fraud detection, backup and recovery
- Develop sophisticated queries to extract information from small to large datasets and develop insights into future data management tool and techniques.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2010.
2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson/Addison - Wesley, 2010.

REFERENCES:

1. C.J. Date, A. Kannan and S. Swamynathan, “An Introduction to Database Systems”, Pearson Education, Eighth Edition, 2006.
2. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, McGraw Hill, 2015.
3. Narain Gehani and Melliyal Annamalai. “The Database Book Principles and Practice Using the Oracle Database System”, Universities Press, 2012.

CS7402	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study the various ways of analyzing algorithms
- To understand the need for asymptotic notations
- To understand the various algorithm design techniques
- To understand string matching algorithms
- To learn about NP class of problems and their variations

UNIT I ANALYSING ALGORITHMS 9

The Role of Algorithms in Computing - Growth of Functions – Recurrences - The Substitution Method - The Recurrence Tree Method - The Master Method - Probabilistic Analysis and Randomized Algorithms – Amortized Analysis – Aggregate Analysis – Accounting Method

UNIT II DIVIDE AND CONQUER & GREEDY DESIGN STRATEGIES 9

Analysis of Quick Sort, Merge Sort – Quick Sort Randomized Version – Sorting in Linear Time - Lower Bounds for Sorting - Selection in Expected Linear Time - Selection in Worst case Linear Time – Greedy Algorithms - Elements of Greedy Strategy - Huffman Code, Dijkstra's Shortest Path Algorithm.

UNIT III DYNAMIC PROGRAMMING AND OTHER DESIGN STRATEGIES 9

Dynamic Programming – Matrix Chain Multiplication - Elements of Dynamic programming – Longest Common Sequences – Warshall's and Floyds Algorithm – Transitive Closure - All Pairs Shortest Path Algorithm – Analysis – Backtracking – Graph Coloring Problem - Branch and Bound Strategy - Knapsack Problem.

UNIT IV FLOW NETWORKS AND STRING MATCHING 9

Flow Networks – Ford Fulkerson Method - String Matching - Naive String Matching Algorithm – Knuth Morris Pratt Algorithm - Analysis.

UNIT V NP PROBLEMS 9

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

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Analyze any given algorithm and express its complexity in asymptotic notation
- Propose appropriate algorithmic strategy for any given problem
- Design algorithms based on strategy to solve any problem and analyse for its time and space efficiency
- Classify algorithms as deterministic polynomial time and non-deterministic polynomial time
- Analyse, suggest and implement optimal algorithms for deterministic polynomial time problems and approximate algorithms for Non-deterministic polynomial time problems

TEXT BOOKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Cliford Stein, "Introduction to Algorithms", Third Edition, Prentice Hall, 2010.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, 2008.

REFERENCES:

1. Kenneth A. Berman and Jerome L. Paul, “Algorithms”, Cengage Learning India, 2010.
2. Alfred V Aho, John E Hopcroft and Jeffrey D Ullman, “The Design and Analysis of Computer Algorithms”, First Edition, Pearson Education, 2006.

CS7451 COMPUTER ARCHITECTURE

L	T	P	C
4	0	0	4

OBJECTIVES:

- To identify the functional units in a digital computer system
- To distinguish between the various ISA styles
- To trace the execution sequence of an instruction through the processor
- To compare different approaches used for implementing a functional unit
- To understand the fundamentals of memory and I/O systems and their interaction with the processor
- To evaluate different computer systems based on performance metrics

UNIT I FUNDAMENTALS OF A COMPUTER SYSTEM 12

Functional Units of a Digital Computer – Hardware – Software Interface –Translation from a High Level Language to the Hardware Language – Instruction Set Architecture – Styles and Features – RISC and CISC Architectures – Performance Metrics – Amdahl’s Law – Case Studies of ISA.

UNIT II ARITHMETIC FOR COMPUTERS 12

Addition and Subtraction – Fast Adders – Binary Multiplication - Binary Division – Floating Point Numbers – Representation, Arithmetic Operations.

UNIT III BASIC PROCESSING UNIT 12

Components of the Processor – Data path and Control – Execution of a Complete Instruction – Hardwired and Micro programmed Control. Instruction Level Parallelism – Basic Concepts of Pipelining – Pipelined Implementation of Data path and Control – Hazards – Structural, Data and Control Hazards – Exception Handling.

UNIT IV MEMORY AND I/O 12

Need for a Hierarchical Memory System – Types and Characteristics of Memories – Cache Memories – Improving Cache Performance – Virtual Memory – Memory Management Techniques – Associative Memories. Accessing I/O devices – Programmed Input/Output - Interrupts – Direct Memory Access.

UNIT V ILP AND PARALLEL PROCESSING 12

Exploitation of more ILP – Dynamic Scheduling – Speculation – Multiple Issue Processors. Parallel Processing - SISD, MIMD, SIMD, SPMD and Vector Architectures - Hardware Multithreading- Shared Memory Multiprocessors – Multicore Processors - Graphics Processing Units. Study of a Basic Architectural Simulator.

TOTAL : 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

- Analyze and Evaluate computer performance & understand how computers represent and manipulate data
- Apply the Boolean algebra, related to designing a computer logic through simple combinational and sequential logic circuits.
- Design a pipeline for consistent execution of instructions with minimum hazards.
- Understand and Compare the properties of shared memory and Memory Management Techniques and cache Memories.

- Generate & evaluate the parallelism both in terms of a single processor and multiple processor.

TEXTBOOK:

1. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software Interface”, Fourth Edition, Morgan Kaufmann / Elsevier, 2009.

REFERENCES:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, “Computer Organization and Embedded Systems”, Sixth Edition, Tata McGraw Hill, 2012.
2. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Sixth Edition, Pearson Education, 2003.
3. John P. Hayes, “Computer Architecture and Organization”, Third Edition, Tata McGraw Hill, 1998.
4. John L. Hennessey and David A. Patterson, “Computer Architecture – A Quantitative Approach”, Morgan Kaufmann / Elsevier Publishers, Fourth Edition, 2007.
5. V.P. Heuring, H.F. Jordan, “Computer Systems Design and Architecture”, Second Edition, Pearson Education, 2004.
6. Behrooz Parhami, “Computer Architecture”, Oxford University Press, 2007.

CS7452 OPERATING SYSTEMS L T P C
3 0 0 3

OBJECTIVES:

- To analyze the various evolutions of operating systems.
- To learn the basic concepts and roles of an operating system.
- To study the various design issues in developing an operating systems.
- To familiarize with the important mechanisms in operating systems.
- To appreciate the emerging trends in operating systems.

UNIT I OPERATING SYSTEMS OVERVIEW 9

Introduction to operating systems – Computer system organization, architecture – Operating system structure, operations – Process, memory, storage management – Protection and security – Distributed systems – Computing Environments – Open-source operating systems – OS services – User operating-system interface – System calls – Types – System programs – OS structure – OS generation – System Boot – Process concept, scheduling – Operations on processes – Cooperating processes – Inter-process communication – Examples – Multithreading models – Thread Libraries – Threading issues – OS examples.

UNIT II PROCESS MANAGEMENT 9

Basic concepts – Scheduling criteria – Scheduling algorithms – Thread scheduling – Multiple-processor scheduling – Operating system examples – Algorithm Evaluation – The critical-section problem – Peterson’s solution – Synchronization hardware – Semaphores – Classic problems of synchronization – Critical regions – Monitors – Synchronization examples – Deadlocks – System model – Deadlock characterization – Methods for handling deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock detection – Recovery from deadlock.

UNIT III STORAGE MANAGEMENT 9

Memory Management – Swapping – Contiguous memory allocation – Paging –Segmentation – Example: The Intel Pentium - Virtual Memory: Background – Demand paging – Copy on write – Page replacement – Allocation of frames – Thrashing**.**

UNIT IV I/O SYSTEMS **9**

File concept – Access methods – Directory structure – File-system mounting – Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling – Disk management – Swap-space management – Protection.

UNIT V CASE STUDY **9**

The Linux System – History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – File systems – Input and Output – Inter-process Communication – Network Structure – Security – Windows 7 – History – Design Principles – System Components – Terminal Services and Fast User – File system – Networking.

TOTAL: 45 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

- Understand the evolution of Operating systems
- Understand the Key concept of Operating Systems
- Analyze the issues in designing Operating Systems
- Analyze the usage and strengths of various algorithms of Operating Systems
- Appreciate the role of various concepts and algorithms towards the performance of the system

TEXT BOOK:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, “Operating System Concepts Essentials”, John Wiley & Sons Inc., 2010.

REFERENCES:

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Addison Wesley, 2001.
2. D M Dhamdhere, “Operating Systems: A Concept-based Approach”, Second Edition, Tata McGraw-Hill Education, 2007.
3. Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw Hill Education”, 1996.
4. William Stallings, “Operating Systems: Internals and Design Principles”, Seventh Edition, Prentice Hall, 2011.

MG7451 PRINCIPLES OF MANAGEMENT **L T P C**
3 0 0 3

OBJECTIVES:

- To understand the principles and techniques of management
- To understand the basic concepts related to an organization
- To understand the skills, roles and functions of management
- To understand the application tools, techniques, and theories related to planning and motivation
- To understand the application of control techniques and reporting in management

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS **9**

Definition of Management – Science or Art – Manager vs. Entrepreneur- Types of Managers- Managerial Roles and Skills – Evolution of Management –Scientific, Human Relations, System and Contingency Approaches– Types of Business Organization- Sole Proprietorship, Partnership, Company- Public and Private Sector Enterprises- Organization Culture and Environment – Current Trends and Issues in Management.

UNIT II PLANNING 9

Nature and Purpose of Planning – Planning Process – Types of Planning – Objectives – Setting Objectives – Policies – Planning Premises – Strategic Management – Planning Tools and Techniques – Decision Making Steps and Process

UNIT III ORGANISING 9

Nature and Purpose – Formal and Informal Organization – Organization Chart– Organization Structure – Types – Line and Staff Authority – Departmentalization – Delegation of Authority – Centralization and Decentralization –Job Design – Human Resource Management –HR Planning, Recruitment, Selection, Training and Development, Performance Management, Career Planning and Management.

UNIT IV DIRECTING 9

Foundations of Individual and Group Behavior– Motivation – Motivation Theories – Motivational Techniques – Job Satisfaction – Job Enrichment – Leadership – Types and Theories of Leadership – Communication – Process of Communication – Barrier in Communication – Effective Communication – Communication and IT.

UNIT V CONTROLLING 9

System and Process of Controlling – Budgetary and Non-Budgetary Control Techniques – Use of Computers and IT in Management Control – Productivity Problems and Management – Control and Performance – Direct and Preventive Control – Reporting.

TOTAL: 45 PERIODS

OUTCOMES:

- The student would have gained the ability to learn the different principles and techniques of management in planning, organizing, directing and controlling
- Understand the concepts related to Business
- Demonstrate the roles, skills and functions of management
- Analyze effective application of PPM knowledge to diagnose and solve organizational problems and develop optimal managerial decisions
- Understand the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities

TEXT BOOKS:

1. Stephen P. Robbins & Mary Coulter, " Management", Prentice Hall of India, Tenth Edition, 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", Pearson Education, Sixth Edition, 2004.

REFERENCES:

1. Stephen A. Robbins, David A. Decenzo and Mary Coulter, "Fundamentals of Management" Pearson Education, Seventh Edition, 2011.
2. Robert Kreitner and Mamata Mohapatra, "Management", Biztantra, 2008.
3. Harold Koontz and Heinz Weihrich "Essentials of Management" Tata McGraw Hill, 1998.
4. Tripathy PC and Reddy PN, "Principles of Management", Tata Mcgraw Hill, 1999.

MA7355 PROBABILITY AND QUEUEING THEORY L T P C
4 0 0 4

OBJECTIVES:

- To understand the basics of random variables with emphasis on the standard discrete and continuous distributions.
- To understand the basic probability concepts with respect to two dimensional random

variables along with the relationship between the random variables and the significance of the Central Limit theorem.

- To learn the classifications of random processes with emphasis on stationarity of various orders along with strict sense stationarity, wide-sense stationarity and ergodicity.
- To provide the required fundamental concepts in queueing models.
- To make the student acquire sound knowledge of queueing models and apply these techniques in Information and Communication theory, image processing and various fields.

UNIT I RANDOM VARIABLES 12

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions - Functions of a Random Variable.

UNIT II TWO - DIMENSIONAL RANDOM VARIABLES 12

Joint Distributions – Marginal and Conditional Distributions – Covariance – Correlation and Linear Regression – Transformation of Random Variables – Central Limit Theorem (For Independent and Identically Distributed Random Variables).

UNIT III RANDOM PROCESSES 12

Classification – Stationary Process – Markov Process - Poisson Process – Discrete Parameter Markov Chain – Chapman Kolmogorov Equations – Limiting Distributions.

UNIT IV QUEUEING THEORY 12

Markovian Queues – Birth and Death Processes – Single and Multiple Server Queuing Models – Little's Formula - Queues with Finite Waiting Rooms – Finite Source Models.

UNIT V NON-MARKOVIAN QUEUES AND QUEUEING NETWORKS 12

M/G/1 Queue – Pollaczek Khinchin formula - M/D/1 and $M/E_K/1$ as special cases – Series Queues – Open and Closed Jackson Networks.

TOTAL: 60 PERIODS

OUTCOMES:

- Students will be able characterize probability models using probability mass (density) functions & cumulative distribution functions.
- Students will be able to understand the terminology & nomenclature appropriate queueing theory.
- Students will demonstrate the knowledge and understand the various queueing models.
- Students will be able to formulate concrete problems using queueing theoretical approaches
- To apply basic probability techniques and models to analyze the performance of computer systems, and, in particular, of networks and queues

TEXT BOOKS:

1. Ibe, O.C. "Fundamentals of Applied Probability and Random Processes", Elsevier, U.P., First Indian Reprint, 2007.
2. Gross, D. and Harris, C.M., "Fundamentals of Queuing Theory", Wiley Student, Third Edition, 2004.

REFERENCES:

1. Allen, A.O., "Probability, Statistics and Queuing Theory with Computer Applications", Elsevier,California, Second Edition, 2005.
2. Taha, H.A., "Operations Research", Pearson Education, Asia, Eighth Edition, 2007.
3. Trivedi, K.S., "Probability and Statistics with Reliability, Queuing and Computer Science Applications", PHI, Second Edition, 2009.

4. Hwei Hsu, “Schaum’s Outline of Theory and Problems of Probability, Random Variables and Random Processes”, Tata McGraw Hill, Ninth Reprint, 2010.

CS7411	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To understand data definitions and data manipulation commands
- To learn about the use of nested and joint queries
- To understand functions, procedures and procedural extensions of databases
- To be familiar with the use of a front end tool
- To understand design and implementation of typical data base applications

Experiment the following commands on the Case studies given above:

1. DDL commands:
   a. Creation of tables with appropriate integrity constraints.
   b. Usage of alter, drop commands
2. DML commands:
   a. Data Insertion using different ways
   b. Usage of truncate command
3. SQL Queries
   a. Simple SQL Queries
   b. Nested Queries (IN and NOT IN, EXISTS and NOT EXISTS, UNIQUE and NOT UNIQUE, op ANY, op ALL, op SOME)
   c. NULL value and OUTER JOIN Queries
   d. Aggregation Operators
   e. Grouping and Ordering commands
4. TCL commands:
   a. Setting privileges
   b. Save point, roll back commands
5. Generation of suitable reports.
6. Implementation of suitable front end for querying and displaying the results.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Use typical data definitions and manipulation commands.
- Design applications to test Nested and Joint Queries
- Implement simple applications that uses Views
- Implement applications that require a Front End Tool and Report Generations
- Critically analyze the use of Tables, Views, functions and Procedures for a realistic database application.

CS7412	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To learn shell programming and the use of filters in the UNIX environment.
- To learn to use system calls through C programs.
- To learn to use the file system related system calls.
- To gain knowledge of process creation and communication between processes.
- To learn how process synchronization can be done using semaphores.

LIST OF EXPERIMENTS

1. Basic UNIX commands – learning and usage.
2.. Shell Programming.

3. Grep, sed, awk.
4. File system related system calls. (Learn to create, open, read, write, seek into, close files; open, read, write, search, close directories).
5. Process management – Fork, Exec (Learn to create a new process and to overlay an executable binary image on an existing process).
6. Inter-process communication between related processes using pipes.
7. Process synchronization using semaphores (Solutions to synchronization problems like producer consumer problem, dining philosophers' problem etc...).
8. Inter-process communication among unrelated processes using Shared memory.
9. Inter-process communication among unrelated processes using Message Queues.
10. CPU Scheduling algorithms.
11. Contiguous memory allocation strategies – best fit, first fit and worst fit strategies.
12. Page replacement algorithms.

TOTAL: 60 PERIODS

OUTCOMES:

At the end of this course, the students will be able to:

- Apply shell scripting for Problem solving
- Apply system calls for different purposes
- Analyze and solve process synchronization problems
- Use IPC for co-ordination among processes
- Able to choose appropriate algorithms for operations such as CPU Scheduling memory allocation and Page replacement.

CS7501 DATA COMMUNICATION AND COMPUTER NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the division of network functionality into layers.
- To familiarize the functions and protocols of each layer of TCP/IP protocol suite.
- To understand the flow of information from one node to another node in the network.
- To understand the components required to build different types of network.
- To learn concepts related to network addressing.

UNIT I INTRODUCTION / APPLICATION LAYER 8

Evolution of Computer Networking – Layered Architecture – ISO/OSI Model – Internet Architecture (TCP/IP) – Application Layer Protocols – HTTP – FTP – Telnet – Email – DNS – Application Performance – Performance Metrics

UNIT II TRANSPORT LAYER 9

End to End Protocols – Connectionless Transport – User Datagram Protocol (UDP) – Reliable Data Transfer – Connection Oriented Transport - Transmission Control Protocol (TCP) - Flow Control – Congestion Control – Transport Layer Alternatives (RPC) – Transport for Real Time Application

UNIT III NETWORK LAYER 10

Internet Protocol – IPV4 Packet Format – IP Addressing – Subnetting – Variable Length Subnet Mask(VLSM) – Classless Inter Domain Routing (CIDR) – Private Addressing – Network Address Translation – BOOTP/DHCP-ICMP – Routing Principles – Distance Vector Routing(RIP) – Link State Routing (OSPF) – Path Vector Routing (BGP) – Router Internals – IPV6 – Quality of Service (QoS)

UNIT IV DATA LINK LAYER 9

Link Layer – Framing – Addressing – Error Detection/Correction – Multiple Access Protocols – Address Resolution Protocol (ARP) – Ethernet Basics – CSMA/CD – Frame Format – Switching – Types (datagram, virtual) – Hubs, Bridges, Switches – Virtual LAN (VLAN) – Wireless LAN (802.11) – WAN Technologies – ATM – Frame Relay - MPLS

UNIT V DATA COMMUNICATIONS 9

Transmission – Impairments – Bandwidth Limitations – Modulation – Frequency Spectrum – Multiplexing – Encoding Techniques – Transmission Media - Copper – Fiber – Optical – Radio (wireless) – Cable Pinouts – Crossover – Straight Through - Rollover

TOTAL: 45 PERIODS

OUTCOMES:

- Understand/ comprehend the underlying principles of computer networking.
- Study the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
- Develop solutions for networking problems.
- Understand and develop the skills of sub-netting and routing mechanisms.
- Understand and explain Data Communication Systems and its techniques.

TEXT BOOKS:

1. James F. Kurose, Keith W. Ross, “Computer Networking, A Top-Down Approach Featuring the Internet”, Sixth Edition, Pearson Education, 2012.
2. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers Inc., 2011.

REFERENCES:

1. William Stallings, “Data and Computer Communications”, Tenth Edition, Pearson Education, 2013.
2. Douglas E. Comer, “Internetworking with TCP/IP (Volume I) Principles, Protocols and Architecture”, Sixth Edition, Pearson Education, 2013.
3. Nader F. Mir, “Computer and Communication Networks”, Second Edition, Prentice Hall, 2014.
4. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, “Computer Networks: An Open Source Approach”, McGraw Hill Publisher, 2011.
5. Behrouz A. Forouzan and Firouz Mosharraf, “Computer Networks a Top Down Approach”, Tata McGraw-Hill, 2011.
6 Rich Seifert, James Edwards, “The All New Switch Book: The Complete Guide to LAN Switching Technology”, Wiley Publishing Inc, 2008

CS7502	EMBEDDED SYSTEM DESIGN	L	T	P	C
		4	0	0	4

OBJECTIVES:

- To learn the architecture and programming of ARM processor
- To learn the architecture and programming of 8051Microcontroller
- To familiarize with the embedded computing platform design and analysis
- To be exposed to the basic concepts of real time operating systems
- To run and debug programs in an IDE
- To design an embedded processor based system for a real-time application.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS AND ARM PROCESSOR 12

Introduction – Complex Systems and Microprocessors - System Design Process – ARM Processor – Architecture - Instruction Set – Programming. Programming Input and Output-Supervisor Mode, Exceptions and Traps.

UNIT II 8051 MICROCONTROLLERS 12

8051 Microcontroller – Architecture, Instruction Set and Programming – Programming Parallel Ports, Timers and Serial Port – Memory System Mechanisms – Memory and IO Devices and Interfacing – Interrupt Handling.

UNIT III PROCESSES AND OPERATING SYSTEMS 12

Introduction – Multiple Tasks and Multiple Processes – Preemptive Real - Time Operating Systems – Priority Based Scheduling– Inter-Process Communication Mechanisms – Evaluating Operating System Performance –Power Management and Optimization for Processes – Design Example.

UNIT IV EMBEDDED C PROGRAMMING 12

Programming Embedded Systems in C – Programming using Microcontroller/OS II Functions – Inline Functions and Inline Assembly – Portability Issues – Meeting Real Time Constraints – Multistate Systems and Function Sequences

UNIT V EMBEDDED COMPUTING PLATFORM DESIGN 12

The CPU Bus – Memory Devices – I/O Devices – Component Interfacing – Embedded Software Development Tools – Emulators and Debuggers. Challenges of Embedded Systems – Embedded System Design Process – Design Issues – Design Methodologies – Complete Design of Example Embedded Systems –Optimization and Performance Analysis – Introduction to Multiprocessors in Embedded Systems – Networks for Embedded Systems

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Describe the architecture and programming of ARM processor and Microcontroller
- Outline the concepts of Embedded Systems
- Explain the basic concepts of Real Time Operating System design
- Use the Embedded System design techniques to develop an real -time application
- Gain knowledge on Multiprocessors and Networks for Embedded System

TEXT BOOKS:

1. Wayne Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.
2. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay ,"The 8051 Microcontroller and Embedded Systems ", Pearson Education, Second edition, 2008.

REFERENCES:

1. David. E. Simon, "An Embedded Software Primer", First Edition, Fifth Impression, Addison-Wesley Professional, 2007.
2. Andrew N Sloss, D. Symes, C. Wright, "ARM System Developer's Guide", First Edition, Morgan Kaufmann/Elsevier, 2006.
3. Steve Heath, "Embedded Systems Design", Second Edition, Elsevier, 2008.

CS7503 OBJECT ORIENTED ANALYSIS AND DESIGN

L	T	P	C
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OBJECTIVES:

- To understand the role of objects in software process models
- To analyze the importance of use cases
- To model the system using standard design diagrams
- To design and manage object based systems

To study standard OO patterns and their impact on testing

UNIT I INTRODUCTION **9**

Object Oriented Analysis and Design – Iterative, Evolutionary and Agile – NextGen POS system – Inception – Inception vs. Requirements – Evolutionary Requirements.

UNIT II USECASES **9**

Usecases – Other requirements – Domain Model – System Sequence Diagrams – Operation Contracts - From Requirements to Design

UNIT III DESIGN **9**

Logical architecture and UML package diagrams – Onto Object Design – UML Interaction Diagrams – UML Class diagrams - GRASP: Designing Objects with Responsibilities – Object Design Examples with GRASP – Designing for Visibility – Mapping Design to Code – Test Driven Development and Refactoring – UML Tools and UML as blueprint

UNIT IV ELABORATION **9**

More patterns – More objects with Responsibilities – Applying GoF Design Patterns – UML Activity Diagrams and Modeling – UML State Machine Diagrams and Modeling –Relating Usecases – Domain Model Refinement – More SSDs and Contracts – Architectural Analysis – Logical Architecture Refinement – Package Design – More Object Design with GoF patterns – UML deployment and Component Diagrams.

UNIT V PATTERN BASED ANALYSIS AND CASE STUDY **9**

Designing a Persistence Framework with Patterns – Creational Patterns: Abstract Factory – Builder – Factory Method – Prototype – Singleton - Structural Patterns: Adapter – Bridge – Composite – Decorator – Façade – Flyweight – Proxy- Behavioral Patterns: Chain of Responsibility – Command – Interpreter – Iterator – Mediator – Memento – Observer – State – Strategy – Template Method – Visitor - Case study: Bank ATM - Managing Object Oriented Projects - Agate Ltd – Food Co Ltd – ATM - Payroll.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Understanding object fundamentals and create designs using various models
- Studying the object constraint language used in design
- Understanding and applying patterns, design principles in design
- Analyzing design to code conversion, testing and code optimization techniques

Applying more design patterns and refining logical architecture

TEXT BOOKS:

1. Craig Larman, “Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development”, Third Edition, Pearson Education, 2005.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, “Design Patterns: Elements of Reusable Object-Oriented Software”, Addison Wesley, 1995, Thirty Seventh Reprint, 2009.

REFERENCE:

1. Simon Bennett, Steve McRobb, Ray Farmer, “Object-Oriented Systems Analysis and Design Using UML”, Fourth Edition, Tata McGraw-Hill Education, 2004.

CS7504	THEORY OF COMPUTATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the language hierarchy
- To construct automata for any given pattern and find its equivalent regular expressions
- To design CFG for any given language
- To understand the need for Turing machines and their capability
- To understand un decidable problems and NP problems

UNIT I REGULAR LANGUAGES 11

Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon Transitions - Regular Expression – FA and Regular Expressions – Pumping Lemma for Regular Languages – Properties - Equivalence and Minimization of Automata.

UNIT II CONTEXT FREE LANGUAGES 11

Context-Free Grammar (CFG) – Derivation Trees – Ambiguity in Grammars and Languages – Equivalence of Parse Trees and Derivation – Simplification of Context-free Grammar – Chomsky Normal Form – Greibach Normal Form - Definition of the Pushdown Automata – Languages of a Pushdown Automata – Equivalence of Pushdown Automata and CFG– Pumping Lemma for CFL – Closure Properties - Deterministic Pushdown Automata.

UNIT III TURING MACHINES 8

Turing Machines – Language of a Turing Machine – Turing Machine as a Computing Device - Techniques for TM – Modifications of Turing Machines – Two-way Infinite Tape, Equivalence of One Way Infinite Tape and Two-way Infinite Tape Turing Machines – Multi Tapeturing Machines, Non-deterministic Turing machine.

UNIT IV CHOMSKY HIERARCHY 7

Regular Grammars – Equivalence of Regular Grammar and Finite Automata - Unrestricted Grammars – Equivalence of Type 0 Grammar and Turing Machines – Context Sensitive Languages – Linear Bounded Automata – Equivalence of LBA’s and CSG’s

UNIT V UNDECIDABILITY 8

A Language that is not Recursively Enumerable (RE) – An Undecidable Problem that is RE – Undecidable Problems about Turing Machine – Rice Theorem for Recursive and Recursively Enumerable Languages – Post’s Correspondence Problem (PCP) – Modified Post Correspondence Problem

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Classify languages based on Chomsky hierarchy
- Identify the class of language and design automata or Type x grammar
- Prove equivalence of the different language representations within a class of the Chomsky hierarchy
- Identify the undecidable problems and their class of languages
- Apply and prove a given language is decidable or undecidable

TEXT BOOK:

1. John E Hopcroft and Jeffery D Ullman, “Introduction to Automata Theory, Languages and Computations”, Narosa Publishing House, 2002.

REFERENCES:

1. H.R. Lewis and C.H. Papadimitriou, “Elements of the theory of Computation”, Second Edition, Pearson Education, 2003.
2. J. Martin, “Introduction to Languages and the Theory of Computation”, Third Edition, Tata McGraw Hill, 2003.
3. Micheal Sipser, “Introduction of the Theory and Computation”, Thomson Brokecole, 1997.

CS7551	DIGITAL SIGNAL PROCESSING	L	T	P	C
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OBJECTIVES:

- To study the classifications and characteristics of signals and systems.
- To acquire knowledge related to Fourier transform and its applications.
- To learn the design of infinite and finite impulse response filters for filtering undesired signals.
- To transform the prototype filter into desired type and realize the filter.
- To understand signal processing concepts in systems having more than one sampling frequency.

UNIT I SIGNALS AND SYSTEMS 9

Basic Elements of DSP – Concepts of Frequency in Analog and Digital Signals – Sampling Theorem – Discrete – Time Signals, Systems – Analysis of Discrete Time LTI Systems – Z Transform – Inverse Z Transform – Convolution – Correlation.

UNIT II FREQUENCY TRANSFORMATIONS 9

Introduction to DFT – Properties of DFT – Circular Convolution – Filtering -Methods Based on DFT – FFT Algorithms – Decimation - in - Time Algorithms, Decimation – in – Frequency Algorithms – Use of FFT in Linear Filtering – DCT – Use and Application of DCT- Introduction to Wavelet Transform – Haar Transform.

UNIT III IIR FILTER DESIGN 9

Structures of IIR – Analog Filter Design – Discrete Time IIR Filter from Analog Filter – IIR Filter Design by Impulse Invariance, Bilinear Transformation, Approximation of Derivatives – (LPF, HPF, BPF, BRF) Filter Design using Frequency Translation.

UNIT IV FIR FILTER DESIGN 9

Structures of FIR – Linear Phase FIR Filter – Fourier Series - Filter Design using Windowing Techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency Sampling Techniques – Finite Word Length Effects in Digital Filters: Errors, Limit Cycle, Noise Power Spectrum.

UNIT V APPLICATIONS 9

Multirate Signal Processing: Decimation, Interpolation, Sampling Rate Conversion by a Rational Factor – Adaptive Filters: Introduction, Applications of Adaptive Filtering to Equalization, Echo Cancellation – Speech Recognition Systems, Speech Synthesis Systems – Image Enhancement, Case Study.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Analyze and classify signals and systems
- Analyze and apply appropriate frequency transformations for any class of signal
- Analyze and design filters for a given signal processing application
- Identify and compute the errors encountered in a digital signal processing systems

- Design applications that involves signal and image processing
- Justify and apply possible extensions to digital filters for a given application

TEXT BOOKS:

1. John G. Proakis and Dimitris G. Manolakis, “Digital Signal Processing – Principles, Algorithms and Applications”, Pearson Education / Prentice Hall, Fourth edition, 2007.
2. Emmanuel C. Ifeachor and Barrie. W. Jervis, “Digital Signal Processing”, Pearson Education / Prentice Hall, Second Edition, 2002.

REFERENCES:

1. Sanjit K. Mitra, “Digital Signal Processing – A Computer Based Approach”, Tata McGraw Hill, Fourth Edition, 2011.
2. Alan V. Oppenheim, Ronald W. Jchafer and Hohn. R. Back, “Discrete Time Signal Processing”, Pearson Education, Third Edition, 2009.
3. K. P. Soman and K. I. Ramachandran, "Insight into Wavelets - From Theory to Practice", Prentice Hall of India, Third Edition, 2010.
4. Lawrence Rabiner and Biing-Hwang Juang, "Fundamentals of Speech Recognition", First Edition, Prentice Hall, 1993.
5. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2009.
6. Dake Liu, “Embedded DSP Processor Design: Application Specific Instruction Set Processors”, Morgan Kaufmann, First Edition, 2008.

CS7511	CASE TOOLS LABORATORY	L	T	P	C
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OBJECTIVES:

- To learn the basics of OO analysis and design skills.
- To be exposed to the UML domain models
- To understand the activity of doing a detailed design with UML including use case, Class, State-chart, activity, sequence
- To learn to map design to code.
- To be familiar with the various testing techniques

LIST OF EXPERIMENTS:

To develop a mini-project by following the 9 exercises listed below:

1. To develop a problem statement.
2.. Identify Use Cases and develop the Use Case model.
3. Identify the conceptual classes and develop a domain model with UML Class diagram.
4. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence diagrams.
5. Draw relevant state charts and activity diagrams.
6. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
7. Develop and test the Technical services layer.
8. Develop and test the Domain objects layer.
9. Develop and test the User interface layer.

SUGGESTED DOMAINS FOR MINI-PROJECT:

1. Passport automation system.
2. Book bank
3. Exam Registration

4. Stock maintenance system.
5. Online course reservation system
6. E-ticketing
7. Software personnel management system
8. Credit card processing
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference Management System
13. BPO Management System
14. Library Management System
15. Student Information System

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Design and implement projects using OO concepts.
- Use the UML analysis and design diagrams.
- Apply appropriate design patterns.
- Create code from design.
- Compare and contrast various testing techniques

CS7512	COMPUTER NETWORKS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To learn socket programming.
- To learn and use network commands.
- To gain knowledge about the working of routing algorithms.
- To use simulation tools to analyze the performance of protocols at different layers in computer networks.
- To be familiar with the contemporary issues in networking technologies

LIST OF EXPERIMENTS

1. Chat Program using TCP Sockets
2. Simulation of HTTP Protocol using TCP Sockets
3. Simulation of DNS using UDP Sockets
4. Simulation of Ping using Raw Sockets
5. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine.
6. Exercise on ARP using live network
7. Devise IP address plan for a mid-size Org network using ideas of subnetting and VLSM. Implement the plan on a simulated network and assign addresses using a DHCP server.
8. Study and configure functionalities of a router and switches (or by simulation)
9. Experiment to understand the concept of Network address translation
10. Simulation of Distance Vector/ Link State Routing algorithm
11. Study of TCP/UDP performance using Simulation tool
12. Performance evaluation of Routing protocols using Simulation tool
13. Simulation of error correction code (like CRC)

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Implement protocols using TCP and UDP Sockets.
- Compare the performance of different routing algorithms using simulation tools.
- Configure functionalities of router and switches.
- Compare the performance of different transport layer protocols
- Implement Client /Server Applications

CS7601	COMPILER DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the various parsing techniques and different levels of translation
- To learn and understand design issues for all the phases of a compiler
- To learn how to obtain specific object code from source language
- To learn how to optimize the code and schedule for optimal performance
- To learn to parallelize and optimize compilers

UNIT I FRONT END OF COMPILERS 10

The Structure of Compiler – Lexical Analysis: Role of Lexical Analyzer, Specification and Recognition of Tokens, Syntax Analysis: Top Down Parsing, Bottom up Parsing, LR Parsers: SLR, CLR, and LALR.

UNIT II INTERMEDIATE CODE GENERATION 9

Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Syntax Directed Translation Schemes, Intermediate Languages: Syntax Tree, Three Address Code, Postfix Code, Declarations, Translation of Expressions, Type Checking, Back Patching.

UNIT III RUNTIME AND OBJECT CODE GENERATION 9

Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management - Issues in Code Generation - Design of Code Generator - Register Allocation and Assignment – Instruction Selection by Tree Rewriting – Optimal Code Generation for Expressions – Dynamic Programming Code Generation.

UNIT IV CODE OPTIMIZATION 9

Basic Blocks and Flow Graphs – Optimization of Basic Blocks – Principal Sources of Optimizations – Data Flow Analysis – Constant Propagation – Partial Redundancy Elimination – Peephole Optimizations.

UNIT V SCHEDULING AND OPTIMIZING FOR PARALLELISM 8

Code Scheduling Constraints – Basic Block Scheduling – Global Code Scheduling - Basic Concepts in Parallelization – Parallelizing Matrix Multiplication – Iteration Spaces – Affine Array Indexes.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Design the various compiler phases from language specification and Identify the issues in different phases
- Analyze the design issues and identify the intermediate code generation that need to be adopted
- Analyze and design the code generators for the specified machine
- Apply the various code optimization techniques and prove the code produced from basic block is optimal

- Analyze the optimization technique for parallelizism

TEXT BOOK:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers: Principles, Techniques and Tools”, Second Edition, Pearson Education, 2009.

REFERENCES:

1. Randy Allen, Ken Kennedy, “Optimizing Compilers for Modern Architectures: A Dependence-based Approach”, Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, “Advanced Compiler Design and Implementation”, Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, “Engineering a Compiler”, Morgan Kaufmann Publishers Elsevier Science, 2004.
4. V. Raghavan, “Principles of Compiler Design”, Tata McGraw Hill Education Publishers, 2010.
5. Allen I. Holub, “Compiler Design in C”, Prentice-Hall Software Series, 1993.

CS7602 MACHINE LEARNING TECHNIQUES

L	T	P	C
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OBJECTIVES:

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability based learning techniques
- To understand the various dimensionality reduction techniques
- To understand graphical models of machine learning algorithms

UNIT I INTRODUCTION **9**

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

UNIT II LINEAR MODELS **9**

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT III TREE AND PROBABILISTIC MODELS **9**

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map

UNIT IV DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS **9**

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

UNIT V GRAPHICAL MODELS **9**

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte

Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques, design of Neural Networks, etc.
- To apply different models on datasets and design suitable problem solutions
- To study the various probability based learning techniques
- To understand graphical models of machine learning algorithm

TEXT BOOKS:

1. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

2. Tom M Mitchell, "Machine Learning", First Edition, McGraw Hill Education, 2013.

REFERENCES:

1. Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", First Edition, Cambridge University Press, 2012.
2. Jason Bell, "Machine learning – Hands on for Developers and Technical Professionals", First Edition, Wiley, 2014
3. Ethem Alpaydin, "Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)", Third Edition, MIT Press, 2014

CS7603	PARALLEL AND DISTRIBUTED COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the need and fundamentals of parallel computing paradigms
- To learn the nuances of parallel algorithm design
- To understand the programming principles in parallel and distributed computing architectures
- To learn few problems that are solved using parallel algorithms
- To learn distributed computing incorporating fault tolerance.

UNIT I INTRODUCTION TO PARALLEL COMPUTING 9

Scope of Parallel Computing – Parallel Programming Platforms – Implicit Parallelism – Limitations of Memory System Performance – Control Structure of Parallel Platforms – Communication Model of Parallel Platforms – Physical Organization of Parallel Platforms – Communication Costs in Parallel Machines – Impact of Process - Processor Mapping and Mapping Techniques.

UNIT II PARALLEL ALGORITHM DESIGN 9

Preliminaries – Decomposition Techniques – Characteristics of Tasks and Interactions – Mapping Techniques for Load Balancing – Methods for Containing Interaction Overheads – Parallel Algorithm Models – Basic Communication Operations – One-to-All Broadcast and All-to-One Reduction – All-to-All Broadcast and Reduction – All-Reduce and Prefix Sum Operations – Scatter and Gather – All-to-All Personalized Communication- Circular Shift – Improving the Speed of some Communication Operations

UNIT III PROGRAMMING USING MESSAGE PASSING AND SHARED ADDRESS SPACE **9**

Principles of Message Passing Programming – Building Blocks – Send and Receive Operations – MPI – Message Passing Interface – Topologies and Embedding – Overlapping Communication with Computation – Collective Communication and Computation Operations – Groups and Communicators – POSIX thread API – OpenMP: a Standard for Directive based Parallel Programming – Applications of Parallel Programming - Matrix-Matrix Multiplication – Solving Systems of Equations – Sorting Networks - Bubble Sort Variations – Parallel Depth First Search **9**

UNIT IV DISTRIBUTED COMPUTING PARADIGM

Paradigms for Distributed applications – Basic algorithms in Message passing Systems – Leader Election in Rings – Mutual Exclusion in Shared Memory

UNIT V FAULT TOLERANT DESIGN **9**

Synchronous Systems with Crash Failures – Byzantine Failures – Impossibility in Asynchronous Systems - Formal Model for Simulation – Broadcast and Multicast – Specification of a Broadcast Service – Implementing a Broadcast Service – Multicast in Groups – Distributed Shared Memory – Linearizable – Sequentially Consistent Shared Memory – Algorithms

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Understand the need and fundamentals of parallel computing paradigms
- Learn the nuances of parallel algorithm design
- Develop programming knowledge with openMP and MPI.
- Understand the programming principles in parallel and distributed computing architectures
- Design applications by incorporating fault tolerance.

TEXT BOOKS:

1. Ananth Grama, Anshul Gupta, George Karypis and Vipin Kumar, “Introduction to Parallel Computing”, Second Edition, Pearson Education, 2009.
2. Haggit Attiya and Jennifer Welch, “Distributed Computing – Fundamentals, Simulations and Advanced Topics”, Second Edition, Wiley, 2012.

REFERENCES:

1. Michael Quinn, “Parallel Computing - Theory and Practice”, Second Edition, Tata McGraw Hill, 2002.
2. Norman Matloff, “Parallel Computing for Data Science – With Examples in R, C++ and CUDA”, Chapman and Hall/CRC, 2015.
3. Wan Fokkink, “Distributed Algorithms: An Intuitive Approach”, MIT Press, 2013.
4. M.L. Liu, “Distributed Computing – Principles and Applications”, First Edition, Pearson Education, 2011.

CS7604 WEB PROGRAMMING **L T P C**
3 0 0 3

OBJECTIVES:

- To examine some of the most important technologies that are being used today by web developers to build a wide variety of web applications.
- To develop Java based web programming.
- To highlight the web frameworks in web2.0
- To build web applications using proven developer tools and message formats.
- To explore several new standards that may play a significant role in the World Wide Web of tomorrow.

UNIT I INTRODUCTION TO THE INTERNET 9

Internet Protocols - TCP/IP, UDP, DNS and Domain Names, Higher-level Protocols, WWW-Versions - HTTP - Request and Response Messages - URI, URN, URL, MIME Type. Web Clients: – HTML - History - Versions – CSS - XHTML Syntax and Semantics – DTD – Schema - XSLT – XML Parser – Client Side Scripting - Java Script, PHP, Python. Web Servers – IIS and Apache - Server Features, Server History, Server Configuration and Tuning, Defining Virtual Hosts, Logging, Access Control, Secure Servers.

UNIT II JAVA PROGRAMMING IN THE INTERNET 9

Java I/O Serialization - AWT – Event Handling – TCP and UDP Socket Programming – Connecting to the Web - Applets – Swings – Remote Method Invocation - Java Database Connectivity (JDBC) – Connecting – Querying Statements – Results – ODBC - JSP – Java Servlets – Architecture – Life Cycle - Generating Dynamic Content - Parameter Data-Sessions-Cookies - URL Rewriting - Data Storage Servlets and Concurrency - Session Management – Cookies - JSP Technology Introduction - JSP and Servlets - Running JSP Applications Basic JSP – JavaBeans Classes and JSP-Tag Libraries and Files - Support for the Model – View - Controller Paradigm

UNIT III DOM, AJAX, JSON 9

Host Objects: Introduction to DOM - Event Handling - Modifying Element Style - Document Tree. Representing Web Data: XML - Documents and Vocabularies-Versions and Declaration - Namespaces - Ajax and Rich Internet Applications with XML and JSON - DOM based XML processing Event-oriented Parsing: SAX -Transforming XML Documents - Selecting XML Data: XPATH -Template Based Transformations: XSLT - Displaying XML Documents in Browsers. Separating Programming and Presentation.

UNIT IV WEB FRAMEWORKS 9

Django Template System - Interacting with a Database (Modules) - Django Administration Site, Form Processing, Advanced Views and Urlconfs, Generic Views - Extending the Template Engine - Generating Non-HTML Content, Sessions, Users, Registration, Caching, Other Contributed Sub Frameworks, Middleware, Integrating with Legacy Databases and Applications, Extending Django's Admin Interface, Internationalization, Security and Deploying Django. The Model Definition Reference, The Data Base API Reference, Generic Views Reference, Settings, Built-In Template Tags and Filters, The Django - Admin Utility and Request and Response Objects. – Web App - Ruby Language – Ruby on Rails – Framework – Action Controller and Action View - RDF, Rdfa, OWL and Jena

UNIT V WEB SERVICES 9

JAX – RPC – Concepts - Writing a Java Web Service-Writing a Java Web Service Client-Describing Web Services: UDDI – WSDL - Representing Data Types: XML Schema-Communicating Object Data: SOAP Related Technologies - Software Installation - Storing Java Objects as Files - Databases and Java Servlets. Web Services Standards – Creating Web Services – Extending Web Services – Messaging Protocol – Describing – Discovering – Securing.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Students gain a through knowledge of Internet principles, Web Designing tools
- to build real world applications using Socket Communication, Client side, and Server side Scripting lanuages
- Build Dynamic web applications using server side PHP Programming and Database connectivity.
- demonstrate knowledge of DOM and SAX objects that interacts with server-based programs
- To identify the suitable web framework to support the development of web applications including web services.

TEXT BOOKS:

1. Robert W. Sebesta, “Programming the World Wide Web”, Eighth Edition, Addison-Wesley, 2015.
2. Deitel and Deitel, “Internet and World Wide Web: How to Program”, Fifth Edition, Pearson Education, 2012.

REFERENCES:

1. http://www.w3schools.com
2. http://www.djangobook.com
3. http://rubyonrails.org/
4. Deitel and Deitel, “Java – How to Program”, Tenth Edition, Pearson Education India, 2015.
5. http://www.cookwood.com/html/extras/cssref.html

CS7611	COMPILER LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- Learning tools for compiler writing
- Designing the specification of language constructs
- Learning code generation
- Learning code optimization
- Translate code to specific machine object code

LIST OF EXPERIMENTS

1. Tokenizer with LEX for declarations in C language.
2. Tokenizer with LEX for assignment statement.
3. Parser with LEX and YACC to validate “for” statement.
4. Evaluation of arithmetic expression with LEX and YACC.
5. Symbol table creation from a list of declarations.
6. Syntax tree creation from “if” statement.
7. Three address code generation from assignment statement with array references.
8. Three address code generation from “while” statement.
9. Construction of flow graph from list of three address statements.
10. Constant propagation in a flow graph.
11. Translation of three address code to assembly language with fixed number of registers.
12. Stack and heap management at run time.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Implement the token recognizer from token specification
- Implement the parser from the syntax specification
- Implement the intermediate code generator for the specified intermediate language
- Implement simple optimizations
- Implement translator with specific input and object language

CS7612	WEB TECHNOLOGY LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- Try and develop the most important technologies that are being used today by web developers to build a wide variety of web applications.
- To develop Java based web programming.
- Web applications using technologies such as Java, Javascript, AJAX, Ruby on Rails, Django, Jena, Servlets, PHP, XML, RSS, XSLT, JSON etc.
- To learn and develop web services.
- To build web applications using proven developer tools Dreamweaver/Flex/Silver Light etc.

LIST OF EXPERIMENTS

1. Using InetAddress class, Socket Programming in Java
2. RMI
3. Client side scripting using
   - XHTML
   - Javascript - DOM
   - CSS
4. XML DTD, Parsers, XSLT, XPATH, SAX
5. Programming with AJAX, JQuery, JSON
6. Server Side programming (implement these modules using any of the server side scripting languages like PHP, Servlets, JSP etc.,
   Gathering form data
   Querying the database
   Response generation
   Session management
   MySQL/JDBC/Oracle
7. Case Study – Sample Application development
8. Ruby-on-Rails setup and programming
9. Django, Jena – Integrating Databases and applications
10. JAX – RPC
11. WSDL
12. SOAP

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Apply the Object Oriented features of Java for programming on the internet
- Implement socket programming and Client side scripting in Java
- Design a Web application using various technologies such as Java, XML, AJAX, Servlets, PHP, JSP, Django and Jena.
- Create applications using web services such as WSDL and SOAP
- Develop application using Dreamweaver/Flex/Silver Light etc.

CS7701 CLOUD COMPUTING TECHNIQUES

L	T	P	C
4	0	0	4

OBJECTIVES:

- To understand the concept of cloud and utility computing.
- To understand the various issues in cloud computing.
- To familiarize themselves with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.
- To be able to set up a private cloud.

UNIT I INTRODUCTION **8**

Introduction - Historical Development - Cloud Computing Architecture – The Cloud Reference Model – Cloud Characteristics – Cloud Deployment Models: Public, Private, Community, Hybrid Clouds - Cloud Delivery Models: IaaS, PaaS, SaaS – Open Source Private Cloud Software: Eucalyptus, Open Nebula, Open Stack.

UNIT II VIRTUALIZATION **9**

Data Center Technology - Virtualization - Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization - Implementation Levels of Virtualization - Tools and Mechanisms: Xen, VMWare, Microsoft Hyper-V.

UNIT III CLOUD COMPUTING MECHANISM **9**

Cloud Infrastructure Mechanism: Cloud Storage, Cloud Usage Monitor, Resource Replication – Specialized Cloud Mechanism: Load Balancer, SLA Monitor, Pay-per-use Monitor, Audit Monitor, Failover System, Hypervisor, Resource Cluster, Multi Device Broker, State Management Database – Cloud Management Mechanism: Remote Administration System, Resource Management System, SLA Management System, Billing Management System.

UNIT IV HADOOP AND MAP REDUCE **10**

Apache Hadoop – Hadoop Map Reduce – Hadoop Distributed File System- Hadoop I/O- Developing a Map Reduce Application - Map Reduce Types and Formats - Map Reduce Features– Hadoop Cluster Setup – Administering Hadoop.

UNIT V SECURITY IN THE CLOUD **9**

Basic Terms and Concepts – Threat Agents – Cloud Security Threats – Cloud Security Mechanism: Encryption, Hashing, Digital Signature, Public Key Infrastructure, Identity and Access Management, Single Sign-on, Cloud Based Security Groups, Hardened Virtual Server Images

TOTAL: 45+15=60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- Identify the architecture, infrastructure and delivery models of cloud computing.
- Explain the core issues of cloud computing such as security, privacy and interoperability
- Choose the appropriate technologies, algorithms and approaches for the related issues.
- Understanding the concepts of Big data tool and its analysis techniques

TEXT BOOK:

1. Thomas Erl, Zaigham Mahood, Ricardo Puttini, “Cloud Computing, Concept, Technology and Architecture”, Prentice Hall, 2013.

REFERENCES:

1. Toby Velte, Anthony Velte, Robert C. Elsenpeter, “Cloud Computing, A Practical Approach”, Tata McGraw-Hill Edition, 2010.
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, “Mastering Cloud Computing”, Tata McGraw-Hill, 2013.
3. Arshdeep Bahga, Vijay Madisetti, “Cloud Computing: A Hands-On Approach”, Universities Press, 2014.
4. Tom White, “Hadoop: The Definitive Guide”, O'Reilly Media, 4th Edition, 2015.
5. James E Smith and Ravi Nair, “Virtual Machines”, Elsevier, 2005.
6. John Rittinghouse and James Ransome,” Cloud Computing, Implementation, Management and Strategy”, CRC Press, 2010

CS7702	SECURITY IN COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand security design principles
- To learn secure programming techniques
- To understand the mathematics behind cryptography
- To know the standard algorithms used to provide confidentiality, integrity and authenticity
- To understand the security requirements in operating systems and databases
- To learn about the security applications in wireless environment.

UNIT I SECURITY DESIGN PRINCIPLES 9

Security Goals – Secure System Design – Understanding Threats – Designing-In Security – Convenience and Security – Security in Software Requirements – Security by Obscurity – Secure Design Principles – Defense in Depth – Diversity in Defense – Securing the Weakest Link – Fail-Safe Stance.

UNIT II SECURE PROGRAMMING TECHNIQUES 9

Worms and Other Malware – Buffer Overflows – Client State Manipulation – SQL Injection – Password Security – Cross Domain Security in Web Applications – Attack Patterns – Preventing XSRF – Preventing XSSI - Preventing XSS.

UNIT III SYMMETRIC CIPHERS & INTRODUCTION TO NUMBER THEORY 9

Overview - Classical Encryption Techniques – Block Ciphers and the Data Encryption Standard – Basic Concepts in Number Theory and Finite Fields – Advanced Encryption Standard – Block Cipher Operation - Fermat’s and Euler’s Theory – CRT – Discrete Logarithms.

UNIT IV PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS 9

Public Key Cryptography and RSA – Diffie-Hellman Key Exchange – Elgamal Cryptographic System – Elliptic Curve Cryptography – Cryptographic Hash Functions – Message Authentication Code - Digital Signature - Certificates.

UNIT V SECURITY APPLICATIONS 9

Security in Operating Systems - Security in the Design of OS – Rootkit- Open Web Application Security – Wireless Network Security – Introduction to Mobile Security.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Understand the approaches, trade-offs in security design principles.
- Discuss various types of attacks and their characteristics.
- Learn secure programming techniques
- Apply number theory in public key encryption techniques.
- Design a secure operating system and databases.
- Discuss the various platform security models in wireless environment.

TEXT BOOKS:

1. Neil Daswani, Christoph Kern, and Anita Kesavan, "Foundations of Security: What Every Programmer Needs to Know", Frist Edition, Apress, 2007.
2. William Stallings, "Cryptography and Network Security: Principles and Practices", Sixth Edition, Pearson Education, 2014.

REFERENCES:

1. Charles P. Pfleeger, Shari Lawrence Pfleeger and Jonathan Margulies, "Security in Computing", Fifth Edition, Pearson Education, 2015.
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 2003.
3. Bruce Schneier, "Applied Cryptography Protocols, Algorithms and Source Code in C", Second Edition, John Wiley and Sons Inc., 2006.
4. Matt Bishop, "Computer Security: Art and Science", First Edition, Addison Wesley, 2002.
5. https://www.owasp.org/index.php/Top_10_2013.
6. N. Asokan, Lucas Davi, Alexandra Dmitrienko, Stephan Heuser, Kari Kostianen, Elena Reshetova, Ahmad-Reza Sadeghi, "Mobile Platform Security", First Edition, Morgan and Claypool Publishers Series, 2014.

CS7703	WIRELESS NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamental technologies that help in the networking of wireless devices.
- To learn about different wireless technologies
- To study the popular Cellular networking technologies
- To learn about the evolution of cellular systems
- To understand the various wireless standards used right from 2G to 5G cellular networks

UNIT I INTRODUCTION AND WIRELESS LANS 9

Frequency Spectrum – Signal Propagation – Modulation – Multiplexing – Spread Spectrum – IEEE 802.11 Wireless LANs – Wireless LAN Equipment – WLAN Topologies – WLAN Technologies - Architecture and Protocols – Data Link Layer – Beacon Frame – Joining an Existing Basic Service Set – Roaming in a Wireless LAN – Security in Wireless LANs – Power Management – Other WLAN Standards – Bluetooth – Overview – Architecture – Radio and Baseband – L2CAP and Frame Format – RFCOMM – SDP – Performance of a Bluetooth Piconet in the Presence of IEEE 802.11 WLANs

UNIT II WIRELESS NETWORKS 9

Ultra-Wideband – Standard and Applications – Radio-Frequency Identification – System – Applications – Wireless Metropolitan Area Networks – Wireless Broadband : IEEE 802.16 – WiMAX – PHY – MAC – Spectrum Allocation – Satellite – Communication – Systems – Wireless Sensor Networks – Applications – Sensor Node – Self-Organized Networks – ZigBee.

UNIT III 2G, 2.5G CELLULAR NETWORKS 9

Global System for Mobile (GSM) – Network Architecture – Location Area Update – Call Routing – Handoff – General Packet Radio Service (GPRS) – Packet Switching – GPRS Architecture – GPRS Services – GPRS Terminals – Packet Data Protocol Context – Enhanced Data Rates for Global Evolution (EDGE) – High Speed Circuit Switched Data (HSCSD) – Code Division Multiple Access (CDMA) – Concept – IS-95 – Software Handoff – GSM vs. CDMA – 2G Mobile Wireless Services – WAP and iMode – SMS.

UNIT IV 3G CELLULAR NETWORKS 9

UMTS/WCDMA – cdma2000 – UMTS/WCDMA versus cdma2000 – UMTS – Channel Structure on the Air Interface – UTRAN – Core and Radio Network Management – UMTS Security – HSDPA.

UNIT V 4G CELLULAR NETWORKS 9

4G Features and Challenges – 4G Applications – Multicarrier modulation – Smart Antenna Techniques – OFDM - MIMO Techniques – Adaptive Modulation and Coding with Time-Slot Scheduler – BLAST system – Software-Defined Radio – Cognitive Radio – LTE – Network Architecture and Interfaces – FDD Air Interface and Radio Networks – Scheduling – Mobility Management and Power Optimization – LTE Security Architecture – Interconnection with UMTS and GSM – LTE Advanced – Introduction to 5G.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- To understand and explain the basics of Wireless Communication Networks
- Discuss the features of different protocols for Wireless and Cellular Networks
- Analyse the issues in designing various protocols for wireless & cellular networks
- understand and appreciate the contribution of various algorithms and protocols towards the performance of wireless systems
- Analyse and compare the importance of various wireless technologies.

TEXT BOOKS:

1. Pei Zheng, Feng Zhao, David Tipper, Jinmei Tatuya, Keiichi Shima, Yi Qian, larry L. Peterson, Lionel M. Ni, Manjunath D, Qing Li, Joy Kuri, Anurag Kumar, Prashant Krishnamurthy, Leonidas Guibas, Vijay K. Garg, Adrian Farrel, Bruce S. Davie, “Wireless Networking Complete”, Elsevier, 2010.
2. Maritn Sauter, “From GSM to LTE: An Introduction to Mobile Networks and Mobile Broadband”, John Wiley and Sons, 2011.

REFERENCES:

1. Asoke K Talukder, Roopa Yavagal, “Mobile Computing – Technology, Application and Service Creation”, McGraw Hill, 2007.
2 Leonhard Korowajczuk, “LTE, WiMAX and WLAN Network Design, Optimization and Performance Analysis”, Wiley-Blackwell, 2011.
3. Erik Dahlman, Stefan Parkvall, Johan Skold, “4G: LTE/LTE-Advanced for Mobile Broadband”, Second Edition, Academic Press Inc., 2013.

CS7711 CREATIVE AND INNOVATIVE PROJECT

L	T	P	C
0	0	4	2

OBJECTIVES:

- To identify the problem based on societal needs
- To interview people on societal problems that require computerization
- To suggest creative solutions to societal problems
- To explore possible alternative solutions
- To estimate risk and develop a prototype

The aim of this course is to encourage the students to identify projects that help in exploring variables that promote creativity and innovation. Each student is expected to choose a real life or socially relevant problem. At the end of the project, students should be familiar with the state of art in their respective fields. They would be able to apply the concepts learnt to relevant research problems or practical applications. This course is to motivate them to learn concepts, models, frameworks, and tools that engineering graduates' need in a world where creativity and innovation is fast becoming a pre-condition for competitive advantage.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to

- Convert user requirements to a software architecture diagram
- Identify and specify the pre-processing necessary to solve a problem
- Suggest optimum solutions by comparing the different solutions from an algorithmic perspective
- Discover the research implications in any societal problem
- Design and use performance metrics to evaluate a designed system
- Perform SWOT and PESTEL Analysis

1. Internals

a. **First Review**
   i. **Block Diagram of the proposed solution for a societal / creative problem**
   ii. **New Contribution in terms of modifications to existing algorithm or suggestion of new ones**
   iii. **Detailed Design of each module**
   iv. **Evaluation Metrics**
   v. **Test Cases**

b. **Second Review**
   i. **Implementation - Justifying pros and Cons**
   ii. **Coding - highlighting what has been reused and what is being written**

c. **Third Review**
   i. **Test Runs**
   ii. **Performance Evaluation based on Metrics**
   iii. **Project Documentation**

2. Externals

- **Presentation, Viva-Voce, Report submission.**

OUTCOMES:

Upon completion of the course, the students will be able to

- Assess the needs of the society
- Describe the background of the problem
- Formulate a problem
- Perform SWOT and PESTEL Analysis
- Frame a policy
- Predict business opportunity
- Design the prototype
- Gain knowledge on system implications.

CS7712 **SECURITY LABORATORY** **L T P C**
0 0 4 2

OBJECTIVES:

- To understand SQL injection and Buffer Overflow
- To understand cross scripting
- To learn to implement the algorithms DES, RSA,SHA-1
- To understand the trusted OS models
- To learn to use tools

LIST OF EXPERIMENTS:

1. Implement the SQL injection attack.
2. Implement the Buffer Overflow attack.
3. Implement Cross Site Scripting and Prevent XSS.
4. Understanding Malwares working and detection.
5. Implement Hacking windows - Windows login password.
6. Implement Hacking windows - Accessing restricted drives.
7. Implement the Symmetric cryptography algorithm Simplified DES algorithm
8. Implement the public key cryptographic RSA algorithm
9. Implement the Secure hash algorithm
10. Write a program to implement a set of rules combining the secrecy controls of the Bell-La Padula with integrity controls of the Biba model
11. Installation of rootkits and study about the variety of options
12. Demonstrate intrusion detection system using any tool.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Write program to perform SQL injection attack and buffer overflow attack
- Write programs on cryptographic and hashing algorithm.
- Design trusted operating system models.
- Discuss various functionality of root kit.
- Demonstrate the working of intrusion detection system

CS7713 **COMPREHENSION AND TECHNICAL REPORT** **L T P C**
0 0 2 1

OBJECTIVES:

- To encourage the students to comprehend the knowledge acquired from first semester to sixth semester of B.E degree course through periodic exercises
- To familiarize students with latest happenings in the area of Computer Science and Engineering
- To learn to write technical content in a well-structured manner
- To familiarize with creation of documentation for existing source code based projects
- To familiarize students with the process of Technical writing using tools for documentation, drawing, compiling etc.

LIST OF EXPERIMENTS

1. **Activity – 1**
   Periodic tests with Objective Type Questions.
2. **Activity – 2**
   Write an article / paper based on project works done by the students in their previous semesters, Present a PPT based on the article
   - Structure the content using either a standard IEEE template or a standard template base, with the elements viz., equations, algorithms, images, graphs, charts,

Tables etc., by using appropriate tools

-

3. Activity – 3

Take an existing software project and create “Software source code documentation and Help” using tools.

Method of Evaluation:

1. Component – 1:
periodic tests with objective type questions based on their academic syllabi

2. Component – 2:
Seminars and paper presentations

3. Component – 3:
Source code documentation and ‘Help’ generation

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Refresh the basic concepts of the subjects in the curriculum
- Acquire knowledge about the latest happenings in the area of Computer Science and Engineering
- Write technical content in a well-structured manner
- Create documentation and help for source code based projects
- Acquire knowledge about a Technical Report

REFERENCES:

1. Mike Markel, “Technical Communication”, Tenth Edition”, 2012.
2. Thomas Arthur Rickard, “A Guide to Technical writing”, Read Books, 2011.
3. Gerald J. Alred, Charles T. Brusaw, Walter E. Oliu, “The Handbook of Technical Writing”, Bedford/St Martins, Eleventh Edition, 2010.
4. www.ieee.org/documents/MSW_A4_format.doc
5. Word / Latex/ LyX, Adobe Frame Maker, SnagIt, MS Visio
6. Javadoc, ROBODoc or any other equivalent tools for source code documentation

CS7001	ADHOC AND SENSOR NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To study the protocols and the functionalities of ad hoc networks
- To understand various applications developed based on ad hoc networking
- To know about sensor networks
- To learn about the security issues in ad hoc and sensor networks

To learn the protocols used in various layers of sensor networks

UNIT I INTRODUCTION AND MAC PROTOCOLS 9

Cellular and Adhoc Networks – Issues and Challenges in Adhoc Networks - Design Issues and Design Goals of MAC protocols for Adhoc Networks - Classification of MAC protocols - Contention Based Protocols – Power-Aware MAC Protocols – Reservation and Scheduling Mechanisms - Other Protocols.

UNIT II ROUTING PROTOCOLS 9

Design Issues and Classification of Unicast and Multicast Routing Protocols - Proactive, Reactive and Hybrid Routing Protocols – Tree Based and Mesh Based Multicast Protocols, Energy Efficient and QoS Guaranteed Multicast Protocols.

UNIT III TRANSPORT LAYER AND SECURITY ISSUES 9

Design Issues, Design Goals and Classification of Transport Layer Protocols – TCP over Ad Hoc – Security in Adhoc Networks – Network Security Requirements – Network Security Attacks – Key Management – Secure Routing in Adhoc Networks.

UNIT IV MAC AND ROUTING IN WIRELESS SENSOR NETWORKS 9

Unique Constraints and Challenges – Advantages and Applications – Collaborative Processing – Key Definitions – Localization and Tracking – MAC – Contention - Based Protocols – Schedule - Based Protocols, Geographic, Energy Aware and Attribute Based Routing.

UNIT V TRANSPORT, QoS AND SECURITY IN WIRELESS SENSOR NETWORKS 9

Data-centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Broadcast Authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Comprehend the challenges and design issues in ad hoc and sensor networks
- To analyze protocols developed for ad hoc and sensor networks
- To evaluate the performance of protocols from a QoS perspective
- To list the security issues in Ad-hoc and sensor networks.
- To design and develop new protocols for adhoc and sensor networks.

TEXT BOOKS:

1. C. Siva Ram Murthy and B.S. Manoj, “Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, Second Edition, 2005.
2. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks – An Information Processing Approach”, Elsevier Publications, 2004.

REFERENCES:

1. Subir Kumar Sarkar, T G Basavaraju and C Puttamadappa, “Ad Hoc Mobile Wireless Networks”, Auerbach Publications, 2008.
2. Holger Karl and Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks”, John Wiley and Sons, 2009.
3. Erdal Cayirci and Chunming Rong, “Security in Wireless Ad Hoc and Sensor Networks”, John Wiley and Sons, 2009.
4. C.K. Toh, “Adhoc Mobile Wireless Networks – Protocols and Systems”, Pearson Education, First Edition, 2002.
5. George Aggelou, “Mobile Adhoc Networks – From Wireless LANs to 4G Networks”, Tata McGraw Hill, 2009.

CS7002 ADVANCED TOPICS ON DATABASES

L	T	P	C
3	0	0	3

OBJECTIVES

- To know advanced concepts in databases in large scale analytics.
- To learn concepts behind parallel, distributed, active, spatial, temporal and object databases.
- To learn reasoning and query processing.
- To understand the challenges in designing multimedia databases.
- To familiarize with state of the art in advanced databases

UNIT I PARALLEL AND DISTRIBUTED DATABASES 9

Inter and Intra Query Parallelism – Architecture – Query Evaluation – Optimization – Distributed Architecture – Storage – Catalog Management – Query Processing - Transactions – Recovery- Large-scale Data Analytics in the Internet Context – MapReduce Paradigm - Run-time System for Supporting Scalable and Fault-Tolerant Execution - Paradigms: PigLatin and Hive - Parallel Databases versus Map Reduce.

9

UNIT II INTELLIGENTAND INTERNET DATABASES

Active Databases – Syntax and Semantics: Starburst, Oracle, DB2 – Taxonomy – Applications – Integrity Management – Workflow Management – Business Rules – Design Principles – Properties – Rule Modularization – Rule Debugging – IDEA Methodology – XML Databases -XML Databases: XML-Related Technologies - XML Schema- XML Query Languages- Storing XML in Databases-XML and SQL- Native XML Databases- Web Databases.

UNIT III TEMPORAL AND OBJECT DATABASES 9

Overview – Data types – Associating Facts – Temporal Query Language – TSQL2 – Time Ontology – Language Constructs – Architecture – Temporal Support – Object Database and Change Management – Change of Schema – Implementing Database Updates in O2 – Benchmark Database Updates – Performance Evaluation.

UNIT IV COMPLEX QUERIES AND REASONING 9

Logic of Query Languages – Relational Calculi – Recursive Rules – Syntax and Semantics of Data log – Fix Point Semantics – Implementation Rules and Recursion – Rule Rewriting Methods – Compilation and Optimization – Recursive Queries in SQL – NoSQL – The Need – Basics – Interfacing and Interacting with NoSQL.

UNIT V SPATIAL, TEXT AND MULTIMEDIA DATABASES 9

Traditional Indexing Methods : Secondary Keys, Spatial Access Methods – Text Retrieval – Multimedia Indexing – 1D Time Series – 2d Color images – Sub-pattern Matching – Open Issues – Uncertainties in DB, KB and RDB.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Write programs involving query optimization.
- Write programs related to large scale data processing.
- Use Map-Reduce in data analytics.
- Evaluate the performance of temporal and spatial databases.
- Write suitable indexing programs for multimedia databases.

Critically analyze the state-of-the-art in advanced databases distributed systems.

TEXT BOOKS:

1. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, McGraw-Hill College Publications, 2015.
2. Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T. Snodgrass, V.S. Subrahmanian and Roberto Zicari, “Advanced Database Systems”, Morgan Kauffmann Publishers, 2006.

REFERENCES:

1. Aris Gkoulalas - Divanis and Abderrahim Labbi, “Large-Scale Data Analytics”, Springer Science and Business Media, 2014.
2. Abraham Silberschatz, Henry F. Korth and S. Sudharshan, “Database System Concepts”, Sixth Edition, McGraw-Hill Education, 2010.
3. C.J.Date, A.Kannan and S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
4. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson Education India, 2010.
5. Shashank Tiwari, “Professional NoSQL”, Wrox, 2011.

CS7003 **AGILE METHODOLOGIES** **L T P C**
3 0 0 3

OBJECTIVES:

- To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
- To provide a good understanding of software design and a set of software technologies and APIs.
- To do a detailed examination and demonstration of Agile development and testing techniques.
- To understand the benefits and pitfalls of working in an Agile team.
- To understand Agile development and testing.

UNIT I AGILE METHODOLOGY 9

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

UNIT II AGILE PROCESSES 9

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT 9

Agile Information Systems – Agile Decision Making - Earl‘S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV AGILITY AND REQUIREMENTS ENGINEERING 9

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V AGILITY AND QUALITY ASSURANCE 9

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Realize the importance of interacting with business stakeholders in determining the requirements for a software system"
- Perform iterative software development processes: how to plan them, how to execute them.
- Point out the impact of social aspects on software development success.
- Develop techniques and tools for improving team collaboration and software quality.
- Perform Software process improvement as an ongoing task for development teams.

Show how agile approaches can be scaled up to the enterprise level.

TEXT BOOKS:

1. David J. Anderson and Eli Schragenheim, “Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results”, Prentice Hall, 2003.
2. Hazza and Dubinsky, “Agile Software Engineering, Series: Undergraduate Topics in Computer Science”, Springer, 2009.

REFERENCES:

1. Craig Larman, “Agile and Iterative Development: A Manager‘s Guide”, Addison-Wesley, 2004.
2. Kevin C. Desouza, “Agile Information Systems: Conceptualization, Construction, and Management”, Butterworth-Heinemann, 2007.

CS7004	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the various characteristics of Intelligent agents
- To learn about the different search strategies in AI
- To learn to represent knowledge in solving AI problems
- To understand the different ways of designing software agents
- To know about the various applications of AI.

UNIT I INTRODUCTION **9**

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT II PROBLEM SOLVING METHODS **9**

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search - Game Playing - Optimal Decisions in Games – Alpha - Beta Pruning - Stochastic Games

UNIT III KNOWLEDGE REPRESENTATION **9**

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information

UNIT IV SOFTWARE AGENTS **9**

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT V APPLICATIONS **9**

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Use appropriate search algorithms for any AI problem
- To Represent a problem using first order and predicate logic
- To Provide the apt agent strategy to solve a given problem
- To Design software agents to solve a problem
- To Design applications for NLP that uses Artificial Intelligence.

TEXT BOOKS:

1 S. Russell and P. Norvig,"Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2009.

2 I. Bratko, "Prolog: Programming for Artificial Intelligence", Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCES:

1. M. Tim Jones, "Artificial Intelligence: A Systems Approach(Computer Science)", Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press, 2009.
3. William F. Clocksin and Christopher S. Mellish," Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003.
4. Gerhard Weiss, "Multi Agent Systems", Second Edition, MIT Press, 2013.
5. David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2010.

CS7005	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To know the fundamental concepts of big data and analytics.
- To explore tools and practices for working with big data
- To familiarize with different Recommendation system
- To learn about stream computing.
- To know about the research that requires the integration of large amounts of data.

UNIT I INTRODUCTION TO BIG DATA 9

Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating - The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value -Understanding Big Data Storage - A General Overview of High-Performance Architecture - HDFS - MapReduce and YARN - Map Reduce Programming Model

UNIT II CLUSTERING AND CLASSIFICATION 9

Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions .- Classification: Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees in R - Naïve Bayes - Bayes' Theorem - Naïve Bayes Classifier.

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM 9

Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT IV GRAPH MEMORY AND STREAM MEMORY 9

Using Graph Analytics for Big Data: Graph Analytics - The Graph Model - Representation as Triples - Graphs and Network Organization - Choosing Graph Analytics - Graph Analytics Use Cases - Graph Analytics Algorithms and Solution Approaches - Technical Complexity of Analyzing Graphs- Features of a Graph Analytics Platform - Considerations: Dedicated Appliances for Graph - Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) applications - Case Studies - Real Time Sentiment Analysis,

Stock Market Predictions.

UNIT V NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION 9

NoSQL Databases : Schema-less Models": Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding –- Hbase – Analyzing big data with twitter - Big data for E-Commerce Big data for blogs - Review of Basic Data Analytic Methods using R.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Work with big data tools and its analysis techniques
- Design efficient algorithms for mining the data from large volumes
- Design an efficient recommendation system
- Design the tools for visualization
- Learn NoSQL databases and management

TEXT BOOKS:

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.

REFERENCES:

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
3. Dietmar Jannach and Markus Zanker, "Recommender Systems: An Introduction", Cambridge University Press, 2010.
4. Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.
5. Jimmy Lin and Chris Dyer, "Data-Intensive Text Processing with MapReduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177, Morgan Claypool publishers, 2010.

CS7006	COMPUTER GRAPHICS THEORY AND PRACTICE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the theory behind display technologies and 2D primitive drawing
- To familiarize oneself with Modeling techniques for drawing 3D primitives and viewing
- To learn the theory behind popular rendering algorithms
- To get to understand the fractal theory for modeling complex objects
- To learn and use OpenGL programming to implement the concepts

UNIT I 2D GRAPHICS 9

Coordinate Systems - Graphics Apis and Hardware – Display Technologies – Output Primitives – Line, Circle - Attributes of Output Primitives – 2D Geometric Transformations -2D Viewing – Line, Polygon Clipping Algorithms

UNIT II 3D MODELING AND VIEWING 9

3D Object representations – Polygonal Mesh Modeling – Bezier Curves and B-Splines - Transformations –3D Viewing

UNIT III RENDERING 9

Color Models - Rendering - Shading Models – Flat shading and Smooth Shading –Visible Surface Detection - Adding Textures and Shadows. Ray Tracing, Volume Rendering.

UNIT IV FRACTALS AND ANIMATION 9

Fractals and Self Similarity – Peano Curves – Mandelbrot Sets – Julia Sets – Random Fractals, Data Structures for Graphics - Graphics File Formats, Animation, Virtual Reality.

UNIT V GRAPHICS PROGRAMMING WITH OPENGL 9

Drawing 3D Scenes .Removal of Hidden Faces, Using Shading Models, Colors And Light, Adding Texture and Shadows, Applying a Ray Tracer. Understanding 3D Modeling and Animation Tools like 3D Studio Max, Maya, Blender.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Devise, solve, demonstrate 2D applications of Computer Graphics
- Devise, Solve and demonstrate 3D Modeling, Transformations and Projections
- Appreciate advanced 3D Graphics that leads to visual realism
- Perceive Knowledge on Fractal theory, color models, Animation
- Do programming in OpenGL for drawing basic 3D scenes and add realism

TEXT BOOKS:

1. Donald D. Hearn, M. Pauline Baker and Warren Carithers, “Computer Graphics with OpenGL”, Fourth Edition, Pearson / Prentice Hall, 2010.
2. Francis S Hill, Jr. and Stephen M Kelley, “Computer Graphics Using OpenGL”, Third Edition, Prentice Hall, 2007.

REFERENCES:

1. Peter Shirley, “Fundamentals of Computer Graphics”, Third Edition, A K Peters, 2009.
2. Shalini Govil Pai, “Principles of Computer Graphics Theory and Practice Using OpenGL and Maya”, Springer, 2004.

CS7007 CYBER FORENSICS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basic concepts and principles of computer forensics
- To identify the smart practices for carrying out forensic investigation
- To understand the legal frameworks and law measures in cyber forensics
- To understand the application of tools and techniques for recovering digital evidence
- To understand the certification requirements and standards for licensing

UNIT I INTRODUCTION 9

The Scope of Computer Forensics - Windows Operating and File Systems –Handling Computer Hardware – Anatomy of Digital Investigation.

UNIT II INVESTIGATIVE SMART PRACTICES 9

Forensics Investigative Smart Practices – Time and Forensics – Incident closure

UNIT III LAWS AND PRIVACY CONCERNS 9

Laws Affecting Forensic Investigations – Search Warrants and Subpoenas – Legislated Privacy Concerns – The admissibility of Evidence – First Response and Digital Investigator

UNIT IV DATA ACQUISITION AND REPORT WRITING 9

Data Acquisition – Finding Lost Files – Document Analysis – Case Management and Report Writing – Building a Forensics Workstation

UNIT V TOOLS AND CASE STUDIES 9

Tools of the Digital Investigator - Licensing and Certification – Case Studies: E-mail Forensics – Web Forensics – Searching the Network – Excavating a Cloud – Mobile device Forensics.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- To understand the fundamentals of computer forensics
- To identify and apply smart practices for investigation
- To recognize the legal underpinnings and critical was affecting forensics
- To apply tools and methods to uncover hidden information in digital systems
- To learn current licensing and certification requirements .

TEXTBOOKS:

1. Michael Graves, “Digital Archaeology: The Art and Science of Digital Forensics”, Addison-Wesley Professional, 2014.
2. Darren R. Hayes, “Practical Guide to Computer Forensics Investigation”, Pearson, 2015.
3. Albert J. Marcella and Frederic Guillossou, “Cyber Forensics: From Data to Digital Evidence “, Wiley, 2015.

REFERENCE:

1. Bill Nelson, Amelia Phillips and Christopher Steuart, “Guide to Computer Forensics and Investigations”, Fourth Edition, Cengage, 2013**.**

CS7008 DATABASE TUNING L T P C
3 0 0 3

OBJECTIVES:

- To get the feel of database tuning basics.
- To learn the concepts of optimizing the database design.
- To write procedures involving query planning.
- To learn to troubleshoot the database issues.
- To understand the usage of benchmark databases for demonstrating database tuning approaches

UNIT I FUNDAMENTALS OF TUNING 9

Review of Relational Databases – Relational Algebra - Locking and Concurrency Control– Correctness Consideration – Lock Tuning – Transaction Chopping – Logging and the Recovery Subsystem – Principles of Recovery – Tuning the Recovery Subsystem – Recovery Tuning– Operating Systems Considerations – Hardware Tuning.

UNIT II INDEX TUNING 9

Indexes – Clustering Indexes – Non Clustering Indexes – Composite Indexes – Comparison of Indexing and Hashing techniques – Hot Table – Storage Structure Optimization through Index Tuning.

UNIT III DESIGN AND QUERY OPTIMIZATION 9

Tuning Relational Systems – Normalization – Tuning De-normalization – Clustering Two Tables – Aggregate Maintenance – Record Layout –Triggers – Client Server Mechanisms – Types of Queries – Query Tuning.

UNIT IV INTERFACE AND CONNECTIVITY TUNING 9

Objects, Application Tools and Performance –Tuning the Application Interface – Bulk Loading Data – Accessing Multiple Databases – ODBC – JDBC Tuning –– Case Studies: Tuning E-Commerce Application– Data Warehouse Tuning.

UNIT V TROUBLESHOOTING 9

Query Plan Explainers – Performance Monitors – Event Monitors – Finding "Suspicious" Queries – Understanding Access Plans – Analyzing a Query's Access Plan – Profiling a Query Execution – Analyzing DBMS Subsystems and Hardware Resources – SQL performance Analyzer – Time Series Databases – Configuration Parameters: Oracle; SQL Server; DB2UDB.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Design databases involving normalization
- Write optimized code for accessing multiple databases
- Use tuning tools for different database operations
- Troubleshoot database issues.
- Use benchmark databases for demonstrating concepts behind database tuning

TEXT BOOKS:

1. Dennis Shasha and Philippe Bonnet "Database Tuning, Principles, Experiments, and Troubleshooting Techniques", Morgan Kaufmann: An Imprint of Elsevier, 2003.
2. Richard Niemiec, "Oracle Database 11g Release 2 Performance Tuning Tips and Techniques", McGraw Hill Osborne, 2012.

REFERENCES:

1. Peter Gulutzan and Trudy Pelzer, "SQL Performance Tuning", Addison-Wesley, First Edition, 2002.
2. Thomas Connolly and Carolyn Begg, "Database Systems: A Practical Approach to Design, Implementation and Management", Fifth Edition, Pearson Education, 2009.

CS7009 GAME THEORY L T P C
3 0 0 3

OBJECTIVES:

- To get introduced to the fundamental concepts of game design and development
- To learn the underlying theory of 2D and 3D Computer Graphics principles and algorithms for game design
- To learn the processes, mechanics, issues in game design
- To understand the architecture of game engines
- To develop and implement simple games using standard APIs

UNIT I INTRODUCTION 9

Elements of Game Play – Artificial Intelligence – Getting Input from the Player - Sprite Programming – Sprite Animation - Multithreading – Importance of Game Design – Game Loop.

UNIT II 3D GRAPHICS FOR GAME PROGRAMMING 9

Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces.

UNIT III GAME DESIGN PRINCIPLES 9

Character Development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI, Path Finding, Case study : Tetris.

UNIT IV GAMING ENGINE DESIGN 9

Renderers, Software Rendering, Hardware Rendering, and Controller Based Animation, Spatial Sorting, Level of Detail, Collision Detection, Standard Objects, and Physics, Case study : The Sims

UNIT V GAME DEVELOPMENT 9

Developing 2D and 3D Interactive Games Using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle Games, Single Player Games, Multi-Player Games. Case study: Mine craft.

TOTAL : 45 PERIODS

OUTCOME:

Upon completion of the course, the students will be able to:

- Understand the essential elements of Game Design and Game Play
- understand the Core Concepts of Graphics for Game Design and Development
- Familiarize oneself with Game Design Principles and process
- Understand the essential components of Game Engine for Designing and Developing Games
- Develop Interactive 2D/3D Games

TEXT BOOKS:

1. David H. Eberly, “3D Game Engine Design: A Practical Approach to Real-Time Computer Graphics”, Second Edition, Morgan Kaufmann, 2010.
2. Jung Hyun Han, “3D Graphics for Game Programming”, First Edition, Chapman and Hall/CRC, 2011.

REFERENCES:

1 Jonathan S. Harbour, “Beginning Game Programming”, Course Technology, Third Edition PTR, 2009.
2. Ernest Adams and Andrew Rollings, “Fundamentals of Game Design”, Third Edition, Pearson Education, 2014.
3. Scott Rogers, “Level Up: The Guide to Great Video Game Design”, First Edition, Wiley, 2010.
4. Jim Thompson, Barnaby Berbank-Green, and Nic Cusworth, “Game Design: Principles, Practice, and Techniques - The Ultimate Guide for the Aspiring Game Designer”, First Edition, Wiley, 2008.

CS7010 GPU ARCHITECTURE AND PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:

- To understand the basics of programming for heterogeneous architectures
- To know programming for massively parallel processors
- To understand the issues in mapping algorithms for GPUs
- To introduce different GPU programming models
- To Understand the need for Synchronization and perform synchronization for parallel programming

UNIT I GPU ARCHITECTURE 9

Understanding Parallelism with GPU –Typical GPU Architecture - CUDA Hardware Overview - Threads, Blocks, Grids, Warps, Scheduling - Memory Handling with CUDA: Shared Memory, Global Memory, Constant Memory and Texture Memory.

UNIT II GPU PROGRAMMING 9

Using CUDA - Multi GPU - Multi GPU Solutions - Optimizing CUDA Applications: Problem Decomposition, Memory Considerations, Transfers, Thread Usage, Resource Contentions, Self-tuning Applications.

UNIT III PROGRAMMING ISSUES 9

Common Problems: CUDA Error Handling, Parallel Programming Issues, Synchronization, Algorithmic Issues, Finding and Avoiding Errors.

UNIT IV ALGORITHMS ON GPU 9

Parallel Patterns: Convolution, Prefix Sum, Sparse Matrix - Matrix Multiplication - Programming Heterogeneous Cluster - CUDA Dynamic Parallelism.

UNIT V OTHER GPU PROGRAMMING MODELS 9

Introducing OpenCL, OpenACC, Thrust.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Describe GPU Architecture
- Write programs using CUDA
- Implement algorithms in GPUs to get maximum occupancy and throughput
- Program in any heterogeneous programming model
- Perform synchronization for parallel processing.

TEXT BOOKS:

1. Shane Cook, CUDA Programming: “A Developer's Guide to Parallel Computing with GPUs (Applications of GPU Computing)”, First Edition, Morgan Kaufmann, 2012.
2. David B. Kirk, Wen-mei W. Hwu,” Programming Massively Parallel Processors - A Hands-on Approach”, Second Edition, Morgan Kaufmann, 2012.

REFERENCES:

1. Nicholas Wilt, “CUDA Handbook: A Comprehensive Guide to GPU Programming”, Addison - Wesley, 2013.
2. Jason Sanders, Edward Kandrot, “CUDA by Example: An Introduction to General Purpose GPU Programming”, Addison - Wesley, 2010.
3 http://www.nvidia.com/object/cuda_home_new.html

CS7011 GREEN COMPUTING L T P C
3 0 0 3

OBJECTIVES:

- To understand the necessity to adopt green computing practices
- To understand the green IT methodologies for creation and management of green assets
- To understand the role and efficiency of green grids in Green IT
- To understand the role and adoption of Environmentally Responsible Business Strategies in Green IT
- To understand the various Green Compliance Protocols, standards, audits and emerging carbon issues in green IT

UNIT I FUNDAMENTALS 9

Green IT Fundamentals: Business, IT, and the Environment – Benefits of a Green Data Centre - Green Computing: Carbon Foot Print, Scoop on Power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

UNIT II GREEN ASSETS AND MODELING 9

Green Assets: Buildings, Data Centers, Networks, Devices, Computer and Earth Friendly peripherals, Greening Mobile devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

UNIT III GRID FRAMEWORK 9

Virtualizing of IT Systems – Role of Electric Utilities, Telecommuting, Teleconferencing and Teleporting – Materials Recycling – Best Ways for Green PC – Green Data Center – Green Grid Framework. Optimizing Computer Power Management, Seamless Sharing Across Systems. Collaborating and Cloud Computing, Virtual Presence.

UNIT IV GREEN COMPLIANCE 9

Socio-Cultural Aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, And Audits – Emergent Carbon Issues: Technologies and Future. Best Ways to Make Computer Greener.

UNIT V GREEN INITIATIVES WITH IT and CASE STUDIES 9

Green Initiative Drivers and Benefits with IT - Resources and Offerings to Assist Green Initiatives. - Green Initiative Strategy with IT - Green Initiative Planning with IT - Green Initiative Implementation with IT - Green Initiative Assessment with IT. The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- To explain the necessity of Green IT.
- To outline methodologies for creating Green Assets and their management.
- To appreciate the use of Grid in Green IT.
- To develop case studies related to Environmentally Responsible Business Strategies.
- To Understand the Green Compliance Protocols, standards, audits and emerging carbon issues in green IT

TEXT BOOKS:

1. Bhuvan Unhelkar, “Green IT Strategies and Applications-Using Environmental Intelligence”, CRC Press, June 2011
2. Carl Speshocky, “Empowering Green Initiatives with IT”, John Wiley and Sons, 2010.

REFERENCES:

1. Alin Gales, Michael Schaefer, Mike Ebbers, “Green Data Center: Steps for the Journey”, Shoff/IBM rebook, 2011.
2. John Lamb, “The Greening of IT”, Pearson Education, 2009.
3. Jason Harris, “Green Computing and Green IT- Best Practices on Regulations and Industry”, Lulu.com, 2008.
4. Woody Leonhard, Katherrine Murray, “Green Home computing for dummies”, August 2009.

CS7012	**INFORMATION RETRIEVAL TECHNIQUES**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

- To learn the concepts behind IR
- To acquire knowledge on document representation
- To understand the operation of web search

- To learn the algorithms related to text classification, indexing and searching
- To practice developing IR models

UNIT I INTRODUCTION 9

Information Retrieval – Early Developments – The IR Problem – The User's Task – Information versus Data Retrieval - The IR System – The Software Architecture of the IR System – The Retrieval and Ranking Processes - The Web – The e-Publishing Era – How the web changed Search – Practical Issues on the Web – How People Search – Search Interfaces Today – Visualization in Search Interfaces.

UNIT II MODELING AND RETRIEVAL EVALUATION 9

IR models – Classic Information Retrieval – Alternative Set Theoretic Models – Alternative Algebraic Models – Alternative Probabilistic Models – Other Models – Hypertext Models – Web based Models – Retrieval Evaluation – Cranfield Paradigm – Retrieval Metrics – Reference Collections – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback – Clicks – Implicit Feedback Through Local Analysis – Global Analysis – Documents: Languages & Properties – Queries: Languages & Properties.

UNIT III TEXT CLASSIFICATION, INDEXING AND SEARCHING 9

A Characterization of Text Classification – Unsupervised Algorithms – Supervised Algorithms – Feature Selection or Dimensionality Reduction – Evaluation metrics – Organizing the classes – Indexing and Searching – Inverted Indexes –Signature Files – Suffix Trees & Suffix Arrays – Sequential Searching – Multi-dimensional Indexing.

UNIT IV WEB RETRIEVAL AND WEB CRAWLING 9

The Web – Search Engine Architectures – Search Engine Ranking – Managing Web Data – Search Engine User Interaction – Browsing – Applications of a Web Crawler – Taxonomy – Architecture and Implementation – Scheduling Algorithms – Evaluation - Structured Text Retrieval.

UNIT V TYPES OF IR AND APPLICATIONS 9

Parallel and Distributed IR –Data Partitioning – Parallel IR – Cluster-based IR – Distributed IR - Multimedia Information Retrieval – Challenges – Content Based Image Retrieval – Audio and Music Retrieval – Retrieving and Browsing Video – Fusion Models – Segmentation – Compression - Enterprise Search –Tasks – Architecture of Enterprise Search Systems – Enterprise Search Evaluation - Library Systems – Digital Libraries

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- To use an open source search engine framework and explore its capabilities
- To represent documents in different ways and discuss its effect on similarity
- To utilize indexing and Searching
- To design and implement an innovative feature in a search engine
- To develop an effective IR model

TEXTBOOKS:

1. Ricardo Baeza-Yates and Berthier Ribeiro-Neto, "Modern Information Retrieval: The Concepts and Technology behind Search", Second Edition, ACM Press Books, 2011.
2. Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, "Information Retrieval: Implementing and Evaluating Search Engines", The MIT Press, 2010.

REFERENCES:

1. C. Manning, P. Raghavan, and H. Schütze, "Introduction to Information Retrieval", Cambridge University Press, 2008.
2. Bruce Croft, Donald Metzler and Trevor Strohman, "Search Engines: Information Retrieval in Practice", First Edition, Addison Wesley, 2009.

CS7013 INFORMATION VISUALIZATION TECHNIQUES

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand perception based modelling
- To comprehend techniques for Visualization of Information spaces
- To familiarize the multidimensional Visualization
- To understand the abstraction techniques using textual mode
- To Know how to create interactive visual interfaces

UNIT I FOUNDATIONS FOR DATA VISUALIZATION 9

Visualization Stages – Experimental Semiotics Based on Perception Gibson‘s Affordance Theory – A Model of Perceptual Processing – Types of Data.

UNIT II COMPUTER VISUALIZATION 9

Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye Views – Fisheye Views for 3D data – Non Linear Magnification – Comparing Visualization of Information Spaces – Abstraction in Computer Graphics – Abstraction in User Interfaces

UNIT III MULTIDIMENSIONAL VISUALIZATION 9

1D, 2D, 3D – Multiple Dimensions – Trees – Web Works – Data Mapping: Document Visualization – Workspaces.

UNIT IV TEXTUAL METHODS OF ABSTRACTION 9

From Graphics to Pure Text – Figure Captions in Visual Interfaces – Interactive 3Dillustrations with Images and Text – Related work – Consistency of rendered – Images and their Textual labels – Architecture – Zoom Techniques for Illustration Purpose – Interactive Handling of Images and Text.

UNIT V ABSTRACTION IN TIME AND INTERACTIVE SYSTEMS 9

Animating non Photo Realistic Computer Graphics – Interaction Facilities and High Level Support for Animation Design – Zoom Navigation in User Interfaces – Interactive Medical Illustrations – Rendering Gestural Expressions – Animating Design for Simulation – Tactile Maps for Blind People – Synthetic Holography – Abstraction versus Realism– Integrating Spatial and Non Spatial Data.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Observe and analyze perception based on Modelling Techniques for the given domain
- Use any available computer based tools to visualize large information spaces
- Appreciate the use and applicability of multidimensional visualization for specific domains
- Design and perform image annotation and use it appropriate application context
  Explore tools and understand the usage contexts for designing creative visual interfaces

TEXT BOOKS:

1. Colin Ware “Information Visualization Perception for Design”, Second edition, Morgan Kaufman 2004.
2. Stuart.K. Card, Jock.D. Mackinlay and Ben Shneiderman, “Readings in Information Visualization Using Vision to Think”, Morgan Kaufmann Publishers, 1999

REFERENCE:

1. Thomas Strothotte, “Computer Visualization–Graphics Abstraction and Interactivity”, Springer, 2011.

CS7014 MICROPROCESSORS AND INTERFACING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To study the basic architectures and operational features of various processors
- To learn assembly language programming
- To design and understand the multiprocessor configurations
- To understand the interfacing concepts of the peripheral devices with processors
- To know about advanced microprocessors

UNIT I THE 8086 MICROPROCESSOR 9

Intel 8086 Microprocessor – Architecture – Instruction Set and Assembler Directives – Addressing Modes – Assembly Language Programming – Procedures – Macros – Interrupts and Interrupt Service Routines.

UNIT II 8086 SYSTEM DESIGN 9

8086 Signals – Basic Configurations –Max and Min Modes - System Bus Timing –System Design Using 8086. Multiprocessor Configurations – Coprocessor, Closely Coupled and Loosely Coupled Configurations

UNIT III I/O INTERFACING 9

Memory Interfacing and I/O Interfacing -Parallel Communication Interface – Serial Communication Interface – Timer – Keyboard /Display Controller – Interrupt Controller – DMA Controller – Programming and Applications.

UNIT IV 80286, 80386 AND 80486 MICROPROCESSORS 9

80286 and 80386 Architectures – Real and Protected mode - Virtual 8086 Modes – Special Registers – Memory Management – Memory Paging Mechanism – 80486 Architecture – Enhancements.

UNIT V ADVANCED MICROPROCESSORS 9

Introduction to the Pentium Microprocessor –Special Pentium Registers –Pentium Memory Management - Instruction Set - Enhancements in Pentium Pro - Pentium II - Pentium III - Pentium IV Processors - Introduction to Multi Core Processors.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, the students should be able to:

- Explain the internal architecture of the 8086microprocessor
- Write Assembly Language Programs with8086
- Perform Interfacing with the 8086microprocessor
- Perform system design using8086
- Point out the salient features of the Architectures of advanced processors - 80386, 80486, Pentium I, II, III, IV
- microprocessors
- Compare and contrast the features of different processors.

TEXT BOOKS:

1. Yu - cheng Liu, Glenn A. Gibson, “Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design”, Second Edition, Prentice Hall of India, 2007.
2. Barry B. Brey, “The Intel Microprocessors, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium IV, Architecture, Programming & Interfacing”, Eighth Edition, Pearson Prentice Hall 2009

REFERENCES:

1. A. K. Ray & K. M. Bhurchandi, “Advanced Microprocessors and Peripherals- Architectures, Programming and Interfacing”, Second Edition, Tata McGraw Hill, 2009.

Peter Abel, “IBM PC Assembly language and programming”, Fifth Edition, Prentice Hall of
2. India Pvt. Ltd., 2001
James L. Turley, "Advanced 80386 Programming Techniques", First Edition, Tata
3. McGraw-Hill, 2005
4. Mohamed Rafiquzzman, "Microprocessors and Microcomputer Based System Design" Second Edition, CRC Press, 2007.
5. Doughlas V. Hall, “Microprocessors and Interfacing, Programming and Hardware”, Second Edition, 2012.

CS7015 MOBILE COMMUNICATIONS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide the student with an understanding of advanced multiple access techniques
- Discuss basic technical standards related to WiFi and sensor networks.
- To enable the student to synthesis and analyze wireless and mobile cellular communication system
- To understand the underlying concepts and protocols of mobile network and mobile transport layer.
- Provide knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid
-

UNIT I INTRODUCTION 9

Introduction – Applications – Signals – Signal Propagation – Multiplexing – Modulation – Spread spectrum – MAC – SDMA – TDMA – FDMA – CDMA

UNIT II WIRELESS LAN 9

IEEE 802.11 - System Architecture and Protocol Architecture of IEEE 802.11 – Physical and MAC layer – MAC management – 802.11b – 802.11a – HIPERLAN - Bluetooth

UNIT III WIRELESS SYSTEMS 9

GSM – DECT – UMTS - Mobile AD HOC Networks - AD HOC Routing Protocols – DSDV - DSR and AODV Routing Techniques - Quality of service in Mobile Ad hoc Networks.

UNIT IV MOBILE NETWORK LAYER 9

Mobile Internet Protocol - IP Packet Delivery - Tunneling and Encapsulation - Reverse Tunneling – DHCP - IPv6 - Security Concerns – Mobile IPv6 – Overview – Basic Operation – Header Extension – Alignment Requirements – Home Address Option – Type 2 Routing Header – Mobility Header – Mobility Options – Neighbor Discovery Messages – Procedure of Mobile IPv6 – Route Optimization – Movement Detection – Dynamic Home Agent Address Discovery – Mobile Prefix Solicitation / Advertisement – Relationship with IPsec

UNIT V TRANSPORT LAYER AND APPLICATIONS 9

Traditional TCP – TCP Improvements for Mobile Devices – TCP over 2.5/3G Wireless Networks – Wireless Application Protocol (WAP) – Mobile Applications.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- To explain the features of smart mobiles and other smart devices
- To develop applications for Android and iOS
- To explain protocols related to routing in mobile networks
- Understand the medium access techniques in GSM, wireless LAN, UMTS handoff, mobility and location management systems.

Analyze the data transfer at network and transport layer in the wireless network.

TEXT BOOKS:

1. Asoke K. Talukder and Roopa R Yavagal, “Mobile Computing, Technology, Application and Service Creation”, Second Edition, Tata McGraw Hill, 2010.
2. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.

REFERENCES:

1. Jon W.Mark and Weihua Zhuang, “Wireless Communication and Networking”, Prentice Hall, 2002.
2. C D M Cordeiro and D. P. Agarwal, “Adhoc and Sensor Networks: Theory and Applications”, World Scientific, 2006.
3. Pei Zhang, Feng Zhao, David Tipper, Jinmei Tatuya, Keiichi Shima, Yi Qian, larry L. Peterson, Lionel M. Ni, Manjunath D, Qing Li, Joy Kuri, Anurag Kumar, Prashant Krishnamurthy, Leonidas Guibas, Vijay K. Garg, Adrian Farrel, Bruce S. Davie, “Wireless Networking Complete”, Elsevier, 2010.

CS7016	NATURAL LANGUAGE PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamentals of natural language processing
- To appreciate the use of CFG and PCFG in NLP
- To implement basic grammar rules for English Language
- To understand the role of semantics and pragmatics
- To overview the variety of applications of NLP

UNIT I INTRODUCTION **9**

Words - Regular Expressions and Automata - Words and Transducers - N-grams - Part-of-Speech – Tagging - Hidden Markov and Maximum Entropy Models.

UNIT II SPEECH **9**

Speech – Phonetics - Speech Synthesis - Automatic Speech Recognition - Speech Recognition: - Advanced Topics - Computational Phonology

UNIT III SYNTAX **9**

Formal Grammars of English - Syntactic Parsing - Statistical Parsing - Features and Unification - Language and Complexity.

UNIT IV SEMANTICS AND PRAGMATICS **9**

The Representation of Meaning - Computational Semantics - Lexical Semantics - Computational Lexical Semantics - Computational Discourse

UNIT V APPLICATIONS **9**

Information Extraction - Question Answering and Summarization - Dialogue and Conversational Agents - Machine Translation

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- To tag a given text with basic language features
- To design an innovative application using NLP components
- To implement a rule based system to tackle morphology/syntax of a language

- To design a tag set to be used for statistical processing for real-time applications
  To compare and contrast use of different statistical approaches for different types of NLP applications.

TEXT BOOKS:

1. Daniel Jurafsky, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech", Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python", First Edition, O'Reilly Media, 2009.

REFERENCES:

1. Breck Baldwin, "Language Processing with Java and LingPipe Cookbook", Atlantic Publisher, 2015.
2. Richard M Reese, "Natural Language Processing with Java", O'Reilly Media, 2015.
3. Nitin Indurkhya and Fred J. Damerau, "Handbook of Natural Language Processing", Second Edition, Chapman and Hall/CRC Press, 2010.

CS7017	PROGRAMMING PARADIGMS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To explore modern programming languages and the techniques used for programming
- To learn the syntax and semantics of programming language spectrum
- To get an idea on evaluation of programming languages
- To learn the differences between various programming techniques
- To analyze a given program from good programming practice perspective

UNIT I INTRODUCTION **9**

The art of Language design – Programming language spectrum - Compilation and Interpretation – Evaluation of Programming languages – Syntax and Semantics of Language C-lite - Names – Types – Type Systems - Binding – Scope – Static – Dynamic – Abstract Data types.

UNIT II SEMANTICS **9**

Expression – Assignment - Control Flow – Input/Output – Exception Handling – State Transformation – Partial Functions – Semantics with Dynamic Typing – Formal Treatment of Semantics

UNIT III FUNCTIONS **9**

Call and Return – Parameter Passing – Function Declaration – Semantics Of Call and Return – Formal Treatment of Types and Semantics – Memory Management – Dynamic Arrays – Garbage Collection.

UNIT IV PROGRAMMING TECHNIQUES **9**

Imperative programming – C – ADA – Perl – Object Oriented Programming – Small Talk-Java– Python – Functional Programming – Scheme – Haskell

UNIT V MODERN PROGRAMMING TECHNIQUES **9**

Logic Programming – Prolog – Event-Driven programming – Concurrent Programming – Concepts – Synchronization Strategies – Language Level Mechanism - Interprocess COMMUNICATION – Scripting LANGUAGES.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

- Write programs related to syntax and semantics
- Compare programs between C, Ada, Perl and Small Talk
- Write programs using scripting languages
- Demonstrate event-driven and concurrent programming using prolog
- Apply prolog for developing distributed systems

TEXT BOOK:

1. Allen B. Tucker and Robert E. Noonan, "Programming Languages – Principles and Paradigms", Second Edition, Tata McGraw Hill, 2009.

REFERENCES:

1. Robert W. Sebesta, "Concepts of Programming Languages", Sixth Edition, Addison Wesley, 2003.
2. Michael L Scott, "Programming Language Pragmatics", Third Edition, Morgan Kauffman, 2009.

CS7018	PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the roles of the project manager
- To understand the threats and opportunities in project management
- To gain Expertise in size, effort and cost estimation techniques
- To understand the techniques available to keep the project's aims and objectives, under control
- To understand how to approach non-technical problems
- To appreciate management issues like team structure, group dynamics

UNIT I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT 9

Project Definition –- Contract Management – Activities Covered by Software Project Management, Plan, Methods and Methodologies- Ways of Categorizing Software Projects Problem with Software Projects – Setting Objectives Stakeholders- Requirements Specification, Management Control – Overview of Project Planning – Stepwise Project Planning.

UNIT II PROJECT EVALUATION 9

Programme Management, Managing the Allocation of Resources, Strategic Programme Management, Creating a Programme, Aids to Programme Management, Benefits Management-Evaluation of Individual Projects – Technical Assessment – Cost Benefit Analysis – Cost Benefit Evaluation Techniques – Risk Evaluation –Cash Flow Forecasting – Software Effort Estimation

UNIT III ACTIVITY PLANNING 9

Objectives of Activity Planning – Project Schedule – Project and Activities - Sequencing and Scheduling Activities – Network Planning Models – Formulating a Network Model – Adding the Time Dimension -Forward Pass – Backward Pass –Identifying Critical Path - Activity Float – Shortening Project Duration – Identifying Critical Activities - Activity on Arrow Networks – Risk Management – Categories -Risk - Framework – Identification – Assessment – Planning – Management – Evaluating Risk to the Schedule – PERT Technique – Mote Carlo Simulation – Resource Allocation – Nature Of Resources – Identifying Resource

Requirements – Scheduling Resources – Creating Critical Paths – Counting the Cost - Publishing the Resource Schedule .

UNIT IV MONITORING AND CONTROL 9

Framework – Collecting the Data –Visualizing Progress – Cost Monitoring – Earned Value Analysis – Prioritizing Monitoring – Getting Project Back to Target – Change Control – Managing Contracts – Introduction – The ISO 12207 Approach –Supply process –Types of Contract – Stages in Contract Placement – Typical Terms Of a Contract – Contract Management – Acceptance.

UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS 9

Introduction – Understanding Behavior – Organizational Behavior - Selecting the Right Person for the Job – Instruction in the Best Methods – Motivation – The Oldham – Hackman Job Characteristics Model – Working in Groups – Becoming a Team –Decision Making – Leadership – Organizational Structures – Stress – Health and Safety.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Comprehend the roles of the project manager.
- Identify the threats and opportunities in project management.
- Gain knowledge about size, effort and cost estimation techniques
- Apply the techniques available to keep the project‘s aims and objectives, under control
- Analyze the different approaches of non-technical problems
- Appreciate the management issues like team structure, group dynamics.

TEXT BOOK:

1. Bob Hughes, Mike Cotterell, “Software Project Management”, Fourth Edition, Tata McGraw Hill, 2006.

REFERENCES:

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001
2. Royce, “Software Project Management”, Pearson Education, 1999.
3. Jalote, “Software Project Management in Practice”, Pearson Education, 2002
4. Robert T. Futrell, Donald F. Shefer and Linda I. Shefer, “Quality Software Project Management”, Pearson Education, 2003.

CS7019 PYTHON PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:

- To introduce object oriented programming using an easy-to-use language.
- To use iterators and generators.
- To test objects and handle changing requirements.
- To be exposed to programming over the web.
- To learn how to read and write files in Python.
-

UNIT I INTRODUCTION TO PYTHON 9

Function Declaration - Import - Objects - Indenting as Requirement - Exceptions - Unbound Variables - Case Sensitive - Scripts - Native Data Types - Booleans - Numbers - Lists - Tuples - Sets - Dictionaries - Comprehensions - List Comprehensions - Dictionary Comprehensions - Set Comprehensions

UNIT II STRINGS 9

Strings - Unicode - Formatting - String Methods - Bytes - Encoding - Regular Expressions - Verbose - Case Studies

UNIT III CLASSES 9

Closures - List of Functions - List of Patterns - File of Patterns - Generators - Defining Classes - Instantiating Classes - Instance Variables - Iterators – Itertools - Assert - Generator Expressions

UNIT IV TESTING AND FILES 9

Test Case - Testing Invalid Inputs - Refactoring - Handling Changing Requirements - Reading and Writing Text Files - Binary Files - Stream Objects - Standard Input, Output and Error.

UNIT V XML, SERIALIZATION AND WEB SERVICES 9

XML - Atom Feed - Parsing XML - Searching for Nodes - lxml - Generation - Serializing Objects - Pickle Files - Versions - Debugging - Serializing to JSON - HTTP Web Services - Features – httplib2

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

- Understand the concepts of Object Oriented Programming
- Use generators and iterators
- Develop test cases and handle refactoring
- Integrate scripts with python packages
- Use objects in web applications

TEXT BOOKS:

1. Mark Pilgrim, “Dive into Python 3”, Apress, 2009.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, “How to Think Like a Computer Scientist - Learning with Python”, Green Tea Press, 2002.

REFERENCES:

1. John V. Guttag, “Introduction to Computation and Programming using Python”, Prentice Hall of India, 2014.
2. Mark Lutz, “Learning Python: Powerful Object-Oriented Programming”, Fifth Edition, O’Reilly, Shroff Publishers and Distributors, 2013.

CS7020	SOFTWARE AGENTS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the how software agents reduce information overhead.
- To gain knowledge in design and architectural frameworks and methodology.
- To know Distributed multi-agent concepts and its Varity.
- To understand the factors to be considered due to security challenges.
- To get practical application insights with real-world problems.

UNIT I INTRODUCTION TO AGENTS 9

Agent Characteristics- Object vs. Agent. Agent Types- Interacting with Agents - Agent From Direct Manipulation to Delegation - Interface Agent, Metaphor with Character – Problem Solving Agent, Rational Agent. Direct Manipulation versus Agent Path to Predictable.

UNIT II AGENT-BASED MODELING, ANALYSIS AND DESIGN METHODOLOGIES 9

Analysis and Design Principles – Architecture – Virtual Agents: Agents in Games and Virtual

Environments – Multiple Reasoning Agents - - CASE TOOLs - Extending UML to Agents - Agent-based Unified Modeling Language (AUML) – Java Agents Development Framework (JADE).

UNIT III DISTRIBUTED MULTI-AGENTS 9

Multi-Agent Paradigm – Asynchronous Messaging - Interoperability - Multi-Agent Planning – Remote Deployment - Mobile Agent Concepts - Wireless Sensor Networks – Wireless Body Sensor Networks (WBSN) – Intelligent Swarms – Grid Computing - Coordinating Protocols, Negotiation Protocols – Challenges

UNIT IV SECURITY AND ANONYMITY IN AGENTS 9

Security and Design Principals – Trust, Reliability and Reputation - Challenges - Agent Societies and Societal Issues - Anonymity – Dynamic Untraceability - Mobile Agent Malware Simulator(MAISim) – Agent Based Generator of Computer Attacks (AGCA) – Advantages.

UNIT V APPLICATIONS 9

NASA – Unmanned Tasks in Deep Space – E-health Territorial Emergencies – UbiMedic – Environment Management – Disaster Management System – Mobile Agent - Teleshopping.

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Identify and explore the advantages of agents
- Design the architecture for an agent
- Design the agent in details in a view for the implementation
- Design communicative actions with agents.
- Design typical agents using a tool for different types of applications

TEXTBOOKS:

1. Mohammad Essaaidi, Maria Ganzha, Marcin Paprzycki, “Software Agents, Agent Systems and Their Applications”, IOS press, 2012.
2. Jeffrey M.Bradshaw, “Software Agents”, Pearson Education, 2010.

REFERENCES:

1. Lin, Fuhua Oscar (Ed.), “Designing Distributed Learning Environments with Intelligent Software Agents”, Information Science Publishing, 2004.
2. Russel and Norvig, “Artificial Intelligence: A Modern Approach”, Prentice Hall, Second Edition, 2002.
3. SMurch Richard, Johnson Tony “Intelligent Software Agents”, Prentice Hall, 1998.
4. Joseph P. Bigus and Jennifer Bigus, “Constructing Intelligent agents with Java: A Programmer’s Guide to Smarter Applications”, Wiley, 1997.
5. Knapik, Michael and Jay Johnson “Developing Intelligent Agents for Distributed Systems: Exploring Architecture, Technologies, and Applications” , McGraw-Hill.1998
6. William R. Cockayne, Michael Zyda, “Mobile Agents”, Prentice Hall, 1998

CS7021 SOFTWARE DEFINED NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn about what software defined networks are
- To understand the separation of the data plane and the control plane
- To learn about the use of SDN in datacenters
- To learn about different applications of SDN
- To learn about SDN controllers

UNIT I INTRODUCTION 9

History of Software Defined Networking (SDN) – Modern Data Center – Traditional Switch Architecture – Why SDN – Evolution of SDN – How SDN Works – Centralized and Distributed Control and Date Planes

UNIT II OPEN FLOW & SDN CONTROLLERS 9

Open Flow Specification – Drawbacks of Open SDN, SDN via APIs, SDN via Hypervisor-Based Overlays – SDN via Opening up the Device – SDN Controllers – General Concepts

UNIT III DATA CENTERS 9

Multitenant and Virtualized Multitenant Data Center – SDN Solutions for the Data Center Network – VLANs – EVPN – VxLAN – NVGRE

UNIT IV SDN PROGRAMMING 9

Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs – Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications.

UNIT V SDN 9

Juniper SDN Framework – IETF SDN Framework – Open Daylight Controller – Floodlight Controller – Bandwidth Calendaring – Data Center Orchestration

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Critically analyze and appreciate the evolution of software defined networks
- Point out the various components of SDN and their uses
- Explain the use of SDN in the current networking scenario
- Design and develop various applications of SDN
- Explain the concepts and principles behind software defined networks.

TEXT BOOKS:

1. Thomas D. Nadeau, Ken Gray, “SDN: Software Defined Networks”, O'Reilly Media, 2013.
2. Paul Goransson and Chuck Black, “Software Defined Networks: A Comprehensive Approach”, First Edition, Morgan Kaufmann, 2014.

REFERENCES:

1. Siamak Azodolmolky, “Software Defined Networking with Open Flow”, Packet Publishing, 2013.
2. Vivek Tiwari, “SDN and Open Flow for Beginners”, Amazon Digital Services, Inc., 2013.
3. Fei Hu, Editor, “Network Innovation through Open Flow and SDN: Principles and Design”, CRC Press, 2014.

CS7022 SOFTWARE QUALITY AND TESTING L T P C
3 0 0 3

OBJECTIVES:

- To understand the basics of software quality
- To learn and apply the metrics related to software quality
- To emphasize the importance of testing in SDLC
- To differentiate the test case view for functional and structural testing
- To gain insight into automation

UNIT I INTRODUCTION TO SOFTWARE QUALITY 9

Ethical Basis for Software Quality – Total Quality Management Principles – Software Processes and Methodologies – Quality Standards, Practices & Conventions –Improving Quality with Methodologies – Structured/Information Engineering – Measuring Customer Satisfaction– Software Quality Engineering – Defining Quality Requirements – Management Issues for Software Quality – Data Quality Control – Benchmarking and Certification.

UNIT II SOFTWARE QUALITY METRICS AND RELIABILITY 9

Writing Software Requirements and Design Specifications – Analyzing Software Documents using Inspections and Walkthroughs – Software Metrics – Lines of Code, Cyclomatic Complexity, Function Points, Feature Points – Software Cost Estimation– Reliability Models – Reliability Growth Models – OO Metrics.

UNIT III TEST CASE DESIGN 9

Testing as an Engineering Activity – Testing Fundamentals – Defects – Strategies and Methods for Black Box Test Case Design – Strategies and Methods for White-Box Test Case Design – Test Adequacy Criteria – Evaluating Test Adequacy Criteria – Levels of Testing and different Types of Testing – OO Testing.

UNIT IV TEST MANAGEMENT 9

Testing and Debugging Goals and Policies – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – Reporting Test Results – The Role of Three Groups in Test Planning and Policy Development – Process and the Engineering Disciplines – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT V CONTROLLING AND MONITORING 9

Measurement and Milestones for Controlling and Monitoring – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of Reviews – Developing a Review Program – Components of Review Plans – Reporting Review Results.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Assess Quality standards of various software using Software Quality Metrics
- Judge the use of infrastructure components and use configuration items for Quality control.
- Differentiate between Functional and Structural Testing practices
- Test a given application using various testing methods.
- Develop test cases to remove bugs

TEXT BOOKS:

1. Ilene Burnstein, “Practical Software Testing”, Springer International Edition, 2003.
2. Stephen Kan, “Metrics and Models in Software Quality”, Addison-Wesley, Second Edition, 2004.

REFERENCES:

1. Milind Limaye, “Software Quality Assurance”, McGraw Hill, 2011.
2. M G Limaye, “Software Testing – Principles, Techniques and Tools”, McGraw Hill, 2011.
3. Edward Kit, “Software Testing in the Real World – Improving the Process”, Pearson Education, 1995.
4. Elfriede Dustin, “Effective Software Testing”, Pearson Education, 2003.
5. Renu Rajani and Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2003.
6. Yogesh Singh, “Software Testing”, Cambridge University Press, 2012.

DATA WAREHOUSING AND DATA MINING 3 0 0 3

OBJECTIVES:

- To make the students to understand data mining principles and techniques
- To discover the knowledge imbibed in the high dimensional system.
- To study algorithms for finding the hidden interesting patterns in data.
- To expose the students to the concepts of Data warehousing Architecture and Implementation.
- To study the overview of developing areas – Web mining, Text mining and Big Data Mining Tools of Data mining.

UNIT I INTRODUCTION TO DATAWAREHOUSING 9

Evolution of Decision Support Systems- Data Warehousing Components –Building a Data Warehouse, Data Warehouse and DBMS, Data Marts, Metadata, Multidimensional Data Model, OLAP vs. OLTP, OLAP Operations, Data Cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations.

UNIT II DATAWAREHOUSE PROCESS AND ARCHITECTURE 9

Types of OLAP Servers, 3 –Tier Data Warehouse Architecture, Distributed and Virtual Data Warehouses. Data Warehouse Implementation, Tuning and Testing of Data Warehouse. Data Staging (ETL) Design and Development, Data Warehouse Visualization, Data Warehouse Deployment, Maintenance, Growth, Business Intelligence Overview - Data Warehousing and Business Intelligence Trends - Business Applications - Tools - SAS

UNIT III INTRODUCTION TO DATA MINING 9

Data Mining - KDD versus Data Mining, Stages of the Data Mining Process- Task Primitives, Data Mining Techniques - Data Mining Knowledge Representation – Data Mining Query Languages, Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – Data Cleaning, Data Transformation, Feature Selection, Dimensionality Reduction, Discretization and Generating Concept Hierarchies - Mining Frequent Patterns Association- Correlation.

UNIT IV CLASSIFICATION AND CLUSTERING 9

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods - Clustering techniques – Partitioning Methods - k-means- Hierarchical Methods - Distance-based Agglomerative and Divisible Clustering, Density-Based Methods – Expectation Maximization - Grid Based Methods – Model-Based Clustering Methods – Constraint – Based Cluster Analysis – Outlier Analysis.

UNIT V TRENDS IN DATAMINING AND BIG DATA MINING 9

Introduction to Big Data-Case Studies on Big Data Mining Tools: Apache Hadoop, Apache Mahout and R - Mining Complex Data Objects, Spatial Databases, Temporal Databases, Multimedia Databases, Time Series and Sequence Data; Text Mining – Web Mining- Application and Trends in Data Mining

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- To build a data warehouse for a real-world system
- To write programs for classification and clustering
- To evaluate various mining techniques on complex data objects
- To verify a data using a various data mining methods.
- To develop applications using Big Data Mining Tools.

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Publishers, Third Edition, 2011.

2. Paul Zikopoulos, Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming”, McGraw-Hill Osborne Media, First Edition, 2011.

REFERENCES:

1. Mehmed Kantardzic, “Datamining Concepts, Models, Methods, and Algorithms”, Wiley Interscience, 2003.
2. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw Hill Edition, Tenth Reprint 2007.
3. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
4. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, “An Introduction to Statistical Learning: with Applications in R”, Springer, 2014.

CS7072	GRAPH THEORY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To comprehend graphs as modeling and analysis tool
- To introduce various data structures with graph theory
- To learn fundamentals behind principle of counting and combinatory.
- To learn about the distinguishing features of various graph algorithms.
- To study the applications of graphs in solving engineering problems.

UNIT I INTRODUCTION **9**

Graphs – Introduction – Isomorphism – Sub Graphs – Walks, Paths, Circuits – Connectedness– Components – Euler Graphs – Hamiltonian paths and circuits – Trees – Properties of Trees– Distance and Centers in Tree – Rooted and Binary Trees.

UNIT II TREES, CONNECTIVITY & PLANARITY **9**

Spanning Trees – Fundamental Circuits – Spanning Trees in a Weighted Graph – Cut Sets – Properties of Cut Set – All Cut Sets – Fundamental Circuits and Cut Sets – Connectivity and Separability – Network Flows – 1-Isomorphism – 2-Isomorphism – Combinational and Geometric Graphs – Planer Graphs – Different Representation of a Planer Graph.

UNIT III MATRICES, COLOURING AND DIRECTED GRAPH **9**

Chromatic Number – Chromatic Partitioning – Chromatic Polynomial – Matching – Covering – Four Color Problem – Directed Graphs – Types of Directed Graphs – Digraphs and Binary Relations – Directed Paths and Connectedness – Euler Graphs.

UNIT IV PERMUTATIONS & COMBINATIONS **9**

Fundamental Principles of Counting - Permutations and Combinations - Binomial Theorem - Combinations with Repetition - Combinatorial Numbers - Principle of Inclusion and Exclusion - Derangements - Arrangements with Forbidden Positions.

UNIT V GENERATING FUNCTIONS **9**

Generating Functions - Partitions Of Integers - Exponential Generating Function - Summation Operator - Recurrence Relations - First Order and Second Order – Non- Homogeneous Recurrence Relations - Method of Generating Functions.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Write programs involving basic graph algorithms
- Write programs for graph coloring
- Differentiate the potential use of directed and undirected graphs

- To learn about the distinguishing features of various graph algorithms
- To study the applications of graphs in solving engineering problems

TEXT BOOKS:

1. Narsingh Deo, “Graph Theory: With Application to Engineering and Computer Science”, Prentice Hall of India, 2003.
2. Grimaldi R.P., “Discrete and Combinatorial Mathematics: An Applied Introduction”, Addison Wesley, 1994.

REFERENCES:

1. Clark J. and Holton D.A., “A First Look at Graph Theory”, Allied Publishers, 1995.
2. Mott J.L., Kandel A. and Baker T.P., “Discrete Mathematics for Computer Scientists and Mathematicians”, Prentice Hall of India, 1996.
3. Liu C.L., “Elements of Discrete Mathematics”, McGraw Hill, 1985.
4. Rosen K.H., “Discrete Mathematics and Its Applications”, McGraw Hill, 2007.

CS7073 MULTIMEDIA TOOLS AND TECHNIQUES

L	T	P	C
3	0	0	3

OBJECTIVES:

- To comprehend the building blocks of multimedia.
- To learn how to use multimedia on the web
- To know and use authoring metaphors and tools concerned
- To learn data compression techniques and theory behind
- To have an understanding of the domains, platforms of multimedia applications
-

UNIT I BASIC ELEMENTS **9**

Creation – Editing – Design – Usage – Tools and Hardware – File Formats for Text, Image / Graphics, Audio, Video, Animation. Color Models, Multimedia Data Structures, KD Trees – R Trees.

UNIT II MULTIMEDIA ON THE WEB **9**

Hypertext, Hypermedia, Hypermedia Structures and Formats, Web Graphics, Web Design Guidelines, HTML5, Plugins, Multimedia Networking.

UNIT III AUTHORING and TOOLS **9**

Authoring – Story Boarding, Metaphors - Card / Page, Icon, Timeline, Tools – Adobe Dream Weaver CC, Flash, Edge Animate CC, Camatasia Studio 8, Claro, E-Learning Authoring Tools – Articulate, Elucidate, Hot Lava.

UNIT IV DATA COMPRESSION **9**

Text Compression – RLE, Huffman, Arithmetic, Dictionary Based, Image Compression – JPEG, JPEG 2000, JPEG – LS, Audio Compression – PCM, ADPCM, LPC, MPEG Audio, Video Compression – MPEG – 1,2,4

UNIT V MULTIMEDIA APPLICATIONS **9**

Multimedia Databases – Content Based Information Retrieval, Multimedia Communications - Multimedia Information Sharing and Retrieval – Applications – Social Media Sharing, Online Social Networking - Virtual Reality - Multimedia for Portable Devices, Collaborative Multimedia Applications

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- A grasp on basic elements of multimedia
- Explain the importance of web based multimedia usage
- Use and apply authoring tools for web and e-learning
- Analyze and apply simple data compression techniques in both lossless and lossy categories.
- Apply the knowledge to analyze, understand and design domain specific multimedia applications

TEXT BOOK:

1. Ze - Nian Li, Mark S Drew and Jiangchuan Liu “Fundamentals of Multimedia”, Second Edition, Springer, 2014.

REFERENCES:

1. Parag Havaldar and Gerard Medioni, “Multimedia Systems - Algorithms, Standards and Industry Practices”, Course Technology, Cengage Learning, 2010.
2. Nigel Chapman and Jenny Chapman, “Digital Multimedia”, Third Edition, Wiley, 2009
3. Ralf Steinmetz and Klara Nahrstedt, “Multimedia Computing, Communications and Applications”, First Edition, Pearson, 2005.
4. www.Webstyleguide.com

CS7074	SOFT COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To give students knowledge of soft computing theories fundamentals,
- To learn the fundamentals of non-traditional technologies and approaches to solving hard real-world problems.
- To learn and apply artificial neural networks, fuzzy sets and fuzzy logic, and genetic algorithms in problem solving and use of heuristics based on human experience
- To introduce the ideas of fuzzy sets, fuzzy logic To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations

UNIT I NEURAL NETWORKS - I 9

(Introduction and Architecture) Neuron, Nerve Structure and Synapse, Artificial Neuron and its Model, Activation Functions, Neural Network Architecture: Single Layer and Multilayer Feed Forward Networks, Recurrent Networks. Various Learning Techniques; Perception and Convergence Rule, Auto-Associative and Hetro-Associative Memory.

UNIT II NEURAL NETWORKS - II 9

(Back Propagation Networks) Architecture: Perceptron Model, Solution, Single Layer Artificial Neural Network, Multilayer Perception Model; Back Propagation Learning Methods, Effect of Learning Rule Co-Efficient ;Back Propagation Algorithm, Factors Affecting Back Propagation Training, Applications.

UNIT III FUZZY LOGIC - I 9

(Introduction) Basic Concepts of Fuzzy Logic, Fuzzy Sets and Crisp Sets, Fuzzy Set Theory and Operations, Properties of Fuzzy Sets, Fuzzy and Crisp Relations, Fuzzy to Crisp Conversion.

UNIT IV FUZZY LOGIC – II 9

(Fuzzy Membership, Rules) Membership Functions, Interference in Fuzzy Logic, Fuzzy If-Then Rules, Fuzzy Implications and Fuzzy Algorithms, Fuzzifications and Defuzzificataions, Fuzzy Controller, Industrial Applications

UNIT V GENETIC ALGORITHM 9

Basic Concepts, Working Principle, Procedures of GA, Flow Chart of GA, Genetic Representations, (Encoding) Initialization and Selection, Genetic Operators, Mutation, Generational Cycle, Applications.

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Awake the importance of tolerance of imprecision and uncertainty for design of robust and low-cost intelligent machines.
- Acquire knowledge of soft computing theories fundamentals and so they will be able to design program systems using approaches of these theories for solving various real-world problems.
- Try and integrate the knowledge of neural networks, fuzzy logic, genetic algorithms, probabilistic reasoning and rough sets.
- Hybrid systems, which are combinations of neural networks, fuzzy logic and genetic algorithms.
- Discover knowledge to develop genetic algorithm to solve various applications.

TEXT BOOKS:

1. S. Rajasekaran and G.A. Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications”, Prentice Hall of India, 2003.
2. N.P.Padhy,”Artificial Intelligence and Intelligent Systems”, Oxford University Press, 2005.
3. J.S.R. Jang, C.T. Sun and E. Mizutani, “Neuro-Fuzzy and Soft Computing”, Pearson Education, 2004.

REFERENCES:

1. Siman Haykin, “Neural Networks ”, Prentice Hall of India, 1999
2. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, Third Edition, Wiley India, 2010
3. S.Y.Kung, “Digital Neural Network”, Prentice Hall International, 1993.
4. Aliev.R.A and Aliev,R.R, “ Soft Computing and its Application”, World Scientific Publishing Company, 2001.
5. Wulfram Gerstner and Wenner Kristler, “Spiking Neural Networks”, Cambridge University Press.
6. Bart Kosko, “Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligence”, Prentice Hall, 1992.

CS7075 WEB DESIGN AND MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the concepts of Web design patterns.
- To learn the concepts of Web page design.
- To understand and learn the scripting languages with design of web applications.
- To apprehend the Pre-Production Management of web design management
- To learn the maintenance and evaluation of web design management

UNIT I SITE ORGANIZATION AND NAVIGATION 9

User Centered Design–Web Medium–Web Design Process–Basics of Web Design –Introduction to Software used for Web Design – ADOBE IMAGE READY, DREAM WEAVER, FLASH – Evaluating Process – Site Types and Architectures – Navigation Theory – Basic Navigation Practices – Search – Sitemaps.

UNIT II ELEMENTS OF PAGEDESIGN 9

Browser Compatible Design Issues-Pages and Layout – Templates – Text – Color – Images – Graphics and Multimedia – GUI Widgets and Forms – Web Design Patterns – STATIC pages: Slice – URL in ADOBE IMAGE READY. Creation and Editing of site map – Layer, Tables, Frame set, - CSS style – Forms –Tools like Insert, Rollover etc., in DREAM WEAVER.

UNIT III SCRIPTING LANGUAGES AND ANIMATION USING FLASHF 9

Client side scripting :XHTML – DHTML – JavaScript – XML Server Side Scripting: Perl–PHP–ASP/JSP Designing a Simple Web Application - Introduction to MACROMEDIA FLASH, Importing Other File Formats to Flash – Saving and Exporting Flash Files, Frame by Frame Animation–Motion Tweening – Shape Tweening.

UNIT IV PRE-PRODUCTION MANAGEMENT 9

Principles of Project Management – Web Project Method – Project Road Map – Project Clarification – Solution Definition – Project Specification – Content – Writing and Managing Content.

UNIT V PRODUCTION, MAINTENANCE AND EVALUATION 9

Design and Construction – Testing, Launch and Handover – Maintenance – Review and Evaluation – **Case Study:** Using the Skills and Concepts Learn with the ADOBE IMAGE READY, DREAM WEAVER, FLASH, and Scripts, Develop Portfolios in the Form of Web Pages which have to be uploaded in Free Public Domains.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Identify the various issues of web design process and evaluation
- Understand the importance of the web as a medium of communication
- Develop simple web applications using scripting languages
- Develop skills in analyzing the usability of a web site
- Create and maintain responsive websites and employ strategies with user-centered design methodologies.

TEXT BOOKS:

1. Themas A. Powell, “The Complete Reference–Web Design”, Tata McGraw Hill, Third Edition, 2003.
2. Ashley Friedlein, “Web Project Management”, Morgan Kaufmann Publishers, 2001.
3. H.M. Deitel, P.J. Deitel, A.B. Goldberg, “Internet and World Wide Web – How to Program”, Third Edition, Pearson Education, 2004.

REFERENCES:

1. Joel Sklar, “Principles of Web Design”, Thomson Learning, 2001.
2. Van Duyne, Landay and Hong, “The Design of Sites: Patterns for Creating Winning Websites”, Second Edition, Prentice Hall, 2006.
3. Lynch, Horton and Rosenfeld, “Web Style Guide: Basic Design Principles for Creating Websites”, Second Edition, Yale University Press, 2002.
4. Deke Mc Clelland, “Photoshop 7 Bible”, Professional Edition, Wiley John and Son Inc., 2000.
5. Curtis Hillman, “Flash Web Design”, First Edition, New Riders Publishing, 2000.

GE7071 DISASTER MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction(DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of Disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts Including Social, Economic, Political, Environmental, Health, Psychosocial, etc.- Differential Impacts- In Terms of Caste, Class, Gender, Age, Location, Disability - Global Trends In Disasters: Urban Disasters, Pandemics, Complex Emergencies, Climate Change- Dos and Don'ts During Various Types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of Safety, Prevention, Mitigation And Preparedness Community based DRR, Structural- nonstructural Measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors Affecting Vulnerabilities, Differential Impacts, Impact of Development Projects such as Dams, Embankments, and Changes in Land-use etc. - Climate Change Adaptation- IPCC Scenario and Scenarios in the Context of India - Relevance of Indigenous Knowledge, Appropriate Technology and Local Resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other Related Policies, Plans, Programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and Field Works Related to Disaster Management.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.

TEXT BOOKS:

1. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES:

1. Govt. of India: Disaster Management Act , Government of India, 2005
2. Government of India, National Disaster Management Policy,2009.

GE7072	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the global trends and development methodologies of various types of products and services
- To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification
- To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends **- Introduction to Product Development Methodologies and Management -** Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies **-** Product Life Cycle – Product Development Planning and Management.

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

Requirement Engineering - Types of Requirements - Requirement Engineering - traceability Matrix and Analysis - Requirement Management - **System Design & Modeling -** Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design.

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – **Challenges in Integration of Engineering Disciplines** - Concept Screening & Evaluation - **Detailed Design -** Component Design and Verification – **Mechanical, Electronics and Software Subsystems** - High Level Design/Low Level Design of S/W Program **-** Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – **Prototyping -** Introduction to Rapid Prototyping and Rapid Manufacturing - **System Integration, Testing, Certification and Documentation**

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product Validation processes and stages - Product Testing Standards and Certification - Product Documentation - **Sustenance -**Maintenance and Repair – Enhancements - **Product EoL -** Obsolescence Management – Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product Development in Industry versus Academia –**The IPD Essentials -** Introduction to Vertical Specific Product Development processes -Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs - Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Define, formulate and analyze a problem
- Solve specific problems independently or as part of a team
- Gain knowledge of the Innovation & Product Development process in the Business Context
- Work independently as well as in teams
- Manage a project from start to finish

TEXTBOOKS:

1. Book specially prepared by NASSCOM as per the MoU.
2. Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2011.
3. John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Eleventh Edition, 2005.

REFERENCES:

1. Hiriyappa B, “Corporate Strategy – Managing the Business”, Author House, 2013.
2. Peter F Drucker, “People and Performance”, Butterworth – Heinemann [Elsevier], Oxford, 2004.
3. Vinod Kumar Garg and Venkita Krishnan N K, “Enterprise Resource Planning – Concepts”, Second Edition, Prentice Hall, 2003.
4. Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013

GE7074 HUMAN RIGHTS L T P C
3 0 0 3

OBJECTIVES:

- To sensitize the Engineering students to various aspects of Human Rights.
- To familiarize students with the origins and assumptions of international human rights law
- To expose students the importance of Human Rights act
- To understand the principles of Human Rights in India
- To expose students the role of NGO's

UNIT I 9

Human Rights – Meaning, origin and Development. Notion and Classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II **9**

Evolution of the Concept of Human Rights Magana Carta – Geneva Convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**

Theories and Perspectives of UN Laws – UN Agencies to Monitor and Compliance.

UNIT IV **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL: 45 PERIODS

OUTCOME:

- To sensitize the Engineering students to various aspects of Human Rights
- An understanding of the principles and institutions of international human rights law, including their origins, assumptions, contents, limits and potential
- Understand the importance of the Human Rights Act 1998
- The role of human rights in contemporary issues relating to terrorism, religion, ethnicity, gender and development
- Analyse a country's situation or an international situation in terms of human rights and formulate human rights-based initiatives and policies

REFERENCES:

1. Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, 2014.
2. Chandra U., "Human Rights", Allahabad Law Agency, 2014.
3. Upendra Baxi, The Future of Human Rights, Oxford University Press, 2012.

GE7351 **ENGINEERING ETHICS AND HUMAN VALUES** **L T P C**

(Common to all branches) **3 0 0 3**

OBJECTIVES

- To emphasize into awareness on Engineering Ethics and Human Values.
- Resolve the moral issues in the profession.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.
- Judge a global issue by presenting an optimum solution.

UNIT I HUMAN VALUES **3**

Morals, Values and Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Discrimination- Character.

UNIT II ENGINEERING ETHICS **9**

Senses of 'Engineering Ethics' - Variety of Moral Issued - Types of Inquiry - Moral Dilemmas - Moral Autonomy - Kohlberg's Theory - Gilligan's Theory - Consensus And Controversy – Models

of Professional Roles - Theories about Right Action - Self-Interest –Professional Ideals and Virtues - Uses of Ethical Theories. Valuing Time – Co-Operation – Commitment

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation - Engineers as Responsible Experimenters - Codes of Ethics – Importance of Industrial Standards - A Balanced Outlook on Law – Anticorruption- Occupational Crime -The Challenger Case Study.

UNIT IV ENGINEER'S RIGHTS AND RESPONSIBILITIESON SAFETY 12

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality- Conflict of Interest – Occupational Crime – Professional Rights – IPR- Safety and Risk - Assessment of Safety and Risk - Risk Benefit Analysis and Reducing Risk - The Three Mile Island, Bhopal Gas Plant and Chernobyl as Case Studies.

UNIT V GLOBAL ISSUES 12

Multinational Corporations - Environmental Ethics - Computer Ethics - Weapons Development - Engineers as Managers - Consulting Engineers - Engineers as Expert Witnesses and Advisors - Moral Leadership - Sample Code of Conduct.

TOTAL: 45 PERIODS

OUTCOMES:

- To emphasize into awareness on Engineering Ethics and Human Values
- To understand social responsibility of an engineer
- To appreciate ethical dilemma while discharging duties in professional life.
- To develop critical thinking skills and professional judements
- To develop professional ethical identity to carry forward in their working life

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger,"Ethics in Engineering", McGraw-Hill, 2005 Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, 2000.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, 2004.

REFERENCES:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, 2000
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford Press , 2000
5. R. Subramanian, "Professional Ethics ", Oxford University Press, Reprint, 2015.

GE7652 TOTAL QUALITY MANAGEMENT L T P C
3 0 0 3

AIM:

To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES:

- To understand the basic concepts, contribution of gurus, barriers and benefits of TQM
- To understand the basics principles of TQM
- To understand the analysis and applications of tools and techniques in TQM

- To understand the various concepts of TQM, quality concepts related to manufacturing and service processes.
- To understand the quality standards and systems in TQM

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of Product and Service Quality –Definition of TQM - Basic Concepts of TQM –- Gurus of TQM (Brief introduction) -- TQM Framework- Barriers to TQM –Benefits of TQM.

UNIT II TQM PRINCIPLES 9

Leadership -The Deming Philosophy, Quality council, Quality statements and Strategic planning-- Customer Satisfaction – Customer Perception of Quality, Feedback, Customer complaints, Service Quality, Kano Model and Customer Retention – Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition & Reward and Performance Appraisal - Continuous process improvement – Juran Trilogy, PDSA cycle, 5s and Kaizen - Supplier Partnership – Partnering, Supplier Selection, Supplier Rating and Relationship Development.

UNIT III TQM TOOLS AND TECHNIQUES I 9

The seven traditional tools of quality – New management tools – Six-sigma Process Capability– Bench marking – Reasons to bench mark, Bench marking process, What to Bench Mark, Understanding Current Performance, Planning, Studying Others, Learning from the data, Using the findings, Pitfalls and Criticisms of Bench Marking – FMEA – Intent of FMEA, FMEA Documentation, Stages, Design FMEA and Process FMEA.

UNIT IV TQM TOOLS AND TECHNIQUES II 9

Quality Circles – Quality Function Deployment (QFD) – Taguchi Quality Loss Function – TPM – Concepts, Improvement Needs – Performance Measures-- Cost of Quality - BPR.

UNIT V QUALITY MANAGEMENT SYSTEM 9

Introduction — Benefits of ISO Registration — ISO 9000 Series of Standards — Sector-Specific Standards — AS 9100, TS16949 and TL 9000 -- ISO 9001 Requirements — Implementation — Documentation — Internal Audits — Registration -- **ENVIRONMENTAL MANAGEMENT SYSTEM:** Introduction — ISO 14000 Series Standards — Concepts of ISO 14001 — Requirements of ISO 14001 — Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- To gain basic knowledge in total quality management relevant to both manufacturing and service industry including IT sector.
- Implement the basic principles of TQM in manufacturing and service based organization.
- "Apply the tools and techniques-I of quality management to Manufacturing and services processes."
- To explore industrial applications of Quality function deployment, Taguchi quality concepts and TP and apply the tools and techniques-II of quality management to manufacturing and services processes.
- Gain the knowledge on various ISO standards and quality systems.

TEXT BOOK:

1. Dale H. Besterfiled, Carol B. Michna, Glen H. Besterfield, Mary B.Sacre, Hemant Urdhwareshe and Rashmi Urdhwareshe, “Total Quality Management”, Pearson Education, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCES:

1. James R. Evans and William M. Lindsay, “The Management and Control of Quality”, Sixth Edition, South-Western (Thomson Learning), 2005.
2. Oakland, J.S. “TQM – Text with Cases”, Butterworth – Heinemann Ltd., Oxford, Third Edition, 2003.
3. Suganthi, L and Anand Samuel, “Total Quality Management”, Prentice Hall of India, 2006.
4. Janakiraman, B and Gopal, R.K, “Total Quality Management – Text and Cases”, Prentice Hall of India, 2006.

IT7071 DIGITAL IMAGE PROCESSING L T P C
3 0 0 3

OBJECTIVES:

- To learn about the basic concepts of digital image processing and various image transforms.
- To familiarize the student with the image enhancement techniques
- To expose the student to a broad range of image processing techniques and their applications.
- To appreciate the use of current technologies those are specific to image processing systems.
- To expose the students to real-world applications of image processing.

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9

Introduction – Applications of Image Processing - Steps in image processing Applications - Digital imaging system- Sampling and Quantization - Pixel connectivity – Distance measures - Color fundamentals and models - File Formats, Image operations.

UNIT II IMAGE ENHANCEMENT AND IMAGE RESTORATION 9

Image Transforms: Fast Fourier Transform and Discrete Fourier Transform. Image Enhancement in Spatial and Frequency domain - Gray level transformations - Histogram processing - Spatial filtering - Smoothing and sharpening - Frequency domain: Filtering in frequency domain. Image Restoration - Image degradation model - Noise modeling – Blur – Order statistic filters – Image restoration algorithms.

UNIT III MULTI RESOLUTION ANALYSIS AND COMPRESSION 9

Multi Resolution analysis: Image pyramids - Multi resolution expansion - Wavelet transforms Image compression : Fundamentals - Models - Elements of information theory - Error free compression - Lossy compression - Compression standards

UNIT IV IMAGE SEGMENTATION AND FEATURE EXTRACTION 9

Image Segmentation - Detection of discontinuities - Edge operators - Edge linking and boundary Detection - Thresholding - Region based segmentation. Image Features and Extraction – Image Features – Types of Features – Feature extraction - Texture - Feature reduction algorithms – PCA – Feature Description.

UNIT V IMAGE CLASSIFICATION AND APPLICATIONS OF IMAGE PROCESSING 9

Image classifiers – Bayesian Classification, nearest neighborhood algorithms - Support Vector Machines - Image Clustering Algorithms – Hierarchical and Partitional clustering algorithms. Case Studies in Image Security - Steganography and Digital watermarking - Visual effects and Digital compositing - Case studies in Medical Imaging and remote sensing.

TOTAL: 45 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

- Implement basic image processing algorithms
- Design an application that uses different concepts of Image Processing
- Apply and develop new techniques in the areas of image enhancement-

restoration- segmentation- compression-wavelet processing and image morphology.
- Critically analyze different approaches to different modules of Image Processing.
- To analyze and design solutions to problems associated with clustering, classification and use other general techniques

TEXT BOOKS:

1. Rafael C.Gonzalez and Richard E.Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2009.
2. S.Sridhar, “Digital Image Processing”, Oxford University Press, 2011.

REFERENCES:

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Second Edition, Thompson Learning, 2007.
2. Anil K.Jain, “Fundamentals of Digital Image Processing”, PHI, 2011.
3. Sanjit K. Mitra, & Giovanni L. Sicuranza, “Non Linear Image Processing”, Elsevier, 2007.

IT7072 TCP/IP DESIGN AND IMPLEMENTATION

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OBJECTIVES:

- To learn about the design of TCP/IP Protocol structure
- To learn about the implementation of TCP and IP functionalities in the form of data structures
- To learn about how TCP handles input and output with synchronization
- To learn about the importance of timers and how it is managed in a TCP communication.
- To learn about the functionality of ICMP error processing routines.

UNIT I FUNDAMENTALS **9**

Internetworking Concepts - IP and Datagram Forwarding - TCP Services - Interactive Data Flow - Timeout and Retransmission - Bulk Data Flow - Persist Timer – Keep-Alive Timer.

UNIT II ARP AND IP **9**

Structure of TCP/IP in OS - Data Structures for ARP - Cache Esign and Management - IP Software Design and Organization - Sending a Datagram to IP.

UNIT III IP ROUTING IMPLEMENTATION **9**

Routing Table - Routing Algorithms - Fragmentation and Reassembly - Error Processing (ICMP) - Multicast Processing (IGMP)

UNIT IV TCP I/O PROCESSING AND FSM **9**

Data Structure And Input Processing - Transmission Control Blocks – Segment Format - Comparison - Finite State Machine Implementation - Output Processing -Mutual Exclusion - Computing TCP Data Length.

UNIT V TCP TIMER AND FLOW CONTROL **9**

Timers - Events and Messages - Timer Process - Deleting and Inserting Timer Event - Flow Control and Adaptive Retransmission - Congestion Avoidance and Control – Urgent Data Processing and Push Function

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Learn the fundamentals of internetworking
- Have knowledge on the data structures of ARP ,IP and TCP software design
- Analyze the routing of packets by routers using its table contents

TEXT BOOKS:

1. Douglas E. Comer, “Internetworking with TCP/IP Principles, Protocols and Architecture”, Vol. 1 Fifth Edition, Pearson Education, 2006.
2. Douglas E. Comer, “Internetworking with TCP/IP- Design, Implementation and Internals”, Vol. 2 Third Edition, Pearson Education, 1999.

REFERENCE:

1. W. Richard Stevens, “TCP/IP Illustrated -The Protocols”, Volume 1, Pearson Education, 2003.

IT7551 UNIX INTERNALS L T P C
3 0 0 3

OBJECTIVES:

- To learn about the design of the UNIX operating system.
- To become familiar with the various data structures used in the UNIX operating systems.
- To learn the various low-level algorithms used in UNIX.
- To understand the fundamental concepts of system calls in the UNIX operating system.
- To know the working of internal algorithms of the UNIX operating system.

UNIT I OVERVIEW 9

General Overview of the System: History – System structure – User perspective –Operating System Services – Assumptions about Hardware. Introduction to the Kernel Architecture of the UNIX Operating System – Introduction to System Concept - The Buffer Cache - Buffer headers – Structure of the Buffer Pool – Scenarios for Retrieval of a Buffer– Reading and Writing Disk Blocks – Advantages and Disadvantages of the Buffer Cache.

UNIT II FILE SUBSYSTEM 9

Internal Representation of Files: Inodes – Structure of a Regular File – Directories –Conversion of a Path Name to an Inode – Super Block – Inode Assignment to a New File – Allocation of Disk Blocks.

UNIT III SYSTEM CALLS FOR THE FILE SYSTEM 9

Open – Read – Write – File And Record Locking – Adjusting the Position of File I/O – lseek – close – File Creation – Creation of Special Files – Changing Directory – Root – Owner - Mode – stat and fstat – Pipes – dup – Mounting And Un mounting File Systems – link – unlink.

UNIT IV PROCESSES 9

Process States and Transitions – Layout of System Memory – The Context of a Process – Saving the Context of a Process – Manipulation of the Process Address Space - Process Control - process Creation – Signals – Process Termination – Awaiting Process Termination – Invoking other programs – User Id of a Process – Changing the size of a Process – Shell – System Boot and the INIT Process– Process Scheduling.

UNIT V MEMORY MANAGEMENT AND I/O 9

Memory Management Policies - Swapping – Demand Paging - The I/O Subsystem: Driver Interface – Disk Drivers – Terminal Drivers.

TOTAL: 45 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

- To learn about the design of the UNIX operating system.
- To become familiar with the various data structures used.
- To learn the various low-level algorithms used in UNIX
- To design and implement the subsystems of an operating system.
- To explain the data structures of an open source operating system

TEXT BOOK:

1. Maurice J. Bach, “The Design of the Unix Operating System”, First Edition, Pearson Education, 1999.

REFERENCES:

1. B. Goodheart, J. Cox, “The Magic Garden Explained”, Prentice Hall of India,1986.
2. S. J. Leffler, M. K. Mckusick, M. J. Karels and J. S. Quarterman., “The Design and Implementation of the 4.3 BSD Unix Operating System”, Addison Wesley, 1998.
3. Robert Love, "Linux Kernel Development", III Edition, Addison Wesley, 2010.