

(Autonomous)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

(REGULATIONS 2018)

Vision of the Institution

IV We envision to achieve status as an excellent Educational Institution in the global knowledge hub, making self-learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world.

Mission of the Institution

IM 1 To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs.

IM 2 To foster and maintain mutually beneficial partnership with global industries and Institutions through knowledge sharing, collaborative research and innovation.

Vision of the Department

DV To create ever green professionals for software industry, academicians for knowledge cultivation and researchers for contemporary society modernization.

Mission of the Department

DM 1 To produce proficient design, code and system engineers for software development.

DM 2 To keep updated contemporary technology and fore coming challenges for welfare of the society.

Programme Educational Objectives (PEOs)

The graduates of the programme will be able to


PEO 1 Rational Computing: Figure out, formulate, analyze typical problems and develop effective solutions by imparting the idea and principles of science, mathematics, engineering fundamentals and computing.

PEO 2 Professional Excellence: Competent professionally and successful in their chosen career through life-long learning.

PEO 3 Social and Ethical Technocrats: Excel individually or as member of a team in carrying out projects and exhibit social needs and follow professional ethics.


Programme Outcomes (POs)

Program Outcomes (POs)	
	Engineering Graduates will be able to:
PO1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
Program Specific Outcomes (PSOs)	
PSO1	Technical competency: Develop and Implement computer solutions that accomplish goals to the industry, government or research by exploring new technologies.
PSO2	Professional awareness: Grow intellectually and professionally in the chosen field.


		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode- 637 215				CURRICULUM UG R - 2018				
Department		Department of Computer Science and Engineering								
Programme		B.E - Computer Science and Engineering								
SEMESTER - I										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	18EN151	Technical English – I (Common To All Branches)	HSMC	2	0	1	3	30	70	100
2.	18MA151	Engineering Mathematics – I (Common To All Branches)	BSC	3	1	0	4	30	70	100
3.	18CH051	Engineering Chemistry (Common To All Branches)	BSC	3	0	0	3	30	70	100
4.	18EE041	Basics of Electrical and Electronics Engineering (Common To AU,CE,CS,IT & ME)	ESC	3	0	0	3	30	70	100
5.	18CS111	Problem Solving Techniques	ESC	3	0	0	3	30	70	100
PRACTICAL										
6.	18CH028	Chemistry Laboratory (Common To All Branches)	BSC	0	0	3	1	50	50	100
7.	18CS121	Problem Solving Techniques Laboratory	ESC	0	0	3	1	50	50	100
8.	18AU027	Engineering Graphics Laboratory (Common To CE,CS,EC,EE & IT)	ESC	0	0	3	1	50	50	100
Total				15	1	9	19	800		

*Induction program will be conducted for three weeks as per AICTE guidelines


SEMESTER - II										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	18EN251	Technical English-II (Common To All Branches)	HSMC	2	0	1	3	30	70	100
2.	18MA243	Discrete Mathematics (Common To CS & IT)	BSC	3	1	0	4	30	70	100
3.	18PH043	Engineering Physics (Common To CS,EC,EE & IT)	BSC	3	0	0	3	30	70	100
4.	18CS211	C Programming	PCC	3	0	0	3	30	70	100
5.	18GE028	Manufacturing Practices (Common To CS,EC,EE & IT)	ESC	1	0	4	3	30	70	100
MANDATORY COURSES										
6.	18MC052	Environmental Science and Engineering (Common To All Branches)	MC	3	0	0	0	50	50	100
PRACTICAL										
7.	18PH028	Physics Laboratory (Common To All Branches)	BSC	0	0	3	1	50	50	100
8.	18CS221	C Programming Laboratory	PCC	0	0	3	1	50	50	100
Total				16	1	10	18	800		

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Department		Department of Computer Science and Engineering								
Programme		B.E - Computer Science and Engineering								
SEMESTER - III										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit C	Maximum Marks		
				L	T	P		CA	ES	Total
THEORY										
1.	18MA343	Numerical Computational Techniques (Common To CS & IT)	BSC	3	1	0	4	30	70	100
2.	18EC332	Logical Design of Digital Computer	ESC	3	0	0	3	30	70	100
3.	18CS311	Data Structures	PCC	3	0	0	3	30	70	100
4.	18CS043	Python Programming (Common To CS & EE)	ESC	3	0	0	3	30	70	100
5.	18CS312	Computer Organization and Architecture	PCC	3	0	0	3	30	70	100
MANDATORY COURSES										
6.	18MC051	Constitution of India (Common To All Branches)	MC	3	0	0	0	50	50	100
PRACTICAL										
7.	18EC325	Digital Systems Laboratory	ESC	0	0	3	1	50	50	100
8.	18CS321	Data Structures Laboratory	PCC	0	0	3	1	50	50	100
9.	18CS028	Python Programming Laboratory (Common To CS, EC& EE)	ESC	0	0	3	1	50	50	100
10.	18HR351	Career Development Skills I (Common To All Branches)	EEC	0	2	0	0	50	50	100
Total				18	3	9	19	1000		


SEMESTER - IV										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit C	Maximum Marks		
				L	T	P		CA	ES	Total
THEORY										
1.	18MA441	Probability and Decision Models (Common To CS & IT)	BSC	3	1	0	4	30	70	100
2.	18CS411	Software Engineering	PCC	3	0	0	3	30	70	100
3.	18CS002	Java Programming (Common To CS & EE)	PCC	3	0	0	3	30	70	100
4.	18CS003	Operating Systems (Common To CS& EE)	PCC	3	0	0	3	30	70	100
5.	18CS412	Design and Analysis of Algorithms	PCC	3	1	0	4	30	70	100
6.	18EC436	Microprocessors and Microcontrollers	ESC	3	0	0	3	30	70	100
PRACTICAL										
7.	18CS421	Java Programming Laboratory	PCC	0	0	3	1	50	50	100
8.	18CS422	Operating Systems Laboratory	PCC	0	0	3	1	50	50	100
9.	18EC425	Microprocessors and Microcontrollers Laboratory	ESC	0	0	3	1	50	50	100
10.	18HR432	Career Development Skills II	EEC	0	2	0	0	50	50	100
Total				18	4	9	23	1000		

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Department		Department of Computer Science and Engineering								
Programme		B.E - Computer Science and Engineering								
SEMESTER - V										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit C	Maximum Marks		
				L	T	P		CA	ES	Total
THEORY										
1.	18CS511	Theory of Computation	PCC	3	1	0	4	30	70	100
2.	18CS512	Database Management Systems	PCC	3	0	0	3	30	70	100
3.	18CS513	Web programming	PCC	3	0	0	3	30	70	100
4.	18CS514	Computer Networks	PCC	3	0	0	3	30	70	100
5.	18HS003	Entrepreneurship Development (Common To CS & ME)	HSMC	3	0	0	3	30	70	100
6.		Professional Elective – I	PEC	3	0	0	3	30	70	100
PRACTICAL										
7.	18CS521	Database Management Systems Laboratory	PCC	0	0	3	1	50	50	100
8.	18CS522	Web and Open Source Laboratory	PCC	0	0	3	1	50	50	100
9.	18CS523	Computer Networks Laboratory	PCC	0	0	3	1	50	50	100
10.	18HR533	Career Development Skills III	EEC	0	2	0	0	50	50	100
Total				18	3	9	22	1000		

SEMESTER - VI										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit C	Maximum Marks		
				L	T	P		CA	ES	Total
THEORY										
1.	18CS611	Principles of Compiler Design	PCC	3	1	0	4	30	70	100
2.	18CS612	Mobile Computing	PCC	3	0	0	3	30	70	100
3.	18CS613	Software Testing	PCC	3	0	0	3	30	70	100
4.		Professional Elective – II	PEC	3	0	0	3	30	70	100
5.		Professional Elective – III	PEC	3	0	0	3	30	70	100
6.		Open Elective – I	OEC	3	0	0	3	30	70	100
PRACTICAL										
7.	18CS621	Case Tools Laboratory	PCC	0	0	3	1	50	50	100
8.	18CS622	Software Testing Laboratory	PCC	0	0	3	1	50	50	100
9.	18CS623	Mini project	PROJ	0	0	6	3	50	50	100
10.	18HR634	Career Development Skills IV	EEC	0	2	0	0	50	50	100
Total				18	3	12	24	1000		

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Department		Department of Computer Science and Engineering								
Programme		B.E - Computer Science and Engineering								
SEMESTER - VII										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	18HS051	Professional Ethics (Common To All Branches)	HSMC	3	0	0	3	30	70	100
2.	18CS711	Big Data and Cloud Computing	PCC	3	0	0	3	30	70	100
3.	18CS712	Cryptography and Network Security	PCC	3	0	0	3	30	70	100
4.	18CS713	Graphics and Multimedia	PCC	3	0	0	3	30	70	100
5.		Professional Elective- IV	PEC	3	0	0	3	30	70	100
6.		Open Elective – II	OEC	3	0	0	3	30	70	100
PRACTICAL										
7.	18CS721	Big Data and Cloud Computing Laboratory	PCC	0	0	3	1	50	50	100
8.	18CS722	Graphics and Multimedia Laboratory	PCC	0	0	3	1	50	50	100
Total				18	0	6	20	800		

SEMESTER - VIII										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.		Professional Elective – V	PEC	3	0	0	3	30	70	100
2.		Professional Elective – VI	OEC	3	0	0	3	30	70	100
3.		Open Elective – III	OEC	3	0	0	3	30	70	100
PRACTICAL										
4.	18CS821	Project work	PROJ	0	0	12	6	50	50	100
Total				9	0	12	15	400		

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Department		Department of Computer Science and Engineering									
Programme		B.E -Computer Science and Engineering									
List of Electives											
PROFESSIONAL ELECTIVE - I (SEMESTER - V)											
Sl.No.	Course Code	Course Name	Speciali- zation	Category	Hours/ Week			Credit C	Maximum Marks		
					L	T	P		CA	ES	Total
1.	18CS561	Distributed Systems	S1	PEC	3	0	0	3	30	70	100
2.	18CS562	Foundation Skills in Integrated Product Development	S5	PEC	3	0	0	3	30	70	100
3.	18CS563	Open Source Technologies	S4	PEC	3	0	0	3	30	70	100
4.	18CS564	Data Warehousing and Data Mining	S3	PEC	3	0	0	3	30	70	100
5.	18CS565	Artificial intelligence and Expert systems	S2	PEC	3	0	0	3	30	70	100
6.	18EC586	Digital Signal Processing	S2	PEC	3	0	0	3	30	70	100

PROFESSIONAL ELECTIVE - II (SEMESTER - VI)											
Sl.No.	Course Code	Course Name	Speciali- zation	Category	Hours/ Week			Credit C	Maximum Marks		
					L	T	P		CA	ES	Total
1.	18CS661	Social Network Analysis	S3	PEC	3	0	0	3	30	70	100
2.	18CS662	Object Oriented Analysis and Design	S1	PEC	3	0	0	3	30	70	100
3.	18CS663	Application Frameworks	S3	PEC	3	0	0	3	30	70	100
4.	18CS664	TCP/IP Design and Implementation	S2	PEC	3	0	0	3	30	70	100
5.	18CS665	Machine Learning Techniques	S1	PEC	3	0	0	3	30	70	100
6.	18CS666	Agile Software Development (Industry Elective)	S4	PEC	2	0	2	3	30	70	100

PROFESSIONAL ELECTIVE – III (SEMESTER - VI)											
Sl.No.	Course Code	Course Name	Speciali- zation	Category	Hours/ Week			Credit C	Maximum Marks		
					L	T	P		CA	ES	Total
1.	18CS667	Green Computing	S1	PEC	3	0	0	3	30	70	100
2.	18CS091	.Net Framework Technologies (Common To CS & EC)	S2	PEC	3	0	0	3	30	70	100
3.	18CS668	Mobile Application Development	S1	PEC	3	0	0	3	30	70	100
4.	18HS002	Total Quality Management (Common To AU,CE,CS,EE,IT & ME)	S5	PEC	3	0	0	3	30	70	100
5.	18CS669	Ad hoc and Sensor Networks	S3	PEC	3	0	0	3	30	70	100
6.	18CS671	Advanced Database Technology	S3	PEC	3	0	0	3	30	70	100

PROFESSIONAL ELECTIVE – IV (SEMESTER – VII)											
Sl.No.	Course Code	Course Name	Speciali- zation	Category	Hours/ Week			Credit C	Maximum Marks		
					L	T	P		CA	ES	Total
1.	18CS761	Soft Computing	S1	PEC	3	0	0	3	30	70	100
2.	18CS762	Multicore Architecture	S4	PEC	3	0	0	3	30	70	100
3.	18CS763	High Speed Networks	S3	PEC	3	0	0	3	30	70	100
4.	18CS764	Information security	S3	PEC	3	0	0	3	30	70	100
5.	18CS765	User Interface Design	S4	PEC	3	0	0	3	30	70	100
6.	18CS766	Business Intelligence (Industry Elective)	S2	PEC	2	0	2	3	30	70	100
7.	18HR791	Professional Readiness For Innovation, Employability And Entrepreneurship	S5	PEC	2	0	2	3	30	70	100

PROFESSIONAL ELECTIVE – V (SEMESTER - VIII)											
Sl.No.	Course Code	Course Name	Speciali- zation	Category	Hours/ Week			Credit C	Maximum Marks		
					L	T	P		CA	ES	Total
1.	18CS861	Service Oriented Architecture	S4	PEC	3	0	0	3	30	70	100
2.	18CS862	Software Project Management	S5	PEC	3	0	0	3	30	70	100
3.	18CS863	Cyber Forensics	S3	PEC	3	0	0	3	30	70	100
4.	18CS864	Natural Language Processing	S4	PEC	3	0	0	3	30	70	100
5.	18CS865	Mainframe Technologies (Industry Elective)	S4	PEC	2	0	2	3	30	70	100
6.	18CS866	Knowledge Based Decision Support System	S5	PEC	2	0	2	3	30	70	100

PROFESSIONAL ELECTIVE – VI (SEMESTER - VIII)											
Sl.No.	Course Code	Course Name	Speciali- zation	Category	Hours/ Week			Credit C	Maximum Marks		
					L	T	P		CA	ES	Total
1.	18CS867	Pervasive Computing	S1	PEC	3	0	0	3	30	70	100
2.	18CS868	Ethical Hacking	S4	PEC	3	0	0	3	30	70	100
3.	18CS869	Internet of Things	S2	PEC	3	0	0	3	30	70	100
4.	18CS871	M-Commerce	S2	PEC	3	0	0	3	30	70	100
5.	18CS872	Enterprise Resource Planning	S3	PEC	2	0	2	3	30	70	100
6.	18CS873	Information Storage Management	S2	PEC	2	0	2	3	30	70	100

OPEN ELECTIVE (SEMESTER VI – VIII)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	18HS094	Disaster Management	HS	OEC	3	0	0	3	30	70	100
2.	18EC662	Medical Electronics	EC	OEC	3	0	0	3	30	70	100
3.	18ME776	Industrial Robotics	ME	OEC	3	0	0	3	30	70	100
4.	18CE091	Basics of Civil and Mechanical Engineering	CE	OEC	3	0	0	3	30	70	100
5.	18EC763	Fundamentals of Nano Technology	EC	OEC	3	0	0	3	30	70	100
6.	18HS095	Engineering Economics and Financial Accounting	HS	OEC	3	0	0	3	30	70	100
7.	18EC613	Digital Image Processing	EC	OEC	3	0	0	3	30	70	100
8.	18CE096	Solid waste Management	CE	OEC	3	0	0	3	30	70	100
9.	18ME097	Industrial Safety Engineering	ME	OEC	3	0	0	3	30	70	100
10.	18EE711	Embedded Systems	EE	OEC	3	0	0	3	30	70	100
11.	18HS001	Principles of Management	HS	OEC	3	0	0	3	30	70	100
12.	18HS098	Human Resource Management	HS	OEC	3	0	0	3	30	70	100
13.	18CE867	Municipal Waste and Management	CE	OEC	3	0	0	3	30	70	100
14.	18AU769	Intelligent Vehicles Technology	AU	OEC	3	0	0	3	30	70	100
15.	18CE866	Architecture Planning Aspects	CE	OEC	3	0	0	3	30	70	100

S1 - Recent Technologies and Computing

S2 - Data and Knowledge Engineering

S3 - Computer Networks and Security

S4 - Systems and Software Engineering

S5 - Entrepreneurship and Managerial Skills

LIST OF VALUE ADDED COURSES

Sl. No.	Course Name	Number of Hours	Offered by Internal / External
1	Business English Certification	15	Internal / External
2	Other Linguistic Learning like German , Japanese , etc.,	15	Internal / External
3	Computer Hardware and Troubleshooting	15	Internal / External
4	Infosys Campus Connect - Foundation Program	15	Internal / External
5	Online Course Certification from edX/ Coursera / NPTEL , etc.,	15	Internal/ External
6	Hands-on Training on Network Simulation Tools like NS3 etc.,	15	Internal / External
7	Hands-on Training on Data Mining Tools like weka etc.,	15	Internal / External
8	Hands-on Training on Video and Audio Editing Tool	15	Internal / External
9	Hands-on Training on MATLAB	15	Internal / External
10	Hands-on Training on Internet of Things	15	Internal/ External
11	Course on Intellectual Property Rights	15	Internal / External
12	Course on Brain Computer Interface	15	Internal / External

COURSE COMPONENT SUMMARY

S. No.	Subject Area	Credits Per Semester								Credits Total	Percentage Credits
		I	II	III	IV	V	VI	VII	VIII		
1.	HSMC	3	3	-	-	3	-	3	-	12	7.5
2.	BSC	8	8	4	4	-	-	-	-	24	15.0
3.	ESC	8	3	8	4	-	-	-	-	23	14.37
4.	PCC	-	4	7	15	16	12	11	-	65	40.62
5.	PEC	-	-	-	-	3	6	3	6	18	11.25
6.	OEC	-	-	-	-	-	3	3	3	9	5.6
7.	PROJ	-	-	-	-	-	3	-	6	9	5.62
TOTAL		19	18	19	23	22	24	20	15	160	100

Total No. of Credits = 160

SEMESTER – I

18EN151	TECHNICAL ENGLISH – I	L	T	P	C
	(Common To All branches)	2	0	1	3

Prerequisite: No prerequisites are needed for enrolling into the course.

Objectives:

- To develop basic conversation skills.
- To build vocabulary skills with the right choice of words.
- To improve students' understanding of grammar in context progressively.
- To empower students on professional writing.
- To use the LSRW skills in professional context.

UNIT – I **[9]**

Synonyms & Antonyms – Tenses (Simple Present, Present Continuous, Present Perfect, Simple Past, and Simple Future) – Use of Modal Auxiliaries – Infinitive and Gerund – Intensive Reading – Predicting Content – Interpretation – Active Listening – Listening for the main idea – Need based Correspondence (request for joining hostel, bonafide certificate)

UNIT – II **[9]**

British & American Terminology – Impersonal passive – Standard Abbreviations and Acronyms – Predicting Content – Drawing inferences – Listening for specific details – Listening to News – Job Application and Resume – Writing Instructions

UNIT – III **[9]**

Preposition of Time, Place and Movement – Concord (Subject & Verb Agreement) – Passive Voice – Consonant Sounds – Pronunciation guidelines related to Vowels and Consonant – Skimming & Scanning – Inference – Context Based Meaning – Welcome Speech – Vote of Thanks.

UNIT – IV **[9]**

Newspaper Reading – Vocabulary Building – Phrasal Verbs (Put, Give, Look, Take, Get, Call) – Note making – Rearranging the jumbled sentences – MoC – Anchoring – Role play in academic context – E Mail Etiquette – Introducing others.

UNIT – V **[9]**

Listening to Dialogues – Listening to Telephonic Conversation – Recommendation Writing – Letter of Invitation (inviting, accepting and declining) – Paragraph writing – Letter to the Editor of a Newspaper – Drills using Minimal pairs – Presentation Skills.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Comprehend and apply Grammar in context for professional communication.

CO2: Infer the gist and specific information.

CO3: Express and interact in the society and place of study.

CO4: Critically interpret by reading a text and comprehend a given text.

CO5: Correspond and communicate for jobs.

Text Books :

- 1 Dr.P.Rathna, English Work Book – I, VRB Publishers Pvt. Ltd., Chennai, Fourth Edition, 2018.
- 2 S.Sumant, Technical English – I, Vijay Nicole, Chennai, Second Edition, 2018

References :

- 1 Menasha Raman. Technical Communication, Oxford University Press, New Delhi, First Edition, 2017
- 2 Seely, The Oxford Guide to Writing and Speaking, Oxford University Press, New Delhi, First Edition, 2016
- 3 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2005
- 4 P.Kiranmani Dutt, A course in Communication Skills, Cambridge University Press, New Delhi, First Edition, 2014

SEMESTER – I

18CH051

ENGINEERING CHEMISTRY
(Common To All branches)

L	T	P	C
3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course.**Objectives:**

- To Impart knowledge about the manufacture, properties and uses of advanced engineering materials.
- To acquaint the students with the basic concepts of corrosion mechanism and its control.
- To understand the concept of thermodynamics.
- To gain knowledge about atomic structure and chemical bonding.
- To make the students conversant with various spectroscopic techniques.

UNIT – I ADVANCED ENGINEERING MATERIALS [9]

Abrasives – Moh's scale of hardness – types – natural [Diamond] – synthetic [SiC]; Refractories – characteristics – classifications [Acidic, basic and neutral refractories] – properties – refractoriness – RUL – porosity – thermal spalling; Lubricants – definition – function – characteristics – properties – viscosity index, flash and fire points, cloud and pour points, oiliness; Solid lubricants – graphite and MoS₂; Nano materials – CNT– synthesis [CVD, laser evaporation, pyrolysis] – applications – medicine, electronics, biomaterials and environment.

UNIT – II ELECTROCHEMISTRY AND CORROSION [9]

Introduction – electrode potential – Nernst equation – EMF series and its significance – types of cells (Electrolytic & electrochemical); Corrosion – causes, consequences – classification – chemical corrosion – electro chemical corrosion – mechanism; Galvanic & differential aeration corrosion – factors influencing corrosion – corrosion control – corrosion inhibitors.

UNIT – III CHEMICAL THERMODYNAMICS [9]

Terminology of thermodynamics – second law; Entropy – entropy change for an ideal gas – reversible and irreversible processes – entropy of phase transition – Clausius inequality; Free energy and work function – Helmholtz and Gibb's free energy functions (Problems) – criteria of spontaneity; Gibb's – Helmholtz equation (Problems) – Clausius-Clapeyron equation; Maxwell's relations – Van't Hoff isotherm and isochore (problems).

UNIT – IV ATOMIC STRUCTURE AND CHEMICAL BONDING [9]

Effective nuclear charge – orbitals – variations of s, p, d and f orbital – electronic configurations – ionization energy – electron affinity and electro negativity; Types of bonding – ionic, covalent and coordination bonding – hydrogen bonding and its types; Crystal field theory – the energy level diagram for transition metal complexes ([Fe(CN)₆]³⁻, [Ni(CN)₄]²⁻ and [CoCl₄]²⁻ only); Role of transition metal ions in biological system; Band theory of solids.

UNIT – V PHOTOCHEMISTRY AND SPECTROSCOPIC TECHNIQUES [9]

Laws of photochemistry – Grotthuss Draper law – Stark-Einstein law – Beer-Lambert law – phosphorescence – fluorescence and it's applications in medicine – chemiluminescence; Colorimetry – principle – instrumentation (block diagram only) – estimation of iron by colorimetry; principles of spectroscopy – selection rules – vibrational and rotational spectroscopy – applications; Flame photometry – principle – instrumentation (block diagram only) – estimation of sodium; Atomic absorption spectroscopy – principle – instrumentation (block diagram only) – estimation of nickel.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO 1: Make use of the manufacture, properties and uses of advanced engineering materials.

CO 2: Recognize the knowledge on the concept of corrosion and its control.

CO 3: Assess knowledge about thermodynamics.

CO 4: Rationalize periodic properties such as ionization energy, electron affinity and electro negativity.

CO 5: Recognize the usage of various spectroscopic techniques.

Text Books :

- 1 Dr. A. Ravikrishnan, Engineering Chemistry, Srikrishna Hi-tech Publishing Company Private Limited, Chennai, Seventeenth Edition, 2016.
- 2 P.C. Jain and Monica Jain, Engineering Chemistry, Dhanpat Rai Publishing company, New Delhi, Seventeenth Edition, 2015.

References :

- 1 S S. Dara and S. S. Umare, A Text book of Engineering Chemistry, S. Chand & Company Limited, New Delhi, Fifth Edition, 2015.
- 2 N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry, PHI Learning Private Limited, New Delhi, Third Edition, 2014.
- 3 S. Vairam, P. Kalyani and Suba Ramesh, Engineering Chemistry, Wiley India Private Limited, New Delhi, First Edition, 2013.
- 4 B. Sivasankar, Engineering Chemistry, Tata McGraw – Hill Education Private Limited, New Delhi, First Edition, 2008.

SEMESTER – I

18EE041	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING (Common To AU, CE, CS, IT & ME)	L	T	P	C
		3	0	0	3

Prerequisite: Engineering Mathematics, Engineering Physics

Objectives:

- To study the basic concepts of electric circuits and various measuring instruments.
- To familiarize the constructional details and operation of the DC machines and transformers.
- To impart knowledge on AC Motors and special electrical machines.
- To understand the basic of various measuring instruments.
- To study the characteristics of semiconductor devices and its applications.

UNIT – I ELECTRICAL CIRCUITS [9]

Structure of Electrical Power System– Ohm's Law – Kirchhoff's Laws – Circuit Analysis – Introduction to AC Circuits: R, RL & RLC series circuits (Quantitative Approach Only), Average and RMS Value – Power factor for single phase Circuits – Three Phase Star and Delta Connections – Electrical Safety.

UNIT – II DC MOTORS AND TRANSFORMERS [9]

Faraday's Law – Lenz's Law–Fleming's left hand and right hand rule, DC Motors: Construction –Operation – Series and Shunt Motor – Characteristics – Applications. Single Phase Transformer: Construction – Operation – EMF Equation – Types – Applications.

UNIT – III AC MOTORS & SPECIAL MACHINES [9]

Single Phase Induction Motor: Construction – Operation – Split Phase Induction Motor and Capacitor Start Induction Run Motor – Applications, Three Phase Induction Motor: Construction – Operation – Types – Applications. Special Machines: Stepper Motor.

UNIT – IV MEASURING INSTRUMENTS [9]

Basic Methods of Measurements: Direct and Indirect, Functional elements of an instrument – Errors in measurements – Analog and Digital Instruments – Basic Principle of Indicating Instruments – Moving Coil and Moving Iron Ammeter and Voltmeter. Dynamometer type Wattmeter – Induction type Energy Meter – Cathode Ray Oscilloscope.

UNIT – V ANALOG AND DIGITAL ELECTRONICS [9]

Semiconductor devices: PN Junction Diode, Zener diode: classification, operation and Characteristics– Bipolar Junction Transistor – CE Configurations and its Characteristics. Review of number systems – digital logic gates – Introduction to Microprocessors.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Solve the electric circuits by applying basic circuit laws using various combinations of circuit elements.

CO2: Explain the construction, operating principle and application of DC motor, transformers.

CO3: Enlighten the construction, operating principle and application of AC motors.

CO4: Illustrate the function of various measuring instruments.

CO5: Discuss the characteristics of Diodes, Zener diode, BJT using CE configurations.

Text Books :

- 1 Smarajit Ghosh, Fundamentals of Electrical and Electronics Engineering, PHI Learning Private Limited, New Delhi, Second Edition, 2007.
- 2 V.Jegathesan, K.VinothKumar and R.Saravanakumar, Basic Electrical and Electronics Engineering, Wiley India Publication, New Delhi, First Edition, 2012.

References :

- 1 Muthusubramanian, R., Salivahanan S and Muraleedharan, K.A., Basic Electrical, Electronics and Computer Engineering, Tata McGraw Hill Publishing Co Ltd., New Delhi, Second Edition, 2006.
- 2 Nagsarkar T K and Sukhija M S, Basics of Electrical Engineering, Oxford University Press, London, Ninth Edition, 2005.
- 3 Mehta, V.K and Rohit Mehta, Principle of Electrical Engineering, S Chand & Company, New Delhi, Second Edition 2008.
- 4 Mahmood Nahvi and Joseph A. Edminister, Electric Circuits, Schaum' Outline Series, Tata McGraw Hill Publishing Co Ltd., New Delhi, Fifth Edition, 2002.

SEMESTER – I

18CS111	PROBLEM SOLVING TECHNIQUES	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course.

Objectives:

- To learn the fundamental concepts of computers and internet.
- To study the basics of problem solving techniques.
- To gain knowledge of fundamental algorithm simple problem.
- To know different factoring methods.
- To learn the array concept for different operations.

UNIT – I COMPUTER FUNDAMENTALS [9]

Introduction and Organization of Computer – Hardware, Software and Firmware – Classification of Software – Introduction to Algorithms, Pseudo code and Flowchart. Steps in Problem Solving – Problem Solving Strategies – Top down design.

UNIT – II FUNDAMENTAL ALGORITHMS [9]

Exchanging the Values – Counting – Summation of Set of Number – Factorial Computation – Generation of the Fibonacci Sequence – Reversing the Digits of an Integer – Decimal to Binary Conversion and vice versa.

UNIT – III FACTORS AND ARRAY TECHNIQUES [9]

Finding the Square Root of a Number – Smallest Divisor of an Integer – Computing Prime Factors of an Integer – GCD of Two Integers – Generating Prime Numbers – Finding the largest number in an array – Removal of Duplicates from an Ordered Array – Finding the kth smallest element.

UNIT – IV TEXT PROCESSING AND PATTERN SEARCHING [9]

Text Line Length Adjustment – Left and Right Justification of text – Keyword searching in text – Text Line Editing – Linear Pattern Search – Sub Linear Pattern Search.

UNIT – V JAVA SCRIPT [9]

Introduction – External Java Script – Java Script Basics: Comments, Variables, Data types, operators, if statement, switch, loop and function. Java Script Objects: Objects, Array and String.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Outline the basics of problem solving techniques.

CO2: Analyze the fundamental algorithms.

CO3: Find the factors and analyze array operations.

CO4: Evaluate the basic string operations.

CO5: Summarize the fundamentals of java script.

Text Books :

- 1 R.G.Dromey, How to Solve it by Computer, Pearson Education, India, Fifth Edition, 2008.
- 2 Paul Wilton, Beginning JavaScript, John Wiley & Sons, United States, Fourth Edition, 2009.

References :

- 1 ITL Educational Solutions Limited, Introduction to Information Technology, Pearson Education, India, Second Edition, India, 2012.
- 2 G. Polya, How to Solve It : A New Aspect of Mathematical Method, Princeton University Press, New Jersey, Second Edition, 2008
- 3 Ellis Horowitz, Fundamentals of Programming languages, Galgotia Publications, New Delhi, Second Edition, 2012.
- 4 www.nptel.ac.in/courses/106104074

SEMESTER – I

18CH028	CHEMISTRY LABORATORY (Common To All Branches)	L	T	P	C
		0	0	3	1

Prerequisite: Knowledge of Engineering Chemistry

Objectives:

- To gain the practical knowledge and hands on experiences of understanding the principle of conductometric titration.
- To acquaint the students with the estimation of iron by spectrophotometry.
- To analyze the instrumental methods of chemical analysis.
- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To impart knowledge about the theoretical principles of corrosion in metals.

LIST OF EXPERIMENTS:

1. Conductometric Titration – Strong Acid Vs. Strong Base.
2. Conductometric Titration – Mixture of Weak and Strong Acids Vs. Strong Base.
3. Conductometric Titration – Precipitation, BaCl₂ Vs. Na₂SO₄.
4. Estimation of Ferrous ion by Potentiometry – Fe²⁺ Vs K₂Cr₂O₇.
5. Estimation of Hydrochloric Acid by pH metry.
6. Estimation of Iron by Spectrophotometry.
7. Estimation of hardness in water by EDTA method.
8. Estimation of chloride in water sample by Argentometry.
9. Estimation of dissolved oxygen (DO) in water by Winkler's method.
10. Determination of rate of corrosion of mild steel by weight loss method.

Total : 30 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Apply the principle of conductometric titration.

CO2: Determine the role of pH in quantitative analysis of a solution.

CO3: Perceive the knowledge of the concentration of Iron by electrochemical methods.

CO4: Analyze the application of water in various fields.

CO5: Identify the nature of corrosion process.

Text Book :

- 1 Department of Chemistry Staff members, Chemistry Laboratory Manual, K.S.R. College of Engineering, Tiruchengode, Third Edition, 2018.
- 2 I. Vogel, Vogel's Textbook of Quantitative Chemical Analysis, John Wiley & sons, Newyork, Eighth Edition, 2014

Reference Books :

- 1 S. K. Bhasin and Sudha Rani, Laboratory Manual of Engineering Chemistry, Dhanpat Rai Publishing Company Private Limited, New Delhi, Third Edition, 2012.
- 2 I. Vogel and J. Mendham, Vogel's Textbook of Quantitative Chemical Analysis, Harlow, Prentice Hall, Sixth Edition, 2000.
- 3 G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denny, Vogel's Text book of quantitative analysis chemical analysis, Longman, Singapore publishers, Singapore, ELBS Fifth Edition, 1996.
- 4 B.S. Furniss, A.J. Hannaford, P.W.G. Smith and A.R. Tatchel, Vogels Textbook of practical organic chemistry, John Wiley & sons, Newyork, Fifth Edition, 1989.

SEMESTER – I

18CS121	PROBLEM SOLVING TECHNIQUES LABORATORY	L	T	P	C
		0	0	3	1

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To study and identification of PC hardware and interfacing components.
- To learn the basic concept of creating a table, flow chart, mail merge in a word document.
- To know spreadsheet for creating the charts and apply formulas and functions.
- To get knowledge of power point presentation with animations and generate a report in MS access.
- To gain the practical knowledge of how to solve real world problems.

LIST OF EXPERIMENTS:

1. Prepare a Bio-data using MS Word with appropriate page, text and table formatting options and send the same too many recipients using mail merge.
2. Prepare a mark sheet with five subjects for five students in MS Excel File using Formulas, Functions and Charts.
3. i) Prepare a Power Point presentation for your organization with varying animation effects using timer.
ii) Prepare a Student Database in MS Access, manipulate the data and generate report.
4. Study of HTML tags and CSS.
5. Design an algorithm for exchanging the Values.
6. Design an algorithm for Factorial Computation.
7. Design an algorithm to reverse the digits of a given number
8. Design an algorithm for to check whether the given number is a prime number.
9. Design an algorithm to accept 10 integer elements for an array and find the largest.
10. Design an algorithm to remove all duplicate elements from an ordered array (may be ascending or descending order) and contract the array accordingly.
11. Design an algorithm to accept a string from the user. Count and print the number of times each character occurs in the given string.
12. Design an algorithm to find the number of vowels, consonant, digits and white space in a string.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Illustrate the basic concepts of MS Office.

CO2: Acquire the knowledge of HTML tags and CSS.

CO3: Recall the fundamentals of java script.

CO4: Demonstrate the simple problems using factorizing concepts

CO5: Analyze the simple problems using array and string operations.

SEMESTER – I

18AU027	ENGINEERING GRAPHICS LABORATORY (Common To CE,CS,EC,EE & IT)	L	T	P	C
		0	0	3	1

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To improve graphic skills for communication of concepts, ideas, and design of engineering products.
- To develop skill for using software to create 2D and 3D models.
- To become proficient in drawing the projection of various solids.
- To gain knowledge about orthographic and isometric projections.
- To improve their visualization skills so that they can apply these skills in developing new products.

LIST OF EXPERIMENTS:

1. Study of basic tools, commands and coordinate system (absolute, relative, polar, etc.) used in 2D software.
2. Draw the conic curves and special curves by using AutoCAD.
3. Draw the front view, top view, side view of objects from the given pictorial view.
4. Draw the projections of straight lines.
5. Draw the projections of polygonal surface.
6. Draw the projections of simple solid objects.
7. Draw the sectional view and the true shape of the given section.
8. Draw the development of surfaces like prism, pyramids, cylinders and cone.
9. Draw the isometric projections of simple solids, truncated prism and pyramids.
10. Draw the isometric projections of cylinder and cone.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Construct the various plane curves.

CO2: Formulate orthographic projection of lines and plane surfaces.

CO3: Draw projections of solids and development of surfaces.

CO4: Prepare the isometric sections of simple solids.

CO5: Develop the section of solids and surfaces.

SEMESTER – II

18EN251	TECHNICAL ENGLISH – II (Common To All branches)	L	T	P	C
		2	0	1	3

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To make students firm on vocabulary and grammar.
- To develop students speaking ability.
- To enhance students' professional skills on professional writing.
- To enable students reading and listening skills.
- To optimize LSRW skills for personal development.

UNIT – I [9]

Technical Vocabulary – Changing words from one form to another – Articles – Compound Nouns – Critical reading–Need based Correspondence (In plant training & Industrial Visit) – Context based meaning – Introducing Oneself – Writing short Essays.

UNIT – II [9]

Numerical Adjectives – Prefixes & Suffixes- If Conditionals – E-mail Writing – Greetings and Introductions – Making Requests – Seeking Information – Inviting People – Likes & Dislikes -. Listening for main ideas – Report Writing.

UNIT– III [9]

Framing Questions – ‘Wh’ Question – Yes / No Question –Discourse markers – Cause and Effect Expression – Critical reading, making inference – Transcoding (Interpretation of Charts) – Listening and Note taking – Oral Presentation.

UNIT – IV [9]

Expression of Purpose – Editing text for Spelling and Punctuation – Redundancies – Business Correspondence – Calling for Quotations, Seeking Clarification, placing order and Complaint – Extensive Listening – Short Comprehension Passages.

UNIT – V [9]

Instructions – Describing – Telephone Etiquette – Listening to fill up forms and gapped texts – Agenda and Minutes of meeting – Check list – Essay Writing – Reading Short texts from Journals and Newspapers.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Comprehend and apply the enriched vocabulary, by knowing the basic grammatical structure, in academic and professional contexts.

CO2: Recognize and use Standard English in diverse situations.

CO3: Critically interpret by reading a text and comprehend a given text.

CO4: Compose and write clearly in professional contest.

CO5: Enhance the listening skill for academic purposes.

Text Books :

- 1 Dr.P.Rathna, English Work Book – II, VRB Publishers Pvt. Ltd., Chennai, Second Edition, 2016
- 2 S.Sumant, Technical English – I, Vijay Nicole, Chennai, Second Edition,2018

Reference Books :

- 1 Dr.S.Sumant, Technical English I, Tata McGraw Hill, Chennai, First Edition, 2016.
- 2 Dept. of Humanities and social sciences, Anna University, Chennai, English for Engineers and Technologists, Orient Longman, First Edition, 2014.
- 3 Hory Sankar Mukerjee, Business Communication, Oxford University Press, New Delhi, First Edition, 2013.
- 4 Department of English, English for Technologists and Engineers, Orient Black Swan, Chennai, First Edition, 2016.

SEMESTER – II

18MA243

DISCRETE MATHEMATICS

(Common To CS & IT)

L	T	P	C
3	1	0	4

Prerequisite: No prerequisites are needed for enrolling into the course.**Objectives:**

- To study the concepts needed to test the logic of a program.
- To study the concepts and acquire knowledge of Discrete Mathematical Structures in the areas of Predicate Calculus.
- To acquire knowledge of various set theoretic concepts.
- To gain the knowledge in functions.
- To study the basics of Graph theory and Combinatorics and its applications in the field of Computer Science and Information Technology.

UNIT – I PROPOSITIONAL CALCULUS [12]

Propositions – Logical connectives – Compound propositions – Conditional and biconditional propositions – Truth tables– Tautologies and contradictions – Contra positive – Logical equivalences and implications – Normal forms – Principal conjunctive and disjunctive normal forms – Rules of inference Theory.

UNIT – II PREDICATE CALCULUS [12]

Predicates – Statement functions – Variables – Free and bound variables – Quantifiers – Universe of discourse – Logical equivalences and implications for quantified statements – Theory of inference – The rules of universal specification and generalization.

UNIT-III SET THEORY [12]

Cartesian product of sets – Relation on sets – Types of relations and their properties – Relational matrix and the graph of a relation –Equivalence relations – Partial ordering – Poset – Hasse diagram.

UNIT – IV FUNCTIONS [12]

Definition – Classification of functions –Composition of functions – Inverse functions – Binary and n-ary operations – Characteristic function of set – Permutation functions.

UNIT – V GRAPH THEORY AND COMBINATORICS [12]

Graphs: Graph terminology and special types of graphs – Representing graphs and graph isomorphism – connectivity – Euler and Hamilton paths – Matching. Combinatorics: Mathematical Induction – The Basics of Counting – Pigeonhole Principle – Recurrence Relations – Generating Functions.

Total (L: 45 T: 15) = 60 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Using mathematical techniques to solve logical problems.

CO2: Construct algorithms and derive complexities.

CO3: Acquire the knowledge of sets that are required for developing computational models.

CO4: Perform computational operations associated with functions.

CO5: Apply the concepts of Graph theory and Combinatorics in network algorithms.

Text Books :

- 1 Trembly J.P, and Manohar R, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw–Hill Publishing Co. Ltd, New Delhi, Forty third Re-print 2014.
- 2 Venkatraman.M.K, Sridharan.N and Chandrasekaran.N. Discrete Mathematics, The National Publishing Company, Chennai, Fourth Edition 2014.

References :

- 1 Kenneth. H. Rosen, Discrete Mathematics and its Applications, Tata McGraw–Hill Publishing Co. Ltd, New Delhi , Seventh Edition,2013
- 2 Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, Discrete Mathematical Structures, Pearson Education Pvt Ltd., New Delhi, 2013, Sixth Indian reprint.
- 3 Subramanian.N, Discrete Mathematics, SCM Publications, Fifth edition, 2018.
- 4 <https://www.youtube.com/watch?v=DmCltf8ypks>

SEMESTER – II

18PH043	ENGINEERING PHYSICS	L	T	P	C
	(Common To EC,EE,CS & IT)	3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course.

Objectives:

- To compute and analyze various problems related to Engineering Physics.
- To understand the various optoelectronic devices and its applications in the field of Engineering and also to explore the prism concepts of Quantum physics.
- To emphasize the basic concepts behind the types of advanced materials & nanotechnology.
- To explore the basic concepts behind the sensors, transducers and Laser.
- To comprehend the fundamentals of physics thereby exploring it for potential engineering applications.

UNIT – I QUANTUM PHYSICS [9]

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton effect – Theory and experimental verification – Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box, Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM).

UNIT – II OPTOELECTRONIC DEVICES [9]

Photoconductive materials – Light Dependent Resistor (LDR) – Working – Applications – Photovoltaic materials – Solar cell – Construction, working and applications – Light Emitting Diode (LED) – Principle, construction and working - Liquid crystal Display (LCD) – Types and applications.

UNIT – III ADVANCED MATERIALS AND NANOTECHNOLOGY [9]

New Engineering Materials: metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of Ni Ti alloy applications – advantages and disadvantages of SMA. Nanomaterials: Properties- Top-down process: Ball Milling method – Bottom-up process: Vapour Phase Deposition method- Carbon nano tube (CNT): Properties, preparation by electric arc method, Applications

UNIT – IV LASER TECHNOLOGY [9]

Introduction – Principle of Spontaneous emission and stimulated emission – Population inversion, pumping – Einstein's A and B coefficients (derivation). Types of lasers – Nd-YAG, CO₂ and Semiconductor lasers (homo-junction and hetero-junction) – Qualitative Industrial Applications: Lasers in welding, heat treatment and cutting – Medical applications – Holography (construction and reconstruction).

UNIT – V SENSOR TECHNOLOGY [9]

Definition – Principle of sensor & transducer – classification – types of Sensors – resolution, accuracy, sensitivity, – Inductive sensor– Linear Variable Differential Transistor (LVDT) – Thermal sensors – Thermocouple – Magnetic sensors – Strain gauge torque meters – biosensors – electronic nose –electronic tongue – medical, food and agricultural applications.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Enumerate the preambles of quantum physics and implement its concepts to tackle the cumbersome engineering problems.

CO2: Explore the concepts of optoelectronic devices for the fabrication of electronic devices.

CO3: Apply the techniques for manufacturing of advanced materials aided with Nano properties.

CO4: Categorize the types of laser and utilize it for specific application based on their desirable requisite.

CO5: Utilize the conceived concepts and techniques for sensors and transducers.

Text Books :

- 1 M.N. Avadhanulu and P.G. Kshirsagar, A text book of Engineering Physics, S. Chand and Company, New Delhi, seventh Edition, 2014.
- 2 R.K.Gaur & S.L.Gupta, Engineering Physics, Dhanpat Rai Publication, New Delhi, seventh Edition, 2014.

References :

- 1 R.K.Gaur & S.L.Gupta, Engineering Physics, Dhanpat Rai Publication, New Delhi, 2014.
- 2 A.K.Sawhney, A Course in Electrical and Electronic Measurements and Instrumentation, Dhanpatrai & Co Delhi, 2012.
- 3 www.fadooengineers.com

SEMESTER – II

18CS211

C PROGRAMMING

L	T	P	C
3	0	0	3

Prerequisite: Fundamental knowledge in problem solving techniques.**Objectives:**

- To study the basics of C primitive, operators and expressions.
- To know the arrays and string concepts.
- To be exposed to function and pointers.
- To learn the use structures and unions
- To be familiarized with files and preprocessor directives.

UNIT – I FUNDAMENTALS OF C PROGRAMMING [9]

History of C: Middle level language – Structured language – Programmer's language – Compilers Vs. Interpreters – Library and Linking – Expressions: Basic Data Types – Variables – C scopes –Type qualifiers –Storage class specifiers – Variable initialization – Constants – Operators – Expressions.

UNIT – II STATEMENTS, ARRAY AND STRING [9]

Statements: Selection Statements – Iteration statements – Jump statements – Expression statements – Block statements. Array: Single-Dimension arrays –Two-Dimensional arrays – Multidimensional arrays – String: Declaring and Initializing String Variables – String Handling Functions and Operations.

UNIT-III FUNCTIONS ANDPOINTERS [9]

Function: General form of function – Understanding the scope of a function – Function arguments – Recursion. Pointers: Pointer variables – Pointer Operators – Pointer expressions – Pointers and Arrays – Indexing pointer – Multiple indirections – Initializing pointers –Pointers to functions.

UNIT – IV STRUCTURES, UNIONS AND CONSOLE I/O [9]

Accessing Structure Members – Structure Assignments – Arrays of Structures – Passing Structures to Functions – Structure pointers – Arrays and Structures within structures. Unions – Console I/O: Reading and Writing Characters – Reading and Writing Strings – Formatted Console I/O: printf() and scanf().

UNIT – V FILES AND PREPROCESSORS [9]

Files: Streams and Files – File System Basics – fread() and fwrite() – fseek() and Random-Access I/O – fprintf() and fscanf() – Command line arguments. Preprocessor: #define, #error, #include, Conditional Compilation Directives, #undef.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Outline the syntax and semantics of the C language.

CO2: Demonstrate programs using control statements, arrays and strings.

CO3: Apply the knowledge of functions and pointers to develop solutions.

CO4: Develop simple programs using structures, unions and console I/O.

CO5: Utilize the file concepts and preprocessors to real world problems.

Text Books :

- 1 Herbert Schildt, C - The Complete Reference, Tata McGraw-Hill, New Delhi, Fourth Edition, 2013.
- 2 Ashok N.Kamathane, Computer Programming, Pearson Education, New Delhi, Second Edition, 2014.

References :

- 1 PradipDey and ManasGhosh, Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, Bengaluru, 2013.
- 2 E.Balagurusamy, Programming in ANSI C, Tata McGraw-Hill, New Delhi, Sixth Edition, 2012.
- 3 Yashavant P. Kanetkar, Let Us C, BPB Publications, New Delhi, Seventeenth Edition, 2011.
- 4 Nptel.ac.in/courses/106104128/

SEMESTER – II

18GE028

MANUFACTURING PRACTICES

(Common To CS,EC,EE & IT)

L	T	P	C
1	0	4	3

Prerequisite: No Prerequisites are needed for enrolling into the course.**Objectives:**

- To study the basic concepts of manufacturing processes.
- To hands on training of Welding and Foundry processes.
- To acquire the knowledge of various manufacturing methods.

GROUP-A**(CIVIL & MECHANICAL)****1. MANUFACTURING PROCESS :****Theory (Lectures & videos)****[10]**

1. Foundry

Mould Preparation-Metal casting-plastic moulding.

2. Carpentry

Carpentry tools-carpentry operations-carpentry joints.

3. Fitting

Fitting tools-Fitting operations - power tools.

4. Welding

Types-Arc Welding-Gas Welding-Brazing.

5. Manufacturing Methods

Metal forming-Basic Machining-CNC Machining-Metal joining- Additive manufacturing-Glass Cutting.

2. WORKSHOP PRACTICE:**Practical****[25]****LIST OF EXPERIMENTS**

1. Prepare a mould using solid pattern in Foundry.
2. Make T joint from the given wooden pieces using carpentry tools.
3. Make a Butt joint using arc welding equipment.
4. Perform simple Facing and Turning operation using Centre Lathe.
5. Make holes as per the given dimensions using drilling machine.

Total [Group-A] = 35 periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Explore the fundamental knowledge of different manufacturing processes.

CO2: Construct different welding joints and preparation of mould cavity.

CO3: Examine various machining operations.

Text Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., Elements of Workshop Technology, Vol. I and Vol. II, Media promoters and publishers private limited, Mumbai, Second Edition, 2017.
2. Gowri P. Hariharan and A. Suresh Babu, Manufacturing Technology – I Pearson Education, New Delhi, Second Edition, 2013.

Reference Books:

1. Roy A. Lindberg, Processes and Materials of Manufacture, Prentice Hall India, Delhi, 4th edition, 1998.
2. Kalpakjian S. And Steven S. Schmid, Manufacturing Engineering and Technology, Pearson Education, Delhi, 7th edition, 2014.
3. Rao P.N., Manufacturing Technology, Vol. I and Vol. II, Tata McGraw Hill, New Delhi, Third edition, 2013.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2018

SEMESTER – II

	L	T	P	C
18GE028	1	0	4	3

MANUFACTURING PRACTICES
GROUP B (ELECTRICAL & ELECTRONICS)
 (Common To EC,EE, CS&IT)

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To study different types of wiring used in house.
- To learn the procedure for calibration of Single Phase Energy meter.
- To learn components in electronics, different logic gates and the working of CRO.

(i) Theory (Lectures & videos)**[02]****Electrical and Electronics**

Electrical symbols

Electrical layout, Electrical wiring materials\

Electronics components

(ii) Practical**[08]****List of Experiments:****ELECTRICAL ENGINEERING**

1. Fluorescent lamp wiring & Stair-case wiring.
2. Calibration of Single Phase Energy meter

ELECTRONICS ENGINEERING

3. Study of Electronic components and Soldering practice.
4. Study of logic gates AND, OR, EX-OR, NOT, Half and Full Adder.
5. Study of CRO

Total (Group B) : 10 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Construct different types of wiring used in house.

CO2: Calibrate single phase Energy meter.

CO3: Organize different electronic components and logic gates.

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

GROUP	Theory Questions (Marks)	Duration (Minutes)	Practical Examinations (Marks)	Duration (Minutes)	Exam will be conducted for (Marks)
Group-A	20	30	50	90	70
Group-B	10	15	20	45	30
Total	30	45	70	135	100

SEMESTER – I / II

18MC052	ENVIRONMENTAL SCIENCE AND ENGINEERING (Mandatory, non - credit course) (Common to All Branches)	L	T	P	C
		3	0	0	0

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To impart knowledge on the principle of environmental science and engineering.
- To embellish the students to understand the usages of natural resources, ecosystem and biodiversity.
- To create awareness on pollution, value education and social issues.
- To appreciate the importance of environment by assessing its impact on the human world.
- To envision the surrounding environment, its functions and its value.

UNIT – I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES [9]

Environment – definition – scope and importance – need for public awareness; Forest resources – use – over exploitation – deforestation; Water resources – over-utilization of surface and ground water; Mineral resources – environmental effects of extracting and using mineral resources; Food resources – overgrazing – effects of modern agriculture – fertilizer-pesticide problems – water logging – salinity; Role of an individual in conservation of natural resources.

Activity: Slogan making event on conserving natural resources or plantation of trees.

UNIT – II ECOSYSTEM AND BIODIVERSITY [9]

Concept of an ecosystem – structure and function of an ecosystem – producers – consumers and decomposers – Food chain – food web – energy flow in the ecosystem – ecological pyramids – Ecological succession; Forest ecosystem and Aquatic ecosystems (Estuary and marine ecosystem); Biodiversity – introduction – definition – Values of biodiversity; Hot-spots of biodiversity; Endangered and Endemic Species of India. **Activity:** Arrange a trip to visit different varieties of plants.

UNIT – III ENVIRONMENTAL POLLUTION [9]

Pollution – introduction and different types of pollution; Causes – effects and control measures of air pollution and water pollution – water quality parameters – hardness – definition – types; Alkalinity – definition – types; BOD and COD (definition and significance); Noise pollution – solid waste management – hazardous waste – medical and e-wastes; Role of an individual in prevention of pollution. **Activity:** Drive for segregation of waste or cleanliness drive.

UNIT – IV SOCIAL ISSUES AND ENVIRONMENT [9]

Water conservation – rain water harvesting and watershed management; Environmental ethics – Issues and possible solutions; Climate change – global warming and its effects on flora and fauna – acid rain – ozone layer depletion; Disaster Management – earth quake – cyclone – tsunami – disaster preparedness – response and recovery from disaster. **Activity:** Poster making event on water management or Climate change.

UNIT – V SUSTAINABILITY AND GREEN CHEMISTRY [9]

Sustainable development – from unsustainable to sustainable development – Environmental Impact Assessment (EIA); Human rights; Value education; HIV/AIDS; Role of information technology in environment and human health; 12 Principles of Green Chemistry. **Activity:** Group discussion on Sustainability or Lecture from an expert on Green chemistry.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO 1: Prioritize the importance in conservation of resources for future generation.

CO 2: Relate the importance of ecosystem and biodiversity.

CO 3: Analyze the impact of pollution and hazardous waste in a global and societal context.

CO 4: Identify the contemporary issues that result in environmental degradation that would attempt to provide solutions to overcome the problems.

CO 5: Categorize the concept of Sustainability and Green Chemistry.

Text Book :

- 1 Dr. T. Arun Luiz, Environmental Science and Engineering, S. Chand & Company Pvt Ltd, New Delhi, First Edition, 2016.
- 2 Anubha Kaushik and C. P. Kaushik, Environmental Science and Engineering, New Age International Publishers, Chennai, Fourth Edition, 2014.

Reference Books :

- 1 G. Tyler Miller and Scott E. Spoolman, Environmental Science, Cengage Learning India Pvt Ltd, New Delhi, Fourteenth Edition, 2014.
- 2 Dr. A. Ravikrishnan, Environmental Science and Engineering, Sri Krishna Hi-tech Publishing Company Pvt Ltd, Chennai, Tenth Edition, 2014.
- 3 Raman Sivakumar, Introduction to Environmental Science and Engineering, Tata McGraw Hill, Fourth Edition, 2012.
- 4 S S. Dara, A Text book of Environmental Chemistry and pollution control, S. Chand & Company Limited, Delhi, Tenth Edition, 2005.

SEMESTER – II

18PH028	PHYSICS LABORATORY (Common To All branches)	L	T	P	C
		0	0	3	1

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To train engineering students on basis of measurements and the instruments.
- To gain the practical knowledge and hands on experiences of understanding the physics concepts applied in optics, sound and thermal physics.
- To give practical training on basic Physics experiments which are useful to engineers.
- Apply the analytical techniques and graphical analysis to the experimental data.
- To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

LIST OF EXPERIMENTS:

1. Determination of wavelength of Laser using grating and the Size of the Particles.
2. Determination of thickness of the given material by Air – wedge method.
3. Determination of velocity of Ultrasonic waves and compressibility using Ultrasonic interferometer.
4. Spectrometer grating - Determination of wavelength of mercury spectrum.
5. Determination of thermal conductivity of a bad conductor by Lee's disc method.
6. Determination of Young's modulus of the material of a uniform bar by Non – Uniform bending method.
7. Determination of Band gap energy of a semiconductor.
8. Determination of Viscosity of a given liquid by Poiseuille's method.
9. Torsional pendulum - Determination of rigidity modulus of a given wire.
10. V-I Characteristics of Solar Cell.

Total : 30 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Comprehend the different physical parameters of optics.

CO2: Perceive the production of ultrasonic waves through inverse piezoelectric effect and to determine the velocity of sound waves in the given liquid.

CO3: Explore the principle of thermal conductivity thereby to calculate the thermal conductivity of various bad conductors like cardboard, mica, etc.

CO4: Confer the experimental counterparts of materials properties such as modulus, solar cell, and energy gap.

CO5: Imbibe the concept of capillary action in fluid dynamics and to compare the coefficient of viscosity of the given liquid.

Text Book :

- 1 Faculty Members of Physics, Physics Lab manual, Department of Physics, K.S.R. College of Engineering, Namakkal, seventeenth Edition, 2018.
- 2 Dr. P. Mani, Physics Lab Manual & Observation Book, Dhanam Publications, twelfth Edition Chennai 2017.

Reference Books :

- 1 Dr. G. Senthilkumar, Physics Lab manual, VRB Publications Pvt. Ltd., Chennai, tenth Edition, 2006.
- 2 R Suresh & Dr. C. Kalyanasundaram, Physics Laboratory, Sri Krishna Hi-tech Publishing Company Pvt. Ltd., Chennai, fifth Edition, 2017.

SEMESTER – II**18CS221****C PROGRAMMING LABORATORY**

L	T	P	C
0	0	3	1

Prerequisite: Fundamental knowledge in problem solving techniques**Objectives:**

- To introduce the basic knowledge of programming fundamentals in C language.
- To impart the concepts of arrays and strings.
- To practice the top down approach.
- To learn the memory requirements and its utilization.
- To familiarized with file handling functions.

LIST OF EXPERIMENTS:

1. To count the number of digits in a given number.
2. To find the maximum and minimum of given set of numbers.
3. To find the roots of a quadratic equation.
4. To convert Binary to Decimal and vice versa.
5. To generate a Pascal triangle of numbers.
6. To find the Factorial of number using Recursion.
7. To perform Matrix multiplication using arrays.
8. To remove all duplicate elements in an arrays.
9. To accept and display five students details namely roll no, name, branch using array of structures.
10. To swap the values of two variables using pointers.
11. To check whether the given string is palindrome or not without using string handling functions.
12. To read the content of the file and copy it to another file.

Total : 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Apply the knowledge of programming using conditional and iterative statements.

CO2: Build code segments for handling homogeneous and heterogeneous data items.

CO3: Identify address of a memory location and its contents.

CO4: Utilize the knowledge of string manipulation.

CO5: Demonstrate file operations using command line arguments.

SEMESTER – III

18MA343	NUMERICAL COMPUTATIONAL TECHNIQUES	L	T	P	C
	(Common To CS & IT)	3	1	0	4

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To study the concepts and applications in solving polynomial and transcendental equations, simultaneous linear equations numerically.
- To acquire knowledge in Interpolation techniques.
- To study the concepts of numerical differentiation and integration.
- To study concepts of numerical solutions for ordinary differential equations.
- To acquire the concepts of numerical solutions for boundary values problems.

UNIT – I SOLUTIONS OF EQUATIONS AND EIGEN VALUE PROBLEMS [12]

Solutions to polynomial and transcendental equations – Newton Raphson Method – Solutions to simultaneous linear system of equations by Gauss Elimination Method – Gauss Seidel Method – Inverse of a matrix by Gauss Jordan Method–Eigen value of a matrix by power method.

UNIT – II INTERPOLATION AND APPROXIMATION [12]

Introduction – Interpolation–Equal Intervals–Newton’s Forward and Backward difference interpolation Techniques–Unequal Intervals – Newton’s divided difference method – Lagrange’s interpolation.

UNIT – III NUMERICAL DIFFERENTIATION AND INTEGRATION [12]

Numerical differentiation using Newton’s Forward and Backward difference interpolation methods (Equal Intervals)–Numerical integration by Trapezoidal rule–Simpson’s 1/3rd and 3/8th rule –Double integration using Trapezoidal and Simpson’s rules.

UNIT – IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS [12]

Solving ODE by Taylor’s Series Method–Euler’s Method for first order equation – Modified Euler’s Method for first order equation–Fourth order Runge-Kutta method for solving first order equations – Milnes Predictor and Corrector Method.

UNIT – V BOUNDARY VALUE PROBLEMS IN PARTIAL DIFFERENTIAL EQUATIONS [12]

Classification of PDE–One dimension heat equation by Crank Nicolson method–One dimensional wave equation–Two Dimensional Laplace and Poisson equations.

Total (L: 45 T:15) =60 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Solve polynomial, transcendental equations and simultaneous linear equations numerically.

CO2: Predict the unknown values by using Interpolation techniques.

CO3: Develop their skills in numerical differentiation and integration.

CO4: Finding numerical solutions for ordinary differential equations.

CO5: Apply the concepts of numerical solutions to boundary values problems.

Text Books :

- 1 Dr. B.S. Grewal, Numerical Methods in Engineering and Science, Khanna Publishers, New Delhi, twelfth Edition, 2016.
- 2 Dr. M.K. Venkataraman, Numerical Methods in Science and Engineering, National Publishing Company, Fourth Edition, 2015.

References :

- 1 Sukhendudey and Shishir Gupta, Numerical Methods, First Edition, Tata McGraw Hill Publishing Company, 2016.
- 2 Gerald.V, Applied Numerical Analysis Pearson Education, Sixth edition, 2015.
- 3 Kandasamy.P, Thilagavathy and Gunavathy.K., Numerical Methods, S. Chand Publishers, Fifth edition, 2016.
- 4 <https://www.youtube.com/watch?v=AT7Olelic8U> & <https://www.youtube.com/watch?v=QTQ8bO1F-Dg>

SEMESTER – III

18EC332	LOGICAL DESIGN OF DIGITAL COMPUTER	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To familiarize with the methods for simplifying boolean expressions and implementation of logic functions.
- To develop a design procedure for combinational circuits.
- To develop a design procedure for synchronous sequential circuits.
- To study the concepts of processor and computer design.
- To study the concepts of simple computer design.

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 and Tabulation Methods – Logic Gates.

UNIT – II COMBINATIONAL LOGIC [9]

Combinational Circuits – Analysis and Design Procedures – Adder and Subtractor– Magnitude Comparator – Code Conversions – Decoders and Encoders – Multiplexers and Demultiplexers.

UNIT – III SYNCHRONOUS SEQUENTIAL LOGIC [9]

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

UNIT –IV PROCESSOR DESIGN [9]

Processor Organization–Design of ALU: Arithmetic Circuits – Logic Circuits – Arithmetic Logic Unit –Status Register – Design of Shifter – Processor Unit.

UNIT –V SIMPLE COMPUTER DESIGN AND HDL [9]

Inter Register Transfer – Conditional Control Statements–Instruction Codes– Design of a Simple Computer – Hardware Description Language (HDL) for Combinational Circuits and Sequential Logic Circuits.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Describe the various methods used for the simplification of boolean functions.

CO2: Design and analyze the combinational circuits.

CO3: Construct and analyze the sequential circuits.

CO4: Apply the knowledge to design the processor unit.

CO5: Summarize the simple computer design and HDL.

Text Books :

- 1 M. Morris Mano, Digital Logic and Computer Design, Prentice-hall of India private limited, New Delhi, Fourteenth Edition Impression, 2012.
- 2 John F. Wakerly, Digital Design Principles and Practices, Pearson Education, US, Fourteenth Edition, 2007.

References :

- 1 Charles H. Roth Jr, Fundamentals of Logic Design, Jaico Publishing House, Fifth Edition, 2003.
- 2 G. K. Kharate, Digital Electronics, Oxford University Press, UK, 2010.
- 3 M. Morris Mano and Michael D. Ciletti, Digital Design, Pearson Education, US, Fourth Edition, 2008.
- 4 nptel.ac.in/courses/117105080/

SEMESTER – III

18CS043	PYTHON PROGRAMMING	L	T	P	C
	(Common To CS & EE)	3	0	0	3

Prerequisite: Basic knowledge of C programming.

Objectives:

- To impart the fundamental concepts of python programming.
- To know various data structures provided by python library including string, list, dictionary etc.,
- To learn to write programs using class.
- To study database system for storing and retrieving data.
- To learn the concept of Web and GUI design.

UNIT – I FUNDAMENTALS OF PYTHON [9]

Introduction to Python – Advantages of Python programming – Variables and Data types – Comments – I/O function – Operators – Selection control structures – Looping control structures –Functions: Declaration – Types of arguments – Anonymous functions: Lambda.

UNIT – II DATA STRUCTURES AND PACKAGES [9]

Strings – List – Tuples – Dictionaries – Sets – Exception Handling: Built-in Exceptions – User-defined exception– Modules and Packages.

UNIT – III OBJECT ORIENTED PROGRAMMING [9]

Object Oriented Programming basics –Inheritance and Polymorphism – Operator Overloading and Overriding – Get and Set Attribute Values – Name Mangling –Duck Typing – Relationships.

UNIT – IV FILES AND DATA BASES [9]

File I/O operations – Directory Operations – Reading and Writing in Structured Files: CSV and JSON – Data manipulation using Oracle, MySQL and SQLite.

UNIT – V GUI AND WEB [9]

UI design: Tkinter – Events – Socket Programming – Sending email – CGI: Introduction to CGI Programming, GET and POST Methods, File Upload.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Illustrate basic concepts of python programming.

CO2: Apply the necessary data structures includes list, tuple and dictionary in the required fields.

CO3: Analyze, design and implement the problems using OOPs technology.

CO4; Demonstrate the simple file operations.

CO5: Design web site using GUI.

Text Books :

- 1 Mark Lutz, Learning Python, O'Reilly Media, California, Fifth Edition, 2013
- 2 Wesley J.Chun, Core Python Programming, Pearson Education, India, Second Edition, 2017

References :

- 1 Bill Lubanovic, Introducing Python Modern Computing in Simple Packages, O'Reilly Media, California, First Edition, 2014
- 2 David Beazley, Brian K. Jones, Python Cookbook, O'Reilly Media, California, Third Edition, 2013
- 3 Mark Lutz, Python Pocket Reference, O'Reilly Media, California, Fifth Edition, 2014
- 4 www.python.org
- 5 www.diveintopython3.net
- 6 To practice: www.codecademy.com and <https://codingbat.com/python>.

SEMESTER – III

18CS312	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

Prerequisite: Basic knowledge of digital electronics

Objectives:

- To know the basic structure and implementation of fixed-point and floating point arithmetic unit.
- To get the idea of basic processing unit of computers.
- To study the concepts of pipelining.
- To gain knowledge of hierarchical memory system including cache and virtual memories.
- To learn the different ways of communication with I/O devices.

UNIT – I BASIC STRUCTURE OF COMPUTERS [9]

Functional Units – Basic Operational Concepts – Performance – Instruction Set Architecture: Instructions and Instruction sequencing – Addressing Modes – RISC and CISC – Fixed Point and Floating Point Operations.

UNIT – II BASIC PROCESSING UNIT [9]

Fundamental Concepts – Instruction Execution – Hardware Components – Instruction Fetch and Execution Steps – Hardwired Control – Micro Programmed Control – Nano Programming.

UNIT – III PIPELINING [9]

Basic Concepts – Pipeline Organization – Pipelining Issues – Data Dependencies – Memory Delays – Branch Delays – Resource Limitations – Performance Evaluation – Superscalar Operation.

UNIT – IV MEMORY SYSTEM [9]

Basic Concepts – Semiconductor RAM Memories – Read Only Memories – Memory Hierarchy – Cache Memories – Performance Considerations – Virtual Memory – Memory Management Requirements – Secondary Storage Devices.

UNIT – V I/O ORGANIZATION [9]

Accessing I/O Devices – Programmed I/O – Interrupt Initiated I/O – Direct Memory Access – Buses – Bus Arbitration – Interconnection Standards: SCSI – USB – SATA – I/O Devices and Processors.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Demonstrate the instruction sets with various addressing modes.

CO2: Outline the execution of instructions and working of hardwired control and micro programmed control.

CO3: Summarize pipelining concepts and superscalar operation.

CO4: Evaluate the performance of memory in commercial processor.

CO5: Analyze the organization of I/O devices.

Text Books :

- 1 Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, McGraw Hill, US, Sixth Edition, 2012.
- 2 M.Morris Mano, Computer System Architecture, McGraw Hill, United states, Third Edition, 2012.

References :

- 1 William Stallings, Computer Organization and Architecture - Designing for Performance, Prentice Hall, United states, Eighth Edition, 2010.
- 2 David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software interface, University of California, Berkeley, Fifth Edition, 2014.
- 3 Carpinelli, Computer Systems Organization & Architecture, Pearson Education, India, First Edition, 2001.
- 4 www.nptel.ac.in/courses/106102062.

SEMESTER – III

18MC051	CONSTITUTION OF INDIA (Common To All branches)	L	T	P	C
		3	0	0	0

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To promote harmony throughout the nation.
- To enables the supreme law and helps to maintain integrity in the society and to promote unity among the citizens to build a great nation.
- To learn about the fundamentals of our Indian constitution and their structure.
- To understand the formation of state government, union government, Indian Judiciary System and Election Commission.
- To provides a way of life. It includes fraternity, liberty, and equality as the notion of a happy life and which cannot be taken from each other.

UNIT – I INTRODUCTION [9]

Historical Background – Significance of the Constitution - Making of the constitution – Constituent Assembly of India - Role of the constituent Assembly - Salient features of the constitution - Nature of Federal system.

UNIT – II FUNDAMENTAL RIGHTS AND DUTIES [9]

Preamble – Citizenship – Fundamental Rights – Fundamental Duties and Responsibilities – Directive Principles of State Policy - Procedure for Amendment.

UNIT – III UNION GOVERNMENT [9]

Union Government – President – Vice President – Prime Minister – Powers and Duties – Cabinet – Council of Ministers – Parliament - Functions – Lok Sabha – Rajya Sabha – Role of the Speaker.

UNIT – IV STATE GOVERNMENT [9]

State Government – The Governor – Council of Ministers and Chief Minister – Powers and Functions – State legislature – Local Governance.

UNIT – V JUDICIAL SYSTEM AND ELECTION COMMISSION [9]

The Indian Judicial System – Supreme Court – High Courts of India – Judicial Review – Election Commission of India – Duties and Responsibilities – State Election Commissions – Roles and functions.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Categorize the emergence and evolution of Indian Constitution.

CO2: Comprehend the fundamental rights and duties of the Indian citizen.

CO3: Recognize and evaluate the Indian Political scenario amidst the emerging challenges.

CO4: Analyze the organs of the state in the contemporary scenario.

CO5: Asses about the Indian judiciary system and working of Election Commission.

Text Books :

- 1 P.M. Bakshi, The Constitution of India , Universal law Publishing, New Delhi, fifteenth Edition, 2018.
- 2 D.D.Basu, Introduction to the constitution india, Lexis nexis Publisher, New Delhi, second Edition, 2015.

References :

- 1 Brij Kishore sharma, Introduction to the constitution india, PHI Learning Pvt. Ltd, New Delhi, seventh Edition, 2015.
- 2 Sharma B. K, Introduction to the Constitution of India, PHI Learning Pvt. Ltd, New Delhi, sixth Edition, 2011.
- 3 M. Laxmikanth, Indian Polity, Tata McGraw Hill, New Delhi, sixth Edition, 2017.
- 4 Prof. Mahendra Pal Singh, Constitution of India, Eastern Book company, Lucknow, thirteenth Edition, 2015
- 5 P. K. Agarwal, Constitution of India, Prabhat Publishers, New Delhi, n second Edition, 2015

SEMESTER – III

18EC325	DIGITAL SYSTEMS LABORATORY	L	T	P	C
		0	0	3	1

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To know about basic logic gates and their corresponding ICs.
- To study the boolean theorems using basic logic gates.
- To Design and implementation of combinational circuits using MSI devices.
- Design and implementation of sequential circuits.
- To know how to program using hardware description language and simulate various digital circuits.

LIST OF EXPERIMENTS:

1. Verification of boolean theorems using logic gates.
2. Design and implementation of combinational circuits using logic gates for arbitrary functions, code converters.
3. Design and implementation of combinational circuits using MSI devices:
 - a) 4 - bit binary adder / subtractor
 - b) Parity generator / checker
 - c) Multiplexers and De-Multiplexers
4. Design and implementation of sequential circuits:
 - a) Shift-registers
 - b) Synchronous counter
5. Coding combinational / sequential circuits using HDL.
6. Design and implementation of a simple digital system.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Outline basic Boolean theorems and verify their functionalities.

CO2: Implement combinational circuits using logic gates.

CO3: Design combinational circuits using MSI devices.

CO4: Construct sequential circuits using HDL.

CO5: Develop HDL models for combinational and sequential circuits.

SEMESTER – III

18CS321

DATA STRUCTURES LABORATORY

L	T	P	C
0	0	3	1

Prerequisite: Basic knowledge of C programming**Objectives:**

- To develop programming skill on linear and non-linear data structures.
- To learn the various tree structures.
- To know different type of traversal in both tree and graph data structure.
- To get knowledge about various applications of linear and non-linear data structures.
- To familiarize with searching and sorting techniques.

LIST OF EXPERIMENTS:

1. Write a C program that uses functions to perform the following.
 - a) Create a singly linked list of integers.
 - b) Insert a given integer to the above linked list.
 - c) Delete a given integer from the above linked list.
 - d) Display the contents of the above list after i) insertion ii) deletion.
2. Write a C program that uses functions to perform the following.
 - a) Create a doubly linked list of integers.
 - b) Insert a given integer to the above doubly linked list.
 - c) Delete a given integer from the above doubly linked list.
 - d) Display the contents of the above list after i) insertion ii) deletion.
3. Develop and execute a program in C to accept two polynomials add and subtract them and display the resulting polynomial.
4. Write a C program that uses stack operations to convert a given infix expression into its postfix equivalent, implement the stack using an array.
5. Design and develop a program in C to simulate the working of a queue of integers using an array. Provide the following operations: i) insertion ii) deletion iii) display
6. Develop a C program to generate expression tree and display it in the following order: i) Preorder ii) Postorder iii) Inorder
7. Write a C program that uses functions to perform the following.
 - a) Create a binary search tree of integers.
 - b) Traverse the above binary search tree recursively using postorder algorithm.
 - c) Traverse the above binary search tree non recursively using inorder algorithm
8. Write a C program that uses functions to perform the following.
 - a) Create an AVL tree of integers.
 - b) Insert a given integer in the right-left of the tree.
 - c) Delete a given integer from left-right of the tree.
9. Write C programs for implementing the following graph traversal and MST algorithms: a) DFS Algorithm b) Prims Algorithm.
10. Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order: a) Bubble sort b) Merge sort

Total : 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Apply the concepts of singly and doubly linked lists.

CO2: Implement the applications of stack and queue.

CO3: Design the balanced tree concepts.

CO4: Demonstrate the sorting algorithm techniques.

CO5: Construct the minimum spanning tree.

SEMESTER – III

18CS028	PYTHON PROGRAMMING LABORATORY (Common To CS, EC& EE)	L	T	P	C
		0	0	3	1

Prerequisite: Basic knowledge of C programming.

Objectives:

- To learn the python environment script code.
- To study python programs with conditionals and looping statement.
- To use functions for python structured programs.
- To implement object oriented programming concepts in python.
- To read and write data from and to files in python.

LIST OF EXPERIMENTS:

1. Write a program to display the largest number among three numbers.
2. Write a program to check the prime number and to display the twin prime numbers.
3. Write a program to display the Fibonacci series and multiplication table by using looping constructs.
4. Write a program for converting decimal to octal, hexadecimals and vice versa by using functions.
5. Write a function to compute the GCD of two numbers.
6. Write a function to perform sorting list of numbers.
7. With the help of string array or list, display a simple calendar in python program without using the calendar module.
8. Demonstrate class and inheritance in python.
9. Create a text file using python file I/O. Read the content of the file and change them from lower to upper case characters. Write the updated content in another file and display it.
10. Write a program to demonstrate the user-defined exception handling mechanism in Python.
11. Design and implement a graphical user interface to perform any arithmetic operation.
12. Write a python program to insert and retrieve data using MySQL.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- CO1: Design simple programs using conditionals and loops.
 CO2: Write functions to solve mathematical problems.
 CO3: Demonstrate the use of files in python.
 CO4: Develop simple applications using python.
 CO5: Construct GUI applications using python programming.

SEMESTER – III

18HR351	CAREER DEVELOPMENT SKILLS I (Common To All Branches)	L	T	P	C
		0	2	0	0

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To help individuals cope with continued changes in the world of work.
- To help individuals understand their unique abilities, interests, and aptitudes.
- Ability to speak, express and interact in the society and place of study.
- Critically interpret and comprehend a given text.
- Ability to make extempore speech.

UNIT – I EFFECTIVE ENGLISH – SPOKEN ENGLISH [6]

Basic Rules of Grammar – Parts of Speech – Tenses – Verbs – Sentences construction - Vocabulary – idioms & phrases – Synonyms – Antonyms – Dialogues and conversation – Exercise(Speaking)

UNIT – II ESSENTIAL COMMUNICATION [6]

Verbal communication – Effective communication – Active Listening – Paraphrasing – Feedback, Non Verbal Communication – Body language of self and Others, Important of feelings in communication – Dealing with feelings in communication practice - Exercise

UNIT – III WRITTEN COMMUNICATION – PART 1 [6]

Usage of noun, pronoun, adjective (Comparative Forms), Verb, Adjectives, Adverb, Tenses, Articles and Preposition – Change of Voice – Change of Speech – One word Substitution – Using the same word as different parts of speech – Odd Man Out – Spelling & Punctuation (Editing)

UNIT – IV WRITTEN COMMUNICATION – PART – 2 [6]

Analogies – Sentences Formation – Sentence Completion – Sentence Correction – idioms & Phrases – Jumbled Sentences, Letter Drafting (Formal Letters) – Reading Comprehension (Level 1) – Contextual Usage – Foreign Languages Words used in English – Exercise

UNIT – V ORAL COMMUNICATION – PART – 1 [6]

Self-introduction – Situational Dialogues / Role Play (Telephonic Skills) – Oral Presentations – Prepared – Just A Minute Sessions (JAM) – Presentation Skills – Exercise

Total = 30 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Have competent knowledge on grammar with an understanding of its basic rules.

CO2: Communicate effectively and enhance interpersonal skills with renewed self – confidence.

CO3: Construct sentence in English and make correction.

CO4: Perform oral communication in any formal situation.

CO5: Develop their LSRW skills.

Text Books :

- 1 Anne Laws, Writing Skills, Orient Black Swan. Hyderabad, First Edition, 2011.
- 2 Sarah Freeman, Written Communication in English, Orient Black Swan, Hyderabad, First Edition, 2015.

Reference Books :

- 1 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2005
- 2 Raj N Bakshmi, English Grammar Practice, Orient Black Swan, Hyderabad, First Edition, 2009.
- 3 Norman Lewis. W.R., "Word Power Made Easy", Goyal Publications
- 4 Thakur K B Sinha, Enrich Your English, Vijay Nicole, Chennai, First Edition, 2005.
- 5 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2005.

SEMESTER – IV

18MA441	PROBABILITY AND DECISION MODELS (Common To CS & IT)	L	T	P	C
		3	1	0	4

Prerequisite: No prerequisites are needed for enrolling into the course.

Objectives:

- To provide the required mathematical support in real life problems and to develop probabilistic models which can be used in several areas of science and engineering.
- To acquire skills in handling situations involving two dimensional random variables.
- To gain the fundamental knowledge in the random processes.
- To study the concepts of queuing models.
- To acquire knowledge in PERT and CPM.

UNIT – I ONE DIMENSIONAL RANDOM VARIABLE [12]

Discrete and Continuous Random Variable – Moments – Moment Generating Functions and their Properties– Standard Distributions: Binomial, Poisson, Exponential and Normal Distributions.

UNIT – II TWO DIMENSIONAL RANDOM VARIABLES [12]

Joint Distributions – Marginal and Conditional Distributions – Covariance – Correlation and Regression analysis and their Properties.

UNIT – III RANDOM PROCESSES [12]

Classification – Stationary Process – Markov Process – Markov Chain – Transition Probabilities – Limiting Distributions – Poisson Process and their Properties.

UNIT – IV QUEUEING MODELS [12]

Markovian Queues – Little’s formula – Single Server Models : (M/M/1):(∞/FIFO) and (M/M/1):(N/FIFO) – Multi Server Models : (M/M/C):(∞/FIFO) and (M/M/C):(N/FIFO).

UNIT – V NETWORK MODELMENT [12]

Network Construction – Critical Path Method (CPM) – Computations of total, free and independent floats – PERT Analysis– Computation of expected time and standard deviation.

Total (L: 45 T:15) =60 Periods

Course Outcomes: On Completion of this course, the student will be able to

- CO1: Explain the importance of one dimensional random variables discrete and continuous distribution.
 CO2: Develop their skills in joint, marginal and conditional distributions and knowing the concept of covariance correlation & regression.
 CO3: Analyze the theory of stationary process, Markov Process and transition probabilities, and Poisson Process.
 CO4: Illustrate the basic concept of single server and multi-server queuing models.
 CO5: Realize the concept of PERT and CPM.

Text Books :

- 1 Kandasamy,P,Thilagavathi.K and Gunavathi.K, Probability and Queueing Theory, S. Chand Publishers, Third Edition Reprint, 2016.
- 2 Hamdy. A.Taha, Operations Research, Pearson Education, Tenth Edition, 2015.

References :

- 1 Oliver C. Ibe, Fundamentals of Applied Probability and Random Processes, Elsevier, Third Indian Reprint, 2016.
- 2 Moorthy M.B.K, Subramani.K and Santha A,Probability and Queueing Theory, Scitech Publishers, Fifth Edition, 2015.
- 3 Veerarajan.T. Probability, Statistics and Random Processes, Tata McGraw-Hill Publications, New Delhi, tenth Edition, 2015.
- 4 https://www.youtube.com/watch?v=J70dP_AECzQ

SEMESTER – IV

18CS411

SOFTWARE ENGINEERING

L	T	P	C
3	0	0	3

Prerequisite: Fundamental knowledge in problem solving techniques.**Objectives:**

- To study the different steps of the software engineering life cycle and design methods.
- To know the fundamental concepts of requirements engineering and Analysis Modeling.
- To gain the various software design methodologies.
- To know the role and contents of testing activities in different life cycle phases.
- To be initiated to develop skills for working in a group on a small software project.

UNIT – I FUNDAMENTALS OF SOFTWARE ENGINEERING [9]

The nature of Software – Software Engineering – Software Process – Software Engineering Practice –Generic Process Model– Process Assessment and Improvement – Prescriptive Process models – Specialized Process Model – Process Technology – Product and Process – Agile Development

UNIT – II REQUIREMENT ENGINEERING [9]

Requirement Engineering – Establishing Groundwork – Eliciting Requirements – Developing Use cases – Building the Requirements Model – Requirements Analysis – Requirements Modeling Strategies – Flow Oriented Modeling – Creating a Behavioral Model.

UNIT – III DESIGN CONCEPTS AND ARCHITECTURAL DESIGN [9]

Design within the context of Software Engineering – Design Process – Design Concepts – Design Model – Architectural Design: Software Architecture – Architectural Genres – Architectural Styles – Architectural Design – Architecture Mapping using Dataflow.

UNIT – IV TESTING TECHNIQUES [9]

A strategic Approach for Software Testing – Test Strategies for Conventional Software – Validation Testing – System Testing – Art of Debugging – Testing Conventional Applications : Software testing Fundamentals – Internal and External Views Testing – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing – Model Based Testing – Testing for Specialized Environments – Architectures and Applications – Patterns for Software Testing.

UNIT – V PROJECT AND QUALITY MANAGEMENT [9]

Quality Concepts: Software Quality – The Software Quality Dilemma – Achieving Software Quality – Formal Technical Review – Software Quality Assurance – Process and Project Metrics – Emerging Trends in Software Engineering.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Outline the concepts behind SDLC software engineering practices.

CO2: Identify the customer requirement and determine the appropriate life cycle model.

CO3: Apply the design methods for software development.

CO4: Evaluate the various testing techniques.

CO5: Ensure the quality of software product.

Text Books :

- 1 Roger S. Pressman, Software Engineering: A Practitioner Approach, McGraw-Hill, New Delhi, Fifth Edition, 2014.
- 2 Ian Sommerville, Software Engineering, Pearson Education, India, Ninth Edition, 2013.

References :

- 1 David Gustafson, Software Engineering, Schaum's Outlines, Tata McGraw-Hill, New Delhi, Third Edition, 2004.
- 2 Shari Lawrence Pfleeger, Joanne M. Atlee, Software Engineering Theory and Practice, Pearson Education, New Delhi, Fourth Edition, 2009.
- 3 Richard Schmidt, Software Engineering: Architecture-driven Software Development, Elsevier Science, Netherlands, Fourth Edition, 2013.
- 4 <http://nptel.ac.in/courses/106101061/1>

SEMESTER – IV**JAVA PROGRAMMING**

18CS002

L	T	P	C
3	0	0	3

Prerequisite: Fundamentals of C programming concepts**Objectives:**

- To know the fundamentals of Java programming language.
- To equip students with comprehensive knowledge on core concepts of java like overloading.
- To gain knowledge in interfaces and exception handling.
- To get idea on threads and multithreaded programming.
- To study the I/O operations and string manipulations and concepts of database connectivity.

UNIT – I JAVA FUNDAMENTALS [9]

The Java Buzzwords – Data Types – Variables – Arrays – Operators – Control Statements – Class Fundamentals – Declaring Objects – Methods – Method Overloading – Objects as Parameters – Returning Objects – Recursion –this keyword – Garbage Collection.

UNIT – II CONSTRUCTORS AND INHERITANCE [9]

Constructors – Constructor Overloading–Access Control – static – final – Nested and Inner Class – Inheritance : Basics –Super – Multilevel – Hierarchical – Method Overriding – Abstract class –Final with Inheritance.

UNIT–III PACKAGES, INTERFACES AND EXCEPTION HANDLING [9]

Packages – Access Protection – Importing Packages – Interfaces – Default Interface Methods – Static Methods in Interface – Exception Handling Fundamentals – Types – Uncaught Exceptions –Try and Catch – Multiple Catch – Nested Try – Throw – Throws – Finally –Array List-Wrapper Classes.

UNIT – IV MULTITHREADED PROGRAMMING AND I/O OPERATIONS [9]

Java Thread Model – Main Thread – Creating a Thread – Creating Multiple Threads – isAlive and join Methods – Thread Priorities - Synchronization – Interthread Communication – Suspending, Resuming, and Stopping Threads – Obtaining a Thread's State – Using Multithreading – I/O Basics – Reading Console Input – Writing Console Output – The PrintWriter Class – Reading and Writing Files – Automatically Closing a File – Scanner class.

UNIT – V STRING AND DATABASE CONNECTIVITY [9]

The String Constructors – String Length – Character Extraction – String Comparison – Searching Strings – Modifying a String – Data Conversion using valueOf method – Methods in StringBuffer – JDBC Product Components – JDBC API – JDBC Driver Manager – JDBC Test Suite – JDBC-ODBC Bridge – JDBC Architecture – Establishing Connection – Handling SQL Exceptions.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Apply java programming fundamentals to solve real world problem.

CO2: Implement the concept of overloading and inheritances.

CO3: Examine important features of java like packages, interfaces and exception handling.

CO4: Illustrate the features of multithreaded programming and I/O operations.

CO5: Demonstrate the concepts of string manipulations and database connectivity.

Text Books :

- 1 Herbert Schildt, Java - The Complete Reference, Oracle Press, McGraw-Hill Education, New Delhi, Tenth Edition, 2018.
- 2 Cay S. Horstmann, Core Java Volume 1 - Fundamentals, Prentice Hall, US, Tenth Edition, 2015.

References :

- 1 Herbert Schildt, Java - A Beginner Guide, Oracle Press, McGraw-Hill Education, New Delhi, Sixth Edition, 2014.
- 2 Joshua Bloch, Effective Java: A Programming Language Guide, Addison-Wesley Professional, US, Third Edition, 2018.
- 3 Allen B. Downey and Chris Mayfield, Think Java: How to Think Like a Computer Scientist, O'Reilly, California, First Edition, 2016.
- 4 https://onlinecourses.nptel.ac.in/noc19_cs07/preview

SEMESTER – IV

18CS003

OPERATING SYSTEMS

L	T	P	C
3	0	0	3

Prerequisite: Basic knowledge of computer architecture.**Objectives:**

- To gain the knowledge about the basics of operating systems concepts.
- To know the various process, threads and CPU scheduling operations.
- To solve deadlocks and memory management problems.
- To study the virtual memory concepts and file sharing interface.
- To learn the file systems, disk structure and I/O Systems concepts.

UNIT – I OPERATING SYSTEMS CONCEPTS [9]

Introduction to Operating Systems – Computer System Architecture: Single Processor Systems – Multiprocessor Systems – Clustered Systems – Operating System Structure – Operating System Services – System Calls: Types of System Calls – System Programs – Process: Process Concept – Process Scheduling – Operation on Processes – Cooperating Process – Inter Process Communication.

UNIT –II THREADS AND CPU SCHEDULING [9]

Threads: Overview – Multithreading Models – Thread Issues – CPU Scheduling: Basic Concepts – Scheduling Criteria – Scheduling Algorithms: FCFS – SJF – Priority – Round Robin – Process Synchronization: Critical Section Problem – Peterson's Solution – Synchronization Hardware – Semaphores – Classic Problems of Synchronization.

UNIT – III DEADLOCK AND MEMORY MANAGEMENT [9]

Deadlock : System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock – Memory Management: Background –Swapping – Contiguous memory Allocation – Segmentation – Paging – Structure of the Page Table.

UNIT –IV VIRTUAL MEMORY AND FILE SHARING INTERFACE [9]

Virtual Memory: Demand Paging – Copy-on-Write – Page Replacement – Allocation of Frames – Thrashing – File Concepts: Access Methods – Directory Structure – File System Mounting – File Sharing – Protection.

UNIT –V FILE SYSTEM STRUCTURE AND STORAGE STRUCTURE [9]

File System Structure – File System Implementation: Directory Implementation – Allocation Methods – Free space Management – Mass Storage Structure: Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management – RAID structure – I/O Systems: I/O Hardware – Kernel I/O Subsystem.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Identify the components and their functionalities in the operating system.

CO2: Determine the efficiency of CPU scheduling algorithms.

CO3: Examine the performance of various memory management techniques.

CO4: Summarize the virtual memory concepts and file access methods.

CO5: Evaluate the performance of disk management and file system.

Text Books :

- 1 Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons, United States, Ninth Edition, 2013.
- 2 Andrew S. Tanenbaum, Modern Operating Systems, Prentice Hall, United States, Third Edition, 2007.

References :

- 1 D. M. Dhamdhere, Operating Systems, Tata McGraw-Hill Education India, Second Edition, 2006.
- 2 Paul J. Deitel and David R. Choffnes, Operating Systems, Prentice Hall, United States, Third Edition, 2003.
- 3 Richard Fox, Linux with Operating System Concepts, Taylor & Francis Limited, United States, Second Edition, 2014.
- 4 <http://nptel.ac.in/courses/106108101>.

SEMESTER – IV

18CS412	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	1	0	4

Prerequisite: Basic knowledge in data structures

Objectives:

- To learn various algorithm design techniques for real world problems.
- To analyze the efficiency of various algorithm design techniques.
- To know the concept dynamic programming and greedy techniques.
- To study various backtracking methods.
- To gain knowledge about P and NP problems.

UNIT-I DIVIDE AND CONQUER TECHNIQUE [12]

Algorithm Analysis Framework – Asymptotic Notations and Basic Efficiency Classes – Analysis of Non-recursive and Recursive Algorithms – Divide and Conquer: Merge Sort – Quick Sort – Strassen's Matrix Multiplication.

UNIT-II DECREASE AND CONQUER TECHNIQUE [12]

Depth First Search and Breadth First Search – Decrease and Conquer: Insertion sort – Binary Search – Selection Problem – Transform and Conquer: Presorting – Balanced Search Trees: AVL tree – 2-3 Tree.

UNIT – III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE [12]

Dynamic Programming: Knapsack Problem – Optimal Binary Search Trees – Warshall's Algorithm – Floyd's Algorithm – Greedy Technique: Prim's Algorithm – Kruskal's Algorithm – Dijkstra's Algorithm – Huffman Trees and Codes.

UNIT – IV BACKTRACKING, BRANCH AND BOUND TECHNIQUES [12]

Backtracking: 8-Queens – Hamiltonian Circuit – Sum of Subset – Graph Coloring – Branch and Bound: Assignment Problem – Knapsack Problem – Traveling Salesman Problem.

UNIT-V NP PROBLEMS AND APPROXIMATION ALGORITHMS [12]

P and NP Problems – NP Complete Problems – Approximation Algorithms for NP Hard Problems – Travelling Salesman Problem: Nearest Neighbor Algorithm – Multifragment Heuristic Algorithm – Knapsack Problem.

Total (L: 45 T:15) =60 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Analyze the efficiency of algorithms.

CO2: Design and analyze problems using decrease, transform and conquer techniques.

CO3: Identify dynamic programming and greedy techniques.

CO4: Evaluate various backtracking, branch and bound techniques.

CO5: Summarize the knowledge about P and NP Problems.

Text Books :

- 1 AnanyLevitin, Introduction to the Design and Analysis of Algorithms, Addition-Wesley Professional, USA, Third Edition, 2014.
- 2 A.V.Aho, J.E. Hopcroft and J.D.Ullman, The Design and Analysis of Computer Algorithms, Pearson Education, India, Second Edition, 2009.

References :

- 1 Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, Introduction to Algorithms, Prentice Hall, India, Second Edition, 2007.
- 2 Sara Baase and Allen Van Gelder, Computer Algorithms - Introduction to Design and Analysis, Pearson Education, India, Third Edition, 2010.
- 3 Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, US, Second Edition, 2008.
- 4 <http://www.nptelvideos.in/2012/11/design-analysis-of-algorithms.html>

SEMESTER – IV

18EC436	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	C
		3	0	0	3

Prerequisite: Basic knowledge in computer architectures.

Objectives:

- To know the basic concepts and programming of 8085 microprocessors.
- To gain knowledge about the basic concepts and programming of 8086 microprocessors.
- To learn about different multiprocessor configuration.
- To study the operations of peripheral interfacing.
- To know 8051 microcontroller architecture and programming.

UNIT – I 8085 MICROPROCESSOR [9]

Introduction – Address, data and control bus – 8085: Hardware architecture, pin diagram, addressing modes, instruction set, assembly language programming.

UNIT – II 8086 MICROPROCESSOR [9]

8086: Hardware architecture, Pin diagram, Addressing modes, Instruction set, Interrupts and Interrupt service routines, Assembly language programming – Assembler directives – Procedures – Macros – BIOS DOS function calls.

UNIT – III MULTIPROCESSOR CONFIGURATIONS [9]

Coprocessor configuration – Closely coupled configuration – Loosely coupled configuration – Numeric data processor (8087) architecture and data types – I/O processor architecture (8089).

UNIT – IV PERIPHERAL INTERFACING [9]

Memory and I/O interfacing – Parallel communication interface (8255) – Serial communication interface (8251) – Programmable interval timer (8253) – Keyboard / display controller (8279) – Interrupt controller (8259) – DMA controller (8237) – ADC and DAC.

UNIT – V 8051 MICROCONTROLLER [9]

8051: Hardware architecture, special function register, I/O ports, external memory, addressing modes, instruction set, timers and counters, serial data I/O, interrupts – Interfacing: Keyboard, LCD, stepper motor.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Describe the architecture of 8085 microprocessors and develop 8085 programming skills in assembly language.

CO2: Demonstrate the architecture of 8086 microprocessors and develop 8086 programming skills in assembly language.

CO3: Illustrate the concepts of multiprocessors.

CO4: Interpret different external peripheral devices with micro processors

CO5: Develop different interfacing applications using microcontrollers and peripherals.

Text Books :

- 1 Ramesh S Gaonkar, Microprocessor architecture programming and application with 8085, Penram International Publishing, Mumbai, Sixth Edition, 2013.
- 2 A K Ray, K M Bhurchandi, Advanced Microprocessors and Peripherals, TMH Publications, New Delhi, Third Edition, 2012.

References :

- 1 Kenneth J. Ayala, The 8086 Microprocessor: programming & interfacing the PC, Delmar Publishers, USA, First Edition, 2007.
- 2 Douglas V Hall, Microprocessors and interfacing, Programming and Hardware, Tata McGraw Hill Publications, New Delhi, Third Edition, 2012.
- 3 Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay, The 8051 Microcontroller and Embedded systems, Pearson Education, London, Second Edition, 2011.
- 4 NPTEL Course Link: <http://nptel.ac.in/courses/108107029/>, <http://nptel.ac.in/courses/106108100/>

SEMESTER – IV

18CS421	JAVA PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	1

Prerequisite: Basic knowledge of object oriented concepts

Objectives:

- To equip students with comprehensive knowledge on Java programming by hands-on experiment.
- To gain practical knowledge on Java in order to meet the industrial standards.
- To identify, analyze and apply the features of java to find optimal solution for the real world problem.
- To gain idea on string operations.
- To know more about database connectivity.

List of Experiments:

1. Write a program to get n numbers in an array. Display the elements in ascending and descending order.
2. Write a program for student management system. Initialize the register number of the student through constructors.
3. Write a program for the following using inheritances
 - a) Finding area of sphere using single inheritance
 - b) Calculating performance of the students using multi-level inheritance
 - c) Students information manipulation using hierarchical inheritance
4. Write a program for calculating area of rectangle and triangle using interface
5. Write a program for employee management using packages.
6. Write a program for calculator operations and handle the exceptions
7. Write a program for manipulating Strings.
8. Write a program using the concept of command line arguments
9. Write a program for threads (extending Threads class and implementing Runnable interface)
10. Write a program to read and display the student details from the database using database connectivity

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Apply the features of java to find optimal solution for the real world problems.

CO2: Practically implement the concept of arrays, constructors, inheritance and overloading.

CO3: Recall interface, abstract class and packages concepts.

CO4: Outline the features of exception handling, string handling, threads and command line arguments practically.

CO5: Examine the concept of database connectivity and to implement.

SEMESTER – IV

18CS422	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	3	1

Prerequisite: Basic knowledge about the C Programming.

Objectives:

- To learn shell programming and the use of filters in the UNIX environment.
- To study system calls using C language.
- To expose process creation and inter process communication.
- To be familiar with implementation of CPU scheduling algorithms, page replacement algorithms and deadlock avoidance.
- To gain the knowledge of File allocation strategies.

List of Experiments:

1. Implementations of basic Linux commands and shell programming.
2. Write programs using the following system calls of Linux operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir, open, read and write.
3. Write a C program to simulate ls, grep and cp.
4. Write a C program to simulate shared memory and IPC
5. Write a C program to implement CPU scheduling algorithms.
6. Write a C program to implement producer consumer problem using semaphores.
7. Write a C program to implement banker's algorithm
8. Write a C program to implement page replacement algorithms
9. Write a C program to implement memory management schemes (first fit, worst fit and best fit)
10. Write a C program to implement File allocation strategies(Sequential, Indexed and Linked list)

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Implement the commands in Linux OS.

CO2: Evaluate the performance of various CPU scheduling algorithms.

CO3: Create process and Implement IPC, deadlock avoidance and detection Algorithms.

CO4: Analyze the performance of the various page replacement Algorithms.

CO5: Examine file organization and file allocation strategies.

SEMESTER – IV

18EC425	MICROPROCESSORS AND MICROCONTROLLERSLABORATORY	L 0	T 0	P 3	C 1
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Prerequisite: Basic knowledge in computer architectures.

Objectives:

- To develop assembly language programming in 8085 microprocessor.
- To give hands on experience in 8086 assembly language programming.
- To develop assembly language programming in 8051 microcontrollers.
- To give hands on experience in peripheral interfacing with 8085, 8086 and 8051.
- To enhance their knowledge on the latest trends and technologies.

List of Experiments:

1. 8085 Microprocessor
 - (i) Arithmetic operations
 - (ii) Array processing
 - (iii) Code conversion
2. 8086 Microprocessor
 - (i) Arithmetic operations
 - (ii) Sorting and searching
 - (iii) String manipulation
 - (iv) BIOS/DOS Calls: Keyboard control, Display control, File Manipulation.
3. 8051 Microcontroller
 - (i) Arithmetic operations
 - (ii) Logical and bit manipulation
4. Peripheral interfacing using 8085/8086/8051
 - (i) Programmable peripheral interface (8255)
 - (ii) Keyboard and display controller (8279)
 - (iii) Stepper motor
5. Mini project

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- CO1: Apply the programming skill to write assembly language programming for 8085 microprocessors.
 CO2: Apply the programming knowledge to write assembly language programs for 8086 microprocessors.
 CO3: Develop the concepts of microcontroller programming.
 CO4: Build the interfacing concepts to program with peripherals.
 CO5: Design and develop applications based on processor and controllers.

SEMESTER – IV

18HR432	CAREER DEVELOPMENT SKILLS – II	L	T	P	C
		0	2	0	0

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To make students strong on verbal and logical reasoning.
- To strengthen students on number system.
- To develop students on logarithms.
- Critically interpret and comprehend a given text.
- To strengthen students on quick math's.

UNIT – I VERBAL AND LOGICAL REASONING – PART 1 [6]

Alphabet Test – Synonyms & Antonyms – Idioms & Phrases – Analogies - Theme Detection – Odd Words – Statement & Conclusions – Family Tree – Blood Relations – Coding & Decoding – Syllogism – Odd Man Out.

UNIT – II QUANTITATIVE APTITUDE – PART 1 [6]

Numbers: Number system - Squaring of Numbers – Square Roots – Cube Roots – Divisibility – HCF, LCM – Decimals.

UNIT – III QUANTITATIVE APTITUDE – PART 2 [6]

Percentages – Averages – Ratio & Proportion – Mixtures and Allegations – logarithms.

UNIT – IV READING COMPREHENSION&WRITTEN COMMUNICATION –PART 3 [6]

READING SKILLS: Importance of Reading – Definition of Reading – Levels of Reading – Requirements of Reading – Types of Reading – Techniques of Reading – Academic Reading Tips.

What is Writing – Sentence – Phrase – Kinds of Sentences – Parts of Sentence – Parts of Speech – Articles – Academic Essay Writing – Precise Writing – Report Abstracts – Letter Writing – Memo – Cover Letter – Resume Writing.

UNIT – V QUANTITATIVE APTITUDE – PART 3 [6]

Profit and Loss – Simple Interest & Compound Interest – Problem on Ages – Calendar

Total = 30 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Speak and write appropriately by understanding and applying the basic grammatical rules.

CO2: Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

CO3: Enhance their communication skills and instructiveness.

CO4: Enhance interpersonal relationship building skills with self – confidence.

CO5: Critically evaluate various real life situations by resorting to analysis of key issues and factors.

Text Books:

- 1 Anne Laws, Writing Skills, Orient Black Swan, Hyderabad, 2011.
- 2 Abhijit Guha, Quantitative Aptitude, TMH, Third Edition, 2009.

Reference Books:

- 1 Agarwal. R.S, A.Modern Approach to Verbal and Non- verbal Reasoning, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
- 2 Sarah Freeman, Written Communication in English, Orient Black Swan, Hyderabad, First Edition, 2015.
- 3 M.B. Lal & Goswami, Objective Instant Arithmetic, Upkar Publications, First Edition, 2010.
- 4 Norman Lewis, Word Power Made Easy, W.R.Goyal Publications, Reprint, 2012.
- 5 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2005.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – V

R 2018

18CS511

THEORY OF COMPUTATION

L	T	P	C
3	1	0	4

Prerequisite: Basic concepts of discrete mathematics.**Objectives:**

- To know about formal languages and automata theory and design techniques for construction of different types of finite automata.
- To gain the knowledge about Regular Expressions and properties of regular expression.
- To study construction of parse tree and how the grammars are simplified.
- To gain the knowledge about Pushdown Automata and its construction.
- To get the knowledge about how to construct the Turing machine and how the problems are classified.

UNIT – I INTRODUCTION TO AUTOMATA THEORY [12]

Mathematical preliminaries – Introduction to Finite Automata (FA) – Central Concepts of Automata Theory – Deterministic Finite Automata (DFA) – Non Deterministic Finite Automata (NFA) – Equivalence of NFA and DFA – Finite Automata with Epsilon Transition – Applications of Finite Automata.

UNIT – II REGULAR EXPRESSIONS AND LANGUAGES [12]

Regular Expressions: Definitions – Equivalence of Regular Expression and Finite Automata: Thomson Method – Basic Method (R_i^k method) – State Elimination Method – Arden's Theorem. Pumping Lemma and its applications – Closure Properties of Regular Language – Equivalence and Minimization of Automata (DFA).

UNIT – III CONTEXT-FREE GRAMMAR AND LANGUAGES [12]

Context-Free Grammar (CFG): Definition – Derivations – Parse Trees – Ambiguity – Simplification of Grammars – Conversion to Normal Forms: Chomsky – Greibach. Pumping Lemma for Context – Free Languages – Applications of Pumping Lemma – Closure Properties of CFL.

UNIT – IV PUSHDOWN AUTOMATA [12]

Pushdown Automata (PDA): Introduction – Definition – Instantaneous Description of Pushdown Automata – Design Examples – The Languages of Pushdown Automata – The Language acceptance by Final State and Empty Stack .Equivalence of PDA and CFG: Construction of PDA from CFG – Construction of CFG from PDA – Deterministic Pushdown Automata.

UNIT-V TURING MACHINE AND UNDECIDABILITY [12]

Definition – Notation – Instantaneous Description and Languages – Design of TM – Programming Techniques for TM: Storage in State – Multiple Tracks – Subroutines. Variants of TM: Multitape – Nondeterministic – Enumerators. Introduction to Undecidable Problems – P and NP Problems – Post Correspondence Problem – Halting Problem.

Total = 60 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Compare and analyze various Finite Automata and convert NFA to DFA.

CO2: Construct finite automata to regular expression and identify the properties of regular language.

CO3: Apply Context-Free Grammars and Languages.

CO4: Construct Pushdown Automata and convert Pushdown Automata to Context-Free Grammar.

CO5: Design Turing machines for various problems and Analyze the Undecidability of Languages.

Text Books :

- 1 John E. Hopcroft, Rajeev Motwani and Jeffrey D.Ullman, Introduction to Automata Theory, Languages and Computation, Pearson Education, India, Third Edition, 2014.
- 2 Michael Sipser, Introduction to the Theory of Computation, Thompson Course Technology, Boston, MA and Cengage Learning India Pvt. Ltd, New Delhi, Third Edition, 2014.

References :

- 1 John C Martin, Introduction to Languages and Automata Theory, Tata McGraw-Hill, India, Third Edition, 2007.
- 2 K.L.PMisra and N.Chandrasekharan, Theory of Computer Science, Automata, Languages and Computation, Prentice Hall, US, Third Edition, 2010.
- 3 https://www.youtube.com/watch?v=_9fuEO5khrI

SEMESTER – V

18CS512	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

Prerequisite: Basic Knowledge about data structures and computer systems.

Objectives:

- To expose the students to the fundamentals of database management systems and relational model.
- To train the students with ER diagrams and SQL.
- To make the students to study SQL Fundamentals and Intermediate SQL.
- To make the students to understand the fundamentals of transaction processing and query processing.
- To familiarize the students with different types of databases.

UNIT – I BASIC CONCEPTS AND RELATIONAL MODEL [9]

File Systems Organization Vs Database System – Purpose of Database System – Views of Data – Database Architecture – Data Models – Entity – Relationship model (E-R model) – Codd's Rule – Introduction to Relational Model – Keys – Relational Algebra – Fundamental and Additional Relational Algebra.

UNIT – II SQL FUNDAMENTALS AND INTERMEDIATE SQL [9]

Database Languages – SQL Data Definition – Basic Structure of SQL Queries – Additional Basic Operations – Set operations – Null values – Aggregate functions – Nested Sub Queries – Modification of the Database – Join Expressions – Views – Transactions – Integrity Constraints – Authorization.

UNIT – III ADVANCED SQL AND QUERY OPTIMIZATION [9]

Accessing SQL from Programming Language – Functions – Procedures – Triggers – Cursors – Recursive Queries – Advanced Aggregation Features – Embedded Structured Query Language – Query Optimization – Cost Estimation – Structure of Query Evaluation Plan.

UNIT – IV RELATIONAL DATABASE DESIGN , INDEXING AND HASHING [9]

Functional Dependencies – Non-loss Decomposition – First, Second and Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form – Ordered Indices – B+ Tree Index Files – Static and Dynamic Hashing.

UNIT-V TRANSACTION PROCESSING AND RECENT TRENDS [9]

Transaction Concepts – ACID Properties – Concurrency Control – Serializability – Locking Protocols – Two Phase Locking – Deadlock – Database Recovery System – Mobile Databases – Spatial Databases.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Use the relational algebra and ER diagrams.

CO2: Apply Structured query language to create and manipulate a relational database.

CO3: Create functions, triggers, cursors and recursive queries.

CO4: Demonstrate the purpose of normalization and indexing techniques.

CO5: Identify recovery mechanisms and different types of databases for real time applications.

Text Books :

- 1 Abraham Silberschatz, Henry F. Korth and S. Sudharshan, Database System Concepts, Tata McGraw Hill, India, Sixth Edition, 2015.
- 2 S.K.Singh, Database Systems Concepts, Design and Applications, Pearson Education, India, Second Edition, 2011.

References :

- 1 Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, India, Sixth Edition, 2010.
- 2 C.J.Date, A.Kannan and S.Swamynathan, An Introduction to Database Systems, Pearson Education, India, Eighth Edition, 2006.
- 3 Raghu Ramakrishnan, Database Management Systems, Tata McGraw Hill, India, Fourth Edition, 2010.
- 4 <http://freevideolectures.com/course/2668/database-management-system#>

SEMESTER – V

18CS513

WEB PROGRAMMING

L	T	P	C
3	0	0	3

Prerequisite: Basic knowledge about internet concepts.**Objectives:**

- To know the technologies in internet.
- To learn the basic web design ideas.
- To get the knowledge of web application.
- To familiarize various concepts of application development using JSP.
- To facilitate students to connect databases using JDBC.

UNIT – I BASIC CONCEPTS OF WEB PROGRAMMING [9]

Internet and History – Protocol –TCP and IP– DNS – URL – HTTP – Websites – Web Application – Servers – Browsers – Website – Code editors – Version Control – Git – Front end – Back end.

UNIT – II USER INTERFACE [9]

HTML: Basics – Elements – Semantic – Attributes – Headings – Paragraph – Styles – Formatting – Quotations – Computer Code – Comments and Colours – CSS – Links – Images – Lists – Blocks – Classes – Layout – Responsive – iframes. CSS: Introduction – Syntax – Colours – Backgrounds – Borders – Padding – Height/Width – Gradients – Shadows –Text – Fonts – 2D Transforms – 3D Transforms – Links – Lists – Tables – Box Model. Bootstrap: Introduction – Grids –Themes – Bootstrap CSS – Bootstrap JS.

UNIT – III CLIENT SIDE SCRIPTING [9]

Javascript: Scope – Events – Strings – Numbers – Math – Arrays – Boolean – Comparisons – Conditions – Switch – Loops – Type Conversion – RegExp – Errors – Debugging – Hoisting – Strict Mode – Functions – Objects – Forms – HTML DOM – BOM. JQuery: Introduction – Syntax – Selectors – Events – Effects – HTML – Traversing – AJAX & Misc.

UNIT –IV SERVER SIDE SCRIPTING [9]

NODE: Getting started – Node Core – Modules – File System – Debugger – Automation and Deployment. Servlet: Servlet API – Interface – Classes – Life cycle – ServletRequest – Request dispatcher – Send Redirect – ServletConfig – ServletContext – Attribute – Session tracking. JSP: Introduction – Life cycle of JSP – Scriptlet – Expression – Declaration – Implicit Objects – Directive Elements – JSP Exceptions – Action Elements.

UNIT-V WEB SERVICES AND DATABASE [9]

AJAX: Introduction – XMLHttpRequest – Request – Response – AJAX XML File. JSON: Introduction –Syntax – JSON vs XML – Data types – Objects – Arrays. JDBC: Introduction – Drivers – DriverManager – Connection – Statement – ResultSet. MongoDB: Introduction – Advantage – Database – Collection – Data Types.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Recognize the technologies around the internet.

CO2: Describe the idea of web designing at user interface.

CO3: Acquire the knowledge of data processing on client and server side.

CO4: Create the web oriented responses at server side.

CO5: Design and handle the online database and services.

Text Books :

- 1 Randy Connolly and Ricardo Hoar, Fundamentals of web development, Pearson Education, New Delhi, First Edition 2016.
- 2 Paul Deitel, Harvey Deitel and Abbey Deitel Internet & World Wide Web - How to program, Pearson Education, New Delhi, Fifth Edition, 2012.

References :

- 1 Chris Bates Web Programming, Building Internet Applications, John Wiley & Sons Ltd, USA, Second Edition 2007.
- 2 John Dean, Web Programming With HTML5, CSS and JavaScript, Jones and Bartlett Publishers, Inc, United States, Third Edition, 2018.
- 3 Jon Duckett, Beginning Web Programming with HTML, XHTML, and CSS, Wiley Publishing Inc, India, Second Edition, 2008.
- 4 www.tutorialspoint.com

SEMESTER – V

18CS514

COMPUTER NETWORKS

L	T	P	C
3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course**Objectives:**

- To realize the basic concepts and functions of Networking.
- To acquire the knowledge of various functionalities of data link layer.
- To enumerate the addressing scheme and routing algorithm in network layer.
- To study, analyze and implement the design of a network using TCP and UDP.
- To be familiar with the protocols of application layer and how they can assist in various network applications.

UNIT – I DATA COMMUNICATIONS [9]

Data Communications – Networks – Topology – Network Types – Protocol Layering – TCP/IP Suite – OSI Model – Multiplexing (FDM, WDM, TDM) – Guided Media – Unguided Media – Connecting Devices.

UNIT – II DATA LINK LAYER [9]

Introduction – Link Layer Addressing – Error Detection and Correction – Block Coding – Cyclic Codes – Checksum – Hamming Code – Data Link Control (DLC) – DLC Services – Data Link Layer Protocols – Medium Access Control – Wired LANs: Ethernet – Standard Ethernet – Fast Ethernet – Gigabit Ethernet – Wireless LAN – IEEE 802.11.

UNIT – III NETWORK LAYER [9]

Network Layer Services – Packet Switching – Internet Protocol (IP) – Forwarding of IP Packets – IPv4 Addressing – IPv6 Addressing – Mobile IP – Link State Routing – Distance Vector Routing – RIP – OSPF – BGP – Multicast – IGMP.

UNIT – IV TRANSPORT LAYER [9]

Introduction – Transport layer Protocol: Stop and Wait Protocol – Go Back N Protocol – Selective Repeat Protocol – Piggybacking – User Datagram Protocol: Datagram – Services – Applications – Transmission Control Protocol: Services – Features – Segment – Connections – Congestion control – Timers.

UNIT – V APPLICATION LAYER AND NETWORK MANAGEMENT [9]

DNS – FTP – E-MAIL (SMTP, MIME, POP3, IMAP, Web Mail) – TELNET – SSH – WWW and HTTP – SNMP.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Demonstrate the key concepts and functions of physical layer.

CO2: Analyze the various flow and error control techniques and identify the best method for data transmission.

CO3: Design the network layer packet delivery using appropriate routing algorithms.

CO4: Apply transport layer services using TCP or UDP protocols.

CO5: Identify the suitable network services for the given network applications.

Text Books :

- 1 Behrouz A. Forouzan, Data Communications and Networking, TATA McGraw Hill Education, USA, Fifth Edition, 2013.
- 2 William Stallings, Data and Computer Communications, Pearson Education, New Delhi, Eighth Edition, 2012.

References :

- 1 Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, Morgan Kaufmann Publishers Inc., United States, Fifth Edition, 2012.
- 2 Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Prentice Hall, Delhi, Fifth Edition, 2011.
- 3 James F. Kurose, Keith W. Ross, Computer Networking, Pearson Education, Delhi, sixth Edition, 2013.
- 4 <http://nptel.ac.in/syllabus/106105081/>

SEMESTER – V

18HS003	ENTREPRENEURSHIP DEVELOPMENT (Common To CS & ME)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To understand the entrepreneurial competence among the students.
- To understand about various support from Government and other non-governmental organization while starting an enterprise.
- To gather the practical training about preparation of business plan.
- To understand the different Legal procedure to start up for business for small enterprises.
- To understand the management of small Enterprises.

UNIT – I INTRODUCTION [9]

Entrepreneur – Entrepreneurship, Nature, scope and types of Entrepreneurship, Entrepreneur Personality Characteristics, Women Entrepreneurs – Family Business.

UNIT – II ENTREPRENEURIAL ENVIRONMENT [9]

Business Environment – Role of family and Society – Institutional Support for small entrepreneurs – Central and State Government Industrial Policies and Regulations – Entrepreneurship Development Program

UNIT – III BUSINESS PLAN PREPARATION [9]

Sources of Product for Business – Criteria for Selection of Product – Feasibility Study – Business plan – Ownership – Financing Plan – Project appraisal.

UNIT – IV PROCEDURE FOR SMALL ENTERPRISES [9]

Government regulation – Procedure for starting enterprise – Institutional Finance support to Entrepreneurs: IDBI, IFCI, ICICI, SIDBI – Human Resource Mobilization – Problems & Recent trends – Operations Planning – Market and Channel Selection.

UNIT – V MANAGEMENT OF SMALL ENTERPRISES [9]

Monitoring and Evaluation of Business – Causes of sickness – Detecting and Preventing Sickness – Rehabilitation of Business Units – Growth Strategies – Intellectual property rights – Social responsibility

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Explain the fundamentals of entrepreneurial competence.

CO2: Discuss the various support from Government and other non-governmental organization while starting an enterprise.

CO3: Describe the various practical training about preparation of business plan.

CO4: Illustrate the various different Legal procedures to start up for business for small enterprises.

CO5: Explain the fundamental concepts in management of small Enterprises.

Text Books :

- 1 S.S. Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi, Twenty Edition, 2017.
- 2 Robert D Hisrich, Michael peters, Entrepreneurship, Tata McGraw Hill, New Delhi, Tenth Edition, 2016

References :

- 1 M.B.Shukla, Entrepreneurship & Small Business Management, Kitab Mahal, New Delhi, Second Edition,2015.
- 2 Madhurimalall, Entrepreneurship, Excel Books, New Delhi, First Edition, 2016
- 3 Rajshankar, Entrepreneurship theory and practice, McGraw Hill, New Delhi , First Edition 2017
- 4 Asawthappa, Entrepreneurship, Tata McGraw Hill, , New Delhi, Seventh Edition, 2016

SEMESTER – V

18CS521	DATABASE MANAGEMENT SYSTEMS LABORATORY	L 0	T 0	P 3	C 1
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Prerequisite: Basic Knowledge in Data Structures.

Objectives:

- To create and use a database.
- To be familiarized with a query language.
- To have hands on experience on DDL Commands, DML Commands and DCL commands.
- To train with advanced SQL queries and PL/SQL Block.
- To be exposed in different application.

List of Experiments:

1. Create and apply DDL (SQL) statements for employee /student /bank /online shopping detail sets.
2. Perform data manipulation using DML (SQL) statements for employee /student /bank /online shopping detail sets.
3. Verify DCL and TCL (SQL) statements for employee /student /bank /online shopping detail sets.
4. Perform all the nested, join queries and set oriented operations for employee /student /bank /online shopping detail sets.
5. Create and apply view for employee /student /bank /online shopping detail sets. (create, insert, update and drop)
6. Write PL/SQL code to display employee details using explicit cursors, implicit cursors and cursor loop.
7. Write a PL/SQL function to find the sum, average, minimum and maximum salary of the employee and count the number of employees in a given company name.
8. Write a PL/SQL procedure to calculate for the following i) factorial ii) prime or not iii) biggest of three number.
9. Write and implement before and after insert, update and delete triggers for employee details.
10. Design and implement employee payroll system form design using visual basic and generate report.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Design and implement a database schema for real time applications.

CO2: Populate and query a database.

CO3: Create and maintain tables using PL/SQL.

CO4: Utilize function and procedures on any application.

CO5: Apply trigger and generate report.

SEMESTER – V**18CS522****WEB AND OPEN SOURCE LABORATORY**

L	T	P	C
0	0	3	1

Prerequisite: Basic knowledge of programming concepts.**Objectives:**

- To develop Web Programming skills using various open source software.
- To learn and practice the web design work.
- To know the website design for different display.
- To acquire the knowledge of user interface design.
- To get the idea of web application development.

List of Experiments:

1. Design a web page for online shopping cart using html.
2. Design a web page for multimedia library with CSS and Bootstrap.
3. Design an online registration form with JavaScript validation.
4. Develop a web application using JDBC or MONGODB.
5. Develop a web application using database with AJAX.
6. Develop a PHP program to implement the following,
 - a. Variables - Constants - Data Types
 - b. Operators - Statements
 - c. Functions - Arrays
7. Construct a PHP program to connect MySQL database and retrieve a record in HTML table.
8. Write a PERL program to implement the following
 - a. Variables and Data - Statements and Control Structures.
 - b. Subroutines - Packages and Modules.
9. Develop a login form using PERL and perform a validation.
10. Create a PERL program to connect MySQL database and retrieve data.

Total : 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Learn the web page design.

CO2: Get the knowledge of web application development.

CO3: Apply the frameworks for dynamic content and database.

CO4: Develop simple applications using PHP, PERL.

CO5: Build simple applications using PHP, PERL with MySQL connectivity.

SEMESTER – V

18CS523	COMPUTER NETWORKS LABORATORY	L	T	P	C
		0	0	3	1

Prerequisite: Basic knowledge of java Programming.

Objectives:

- To acquire practical exposure on basic networking concepts.
- To gain experience on error control and data link layer protocols.
- To identify the functions of various routing algorithms.
- To comprehend the role of cryptography techniques and communication using UDP and TCP.
- To learn and use simulation tools.

List of Experiments:

1. Study of Network topology configuration and Network Devices in detail.
2. Connect the computers in Local Area Network.
3. Simulation of error detecting code using CRC.
4. Simulation of Stop and wait protocol.
5. Simulation of Go Back-N and selective repeat protocols.
6. Simulation of Distance vector routing algorithm.
7. Simulation of Link state routing algorithm.
8. Apply Caesar cipher security algorithm for network security.
9. Apply TCP program for date/time server.
10. Simple UDP socket program for echo server client chat.
11. Develop a program for congestion control using Leaky bucket algorithm.
12. Study the simulation of Network Simulator

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Demonstrate the various network topologies.

CO2: Implement the performance of error control and data link layer protocols.

CO3: Create and analyze the routing algorithms and congestion control mechanism.

CO4: Apply TCP and UDP to Infer network security and communication.

CO5: Be aware of the simulation of Network simulator.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
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R 2018

18HR533

CAREER DEVELOPMENT SKILLS III

L	T	P	C
0	2	0	0

Prerequisite: No prerequisites are needed for enrolling into the course**Objectives:**

- To enhance the writing and speaking skills through continuous practices.
- To sharpen the verbal and logical reasoning through skillful conceptualization.
- To improve the learning skills of students in aptitude.
- To learn the problem solving skill and to improve thinking capability of the students.
- To study the various concept in core subjects.

UNIT – I WRITTEN AND ORAL COMMUNICATION – PART 1 [6]

Reading Comprehension Level 3 – Self Introduction – News Paper Review – Self Marketing – Debate – Structured and Unstructured GDs Psychometric Assessment – Types and strategies to answer the questions – Practices : Sentence Completion – Sentence Correction – Jumbled Sentences – Synonyms and Antonyms – Using the same word as different parts of speech – Interpretation of Pictorial Representations – Editing.

UNIT – II VERBAL AND LOGICAL REASONING – PART 2 [6]

Syllogism – Assertion and Reasons – Statements and Assumptions – Identifying Valid Inferences – Identifying strong arguments and weak arguments – Statements and Conclusions – Cause and Effect – Deriving conclusions from passages – Seating Arrangements – Practices : Analogies – Blood Relations – Statement and Conclusions.

UNIT – III QUANTITATIVE APTITUDE – PART 3 [6]

Probability – Calendar – Clocks – Logarithms – Permutations and Combinations.

UNIT – V QUANTITATIVE APTITUDE – PART 4 [6]

Algebra – Linear Equations – Quadratic Equations – Polynomials – Problem on Numbers – Ages – Train – Time and Work – Sudoku – Puzzles.

UNIT – V DOMAIN PROFICIENCY [6]

C Language – Control Structures – Data Types – Arrays – Operators – Functions – Structures – Pointers – Files.

Total = 30 Periods**Course Outcomes: On Completion of this course , the student will be able to**

CO1: Understand the nearness of leading various texts.

CO2: Perform well in verbal and logical reasoning.

CO3: Understand and develop the etiquette necessary to present oneself in a professional setting.

CO4: Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

CO5: Enhance the comprehension Skills in core subjects.

Text Books :

- 1 Anne Laws, Writing Skills, Orient Black Swan, Hyderabad, 2011.
- 2 Abhijit Guha, Quantitative Aptitude, TMH, Third Edition, New Delhi, 2009.

Reference Books :

- 1 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2005.
- 2 Sarah Freeman, Written Communication in English, Orient Black Swan, Hyderabad, First Edition, 2015.
- 3 M.B. Lal & Goswami, Objective Instant Arithmetic, Upkar Publications, First Edition, 2010.
- 4 Norman Lewis, Word Power Made Easy ,W.R.Goyal Publications, Reprint, 2012.
- 5 Herbert Schildt, C - The Complete Reference, Tata McGraw-Hill, New Delhi, Fourth Edition, 2013.

SEMESTER – VI

18CS611	PRINCIPLES OF COMPILER DESIGN	L	T	P	C
		3	1	0	4

Prerequisite: Basic knowledge about Theory of Computation.

Objectives:

- To introduce the techniques adopted in the design and implementation of system software.
- To learn the design principles of a compiler and how the tokens are specified and recognized.
- To know the various parsing techniques like top down parsing and bottom up parsing.
- To study about three address code and how it can be represented.
- To learn how to optimize the source code and learn how effectively generate machine codes.

UNIT – I ASSEMBLER, LINKER AND LOADER [12]

Overview of Language Processors – SIC architecture – Assemblers: Functions – Data Structures – Design of Two Pass Assembler. Loaders and Linkers: Basic Loader Functions – Types of Loaders – Design of Absolute Loader – Simple Bootstrap Loader – Design of Dynamic Linking Loader.

UNIT –II COMPILER AND LEXICAL ANALYSIS [12]

The Phases of Compiler – Cousins of Compiler – The Grouping of Phases – Compiler Construction Tools – Need and Role of Lexical Analyzer – Input Buffering – Specification and Recognition of Tokens – Lex – Converting Regular Expression to DFA(Direct and Indirect method) – Minimization of DFA.

UNIT – III SYNTAX ANALYSIS [12]

Need and Role of the Parser – Context Free Grammar – Top Down Parsing: Recursive Descent Parser – Predictive Parser – LL(1) Parser – Bottom up parsing: Shift Reduce Parser – Operator Precedence Parser – LR Parser – Construction of SLR Parsing Table – CLR Parser – LALR Parser – Error Handling and Recovery in Syntax Analyzer – YACC.

UNIT – IV INTERMEDIATE CODE AND RUN TIME ENVIRONMENT [12]

Intermediate Languages: Postfix Notation – Syntax tree –Three Address Code. Implementation of Three Address Code – Types and Declarations, Translation of Expressions, Type Checking. Run time environment: Source Language Issues – Storage Organizations – Storage Allocation Strategies.

UNIT – V CODE OPTIMIZATION AND CODE GENERATION [12]

Principal Sources of Optimization – Peephole Optimization – Basic Blocks and Flow Graphs – DAG Representation of Basic Blocks – Optimization of Basic Blocks – Global Data Flow Analysis – Code Improving Transformations – Issues in a Design of Code Generator – Simple Code Generator Algorithm.

Total = 60 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Know the knowledge about how to implement system software like assembler, loader and linker.

CO2: Analyze the output generated in each phase of the compiler and Construct Finite Automata and apply minimization techniques.

CO3: Design and analyze various top down and bottom up parsers.

CO4: Generate intermediate code for programming constructs.

CO5: Apply optimization techniques in code generation and analyze the issues in a design code generation.

Text Books :

- 1 Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, Compilers – Principles, Techniques and Tools, Pearson Education, New Delhi , Second Edition, 2014.
- 2 Leland L. Beck, System Software - An Introduction to Systems Programming, Pearson Education, New Delhi, Third Edition, 2006.

References :

- 1 Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence-based Approach, Morgan Kaufmann Publishers, USA, First Edition, 2002.
- 2 Steven S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers - Elsevier Science, India, First Edition, 2003.
- 3 Keith D Cooper and Linda Torczon, Engineering a Compiler, Morgan Kaufmann Publishers Elsevier Science, India, First Edition, 2004.
- 4 <http://nptel.ac.in/courses/106108052/17>

SEMESTER – VI

18CS612	MOBILE COMPUTING	L	T	P	C
		3	0	0	3

Prerequisite: Basic knowledge of Computer Networks.

Objectives:

- To know the basic concepts of mobile computing.
- To learn the methods of mobile telecommunication system.
- To be familiar with the mobile network and transport layers.
- To explore in the field of mobile Adhoc wireless networks.
- To gain knowledge about different mobile platforms and application development.

UNIT – I FUNDAMENTALS OF MOBILE COMPUTING [9]

Introduction to Mobile Computing – Mobile Computing Vs Wireless Networking – Mobile Computing Applications - Characteristics of Mobile computing – Structure of Mobile Computing Application – Mobile Wireless Transmission – MAC: SDMA – FDMA – TDMA – CDMA.

UNIT – II MOBILE TELECOMMUNICATION SYSTEM [9]

Introduction to Cellular Systems – GSM –Services and Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS-UMTS – Architecture – Handover – Security- 3G wireless systems.

UNIT – III MOBILE NETWORK AND TRANSPORT LAYER [9]

Infra-Red Vs. Radio Transmission – Infrastructure and Adhoc Network – Mobile IP – Mobile Adhoc Networks –Traditional TCP and classical TCP improvements.

UNIT – IV MOBILE ADHOC WIRELESS NETWORKS [9]

Adhoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols – Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security. 4G Vision – 4G Features and Challenges – Applications of 4G. 4G Technologies – LTE FDD Vs TDD comparison – 5G wireless systems.

UNIT – V MOBILE PLATFORMS AND APPLICATIONS [9]

Mobile Device Operating Systems – Special Constrains and Requirements – Commercial Mobile Operating Systems – Software Development Kit: Android, BlackBerry, Windows Phone – M-Commerce – Structure – Pros and Cons – Mobile Payment System – Security Issues.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Explain the basics of mobile telecommunication system.

CO2: Illustrate the generation of telecommunication systems in wireless network.

CO3: Determine the functionality of MAC, network layer and Identify a routing protocol for a given Ad hoc network.

CO4: Explain the functionality of mobile adhoc wireless networks.

CO5: Develop a mobile application using android, blackberry, iOS and Windows.

Text Books :

- 1 Jochen H. Schller, Mobile Communications, Pearson Education, New Delhi, Second Edition, 2012.
- 2 Prasant Kumar Pattnaik, Rajib Mall, Fundamentals of Mobile Computing, PHI Learning Pvt. Ltd, New Delhi, Second Edition, 2012.

References :

- 1 William.C.Y.Lee, Mobile Cellular Telecommunications-Analog and Digital Systems, Tata McGraw Hill, India, Second Edition,2006.
- 2 Vijay Garg K, Wireless Communications and Networks, Morgan Kaufmann Publishers (Elsevier), Mexico, Second Edition, 2007.
- 3 Clint Smith and Daniel Collins, 3G Wireless Networks, Tata McGraw Hill, New Delhi, Second Edition, 2007.
- 4 <http://developer.android.com/index.html>.

SEMESTER – VI

18CS613

SOFTWARE TESTING

L	T	P	C
3	0	0	3

Prerequisite: Basic knowledge about Software Engineering.**Objectives:**

- To learn the criteria for test cases and the knowledge in Selenium.
- To make the student to design the test cases.
- To gain knowledge in levels of testing.
- To know the ideas in test management.
- To study about test automation, testing metrics and measurements.

UNIT – I BASIC CONCEPTS OF SOFTWARE TESTING [9]

Testing as an Engineering Activity – Testing as a Process – Testing Maturity Model- Testing axioms – Basic definitions – Software Testing Principles – Tester's Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – Introduction to Selenium – Using Selenium IDE for Automation Testing – Using Selenium Web Driver for Automation Testing – Understanding Testing Framework with Selenium Web Driver for Automation Testing.

UNIT – II TEST CASE DESIGN STRATEGIES [9]

Test case Design Strategies – Using Black Box Approach to Test Case Design – Boundary Value Analysis – Equivalence Class Partitioning – State based testing – Cause-effect graphing – Compatibility testing – User documentation testing - Requirements based testing – Using White Box Approach to Test design – Test Adequacy Criteria – Static testing vs. structural testing – Code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – Code complexity testing.

UNIT – III LEVELS OF TESTING [9]

The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Alpha, Beta Tests – Usability and Accessibility testing – Configuration testing.

UNIT – IV TEST MANAGEMENT [9]

People and organizational issues in testing – Organization structures for testing teams – Testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – Test management – test process – Reporting Test Results – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group – Structure of Testing Group.

UNIT – V TEST AUTOMATION [9]

Software test automation – skills needed for automation – Scope of automation – Design and architecture for automation – Requirements for a test tool – Challenges in automation – Test metrics and measurements – Project, progress and productivity metrics.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Design test cases suitable for a selenium tool.

CO2: Identify suitable tests to be carried out.

CO3: Prepare test planning based on the requirements.

CO4: Document test plans and test cases designed.

CO5: Use automatic testing tools.

Text Books :

- 1 Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing Principles and Practices, Pearson Education, India, Sixth Edition, 2008.
- 2 Ron Patton, Software Testing, Sams Publishing, Pearson Education, India, Second Edition, 2007.

References :

- 1 Elfriede Dustin, Implementing Automated Software Testing: How to Save Time and Lower Costs While Raising Quality, Addison Wesley, US, First Edition, 2009.
- 2 Milind G. Limaye, Software Testing: Principles, Techniques and Tools, Tata McGraw-Hill Education, New Delhi, First Edition, 2009.
- 3 Selenium.org - <http://docs.seleniumhq.org/docs/>
- 4 <http://www.seleniumhq.org/download/>

SEMESTER – VI

18CS621

CASE TOOLS LABORATORY

L	T	P	C
0	0	3	1

Prerequisite: Basic knowledge of programming concepts.

Objectives:

- To learn the basics of object oriented analysis and design skills.
- To be exposed to the UML design diagrams.
- To learn to map design to the code.
- To be familiar with the various design techniques.
- To apply design patterns for viewing a system as a set of procedures.

To progress a mini project by following the exercises listed below.

- To develop a problem statement.
- Identify the Use Cases and develop the Use Case model.
- Identify the conceptual classes and develop a domain model with UML Class diagram.
- Using the identified scenarios find the interaction between objects and represent those using UML Sequence diagrams.
- Draw relevant state charts and activity diagrams.
- Code Generation.

Suggested Domains for Mini project:

1. Passport automation system.
2. On line shopping
3. Banking system
4. Online course reservation system
5. Credit card processing
6. Library automation system
7. BPO Management System
8. Conference management system
9. Stock maintenance system.
10. Foreign trading system

SOFTWARE TOOLS

Rational Suite (or) Argo UML, Eclipse IDE and Junit

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Design and implement projects using OO concepts.

CO2: Use the UML analysis and design diagrams.

CO3: Apply appropriate design patterns.

CO4: Create code from design.

CO5: Compare and contrast various testing techniques

SEMESTER – VI**18CS622****SOFTWARE TESTING LABORATORY**

L	T	P	C
0	0	3	1

Prerequisite: Basic knowledge of programming concepts.**Objectives:**

- To learn more about automation testing.
- To apply various testing techniques and to detect the errors in the software.
- To develop a web page and test it.
- To generate and apply the test cases using the automated testing tool.
- To learn the functionality of automated testing tools to apply in their specialized area.

List of Experiments:

1. Study of the Automation Testing Approach
2. Write a test suite containing minimum 4 test cases use.
3. Conduct a test suite for any two web sites.
4. Develop a web page which calculates the GCD of 2 numbers. write a script for testing it.
5. Develop and test a program to login a web.
6. Write and test a program to update student records into Excel file in table format.
7. Write and test a program to count number of items present on a desktop.
8. Write and test a program to get the number of list items selected in a list / combo box.

Note - Selenium IDE and Java Eclipse IDE.**Total : 45 Periods****Course Outcomes: On Completion of this course, the student will be able to**

CO1: Test the software by applying various testing techniques.

CO2: Debug the project and to test the entire computer based systems at all levels.

CO3: Analysis the applications in the specialized environment using various automation tools.

CO4: Evaluate the web applications using bug tracking tools.

CO5: Apply quality and reliability metrics to ensure the performance of the software.

SEMESTER –VI**18CS623****MINI PROJECT**

L	T	P	C
0	0	6	3

Prerequisite: Basic knowledge of programming and computer engineering concepts.

Objectives:

- To prepare students to gain confidence in solving real time problems related to computer engineering.
- To develop the ability to solve a specific problem right from its identification.
- To undergo literature review till the successful solution of the same is achieved.
- To train the students in preparing project reports.
- To prepare the students to face reviews and viva voce examination.

GUIDELINES:

1. Each Student can undergo project work, either Individual / Group, based on Society, Application, Software, Hardware, Research, Innovation, Industry, etc., with the guidance of reputed Journals and Articles.
2. Project Team will be supervised by subject / industrial experts based on their Area of specialization
3. Each student will undertake a sizeable project involving survey of literature.
4. Contact Hours shall be allotted in the timetable and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, and computer analysis of field work as assigned by the guide and also to presenting periodical seminars on the progress made in the project.
5. The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.
6. The student should implement and develop systems by selecting appropriate techniques based on its performance.
7. The progress of the project is evaluated based on a minimum of three reviews.
8. The student should have to write the reports under respective regulation along with the guidance of faculty members / industry experts.
9. Project Report → Number of Project report to be submitted = No. of Students in the Batch + Guide + Department Library + College Library

Course Outcomes: On Completion of this course, the student will be able to

CO1: Formulate a real world problem, identify the requirement and develop the design solutions.

CO2: Identify technical ideas, strategies and methodologies.

CO3: Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.

CO4: Test and validate through conformance of the developed prototype and analysis the cost effectiveness.

CO5: Prepare report and present oral demonstrations.

SEMESTER - VI

18HR634

CAREER DEVELOPMENT SKILLS IV

L	T	P	C
0	2	0	0

Prerequisite: No prerequisites are needed for enrolling into the course.**Objectives:**

- To enhance their writing and reading skills in a technical concept.
- To improve their own problem solving skills.
- To study the data interpretation and analysis of various methods.
- To enhance their own growth opportunities.
- To learn the different concepts in core subjects.

UNIT – I WRITTEN AND ORAL COMMUNICATION - PART 2 [6]

Self Introduction – GD – Personal Interview Skills Practices on Reading Comprehension Level 2 – Paragraph Writing – Newspaper and Book Review Writing – Skimming and Scanning – Interpretation of Pictorial Representations – Sentence Completion – Sentence Correction – Jumbled Sentences – Synonyms and Antonyms – Using the Same Word as Different Parts of Speech – Editing.

UNIT – II QUANTITATIVE APTITUDE - PART - 5 [6]

Geometry – Straight Line – Triangles – Quadrilaterals – Circles – Co-ordinate Geometry – Cube – Cone – Sphere.

UNIT – III DATA INTERPRETATION AND ANALYSIS [6]

Data Interpretation based on Text – Data Interpretation based on Graphs and Tables. Graphs: Column Graphs, Bar Graphs, Line Charts and Pie Chart, Graphs representing Area, Venn Diagram and Flow Charts.

UNIT – IV RESUME WRITING AND PRESENTATION SKILLS [6]

An Introduction to the Resume –Types of Resumes – Common Resume Errors – Anatomy of a Resume – What is a Cover Letter? – Types of Cover Letters – Enhancing the Language and Style of Your Resume and Cover Letter – Assessment

Presentation Skills: Oral presentation and public speaking skills; business presentations. – Understand the Situation – Know Your Tools – Know Yourself – Organize It, Write the Script – Practice – Delivering a Presentation.

UNIT – V DOMAIN PROFICIENCY [6]

JAVA: Java Buzzwords – Access Control – Inheritance – Packages – Exceptions – string – threads.

Total = 30 Periods**Course Outcomes: On completion of this course, the student should be able to**

CO1: Perform well in interview type situations.

CO2: Understand the quantitative aptitude problem in geometry.

CO3: Understand the data interpretation and analysis by using various graphs.

CO4: Enhance the skills in resume writing and presentation.

CO5: Understand and implement various Java concepts.

Reference Books :

- 1 Dr.R.S.Aggarwal, Quantitative Aptitude, S. Chand & Company Limited, New Delhi, Sixteenth Edition, 2018.
- 2 Dr.R.S.Aggarwal, A Modern Approach to Verbal & Non -Verbal Reasoning, S. Chand & Company Limited ,New Delhi, Fourth Edition,2015.

Reference Books :

- 1 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2005
- 2 Abhijit Guha, Quantitative Aptitude, TMH,New Delhi, Third Edition,2016.
- 3 M.B. Lal, Goswami, Objective Instant Arithmetic,Upkar Publications, Delhi, Second Edition,2012.
- 4 W.R.Norman Lewis, Word Power Made Easy, Goyal Publications, New Delhi, Fourth Edition,2016.
- 5 Herbert Schildt, Java - The Complete Reference, Oracle Press, McGraw-Hill Education, New Delhi, Tenth Edition, 2018.

SEMESTER – VII

18HS051	PROFESSIONAL ETHICS (Common to All Branches)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites needed for enrolling into the course.

Objective(s):

- To gain the knowledge of basic perception of ethics, moral and values.
- To know the current Industrial standards.
- To know the risk and safety benefit in industry.
- To Discuss the rights and responsibility of an engineers.
- To Acquire Knowledge in global issues and able to apply in ethical principles in professional life.

UNIT – I 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 – Professional ideals and virtues – Uses of ethical theories

UNIT – II ENGINEERING AS SOCIAL EXPERIMENTATION [9]

Engineering as experimentation – Engineers as responsible experimenters – Codes of ethics – Industrial standards – Balanced outlook on law – The challenger case study.

UNIT – III ENGINEER'S RESPONSIBILITY FOR SAFETY [9]

Safety and risk – Assessment of safety and risk – Risk benefit analysis – Reducing risk – Liability – The Chernobyl and Bhopal case studies.

UNIT – IV RESPONSIBILITIES AND RIGHTS [9]

Collegiality and loyalty – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Occupational crime – Professional rights – Employee rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT - V GLOBAL ISSUES [9]

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Corporate Social Responsibility(CSR) – Moral Leadership – Code of Conduct.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Understand the basic perceptions of ethics, moral and values.

CO2: Aware the current industrial standards.

CO3: Identify and access the risk and safety benefits in the industry.

CO4: Aware of professional rights and responsibilities of an engineers.

CO5: Acquire knowledge in global issues and able to apply ethical principles in professional life.

Text Books :

1. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw-Hill, New York, Fifth edition, 2017.
2. Dr.K.R.govindan and S.Senthilkumar, Professional Ethics, Anuradha Agencies, Revised edition, Chennai, 224.

Reference Books :

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, Engineering Ethics, Prentice Hall ,New Delhi, Fourth Edition, 2016.
2. Charles D. Fleddermann, Engineering Ethics, Pearson Education / Prentice Hall, New Jersey, Seventh Edition, 2015
3. Charles E Harris, Michael S. Protchard and Michael J Rabins, Engineering Ethics - Concepts and Cases, Thompson Learning, Sixth Edition, 2015
4. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 8th edition, New Delhi, 2014.

SEMESTER - VII

18CS711

BIG DATA AND CLOUD COMPUTING

L	T	P	C
3	0	0	3

Prerequisite: Basic Knowledge in database management and distributed systems.**Objectives:**

- To gain basic knowledge about Big Data and its tool.
- To get the knowledge about comprehensive tools of Big Data.
- To learn the fundamentals and working principles of Hive and Pig.
- To learn about basic concepts of Cloud Computing.
- To learn the real time implementation of Cloud.

UNIT – I BASCIS OF BIG DATA AND HADOOP [9]

Classification of Digital Data – Characteristics of Data – Evaluation of Data – Definition of Big Data - Challenges with Big Data – Traditional Business Intelligence versus Big Data – A Typical Hadoop Environment – Definition of Big Data Analytics – Classification of Analytics – Top Challenges facing Big Data – Data Science and Scientist – Terminologies used in Big Data Environments – Few Top Analytic Tools – NoSQL – Types of NoSQL Database – Advantages of NoSQL – Use of NoSQL in Industry – NoSQL Vendors – SQL versus NoSQL – NewSQL– Hadoop – Features of Hadoop – Versions of Hadoop – Hadoop Overview – HDFS – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN – Interacting with Hadoop Ecosystems.

UNIT – II MONGODB , CASSANDRA AND MAPREDUCE PROGRAMMING [9]

MongoDB – Terms used in RDBMS and MongoDB – Data Types in MongoDB – MongoDB Query Language – Cassandra: Features of Cassandra – CQL Data Types – CQLSH – Key Spaces – CRUD – Collections – Using a Counter – TTL – Alter Commands – Import and Export – Query System Tables. MapReduce: Introduction – Mapper – Reducer – Combiner – Partitioner– Searching – Sorting –Compression.

UNIT – III HIVE AND PIG [9]

HIVE: Hive Architecture – Hive Data Types – Hive File Format – HQL– RCFile Implementation – SerDe – UDF. Pig: Pig overview – Anatomy of Pig – Pig on Hadoop – Pig Latin overview–Data types in Pig – Running Pig – Execution Modes of Pig – HDFS Commands – Relational Operators – Eval Function – Complex Data type – UDF – Pig Versus Hive

UNIT – IV BASIC CONCEPTS OF CLOUD COMPUTING [9]

Introduction to Cloud Computing – Cloud Computing Architecture – Service Management in Cloud Computing – Data Management in Cloud Computing.

UNIT- V CLOUD INFRASTRUCTURE [9]

Resource Management in Cloud – Cloud Security – Open Source and Commercial Clouds – Cloud Simulator – Research trend in Cloud Computing – Fog Computing.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Summarize the systems and mechanisms to support cloud computing.

CO2: Comprehend the hardware necessary for cloud computing.

CO3: Realize how to leverage the insights from big data analytics.

CO4: Be aware of MongoDB, Cassandra MapReduce Programming and analyze the large dataset.

CO5: Analyze and implement Hive and Pig technology in real time environment.

Text Books :

- 1 Seema Acharya and Subhashini Chellappan, Big Data and Analytics, Wiley India Pvt. Ltd, India, First Edition, 2015.
- 2 Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd, India, First Edition, 2011.

References :

- 1 Rajkumar Buyya,C, Christian Vecchiola, S. Thamarai Selvi, Mastering Cloud Computing, McGraw Hill Education(India) Pvt. Ltd, New Delhi, Third Edition, 2013
- 2 WA Gmob, Big Data and Hadoop, Madhya Pradesh, Kindle Edition, 2013
- 3 Eric Miller, A Overview of Map Reduce and its impact on Distributed Data, Madhya Pradesh, Kindle Edition, 2012.
- 4 Kristina, MongoDB: The Definitive Guide, O'Reilly, California, Second Edition, 2013.

SEMESTER - VII

18CS712

CRYPTOGRAPHY AND NETWORK SECURITY

L	T	P	C
3	0	0	3

Prerequisite: Basic knowledge on computer networks.**Objectives:**

- To know OSI security architecture and classical encryption techniques.
- To acquire fundamental knowledge on the concepts of finite fields and number theory.
- To study various block cipher and stream cipher models.
- To describe the principles of public key cryptosystems, hash functions and digital signature.
- To learn about system security, e-mail, IP and web security.

UNIT – I ENCRYPTION TECHNIQUES AND NUMBER THEORY [9]

Services, Mechanisms and attacks – The OSI security architecture - Network security model – Classical Encryption techniques. Finite Fields and Number Theory: Groups – Rings – Fields – Modular arithmetic – Euclid's algorithm – Finite fields – Polynomial Arithmetic – Prime numbers – Fermat's and Euler's theorem – Testing for Primality – The Chinese remainder theorem.

UNIT – II BLOCK CIPHERS AND PUBLIC KEY CRYPTOGRAPHY [9]

Data Encryption Standard – Block cipher principles – Block cipher modes of operation – Advanced Encryption Standard (AES) – Triple DES – Blowfish – RC5 algorithm. Public key cryptography: Principles of Public Key Cryptosystems – The RSA algorithm – Key management – Diffie Hellman Key exchange – Elliptic curve arithmetic – Elliptic curve cryptography.

UNIT – III HASH FUNCTIONS AND DIGITAL SIGNATURES [9]

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – MD5 – SHA – HMAC – CMAC – Digital signature and Authentication Protocols – DSS.

UNIT – IV SECURITY PRACTICE AND SYSTEM SECURITY [9]

Kerberos – X.509 Authentication services – Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology – Types of Firewalls – Firewall designs – Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems.

UNIT – V E-MAIL, IP AND WEB SECURITY [9]

E-mail Security: Security Services for E-mail-attacks possible through E-mail – Establishing keys privacy – Authentication of the source – Message Integrity – Non-repudiation – Pretty Good Privacy – S/MIME. IP Security: Overview of IPSec – IP and IPv6 – Authentication Header – Encapsulation Security Payload – Internet Key Exchange. Web Security: SSL/TLS Basic Protocol – computing the keys – Client authentication – PKI – Secure Electronic Transaction (SET).

Total = 45 Periods**Course Outcomes: On Completion of this Course, the student will be able to**

- CO1: Recognize OSI security architecture and classical encryption techniques.
 CO2: Obtain fundamental knowledge on finite fields, pseudorandom number generation and number theory.
 CO3: Be familiar with various block cipher and stream cipher models.
 CO4: Describe the principles of public key cryptosystems, hash functions and digital signature.
 CO5: Identify the concepts of Transport-Level, Wireless Network, Electronic Mail and IP Security.

Text Book :

- 1 William Stallings, Cryptography and Network Security Principles and Practices, Pearson Education, New Delhi, Seventh Edition, 2019.
- 2 Behrouz A. Ferouzan, Cryptography and Network Security, Tata McGraw Hill, New Delhi, Third Edition, 2015.

References :

- 1 Charlie Kaufman, Radia Perlman and Mike Speciner, Network Security, Prentice Hall of India, Second Edition, 2002
- 2 Man Young Rhee, Internet Security: Cryptography Principles, Algorithms and Protocols, Wiley Publications, India, First Edition, 2003
- 3 Ajay Kumar and S. Bose, Cryptography and Network Security, Pearson Education, India, Fourth Edition, 2016.
- 4 <http://www.nptelvideos.in/2012/11/cryptography-and-network-security.html>

SEMESTER - VII

18CS713

GRAPHICS AND MULTIMEDIA

L	T	P	C
3	0	0	3

Prerequisite: Basic C language, linear algebra, geometry and calculus**Objectives:**

- To know about graphics systems and different display systems.
- To learn the algorithms for generating geometric shapes and filling polygons.
- To know the two-dimensional geometric transformations and clipping techniques.
- To study the three-dimensional transformation and their surface detection & rendering with appreciate illumination.
- To know about basics of multimedia systems.

UNIT – I OVERVIEW OF GRAPHICS SYSTEMS [9]

Introduction of Computer Graphics and its Applications – Video Display Devices: Refresh Cathode-Ray Tubes – Raster Scan Displays – Raster Scan Displays – Color CRT Monitor – Direct-View Storage Tubes – Flat Panel Displays – Raster Scan Systems – Random-Scan Systems – Input Devices – Hard-Copy Devices – Graphics Software.

UNIT – II GEOMETRIC DISPLAY PRIMITIVES AND ATTRIBUTES [9]

Points and Lines – Line Drawing Algorithms: Line Equations – DDA Algorithm – Bresenham's Line Algorithm – Loading the Frame Buffer – Line Function – Circle Generating Algorithms: Properties of Circles – Mid-Point Circle Algorithm – Ellipse Generating Algorithms: Properties of Ellipses – Midpoint Ellipse Algorithm – Filled-Area Primitives.

UNIT – III 2D TRANSFORMATION AND CLIPPING [9]

Two-Dimensional Geometric Transformations – Basic Transformations – Matrix Representations and Homogeneous Coordinates – Composite Transformations: Translations – Rotations – Scalings – General Pivot-Point Rotation – General Fixed-Point Scaling. Two Dimensional Viewing: The Viewing Pipeline – Clipping Operations: Point Clipping – Line Clipping: Cohen-Sutherland Line Clipping – Liang-Barsky Line Clipping – Polygon Clipping: Sutherland – Hodgman Polygon Clipping – Curve Clipping.

UNIT – IV 3D TRANSFORMATION AND RENDERING [9]

Three-Dimensional Transformation: Translation – Rotation: Coordinate – Axis Rotations – Scaling. Three-Dimensional Viewing: The Viewing Pipeline. Visible Surface Detection Methods: Classification of Visible – Surface Detection Algorithms – Back Face Detection, Depth Buffer Method. Illumination Models: Light Sources – Basic Illumination Models: Ambient Light – Diffuse Reflection – Specular Reflection and the Phong Model – Polygon Rendering Methods.

UNIT – V MULTIMEDIA SYSTEMS [9]

Multimedia Elements – Multimedia Applications – Multimedia System Architecture – Evolving Technologies for Multimedia Systems – Defining Objects for Multimedia Systems – Multimedia Data Interface Standards – Need for Data Compression – Multimedia Databases.

Total = 45 Periods**Course Outcomes: On Completion of this Course, the student will be able to**

CO1: Comprehend the basic about graphics and different display systems.

CO2: Learn algorithms for generating different 2-D graphical objects like circle, line, ellipse and polygon filling.

CO3: Apply two dimensional transformations and clipping techniques.

CO4: Apply three dimensional transformations and surface detection & rendering methods.

CO5: Analyze about overview of multimedia systems.

Text Book :

- 1 Donald Hearn and M. Pauline Baker, Computer Graphics C version, Pearson Education, India, Second Edition, 2014.
- 2 Prabhat K. Andleigh, Kiran Thakra, Multimedia Systems Design Always Learning, Pearson Education, India, First Edition, 2015.

References :

- 1 Hearn, Baker and Carithers, Computer Graphics with Open GL, Pearson Education Limited, India, Fourth Edition, 2014.
- 2 Roger, Mathematical Elements for Computer Graphics Tata McGraw Hill, New Delhi, Second Edition, 2012.
- 3 Prabat K Andleigh and Kiran Thakrar, Multimedia Systems and Design, Prentice Hall, New Delhi, Second Edition, 2007.
- 4 <https://nptel.ac.in/courses/106/102/106102063/>

SEMESTER – VII

18CS721	BIG DATA AND CLOUD COMPUTING LABORATORY	L	T	P	C
		0	0	3	1

Prerequisite: Basic knowledge of database management system, data warehousing and data mining.

Objectives:

- To know about basic tools of Big Data.
- To know about Hadoop Concept and form one node Hadoop cluster.
- To learn the Hive Queries in Large data set and retrieve relevant document.
- To study about Pig Queries and map reduces programming.
- To learn the real time implementation of Cloud using Apex Programming.

List of Experiments:

1. Write a word count program to demonstrate the use of Map and Reduce tasks
2. Installation and Configuration of Hadoop.
3. Implement Matrix Multiplication with Hadoop Map Reduce.
4. Write a MongoDB query to display all the documents in the collection restaurants
5. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
6. Install and Run Hive then use Hive to create, alter and drop databases, tables, views, functions and indexes
7. Create a Hadoop Cluster on Amazon.
8. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
9. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
10. Install a C compiler in the virtual machine and execute a sample program
11. Creating an Application in Salesforce.com using Apex Programming Language.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- CO1: Discover about Cloud Types and Virtual Environment.
 CO2: Analyze about Hadoop Concept and form one node Hadoop cluster.
 CO3: Apply Hive Queries in Large data set and retrieve relevant document.
 CO4: Be aware of about Pig Queries and map reduces programming.
 CO5: Examine how to run Apex Programming.

SEMESTER – VII

18CS722	GRAPHICS AND MULTIMEDIA LABORATORY	L	T	P	C
		0	0	3	1

Prerequisite: Basic C language, linear algebra, geometry, and calculus

Objectives:

- To learn algorithmic development of graphics primitives like: line, circle and ellipse.
- To know the concepts of different type of geometric transformation of objects in 2D and 3D.
- To study clipping techniques for the 2D objects.
- To learn to create simple design of UI and logo.
- To learn the implementation of animation techniques.

List of Experiments:

1. Implementation of line drawing algorithm. a) DDA b) Bresenham's Line Algorithm
2. Implementation of Mid-Point Circle Algorithm for drawing circle.
3. Implementation of Mid-Point Ellipse Algorithm for drawing ellipse.
4. Implementation of 2D transformations: Translation, Rotation and Scaling.
5. Implementation of Cohen - Sutherland line clipping algorithm.
6. Implementation of Liang - Barsky Line Clipping.
7. Implementation of 3D transformations: Translation, Rotation and Scaling.
8. To create a UI design using Adobe Photoshop.
9. To create a logo design using Adobe Illustrator.
10. 2D Animation – To create Interactive animation using any authoring tool.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Apply geometric, mathematical and algorithmic concepts necessary for programming computer graphics.

CO2: Apply various line Drawing and clipping algorithms.

CO3: Identify the Concepts of 2D and 3D object representation.

CO4: Summarize different realizations of multimedia tools.

CO5: Develop interactive animations using multimedia tools.

SEMESTER – VIII**18CS821****PROJECT WORK**

L	T	P	C
0	0	6	3

Prerequisite: Basic knowledge of programming and computer engineering concepts.

Objectives:

- To prepare students to gain confidence in solving real time problems related to computer engineering.
- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
- To make the students come up with innovative and new ideas in his area of interest.
- To train the students in preparing project reports.
- To prepare the students to face reviews and viva voce examination.

GUIDELINES:

1. Each Student can undergo project work, either Individual / Group, based on Society, Application, Software, Hardware, Research, Innovation, Industry, etc., with the guidance of reputed Journals and Articles.
2. Project Team will be supervised by subject / industrial experts based on their Area of specialization
3. Each student will undertake a sizeable project involving survey of literature.
4. Contact Hours shall be allotted in the timetable and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, and computer analysis of field work as assigned by the guide and also to presenting periodical seminars on the progress made in the project.
5. The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.
6. The student should implement and develop systems by selecting appropriate techniques based on its performance.
7. The progress of the project is evaluated based on a minimum of three reviews.
8. The student should have to write the reports under respective regulation along with the guidance of faculty members / industry experts.
9. Project Report → Number of Project report to be submitted = No. of Students in the Batch + Guide + Department Library + College Library

Course Outcomes: On Completion of this course, the student will be able to

CO1: Formulate a real world problem, identify the requirement and develop the design solutions.

CO2: Identify technical ideas, strategies and methodologies.

CO3: Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.

CO4: Test and validate through conformance of the developed prototype and analysis the cost effectiveness.

CO5: Prepare report and present oral demonstrations.

SEMESTER – V

18CS561

DISTRIBUTED SYSTEMS
(PROFESSIONAL ELECTIVE - I)

L	T	P	C
3	0	0	3

Prerequisite: Basic knowledge of Computer Networks.**Objectives:**

- To learn about the basic concepts of distributed environment.
- To enrich knowledge about synchronization and transaction in distributed environment.
- To be familiar with consistency and Replication.
- To learn about fault tolerance and security in distributed system.
- To gain knowledge about object and file system.

UNIT – I OVERVIEW OF DISTRIBUTED SYSTEMS [9]

Introduction – Examples of Distributed Systems – Resource Sharing and Web – Challenges – API for Internet Protocol – External Data Representation and Marshaling – Remote Procedure Call – Communication Between Distributed Objects – Client Server Communication – Group Communication.

UNIT – II PROCESS AND SYNCHRONIZATION [9]

Processes – Threads – Communication and Invocation – Clocks, Events and Process States – Synchronization : Physical Clocks – Logical Time and Logical Clocks – Global States – Distributed Mutual Exclusion – Elections – Distributed Transactions.

UNIT – III CONSISTENCY AND REPLICATION [9]

Introduction – Data Centric Consistency Models – Client Centric Consistency Models – Distribution Protocols – Consistency Protocols – Casually Consistent – Lazy Replication.

UNIT – IV FAULT TOLERANCE AND SECURITY [9]

Introduction – Process resilience – Reliable client server communication – Reliable group communication – Distributed commit – Security Threads and Attacks – Access Control – Cryptography – Cryptography Algorithms – Kerberos – Electronic Payment System.

UNIT – V DISTRIBUTED OBJECT AND FILE SYSTEMS [9]

Distributed Object Based System – CORBA – COM+ – Distributed File System – Sun NFS – Andrew File System – Distributed Coordination Based System – JINI.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Identify the problems in developing distributed applications.

CO2: Identify feasibilities and impossibilities in managing resources.

CO3: Analyze the necessity of consistency and replication.

CO4: Recognize the inherent difficulties that arise due to distribution of computing resources.

CO5: Acquire knowledge about distributed object and file systems.

Text Books :

- 1 George Coulouris, Jean Dollimore, Tim Kindberg, Distributed Systems: Concepts and Design, Pearson Education, New Delhi, Fourth Edition, 2011.
- 2 Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems, Pearson Education, New Delhi, Second Edition, 2013.

References :

- 1 SunitaMahajan and Seema Shah, Distributed Computing, Oxford Higher Education, England, Second Edition, 2010.
- 2 A.S. Tanenbaum, Distributed Operating Systems, Pearson Education, New Delhi, Second Edition, 2011.
- 3 Ajay D. Kshemkalyani and Mukaeshsinghal, Distributed Computing Principles Algorithms & Systems, Cambridge University press, England, Second Edition, 2010
- 4 <http://nptel.ac.in/syllabus/106106107/>.

SEMESTER – V

18CS562	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT (PROFESSIONAL ELECTIVE - I)	L	T	P	C
		3	0	0	3

Prerequisite: Basic knowledge of Software Engineering.

Objectives:

- To know 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 methodology.
- To be aware of requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification.
- To learn system modeling for system, sub-system and their interfaces.
- 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 and 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 and Evaluation – Detailed Design – Component Design and Verification – Mechanical, Electronics and Software Subsystems – High Level Design and Low Level Design of Software Program – Types of Prototypes – Software 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 SERVICE 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

Course Outcomes: On Completion of this course, the student will be able to

CO1: Define, formulate and analyze a problem.

CO2: Solve specific problems independently or as part of a team.

CO3: Gain knowledge of the Innovation & Product Development process in the Business Context.

CO4: Work independently as well as in teams.

CO5: Manage a project from start to finish.

Text Books :

- 1 Karl T Ulrich and Stephen D Eppinger, Product Design and Development, Tata McGraw Hill, New Delhi, Fifth Edition, 2011
- 2 John W Newstorn and Keith Davis, Organizational Behavior, Tata McGraw Hill, New Delhi, Eleventh Edition, 2005

References :

- 1 Hiriappa B, Corporate Strategy - Managing the Business, Author house, USA, Second Edition, 2013
- 2 Peter F Drucker, People and Performance, Butterworth - Heinemann [Elsevier], Oxford, UK, First Edition, 2004.
- 3 Mark S Sanders and Ernest J McCormick, Human Factors in Engineering and Design, McGraw Hill Education, New Delhi, Seventh Edition, 2013.
- 4 https://onlinecourses.nptel.ac.in/noc17_me16/preview

SEMESTER – V

18CS563	OPEN SOURCE TECHNOLOGIES (PROFESSIONAL ELECTIVE - I)	L	T	P	C
		3	0	0	3

Prerequisite: Basic knowledge of Operating Systems and Database management systems.

Objectives:

- To know the basics of open source software.
- To gain the knowledge about working with various open source servers.
- To study the basis of open source database.
- To be familiar with PHP programming.
- To learn programming concepts of PERL.

UNIT – I BASICS OF OPEN SOURCE SOFTWARE [9]

Introduction to Open Source Software – Need of Open Source Software – Advantages of Open Source Software – Application of Open Source Software – Open Source Operating Systems: LINUX Introduction – General Overview – Kernel Mode and User Mode – Basic UNIX Commands – File and Filter Related Commands – Piping – Joining and Backup Commands.

UNIT – II OPEN SOURCE SERVERS [9]

Apache Web Server – Working with Web Server – Configuring and Using Apache Web Services – Samba Installation and Configuration: File Sharing – Installing NFS – XAMPP Server – Introduction and Installation.

UNIT – III MYSQL [9]

Introduction – Setting up Account – Record Selection Technology – Working with Strings – Date and Time – Sorting Query Results – Generating Summary – Working with Metadata – Using Sequences.

UNIT – IV PHP [9]

Introduction – Programming in Web Environment – Variables – Constants – Data Types – Operators – Statements – Functions – Arrays – OOP – String Manipulation – File handling – PHP and MYSQL database Connectivity – Applications based on PHP and MySQL.

UNIT – V PERL [9]

Perl: Background – Perl overview – Perl parsing rules – Variables and Data Statements and Control structures – Packages – Working with Files – Data Manipulation.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Demonstrate the use of various open source software.

CO2: Configure and manage various open source servers.

CO3: Apply the knowledge of MySQL for application development.

CO4: Build applications using PHP and MySQL.

CO5: Develop web applications using PERL.

Text Books :

- 1 N. B. Venkateshwarlu, Introduction to Linux: Installation and Programming, B S Publishers, First Edition, 2011.
- 2 Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, O'Reilly Publications, California, Fifth Edition, 2014.

References :

- 1 Robert Sheldon and Geoff Moes, Beginning MySQL, Wiley, India, First Edition 2006.
- 2 Adam McDaniel, Perl and Apache: Your visual blueprint for developing dynamic Web content, Wiley Publishing Inc, Indiana, Second eDition, 2010.
- 3 Martin C. Brown, Perl: The Complete Reference, Tata McGraw-Hill, New Delhi, Second Edition, 2009.
- 4 Steven Holzner, PHP: The Complete Reference, Tata McGraw-Hill, New Delhi, Second Edition, 2009.
- 5 <http://dev.mysql.com/doc/>

SEMESTER – V

18CS564	DATA WAREHOUSING AND DATA MINING	L	T	P	C
	(PROFESSIONAL ELECTIVE - I)	3	0	0	3

Prerequisite: Basic knowledge of Database Management Systems.

Objectives:

- To provide an exposure to fundamental concepts of data warehouse and data mining.
- To learn the concept of knowledge extraction and data preprocessing.
- To learn the concept of Mining patterns techniques.
- To know about various techniques, mechanism for classification.
- To study about the knowledge of data mining tools.

UNIT – I BASICS OF DATA WAREHOUSE [9]

Basic Concepts – Data Warehouse Modeling– Data Warehouse Design and Usage – Data Warehouse Implementation – Data Generalization by Attribute Oriented Induction.

UNIT – II DATA MINING AND DATA PREPROCESSING [9]

Data Mining : Introduction – Kinds of Data – Data Mining Functionalities – Classification of Data Mining Systems – Data Mining Task Primitives – Data Mining Applications – Major Issues in Data Mining – Data Preprocessing – Data Cleaning – Data Integration – Data Reduction – Data Transformation and Data Discretization.

UNIT – III ASSOCIATION RULE MINING [9]

Mining Frequent Patterns, Associations and Correlations: Basic Concepts – Frequent Item set Mining Methods – Pattern Evaluation Methods – Pattern Mining in Multilevel – Multidimensional Space – Constraint Based Frequent Pattern Mining – Mining High Dimensional Data and Colossal Patterns.

UNIT – IV CLASSIFICATION TECHNIQUES [9]

Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule Based Classification – Techniques to Improve Classification Accuracy – Classification by Backpropagation – Support Vector Machine – Classification Using Frequent Patterns – Lazy Learners – Other Classification Methods.

UNIT – V CLUSTER ANALYSIS AND DATA MINING TOOLS [9]

Cluster Analysis – Requirements for Cluster Analysis – Clustering Methods – Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Model Based Clustering Methods – Machine Learning with Open Source and Commercial Software – Machine Learning with Weka – XLMiner.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Develop conceptual design of data warehouses.

CO2: Obtain a good knowledge of the fundamental concepts that provide the foundation of data mining.

CO3: Select the technique for pre-processing the data using association rule mining.

CO4: Analyze good knowledge of feature extraction and classification techniques.

CO5: Develop real-time applications using recent data mining software.

Text Books :

- 1 Jaiwei Han, Micheline Kamber and Jian Pei, Data Mining Concepts and Techniques, Morgan Kauffman, California, Third Edition, 2012.
- 2 K.P. Soman, Shyam Diwakar and V. Ajay, Insight into Data mining Theory and Practice, PHI, India, Eastern Economy Edition, 2014.

References :

- 1 Alex Berson and Stephen J. Smith, Data Warehousing, Data Mining & OLAP, Tata McGraw - Hill, New Delhi, Thirteenth Edition, , 2008.
- 2 Jiawei Han and Micheline Kamber, Data Mining Concepts and Techniques, University of Illinois at Urbana-Champaign, USA, Third Edition, 2011.
- 3 G. K. Gupta, Introduction to Data Mining with Case Studies, Prentice Hall of India, New Delhi, Third Edition, 2014.
- 4 <https://www.youtube.com/watch?v=dGDuD10U4-M>

SEMESTER – V

18CS565	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS (PROFESSIONAL ELECTIVE - I)	L	T	P	C
		3	0	0	3

Prerequisite: Basic knowledge of problem solving techniques.

Objectives:

- To know the various characteristics of Intelligent agents.
- To be familiarized with the different search strategies in AI.
- To study reasoning and decision making in uncertain world.
- To learn plans and learning methods for generating knowledge.
To learn concepts of expert systems.

UNIT – I FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE [9]

Intelligent Agents – Agents and environments – Good behavior– Nature of environments – Structure of agents – Problem Solving: Problem solving agents – Example problems – Searching for solutions – Un-informed search strategies – Avoiding repeated states – Searching with partial information

UNIT – II INFORMED SEARCHING TECHNIQUES [9]

Informed search and exploration – Informed search strategies – Heuristic function – Local search algorithms and optimistic problems – Constraint Satisfaction Problems (CSP) – Backtracking search – Structure of problems – Adversarial Search – Games – Optimal decisions in games – Alpha-Beta Pruning.

UNIT – III LOGICAL REASONING [9]

First order logic – Representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic – Inference in First order logic – Prepositional versus first order logic – Unification and lifting – Forward chaining – Backward chaining – Resolution – Knowledge representation.

UNIT – IV PLANNING AND LEARNING [9]

Planning Problem – Planning with state – space search – Partial-order planning – Planning graphs – Planning and acting in the real world: Time schedules and resources – Learning from observation – Inductive learning – Decision trees – Explanation based learning.

UNIT – V EXPERT SYSTEMS [9]

Expert Systems – Architecture of Expert Systems – Roles of Expert Systems – Knowledge Acquisition – Typical Expert Systems – MYCIN – Expert Systems Shells.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- CO1: Use appropriate search algorithms for any AI problem.
 CO2: Analyze appropriate AI methods to solve a given problem.
 CO3: Formalize a given problem in the language/framework of different AI methods.
 CO4: Implement basic AI algorithms.
 CO5: Design and carry out an empirical evaluation of different algorithms on problem formalization.

Text Books :

- 1 Stuart Russell and Peter Norvig, Artificial Intelligence – A Modern Approach, Pearson Education, New Delhi, Third Edition, 2016
- 2 Kevin Night and Elaine Rich, Nair B., Artificial Intelligence (SIE), Tata McGraw Hill, New Delhi, Third Edition, 2008

References :

- 1 Dan W. Patterson, Introduction to AI and ES, Pearson Education, New Delhi, Third Edition, 2007.
- 2 Peter Jackson, Introduction to Expert Systems, Pearson Education, New Delhi, Third Edition, 2007.
- 3 P.H. Winston - Artificial Intelligence, Pearson Edition, New Delhi, Third Edition, 2006.
- 4 https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_expert_systems.html

SEMESTER – V

18EC586	DIGITAL SIGNAL PROCESSING	L	T	P	C
	(PROFESSIONAL ELECTIVE - I)	3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course.

Objectives:

- To learn about basic concepts in signals and systems.
- To learn discrete Fourier transform, properties of DFT.
- To explore the design procedures for FIR digital filters.
- To explore the design procedures for IIR digital filters.
- To understand the effects of finite precision representation on digital filters.

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 – 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 algorithm, Decimation-In-Frequency algorithm – Use of FFT in linear filtering.

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]

Symmetric and Asymmetric FIR filters – Linear phase FIR filters – Design using rectangular, Hamming, Hamming and Blackmann windows – Frequency sampling method – Realization of FIR filters – Transversal, Linear phase.

UNIT - V FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS [9]

Binary fixed point and floating point number representations – Comparison – Quantization noise – Truncation and rounding – Quantization noise power – Input quantization error – Coefficient quantization error – Limit cycle oscillations – dead band – Overflow error-signal scaling.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Describe the types of signals and systems.

CO2: Interpret the frequency transforms for the signals.

CO3: Design digital IIR filter using appropriate type.

CO4: Design appropriate type of FIR filter and implement digital filters in different FIR filter structures.

CO5: Analyze and Characterize the effects of finite precision representation.

Text Books :

- 1 John G Proakis and Dimtris G Manolakis, Digital Signal Processing Principles, Algorithms and Application, Pearson Education, USA ,Fourth Edition, 2014.

References :

- 1 Emmanuel C.Ifeachor, and Barrie.W.Jervis, Digital Signal Processing, Pearson Education, US, Second Edition, 2002.
- 2 Sanjit K. Mitra, Digital Signal Processing - A Computer Based Approach, Tata McGraw Hill, USA, Fourth Edition, 2013
- 3 A.V.Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, Pearson, New Delhi, Eighth Indian Reprint, 2004.
- 4 Andreas Antoniou, Digital Signal Processing, Tata McGraw Hill, New Delhi, Third Edition, 2013.
- 5 <http://nptel.ac.in/courses/117102060/>

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

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SEMESTER – VI

18CS661	SOCIAL NETWORK ANALYSIS (PROFESSIONAL ELECTIVE - II)	L	T	P	C
		3	0	0	3

Prerequisite: Basic knowledge of networks and data mining concepts.

Objectives:

- To know the concept of semantic web and related applications.
- To learn knowledge representation using ontology.
- To know human behavior in social web and related communities.
- To learn evaluation of social networks.
- To study applications of social networks.

UNIT – I BASIC CONCEPT OF SEMANTIC WEB [9]

Introduction to Semantic Web: Limitations of Current Web – Development of Semantic Web – Emergence of the social Web – Social Network Analysis: Development of Social Network Analysis – Electronic Sources for Network Analysis: Electronic Discussion Networks – Blogs and Online Communities – Web Based Networks – Applications of Social Network Analysis.

UNIT – II MODELING AND VISUALIZATION [9]

Visualizing Online Social Networks – A Taxonomy of Visualizations – Graph Representation – Centrality– Clustering – Node-Edge Diagrams – Visualizing Social Networks with Matrix– Based Representations – Node-Link Diagrams – Hybrid Representations – Modelling and aggregating social network data – Random Walks and their Applications – Use of Hadoop and Map Reduce – Ontological representation of social individuals and relationships.

UNIT – III MINING COMMUNITIES [9]

Aggregating and reasoning with social network data, Advanced Representations – Extracting evolution of Web Community from a Series of Web Archive – Detecting Communities in Social Networks – Evaluating Communities – Core Methods for Community Detection and Mining – Applications of Community Mining Algorithms – Node Classification in Social Networks.

UNIT – IV EVOLUTION OF SOCIAL NETWORKS [9]

Evolution in Social Networks – Framework – Tracing Smoothly Evolving Communities – Models and Algorithms for Social Influence Analysis – Influence Related Statistics – Social Similarity and Influence – Influence Maximization in Viral Marketing – Algorithms and Systems for Expert Location in Social Networks – Expert Location without Graph Constraints – with Score Propagation – Expert Team Formation – Link Prediction in Social Networks – Feature based Link Prediction – Bayesian Probabilistic Models – Probabilistic Relational Models.

UNIT – V APPLICATIONS OF SOCIAL NETWORKS [9]

Graph Theory – Centrality – Clustering – Node Edge Diagrams – Matrix Representation – Visualizing Online Social Networks – Co-Citation Networks. A New Linguistic Approach to Assess the Opinion of Users in Social Network Environments – Explaining Scientific and Technical Emergence Forecasting – Social Network Analysis for Biometric Template Protection

Total = 45 Periods**Course Outcomes: On completion of this course, the student will be able to**

- CO1: Develop semantic web related applications.
- CO2: Represent knowledge using ontology.
- CO3: Predict human behavior in social web and related communities.
- CO4: Evaluate social networks.
- CO5: Comprehend the various social networks Applications

Text Book :

- 1 Charu C. Aggarwal, Social Network Data Analytics, Springer, United States, Second Edition, 2014.
- 2 Peter Mika, Social Networks and the Semantic Web, Springer, United States, First Edition, 2007.

References :

- 1 Ajith Abraham, Aboul Ella Hassanien, vaclasnel, Computational Social Network Analysis: Trends, Tools and Research Advances, Springer, United States, Third Edition, 2012.
- 2 Borko Furht, Handbook of Social Network Technologies and Applications, Springer, United States, First Edition, 2011
- 3 Giles, Mark Smith, John Yen, Advances in Social Network Mining and Analysis, Springer, United States, 2010.
- 4 nptel.ac.in/courses/106106146/21

SEMESTER – VI

18CS662	OBJECT ORIENTED ANALYSIS AND DESIGN (PROFESSIONAL ELECTIVE - II)	L 3	T 0	P 0	C 3
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Prerequisite: Basic knowledge about Software Engineering.

Objectives:

- To study the basics of object oriented systems development concepts.
- To learn various UML design diagrams and to apply the appropriate design patterns.
- To know the concepts of object oriented design axioms and software quality assurance.
- To develop robust object-based models for Systems.
- To learn the Object-based view of Systems.

UNIT – I OVERVIEW OF OBJECT ORIENTED ANALYSIS AND DESIGN [9]

An Overview of Object Oriented Systems Development – Object Basics – Object Oriented System Development Life Cycle–The software development process – Building high quality software and Reusability.

UNIT – II OBJECT ORIENTED METHODOLOGIES AND MODELLING [9]

Rum Baugh Methodology – Booch Methodology – Jacobson Methodology – Patterns – Frameworks – Unified Approach – Unified Modeling Language – Class diagram – Use case diagram – Interaction Diagram – State chart Diagram – Activity diagram – Package Diagram – Implementation Diagram.

UNIT – III OBJECT ORIENTED ANALYSIS [9]

Identifying use cases – Use case model – Classification – Approaches for Identifying Classes: Noun Phrase Approach – Common Class Patterns Approach – Use case Driven approach – Classes, Responsibilities and Collaborators – Identifying Object Relationships, Attributes and Methods.

UNIT– IV OBJECT ORIENTED DESIGN [9]

Object Oriented Design Axioms – Designing Classes – Refining attributes – Designing methods and protocols – Access Layer – Object Storage and Object Interoperability.

UNIT – V SOFTWARE QUALITY AND SYSTEM USABILITY [9]

Designing Interface Objects – Software Quality Assurance – System usability – Measuring User Satisfaction.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- CO1: Aware of the object model for System development.
- CO2: Express software design with UML diagrams.
- CO3: Identify the concept of Relationships.
- CO4: Acquire knowledge in object oriented design and protocols.
- CO5: Obtain information about software quality assurance and system usability. .

Text Books :

- 1 Ali Bahrami, Object Oriented Systems Development, Tata McGraw-Hill, New Delhi, Ninth Edition, 2011
- 2 Mahesh P.Matha, Object Oriented Analysis and Design Using UML, PHI, New Delhi, Second Edition, 2010.

References :

- 1 Martin Fowler, UML Distilled, PHI/Pearson Education, New Delhi, Third Edition, Second Edition 2011.
- 2 Cay Horstmann, Object Oriented Design & Patterns, Wiley India Edition, India, Third Edition 2009.
- 3 Srinivasan Desikan, Gopaldaswamy Ramesh, Software Testing, Pearson Education, India, First Edition, 2008.
- 4 https://onlinecourses.nptel.ac.in/noc16_cs19

SEMESTER – VI

18CS664	TCP/IP DESIGN AND IMPLEMENTATION (PROFESSIONAL ELECTIVE - II)	L 3	T 0	P 0	C 3
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Prerequisite: Basic knowledge of Computer Networks.

Objectives:

- To impart knowledge about the basic concepts of internetworking, internet addressing and forwarding.
- To learn the fundamentals of network design and implementation.
- To learn the routing architecture and the protocols routers use to exchange routing information.
- To study on network management issues.
- To discuss application level services available in the internet.

UNIT – I INTERNETWORKING CONCEPTS [9]

The TCP/IP internet-Internet Services – Internetworking Concept and Architectural Model – TCP/IP 5 –Layer Reference Model – Protocol layering Principle – IP datagram – IP Forwarding algorithm – Internet addresses: Classful Addressing and Classless Addressing

UNIT – II TCP/IP PROTOCOL [9]

ARP message format and Implementation – RARP – The ICMP message formats – User Datagram protocol (UDP) – Reliable Stream Transport Service (TCP): Segment format, Establishing and closing TCP connections – TCP state machine – Silly window syndrome – Karn's algorithm and Timer Backoff.

UNIT – III IP ROUTING [9]

Routing Architecture: Cores, Peers, and Algorithms – Routing between Peers (BGP): Characteristics, Message header, Functionality and Message types – Routing within an Autonomous System (RIP, OSPF): RIP message format(IPv4 and IPv6) – OSPF message format – IGMP

UNIT – IV SOCKET INTERFACE [9]

Virtual Private Networks – Network Address Translation – Client-Server Model – The Socket API: Socket operations – Bootstrap and Auto configuration (DHCP) – The Domain Name System: Name Syntax and type – Mapping domain names to addresses – Domain name Resolution – Message format.

UNIT – V NETWORK PROTOCOLS AND FIREWALL DESIGN [9]

Electronic Mail (SMTP, POP, IMAP, MIME) – World Wide Web HTTP) – Voice and Video Over IP (RTP, RSVP, QoS) – Network Management (SNMP): Message format – Encoded SNMP message – Security in SNMP3 – IP Security – Firewalls.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Identify the basic concepts of internetworking, protocol layering and internet addressing in TCP/IP.

CO2: Examine the protocols used to deliver the datagram and report error information.

CO3: Analyze the protocols and algorithms used for exchanging routing information.

CO4: Evaluate the interaction between client-server using sockets API.

CO5: Create an application using SMTP, IMAP, HTTP and RTP protocols.

Text Books :

- 1 Douglas E.Comer, Internetworking with TCP/IP Principles, Protocols and Architecture, PHI, New Delhi, Sixth Edition,2014
- 2 Behrouz A.Forouzan, TCP/IP protocol suite, TMH, New Delhi, Fourth Edition, 2010.

References :

- 1 Kevin R.Fall, W. Richard Stevens, TCP/IP Illustrated, Volume 1: The Protocols, 2/E Pearson Education, New Delhi, Second Edition, 2011.
- 2 Dr.Sidnie Feit, TCP/IP, TMH, New Delhi, Second Edition, 2008
- 3 Kevin R. Fall and W. Richard Stevens, TCP/IP Illustrated, Addison-Wesley Professional, USA, Second Edition, 2012.
- 4 <http://nptel.ac.in/courses/106105081>.

SEMESTER – VI

18CS665	MACHINE LEARNING TECHNIQUES (PROFESSIONAL ELECTIVE - II)	L	T	P	C
		3	0	0	3

Prerequisite: Basic knowledge of Data Mining and Artificial Intelligence.

Objectives:

- To introduce the basic concepts and techniques of machine learning.
- To learn supervised and unsupervised learning techniques.
- To study the various probabilities based learning techniques.
- To know concept of decision tree and algorithms.
- To learn graphical models of machine learning algorithms.

UNIT – I FUNDAMENTALS OF LEARNING TECHNIQUES [9]

Learning – Types of Machine Learning – Supervised Learning – Machine Learning Process – Machine Learning applications – Terminology – Testing Machine Learning Algorithms – Turning Data Into Probabilities –The Brain and the Neuron – Perceptron – Linear Separability – Linear Regression.

UNIT – II LINEAR MODELS [9]

Multi-layer Perceptron: Going Forwards – Back Propagation of Error – Multi- layer Perceptron in Practice – Examples of using the MLP – Deriving Back Propagation – Radial Basis Functions and Splines: Concepts of RBF Network – Interpolations and Basis Functions – Support vector machine.

UNIT – III DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS [9]

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Least Squares Optimization – Basic approach in search – Evolutionary Learning: Genetic algorithms – Genetic Offspring – Genetic Operators – Reinforcement Learning.

UNIT – IV TREE AND UNSUPERVISED LEARNING [9]

Learning with Trees: Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning: Boosting – Bagging – Random forests – Different ways to Combine Classifiers – Unsupervised Learning: K means Algorithms – Vector Quantization – Self Organizing Feature Map.

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

Course Outcomes: On Completion of this course, the student will be able to

CO1: Summarize machine learning process and algorithms.

CO2: Distinguish between, supervised, unsupervised and semi-supervised learning.

CO3: Apply the appropriate machine learning strategy for any given problem.

CO4: Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem.

CO5: Design systems that use the appropriate graph models of machine learning.

Text Books :

- 1 Stephen Marsland, Machine Learning An Algorithmic Perspective, CRC Press Taylor & Francis Group, United States, Second Edition, 2015.
- 2 Ethem Alpaydin, Introduction to Machine Learning, MIT Press, Cambridge, Third Edition, 2014.

References :

- 1 Kevin P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, Cambridge ,Third Edition, 2012
- 2 Trevor Hastie, Robert Tibshirani and Jerome Friedman, The Elements of Statistical Learning, Springer, New York, Second Edition, 2011.
- 3 Christopher Bishop, Pattern Recognition and Machine Learning, Springer, New York, Second Edition, 2007.
- 4 <https://nptel.ac.in/courses/106105152/>

SEMESTER – VI

18CS666	AGILE SOFTWARE DEVELOPMENT (PROFESSIONAL ELECTIVE - II)	L	T	P	C
		2	0	2	3

Prerequisite: Basic concept of Software Engineering.

Objectives:

- To learn the fundamentals of agile environment.
- To impart knowledge on agile framework using Scrum.
- To learn and deploy testing models of Agile.
- To acquire knowledge on Drive development with unit tests using Test Driven Development.
- To enhance our knowledge on recent trends of Agile.

UNIT - I FUNDAMENTALS OF AGILE [7+2]

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 SCRUM FRAMEWORK [7+2]

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

UNIT - III AGILE TESTING [7+2]

Agile Information Systems – Agile Decision Making – Earls' 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 AGILE SOFTWARE DESIGN AND DEVELOPMENT [7+2]

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 INDUSTRY TRENDS [7+2]

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 (L: 35 P: 10) = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Discern the background and driving forces for taking an Agile approach to software development.

CO2: Recognize the business value of adopting Agile approaches.

CO3: Comprehend the Agile development practices.

CO4: Drive development with unit tests using Test Driven Development.

CO5: Apply design principles and refactoring to achieve Agility.

Text Books :

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

References :

- 1 Craig Larman, Agile and Iterative Development: A Managers Guide, Addison-Wesley, USA, First Edition, 2004.
- 2 Kevin C. Desouza, Agile Information Systems: Conceptualization, Construction, and Management, Butterworth Heinemann, United Kingdom, First Edition, 2007.
- 3 Robert Martin, Agile Software Development, Principles, Patterns, and Practices, PHI, New Delhi, First Edition, 2002.
- 4 nptel.ac.in/courses/106101061/26.

SEMESTER – VI

GREEN COMPUTING

(PROFESSIONAL ELECTIVE - III)

18CS667

L	T	P	C
3	0	0	3

Prerequisite: Environmental Science and Engineering, Basics of Computer Networks**Objectives:**

- To study the concepts related to Green IT.
- To learn Green devices and hardware.
- To learn the green IT strategies followed in enterprises.
- To be aware of green enterprise readiness and its role.
- To aware about Green IT laws, standards and protocols.

UNIT – I GREEN IT [9]

Environmental Concerns and Sustainable Development – Environmental Impacts of IT – Green IT – Holistic Approach to Greening IT – Greening IT – Applying IT for enhancing Environmental sustainability – Green IT Standards and Eco- Labelling of IT - Enterprise Green IT strategy – Life Cycle of a device or hardware – Reuse, Recycle and Dispose.

UNIT – II SUSTAINABLE SOFTWARE DEVELOPMENT AND GREEN DATA CENTRES [9]

Current Practices – Sustainable Software – Attributes – Metrics – Methodology – Defining Actions – Data Centre: Associated Energy Challenges – IT Infrastructure – Implications for Energy Efficiency – Management – Green Data Centre Metrics – Green Data Storage – Storage Media Power Characteristics – Energy Management Techniques for Hard Disks.

UNIT – III ENTERPRISE GREEN IT STRATEGY [9]

Approaching Green IT Strategies – Business Drivers – Business Dimensions for Green IT Transformation – Organizational Considerations – Steps to Develop Green IT Strategy – Metrics and Measurements – Multilevel Sustainable Information – Sustainability Hierarchy Models – Product, Individual and Functional Level Information – Organizational and Regional/City Level Information.

UNIT – IV GREEN ENTERPRISE READINESS AND THE ROLE OF IT [9]

Readiness and Capability – Development and Measuring of an Organization's G-Readiness Framework – Organizational and Enterprise Greening – Information systems in Greening Enterprises – IT Usage and Hardware – Inter-Organizational Enterprise activities and Green Issues – Enablers and making the case for IT and Green Enterprise.

UNIT – V REGULATING THE GREEN IT: LAWS, STANDARDS AND PROTOCOLS [9]

The regulatory environment and IT manufacturers – Non regulatory government initiatives – Industry associations and standards bodies – Green building standards – Green data centre – Social movements and Greenpeace – Cloud Computing – Energy Usage Model – Case Study: IaaS Provider.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Identify Green IT with its different dimensions and Strategies.

CO2: Describe Green data centre and storage along with its green software methodologies.

CO3: Describe the concepts to manage the green IT with necessary components.

CO4: Recognize various green enterprise activities, functions and their role with IT.

CO5: Identify various laws, standards and protocols for regulating green IT.

Text Books :

- 1 San Murugesan, G.R. Gangadharan, Harnessing Green IT - Principles and Practices, Wiley Publication, India, First Edition, 2012.
- 2 Bhuvan Unhelkar, Green IT Strategies and Applications - Using Environmental Intelligence, CRC Press, Florida, First Edition, 2011.

References :

- 1 Woody Leonhard, Katherrine Murray, Green Home computing for dummies, Wiley Publication, India, First Edition, 2009.
- 2 Bud E. Smith, Green Computing: Tools and Techniques for Saving Energy, Money and Resources, CRC Press, Florida, Second Edition, 2014.
- 3 Jason Harris, Green Computing and Green IT - Best Practices on regulations and industry, Lulu.com, first edition, 2008.
- 4 <https://nptel.ac.in/courses/106/105/106105167/>

SEMESTER – VI

.NET FRAMEWORK TECHNOLOGIES

18CS091

(Common To CS & EC)

(PROFESSIONAL ELECTIVE - III)

L	T	P	C
3	0	0	3

Prerequisite: Basic knowledge of Object oriented programming.**Objectives:**

- To impart the fundamental concepts of C# and .Net Framework.
- To learn the basic object oriented aspects of c#.
- To use various control in windows forms application.
- To create ASP .Net application.
- To deploy the created .Net application in real world.

UNIT – I .NET FRAMEWORK AND C# [9]

Origins of .Net strategy – .Net Framework – Visual Studio .Net – .Net languages – Benefits – Characteristics of C# – Applications of C# – Difference between C# and other Object Oriented Languages – Literals – Data types – Operators – Expressions – Statements – Looping: For each – Methods – Arrays – Strings.

UNIT – II OBJECT ORIENTED ASPECTS OF C# [9]

Class – Objects – Inheritance – Polymorphism – Operator Overloading – Delegates – Events and Exceptions.

UNIT – III APPLICATION DEVELOPMENT ON .NET [9]

Controls – Menus and Context menus – Forms – Building Windows Application – Relational Databases and SQL – ADO .Net object model – Getting started with ADO.Net – ADO Managed Providers – Data Bound Controls – Changing Database Records – ADO .Net and XML.

UNIT – IV WEB BASED APPLICATION DEVELOPMENT ON .NET [9]

Introduction to ASP.Net – Creating ASP .Net Site – ASP .Net working with page – ADO.Net Data Containers – Creating Bindable Grids of Data – ASP.Net Catching – Sessions and Cookies – Programming Web Services.

UNIT – V DEPLOYING .NET APPLICATION [9]

Assemblies – Versioning – Attributes – Reflection – Viewing Metadata –Type Discovery – Reflecting on a Type – Marshalling – Remoting – Server object types – Specifying with an interface – Building a server – Building a client – Using single call threads.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Solve the basic problems using object and classes in C#.

CO2: Demonstrate the concepts of OOPs.

CO3: Design application programs using .Net Components.

CO4: Design website using ASP .Net.

CO5: Build a server and client with an interface.

Text Books :

- 1 E. Balagurusamy, Programming in C#, Tata McGrawHill, New Delhi, Third Edition, 2010.
- 2 J. Liberty, Ian Griffiths and Mathew Adams, Programming C# 4.0, O'Reilly, California, Sixth Edition, 2010.

References :

- 1 Andrew Troelsen, Pro c# 5.0 and the .net 4.5 frameworks, Apress, India, Sixth Edition, 2010.
- 2 Herbert Schildt, The complete reference C# 4.0, Tata McGraw Hill, New Delhi, First Edition, 2010.
- 3 Art Gittleman, Computing with C# & .Net Framework, Jones & Bartlett Publishers, US, Second Edition, 2011.
- 4 nptel.ac.in/courses/105108081/module9/lecture39/lecture.pdf

SEMESTER – VI

18CS668	MOBILE APPLICATION DEVELOPMENT (PROFESSIONAL ELECTIVE - III)	L 3	T 0	P 0	C 3
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Prerequisite: Basic knowledge on Java Programming and Database Management Systems.

Objectives:

- To learn the setup of Android application development environment.
- To illustrate user interfaces for interacting with apps and triggering actions.
- To identify options to save persistent application data.
- To appraise the role of security and performance in Android applications.
- To interpret tasks used in handling multiple activities.

UNIT – I GET STARTED WITH ANDROID [9]

Get started – Build your first app – Introduction to Android – Create Your First Android App – Layouts, Views and Resources – Text and Scrolling Views – Resources to Help You Learn – Activities – Understanding Activities and Intents – The Activity Lifecycle and Managing State – Activities and Implicit Intents – Testing – debugging and using support libraries.

UNIT – II USER INTERFACE [9]

User Interaction -User Input Controls – Menus - Screen Navigation – RecyclerView View - Delightful user experience – Drawables, Styles, and Themes – Material Design - Providing Resources for Adaptive Layouts - Testing your UI - Testing the User Interface.

UNIT – III BACKGROUND SERVICES [9]

Background Tasks – Async Task and Async Task Loader – Connect to the Internet – Broadcast Receivers – Services – Triggering – scheduling and optimizing background tasks – Notifications - Scheduling Alarms – Transferring Data Efficiently.

UNIT – IV HANDLING OF DATA [9]

All about data – Preferences and Settings – Storing Data – Shared Preferences – App Settings – Storing data using SQLite – SQLite Primer – SQLite Database – Sharing data with content providers – Loading data using Loaders.

UNIT – V SECURING AND PUBLISHING APPS [9]

Permissions – Performance and Security – Firebase and AdMob, Publish.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Create, test and debug Android application by setting up Android development environment.

CO2: Implement adaptive, responsive user interfaces that work across a wide range of devices.

CO3: Infer long running tasks and background work in Android applications.

CO4: Demonstrate methods in storing, sharing and retrieving data in Android applications.

CO5: Analyze the performance of android applications and understand the role of permissions and security.

Text Books :

- 1 Google Developer Training, Android Developer Fundamentals Course – Concept Reference, Google Developer Training Team, 2016.
- 2 Erik Hellman, Android Programming – Pushing the Limits, Wiley India Pvt Ltd, India, First Edition, 2014.

References :

- 1 Dawn Griffiths and David Griffiths, Head First Android Development, O'Reilly SPD Publishers, California, First Edition, 2015.
- 2 J F DiMarzio, Beginning Android Programming with Android Studio, Wiley India Pvt Ltd, India, Fourth Edition, 2016.
- 3 Anubhav Pradhan, Anil V Deshpande, Composing Mobile Apps using Android, Wiley India Pvt Ltd, India, India, Fourth Edition, 2014.
- 4 <https://nptel.ac.in/courses/106/106/106106156>

SEMESTER – VI

18HS002	TOTAL QUALITY MANAGEMENT (Common To AU, CE, CS, EE, IT & ME) (PROFESSIONAL ELECTIVE - III)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Objectives:

- To explain the basic concepts of total quality management.
- To explain the various principles of total quality management.
- To describe the various statistical process control concepts.
- To discuss the various tools in Total quality management.
- To explain the different quality systems in manufacturing and service sectors

UNIT – I INTRODUCTION [9]

Introduction – Need for quality – Evolution of quality - Definition of quality – Dimensions of manufacturing and service quality – Basic concepts of TQM – Definition of TQM – TQM implementation steps – Quality council-Importance of leadership and motivation in TQM – Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT – II TQM PRINCIPLES [9]

Quality statements – Customer perception of quality – Customer complaints, Customer retention. Employee involvement, Empowerment, Team and Teamwork, Recognition and Reward – Continuous process improvement – Juran trilogy, PDSA cycle, 5s, 8D Methodology – Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT – III STATISTICAL PROCESS CONTROL [9]

The seven traditional tools of quality – Measurement of central tendency and dispersion, population and sample, normal curve, control chart (X,R,p) for variable and attributes, process capability – Seven new management tools – Six-sigma Concepts.

UNIT – IV TQM TOOLS [9]

Bench marking – reason , process – Quality circles concepts – FMEA – stages, types – Quality Function Deployment (QFD) – Taguchi quality loss function –TPM – concepts, improvement needs – Performance measures-criteria – Quality Cost.

UNIT – V QUALITY SYSTEMS [9]

Need for ISO 9000 – ISO 9001-2014, ISO 14000 Quality System – elements, implementation, Documentation. Quality auditing – concepts, requirements and benefits, non-conformance report – Case studies of TQM implementation in manufacturing and service sectors.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- CO1: Explain the fundamental concepts of total quality management.
 CO2: Illustrate the Various TQM principles for continuous process improvement.
 CO3: Classify the statistical tools to control and improve the quality of the products and services.
 CO4: Describe the tools and techniques to improve the quality concept.
 CO5: Explain the quality system in manufacturing and service sectors.

Text Books :

- 1 Dale H.Besterfield, et at., Total Quality Management, Pearson Education Asia, Indian Reprint, New Delhi, Third Edition, 2016.
- 2 Janakiraman,B and Gopal, R.K, Total Quality Management – Text and Cases, Prentice Hall (India) Pvt. Ltd., New Delhi, Third Edition, 2015.

References :

- 1 Suganthi,L and Anand Samuel, Total Quality Management, Prentice Hall (India)Pvt. Ltd., New Delhi, First Edition, 2014
- 2 James R. Evans and William M. Lindsay, The Management and Control of Quality, Thomson Learning, New Delhi, Nineteenth Editions, 2015.
- 3 Subburaj R, Total Quality Management, Tata McGraw Hill, New Delhi, First Edition, 2014
- 4 Eugence Mckenna and Nic Beach, Total Quality Management, Pearson Education Limited, New Delhi, Second Edition, 2014.

SEMESTER – VI

AD HOC AND SENSOR NETWORKS
(PROFESSIONAL ELECTIVE - III)

18CS669

L	T	P	C
3	0	0	3

Prerequisite: Basic knowledge of computer networks.**Objectives:**

- To know the basic concepts of adhoc networks.
- To study the different types of MAC protocols.
- To be familiar with different types of ad hoc routing protocols.
- To learn the architecture and protocols of wireless sensor networks.
- To be familiar with routing and Quality of Sensor Networks.

UNIT– I FUNDAMENTALS OF AD HOC NETWORKS [9]

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio Propagation Mechanisms – Characteristics of the Wireless Channel – Cellular and Ad Hoc Wireless Networks – Applications of Ad Hoc networks – Wireless Sensor Networks – Design Challenges in Ad hoc Wireless Networks.

UNIT – II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS [9]

Issues in Designing a MAC Protocol – Classification of MAC Protocols – Contention Based Protocols: Media Access Protocol for Wireless LANS, Busy Tone Multiple Access Protocol. – Contention Based Protocols with Reservation Mechanisms: Collision Avoidance Time Allocation Protocol, Hop Reservation Multiple Access Protocol. – Contention Based Protocols with Scheduling Mechanisms: Distributed Priority Scheduling – Distributed Wireless Ordering Protocol.

UNIT– III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS [9]

Issues in Designing a Routing for Ad Hoc Networks – Classification of Routing Protocols – Table Driven Routing Protocol: Destination Sequenced Distance Vector Routing Protocol – On-Demand Routing Protocol: Dynamic Source Routing Protocol, Ad Hoc On Demand Distance Vector Routing Protocol – TCP Over Ad Hoc Wireless Networks.

UNIT– IV WIRELESS SENSOR NETWORKS AND MAC PROTOCOLS [9]

Introduction – Sensor Node Technology – Sensor Taxonomy – WN operating Environment – WN Trends – Sensor Network Architecture – Data Dissemination – Data Gathering – MAC Layer Protocols: Self-Organizing, Hybrid TDMA/FDMA and CSMA Based MAC – IEEE 802.15.4

UNIT – V WSN ROUTING, LOCALIZATION AND QOS [9]

Challenges and Issues in WSN Routing – Routing strategies in Wireless Sensor Networks – Localization – Indoor and Sensor Network Localization – Quality of Sensor Network(QOS) – Energy Efficient Design – Synchronization – Transport Layer Issues – Security Issues – Real Time communication.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

- CO1: Summarize the applications of ad hoc and wireless sensor networks.
 CO2: Analyze the protocol design issues of ad hoc and sensor networks.
 CO3: Design routing protocols for ad hoc wireless networks with respect to some protocol design issues.
 CO4: Identify the basic concepts of wireless sensor networks and MAC layer Protocols.
 CO5: Discuss the WSN routing issues, localization and Quality of Sensor Networks in an efficient manner.

Text Books :

- 1 C. Siva Ram Murthy, and B. S. Manoj, Ad Hoc Wireless Networks: Architectures and Protocols, Prentice Hall, India, Second Edition, 2013.
- 2 Kazem Sohraby, Daniel Minoli, & Taieb Znati, Wireless Sensor Networks-Technology, Protocols, and Applications, John Wiley, India, Third Edition, 2013.

References :

- 1 Carlos De Moraes Cordeiro, Dharma Prakash Agrawal Ad Hoc & Sensor Networks: Theory and Applications, World Scientific Publishing Company, Singapore, Second Edition, 2011.
- 2 Feng Zhao and Leonides Guibas, Wireless Sensor Networks, Elsevier Publication, Netherlands, First Edition, 2004.
- 3 Holger Karl and Andreas Willig Protocols and Architectures for Wireless Sensor Networks, Wiley, India, Second Edition, 2005.
- 4 <https://nptel.ac.in/courses/106105160/>

SEMESTER – VI

18CS671

ADVANCED DATABASE TECHNOLOGY
(PROFESSIONAL ELECTIVE - III)

L	T	P	C
3	0	0	3

Prerequisite: Basic knowledge of database management systems.**Objectives:**

- To know different Data Models that can be used for specialized applications.
- To gain information about Parallel, Distributed Database, Object-Relational and XML.
- To develop in-depth knowledge about Advanced Database Models and Applications.
- To get the knowledge of Query optimization, Parallel and distributed database systems.
- To be able to develop new methods in databases based on knowledge of existing techniques.

UNIT – I RELATIONAL MODEL ISSUES [9]

ER Model: overview of database design process – Entity-Relationship model – Complex Attributes – Mapping Cardinalities – Primary key – Removing Redundant Attributes in Entity Sets Reducing E-R diagrams to Relation Schemas – Extended E-R Feature. Normalization: Features of Good Relational Designs –Decomposition using Functional dependencies – Functional Dependency Theory – 1NF, 2NF, 3NF & BCNF–Decomposition Using Multivalued Dependencies.

UNIT – II PARALLEL AND DISTRIBUTED DATABASES [9]

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems– Distributed Systems –Transaction processing in parallel and Distributed Systems. Parallel and Distributed Storage: Overview – Data partitioning – Dealing with skew in partitioning – Replication. Parallel and Distributed Transaction Processing: Distributed Transactions – Commit protocols.

UNIT – III OBJECT-RELATIONAL AND XML [9]

Overview of Object Database Concepts – Object Database Extensions to SQL – The ODMG Object Model and the Object Definition Language ODL – Object Database Conceptual Design – The Object Query Language OQL. XML and Internet Databases: Structured, Semi structured, and Unstructured Data – XML Hierarchical (Tree) Data Model – XML Documents, DTD, and XML Schema – Storing and Extracting XML Documents from Databases – XML Languages – Extracting XML Documents from Relational Databases.

UNIT – IV ADVANCED DATABASE MODELS AND APPLICATIONS [9]

Enhanced Data Models for Advanced Applications: Active Database Concepts and Triggers –Temporal Database Concepts – Spatial Database Concepts – Multimedia Database Concepts – Introduction to Deductive Databases. Overview of Data Mining Technology – Applications of Data Mining – Commercial Data Mining Tools – Overview of Data Warehousing – Introduction, Definitions and Terminology – Characteristics of Data Warehouses – Mobile Databases.

UNIT – V ADVANCED INDEXING AND BLOCKCHAIN [9]

Advanced Indexing Techniques: Bloom Filter – Log-Structured Merge Tree and Variants – Bitmap Indices – Indexing of Spatial Data. Advanced Application Development: Performance Tuning – Performance Benchmarks. Blockchain Databases: Overview – Blockchain Properties – Achieving Blockchain Properties via Cryptographic Hash Functions – Consensus – Data Management in a Blockchain – Smart Contracts – Performance Enhancement – Emerging Applications.

Total = 45 Periods**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Design relational database systems using ER and normalization.

CO2: Apply the concepts of parallel and distributed databases.

CO3: Use object-oriented technologies and XML to design relational databases.

CO4: Design relational databases using advanced models.

CO5: Acquire the knowledge in advanced indexing, application development and Blockchain databases.

Text Books :

- 1 Abraham Silberschatz, Henry F. Korth, Sudarshan, Database System Concepts, Tata McGraw Hill, New Delhi, Seventh Edition, 2020.
- 2 R.Elmasri, S.B.Navathe, Fundamentals of Database Systems, Pearson Education, New Delhi, Seventh Edition, 2016.

References :

- 1 Thomas Connolly, Carolyn Begg, Database Systems, A Practical Approach to Design, Implementation and Management, Addison Wesley Person Education, New Delhi, Fifth Edition, 2010
- 2 Peter Rob and Corlos Coronel, Database Systems - Design, Implementation and Management, Thompson Learning, India, Seventh Edition, 2003
- 3 Raghu Ramakrishnan, Database Management Systems, Tata McGraw Hill, India, Fourth Edition, 2010.
- 4 <http://www.nptelvideos.in/2012/11/database-management-system.html>

SEMESTER - VII**SOFT COMPUTING**

18CS761

(PROFESSIONAL ELECTIVE - IV)

L	T	P	C
3	0	0	3

Prerequisite: Basics of Data mining algorithms and Machine learning algorithms**Objectives:**

- To learn the basic concepts of Soft Computing.
- To become familiar with neural networks.
- To know the concepts of fuzzy systems.
- To gain the knowledge of genetic algorithms.
- To study soft computing techniques to solve problems.

UNIT – I INTRODUCTION TO SOFT COMPUTING [9]

Introduction – Neural Networks – Application Scope of Neural Networks – Fuzzy Logic – Genetic Algorithm – Hybrid Systems – Soft Computing – Artificial Neural Network – Fundamental Concept – Evolution of Neural Networks – Basic Models of ANN – McCulloch and Pitts Neuron Model – Linear Separability – Hebb Network.

UNIT – II ARTIFICIAL NEURAL NETWORKS [9]

Supervised Learning Network – Perceptron Networks – Adaline – Madaline – Back propagation Networks – Associative Memory Networks – Training Algorithms for Pattern Association - Bidirectional Associative Memory – Hopfield Networks – Unsupervised Learning Networks – Kohonen Self-Organizing Feature Maps – Learning Vector Quantization.

UNIT – III FUZZY SYSTEMS [9]

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets – Classical Relations and Fuzzy Relations - Cartesian Product of Relation – Classical Relation – Fuzzy Relations – Membership Functions – Features of the Membership Functions – Fuzzification – Methods of Membership Value Assignments.

UNIT – IV GENETIC ALGORITHMS [9]

Basic Terminologies in Genetic Algorithm – Operators in Generic Algorithm – Encoding – Selection – Crossover – Mutation – Stopping Condition for Generic Algorithm Flow – Constraints in Genetic Algorithm .

UNIT – V HYBRID SYSTEMS [9]

Hybrid Soft Computing Techniques – Neuro-Fuzzy Hybrid Systems – Genetic Neuro-Hybrid Systems – Genetic Fuzzy Hybrid and Fuzzy Genetic Hybrid Systems – Applications of Soft Computing – A Fusion Approach of Multispectral Images with SAR – Optimization of Traveling Salesman Problem using Genetic Algorithm Approach.

Total = 45 Periods**Course Outcomes: On Completion of this Course, the student will be able to**

CO1: Describe Neural networks.

CO2: Analyze various artificial neural networks.

CO3: Classify fuzzy sets and solving fuzzy problems.

CO4: Apply genetic algorithm operations.

CO5: Apply suitable soft computing techniques for various applications.

Text Book :

- 1 S.N.Sivanandam , S.N.Deepa, Principles of Soft Computing, Wiley India Pvt. Ltd, New Delhi, Third Edition, 2018.
- 2 S.Rajasekaran, G.A.Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications, PHI Learning Pvt. Ltd., New Delhi, Second Edition,2017.

References :

- 1 N.P.Padhy, S.P.Simon, Soft Computing with MATLAB Programming, Oxford University Press, England, Second Edition, 2015.
- 2 James A. Freeman and David M. Skapura, Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education, New Delhi, Fourth Edition, 2011.
- 3 Timothy J. Ross, Fuzzy Logic, John Wiley & Sons, Ltd, United States, Third Edition, 2010.
- 4 <https://nptel.ac.in/courses/106/105/106105173/>

SEMESTER - VII

18CS762	MULTICORE ARCHITECTURE (PROFESSIONAL ELECTIVE - IV)	L	T	P	C
		3	0	0	3

Prerequisite: Basic knowledge of Computer Architecture and Operating Systems.

Objectives:

- To know the need for multi-core processors and their architecture.
- To study the challenges in parallel and multi-threaded programming.
- To get the idea of shared memory programming with OpenMP.
- To learn distributed memory programming with MPI.
- To develop multicore programs and design parallel solutions.

UNIT – I MULTI-CORE PROCESSORS [9]

Single core to Multi-core Architectures – SIMD and MIMD systems – Interconnection Networks – Symmetric and Distributed Shared Memory Architectures – Cache Coherence – Performance Issues – Parallel program design.

UNIT – II PARALLEL PROGRAM CHALLENGES [9]

Performance – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – Deadlocks and Livelocks – Communication between threads (condition variables, signals, message queues and pipes).

UNIT – III SHARED MEMORY PROGRAMMING WITH OpenMP [9]

Open MP Execution Model – Memory Model – OpenMP Directives – Work-sharing Constructs – Library Functions – Handling Data and Functional Parallelism – Handling Loops – Performance Considerations.

UNIT – IV DISTRIBUTED MEMORY PROGRAMMING WITH MPI [9]

MPI Program Execution – MPI Constructs – Libraries – MPI Send and Receive – Point-to-Point and Collective Communication – MPI Derived Data Types – Performance Evaluation.

UNIT – V PARALLEL PROGRAM DEVELOPMENT [9]

Case studies: n-Body solvers – Tree Search – OpenMP and MPI Implementations and comparison.

Total =45Periods

Course Outcomes: On completion of this course, the student will be able to

- CO1: Learn multicore architectures and identify their characteristics.
 CO2: Infer the processor concepts by introducing multi-core, cluster, shared and distributed architecture concepts.
 CO3: Analyze the issues of programming Parallel Processors.
 CO4: Develop programs using OpenMP and MPI.
 CO5: Compare and contrast serial processors and parallel processors.

Text Book :

- 1 Peter S. Pacheco, An Introduction to Parallel Programming, Morgan-Kaufman/Elsevier, United States, Second Edition, 2021.
- 2 Darryl Gove, Multicore Application Programming for Windows, Linux, and Oracle Solaris, Pearson, New Delhi, First Edition, 2011.

References :

- 1 Michael J Quinn, Parallel programming in C with MPI and OpenMPI, Tata McGraw Hill, New Delhi, First Edition, 2003.
- 2 Victor Alessandrini, Shared Memory Application Programming: Concepts and Strategies in Multicore Application Programmin, Morgan Kaufmann, United States, First Edition, 2016.
- 3 Yan Solihin, Fundamentals of Parallel Multicore Architecture, CRC Press, Florida, First Edition, 2015.
- 4 <https://nptel.ac.in/courses/106/104/106104025>

SEMESTER - VII

18CS763

**HIGH SPEED NETWORKS
(PROFESSIONAL ELECTIVE - IV)**

L	T	P	C
3	0	0	3

Prerequisite: Basic Knowledge of Computer Networks**Objectives:**

- To learn basics of Computer networks.
- To know traffic and congestion management.
- To get knowledge of resource allocation and service management approaches.
- To study wireless network operations and functions.
- To teach network management, Protocols and its Application.

UNIT – I BASICS OF HIGH SPEED NETWORKS [9]

Introduction – Frame Relay Networks – ATM Protocol Architecture – ATM logical connection – ATM Cells – ATM service categories – AAL – High speed LANS: Emergence of High Speed LANS – Ethernets – Fiber Channel – Wireless LANS.

UNIT– II CONGESTION AND TRAFFIC MANAGEMENT [9]

Congestion Control in Data Networks and Internets – Link Level Flow and Error Control – TCP Traffic – Congestion Control in ATM Networks – Interior Routing Protocols.

UNIT – III QOS IN IP NETWORKS [9]

Integrated Service Architecture – Queuing Discipline – Random Early Detection Differentiated Services Protocol for QOS Support – RSVP– Multiportal Label Switching – Real Time Transport Protocol – IP Version 6.

UNIT – IV PRINCIPLES OF WIRELESS NETWORK OPERATIONS [9]

Local Broad Band and Ad hoc Networks – Introduction to Wireless LANS – IEEE 802.11 WLAN – WATM – HIPERLAN – Ad hoc Networking and WPAN.

UNIT – V NETWORK MANAGEMENT AND APPLICATIONS [9]

Network Management – Firewalls – MIB – SNMP –COPS VPNS – Mobile IP – Voice over IP.

Total = 45 Periods**Course Outcomes: On Completion of this Course, the student will be able to**

CO1: Explain the basics of high speed networks.

CO2: Determine the functionality of congestion control and identify traffic management.

CO3: Explain the functionality of QOS in IP Networks.

CO4: Analyze fundamentals of wireless communications.

CO5: Summarize fundamentals of network management and Its applications.

Text Book :

- 1 Williams Stallings, High Speed networks And Internet Performance And Quality Of Service, Pearson, New Delhi, Second Edition, 2002.(UNIT I & II)
- 2 Kaven Pahlavan And Prashant Krishnamoorthy, Principles Of Wireless Network, Prentice Hall Of India, New Delhi , Second Edition, 2010.(UNIT III &IV)

References :

- 1 Adrian Farrel, The Internet And Its Protocols, Elsevier Publications, Netherlands, First Edition,2011.(UNIT V)
- 2 Behrouz A. Forouzan, Data Communication And Computer Networking, McGraw Hill, New Delhi, Fourth Edition, 2011.
- 3 Larry L. Peterson and Bruce S.Davie, Computer Networks, Elsevier Publications, Netherlands, Third Edition, 2003
- 4 www.rivier.edu/faculty/vricbov

SEMESTER - VII

18CS764	INFORMATION SECURITY	L	T	P	C
	(PROFESSIONAL ELECTIVE - IV)	3	0	0	3

Prerequisite: Basic Knowledge of computer networks and software engineering

Objectives:

- To provide the basic concepts of information security and its life cycle.
- To know about legal, ethical and professional issues in information security.
- To learn various risk identification, assessment and management techniques.
- To develop various security tools and its technologies.
- To study about physical, personal and operational security.

UNIT – I BASICS OF INFORMATION SECURITY [9]

History, Definition – Information Security, Critical Characteristics of Information – CNSS Security Model – Components of an Information Systems – Securing the Components – Balancing Security and Access – The SDLC – The Security SDLC-Security Professional and the Organization – Communities of Interest.

UNIT – II SECURITY INVESTIGATION [9]

Need for Security – Business Needs – Threats – Attacks – Legal, Ethical and Professional Issues – Planning for Security - Information Security Planning and Governance – Information Security Policy, Standards and Practices.

UNIT-III RISK MANAGEMENT [9]

Introduction - An overview of Risk Management – Risk Identification –Risk Assessment – Risk Control strategies – Selecting a Risk Control Strategy – Quantitative versus Qualitative Risk Management.

UNIT – IV SECURITY TECHNOLOGIES [9]

Introduction - Access Control – Firewalls – Protecting Remote Connections – Intrusion Detection and Prevention Systems – Honeypots, Honeynets and Padded Cell Systems – Scanning and Analysis Tools.

UNIT- V PHYSICAL, PERSONNEL AND OPERATIONAL SECURITY [9]

Physical Access Controls – Fire Security and Safety – Failure of Supporting Utilities and Structural Collapse, Interception of Data – Securing Mobile and Portable Systems – Security and personnel – Information Security Maintenance – Real time case studies.

Total = 45 Periods

Course Outcomes: On Completion of this Course, the student will be able to

CO1: Summarize the principal concepts, major issues, technologies and basic approaches in information security.

CO2: Analyze the threats, attacks and understand legal professional and ethical issues.

CO3: Discover the process of identifying, assessing and treating risks.

CO4: Select the appropriate security technology for risk control.

CO5: Choose the appropriate operational security technologies to prevent security breach.

Text Book :

- 1 Michael E Whitman and Herbert J Mattord, Principles of Information Security, Cengage Learning India, Sixth Edition, 2018.
- 2 Micki Krause, Harold F. Tipton, Handbook of Information Security Management, CRC Press, Florida, Second Edition, 2004.

References :

- 1 Mark Stamp, Information Security: Principles and Practice, John Wiley and Sons, United States, Second Edition 2011.
- 2 Stuart McClure, Joel Scrambray, George Kurtz, Hacking Exposed, Tata McGraw- Hill, New Delhi, Seventh Edition 2012.
- 3 Charles P. Pfleeger & Shari Lawrence Pfleeger and Jonathan Margulies, Security in Computing, Pearson Education, New Delhi, Fifth Edition, 2015
- 4 https://www.nisc.go.jp/security-site/campaign/files/aj-sec/handbook-all_eng.pdf

	SEMESTER - VIII			
18CS862	SOFTWARE PROJECT MANAGEMENT (PROFESSIONAL ELECTIVE - V)	L	T	P
		3	0	0
				C 3

Prerequisite: Basic knowledge of software engineering

Objectives:

- To outline the need for software project management.
- To learn the lifecycle and different artifacts of software project management.
- To know workflow and checkpoints.
- To develop skills to handle process automation and project control.
- To deliver successful software projects that support organization's strategic goals.

UNIT – I PROJECT PLANNING AND ECONOMICS [9]

Project Definition – Importance of Software Project Management – Contract Management – Activities covered By Software Project Management – Overview of Project Planning – Stepwise Project Planning – Improving Software Economics: Reducing Software Product Size – Improving Software Processes – Improving Team Effectiveness – Improving Automation – Achieving Required Quality – Peer Inspections.

UNIT – II LIFE CYCLE AND ARTIFACTS [9]

Old way and New way: Principles of Conventional Software – Engineering Principles of Modern Software Management – Transitioning to an iterative process. Life Cycle Phases: Engineering and Production Stages – Inception – Elaboration – Construction – Transition Phases. Artifacts of the process: Artifact Sets – Management Artifacts – Engineering Artifacts – Programmatic Artifacts.

UNIT – III WORK FLOWS AND CHECK POINTS [9]

Work Flows of the process: Software Process Workflows – Iteration Workflows. Checkpoints of the process: Major Milestones – Minor Milestones – Periodic Status Assessments. Iterative Process Planning: Work Breakdown Structures – Planning Guidelines – Cost and Schedule Estimating – Iteration Planning Process – Pragmatic Planning.

UNIT – IV PROCESS AUTOMATION AND PROJECT CONTROL [9]

Process Automation: Automation Building Blocks – Project Control and Process instrumentation: Seven Core Metrics – Management Indicators – Quality Indicators – Life Cycle Expectations – Pragmatic Software Metrics – Metrics Automation – Tailoring the Process: Process Discriminants.

UNIT – V STAFFING IN SOFTWARE PROJECTS [9]

Managing people – Organizational behavior – Best Methods of Staff Selection – Motivation – The Oldham – Hackman Job Characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in Teams – Decision Making – Organizational Structures – Dispersed and Virtual Teams – Communications Genres – Communication Plans – Leadership.

Total = 45 Periods

Course Outcomes: On completion of this course, the student will be able to

- CO1: Summarize basics of software project management and economics.
 CO2: Obtain adequate knowledge about software project lifecycle phases and artifacts.
 CO3: Gain extensive knowledge about workflow and checkpoints.
 CO4: Analyze the process automation and project control.
 CO5: Learn staff selection process and the issues related to people management.

Text Book :

- 1 Bob Hughes and Mike Cotterell, Rajib Mall Software Project Management, Tata McGraw Hill, New Delhi, Fifth Edition, 2018.
- 2 Walker Royce, Software Project Management: A Unified Approach, Pearson Education, New Delhi, First Edition, 1998.

References :

- 1 Robert K. Wysocki, Effective Software Project Management – Wiley Publication, India, Second Edition, 2011.
- 2 Pankaj Jalote, Software Project Management in practice, Pearson Education, New Delhi, Second Edition, 2005.
- 3 Walker Royce, Software Project Management: A Unified Approach, Pearson Education, New Delhi, First Edition, 1998.
- 4 https://onlinecourses.nptel.ac.in/noc19_cs70/preview

	SEMESTER - VIII			
18CS863	CYBER FORENSICS	L	T	P
	(PROFESSIONAL ELECTIVE - V)	3	0	0
				C
				3

Prerequisite: Basic Knowledge about Information(Internet) Security

Objectives:

- To learn the security issues in network layer and transport layer.
- To be exposed to security issues of the application layer.
- To learn computer forensics.
- To be familiar with forensics tools.
- To learn to analyze and validate forensics data.

UNIT – I NETWORK LAYER SECURITY AND TRANSPORT LAYER SECURITY [9]

IPSec Protocol – IP Authentication Header – IP ESP – Key Management Protocol for IPSec. Transport layer Security: SSL protocol, Cryptographic Computations –TLS Protocol.

UNIT – II E-MAIL SECURITY AND FIREWALLS [9]

PGP – S/MIME – Internet Firewalls for Trusted System: Roles of Firewalls – Firewall Related Terminology –Types of Firewalls – Firewall Designs – SET for E-Commerce Transactions.

UNIT – III INTRODUCTION TO COMPUTER FORENSICS [9]

Introduction to Traditional Computer Crime – Traditional Problems Associated with Computer Crime – Introduction to Identity Theft and Identity Fraud. Types of CF techniques – Incident and Incident Response Methodology – Forensic Duplication and Investigation. Preparation for IR: Creating Response Tool Kit and IR team – Forensics Technology and Systems – Understanding Computer Investigation – Data Acquisition.

UNIT – IV EVIDENCE COLLECTION AND FORENSICS TOOLS [9]

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

UNIT – V ANALYSIS AND VALIDATION [9]

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics.

Total = 45 Periods

Course Outcomes: On completion of this course, the student will be able to

CO1: Discuss the security issues network layer and transport layer.

CO2: Apply security principles in the application layer.

CO3: Explain computer forensics.

CO4: Use forensics tools.

CO5: Analyze and validate forensics data.

Text Book :

- 1 Kavrestad, Joakim, Fundamentals of Digital Forensics Theory, Methods, and Real-Life Applications, Springer, US, Second Edition, 2020.
- 2 Andre Arnes, Digital Forensics, Wiley, India, First Edition, 2017.

References :

- 1 C. Altheide & H.Carvey, Digital Forensics with Open Source Tools, Elsevier, Netherlands, First Edition, 2011.
- 2 <http://www.forensiceducation.co.in/course.syllabus.html>.
- 3 <https://esu.desire2learn.com>.
- 4 <https://www.youtube.com/watch?v=giv0DQDSsjQ&list=PLJu2iQtpGvv-2LtysuTTka7dHt9GKUbxD>.

SEMESTER - VIII

NATURAL LANGUAGE PROCESSING
(PROFESSIONAL ELECTIVE - V)

L	T	P	C
3	0	0	3

18CS864

Prerequisite: Basic knowledge of Probability and Information Retrieval.**Objectives:**

- To tag a given text with basic Language processing 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 keeping an application in mind.
- To Compare and contrast use of different statistical approaches for different types of applications.

UNIT – I BASICS OF NLP AND MODELS [9]

Natural Language Processing tasks in syntax, Semantics, and Pragmatics – Issues – Applications – The role of machine learning – Probability Basics – Information Theory – Collocations – N-gram Language Models – Estimating Parameters and Smoothing – Evaluating Language Models.

UNIT– II MORPHOLOGY AND PART OF SPEECH TAGGING [9]

Linguistic Essentials – Lexical Syntax – Morphology and Finite State Transducers – Part of Speech Tagging – Rule-Based Part of Speech Tagging – Markov Models – Hidden Markov Models – Transformation based Models – Maximum Entropy Models. Conditional Random Fields.

UNIT – III SYNTAX PARSING [9]

Syntax Parsing – Grammar Formalisms and Treebank's – Parsing with Context Free Grammars – Features and Unification – Statistical Parsing and Probabilistic CFGs (PCFGs) – Lexicalized PCFGs.

UNIT– IV SEMANTIC ANALYSIS [9]

Representing Meaning – Semantic Analysis – Lexical semantics – Word-sense disambiguation –Supervised – Dictionary based and Unsupervised Approaches – Compositional semantics – Semantic Role Labeling and Semantic Parsing – Discourse Analysis.

UNIT – V APPLICATIONS [9]

Named Entity Recognition and Relation Extraction – IE using Sequence Labeling – Machine Translation (MT) – Basic Issues in MT– Statistical Translation – Word Alignment – Phrase-Based Translation – Question Answering.

Total =45 Periods**Course Outcomes: On completion of this course, the student will be able to**

CO1: Build a morphological analyzer for a language using finite state automata concepts.

CO2: Create a parser by providing suitable grammar and words.

CO3: Make parse tree showing the semantic interpretations for the constituents.

CO4: Compare algorithms for word sense disambiguation.

CO5: Construct an augmented transition network for discourse planning.

Text Book :

- 1 Daniel Jurafsky and James H. Martin, Speech and Language Processing, Prentice Hall, New Delhi, Second Edition, 2008.
- 2 Christopher D. Manning and Hinrich Schuetze, Foundations of Statistical Natural Language Processing, MIT Press, Cambridge,First Edition,1999.

References :

- 1 Pierre M. Nugues, An Introduction to Language Processing with Perl and Prolog: An Outline of Theories, Implementation, and Application with Special Consideration of English, French, and German (Cognitive Technologies), McGraw-Hill, New Delhi, Sixth Edition, 2010.
- 2 James Allen, Natural Language Understanding, Addison Wesley, US, Second Edition, 1994.
- 3 Steven Bird, Ewan Klein and Edward Loper, Natural Language Processing with Python, O'Reilly Media, California, First edition, 2009.
- 4 NLTK – Natural Language Tool Kit - <http://www.nltk.org/>

SEMESTER - VIII

18CS865

**MAINFRAME TECHNOLOGIES
(PROFESSIONAL ELECTIVE - V)**L T P C
3 0 1 3**Prerequisite:** Basic Knowledge of computer Architecture and Operating Systems.**Objectives:**

- To know about classification of computers and mainframe computers.
- To get the knowledge of mainframe operating system Z/OS and JCL.
- To learn the languages of COBOL Programming.
- To learn the languages of DB2.
- To identify the embedded SQL programming.

UNIT – I EVOLUTION OF MAINFRAME HARDWARE AND MAINFRAMES OS [7+2]

Overview of Computer Architecture – Classification of Computers: Micro, Mini, Mainframes and Super Computer – Mainframe Computer – Key Features – Benefits – Evolution of Mainframes – Different Hardware Systems – Operating Systems on Mainframes: Batch Processing Vs Online Processing – Mainframe Operating System: Evolution – Concepts of Address Space, Buffer Management – Virtual Storage – Paging – Swapping – Dataset Management in Mainframes.

UNIT – II Z/OS AND JCL [7+2]

Z-operating system (Z/OS) – Virtual storage – Paging process – Storage Managers – Program Execution Modes – Address Space : Multiple Virtual System(MVS) - MVS Address Space - Z/OS Address Space – Dataset – Sequential and Partial Dataset – Direct Access Storage Device(DASD) – Access Methods – Record Formats – Introduction to Virtual Storage Access Methods(VSAM) – Introduction to Job Control Language – JOB Processing – Structure of JCL Statements – Various Statements in JCL – JOB Statement – Exec Statement – DD Statement – JCL procedures.

UNIT – III COBOL PROGRAMMING - I [7+2]

Introduction: History – Evolution and Features – COBOL Program Structure – Steps in Executing COBOL – Language Fundamentals : Divisions – Sections – Paragraphs – Sections – Sentences and Statements – Character Set – Literals – Words – Figurative Constants – Rules for Forming User Defined Words – COBOL Coding Sheet – Data Division: Data Names – Level Numbers – PIC and VALUE Clause – Redefines – Renames and Usage Clause – Procedure Division: Input / Output Verbs – Initialize Verb – Data Movement Verbs – Arithmetic Verbs – Sequence Control Verbs.

UNIT – IV COBOL PROGRAMMING - II [7+2]

File Processing : Field – Physical / Logical Records – File – File Organization (Sequential - Indexed And Relative) and Access Mode – File – Control Paragraph – File Section – File Operations – File Handling Verbs : Open – Read – Write – Rewrite – Close – Table Processing : Definition – Declaration – Accessing Elements – Subscript and Index – Set Statement – Search Verb – Search ALL Verb – Comparison – Miscellaneous Verbs : Copy – Call – Sort – Merge – String – Unstring Verbs.

UNIT – V DB2 [7+2]

Introduction to DB2 : System Service Component – Database Service Component – Locking Service Component – Distributed Data Facility Services Component – Stored Procedure Component – Catalogs and Optimizer – DB2 Objects and Data Types : DB2 Objects Hierarchy – Storage Groups – Database – Table Space – Table – Index – Clustered Index – Synonyms and Aliases – Views – Data Types DB2 – SQL programming :Types of SQL Statements – DCL– DDL– DML– SPUFI Utility – Embedded SQL Programming : Host Variable – DECLGEN Utility – SQLCA – Single/Multiple Row Manipulation – Cursors – Scrollable Cursors.

Total =(L: 35 P: 10) =45 Periods**Course Outcomes: On completion of this course, the student will be able to**

- CO1: Aware of the evolution of mainframe hardware and mainframes OS.
CO2: Enhance the knowledge of mainframe computers- Z/OS and JCL.
CO3: Write programs using COBOL language in mainframe computers.
CO4: Design a programs using DB2 language in mainframe computers.
CO5: identify with the embedded SQL programming.

Text Books :

- 1 Gary DeWard Brown, JCL Programming Bible (with z/OS), Wiley India Dream Tech, India, Fifth Edition, 2002
- 2 M.K. Roy and D. Ghosh Dastidar, COBOL Programming, Tata McGraw Hill, New York, First Edition, 1973.

References :

- 1 Gabrielle Wiorkowski & David Kull, DB2 Design & Development Guide, Addison Wesley, US, First Edition, 1992
- 2 Newcomer and Lawrence, Programming with Structured COBOL, McGraw Hill Books, New York, First Edition, 1973.
- 3 Craig S Mullins, DB2 Developer's Guide, Sams Publishing, US, First Edition, 1992.
- 4 <http://www-1.ibm.com/support/docview.wss?uid=pub1sa22759706>

SEMESTER - VIII

18CS866	KNOWLEDGE BASED DECISION SUPPORT SYSTEM (PROFESSIONAL ELECTIVE - V)	L	T	P	C
		3	0	0	3

Prerequisite: Basic Knowledge of Artificial Intelligence and Expert System

Objectives:

- To know the process of decision making and how computers can provide support to the decision making.
- To learn Decision Support Systems and how this technology provides support to decision makers.
- To learn how Knowledge management provides support to decision makers and to develop DSS Systems.
- To get idea about the Knowledge Acquisition and Intelligent system.
- To learn about intelligent decision support systems and to solve business problem along with management support systems.

UNIT – I FUNDAMENTALS OF DECISION MAKING SYSTEM [9]

Decision Making, Systems, Modeling, and Support – Introduction and Definition – Systems – Models – Modeling process – Decision making: The Intelligence phase – The Design phase – The Choice phase – Evaluation: The implementation phase.

UNIT – II DECISION SUPPORT SYSTEMS [9]

Decision Support Systems (DSS) – Characteristics and Capabilities of DSS – Components of DSS – DSS Hardware – DSS Classifications – DSS Development – Traditional System Development Life Cycle – Methodologies – Technology Levels and Tools – Development platforms – Tool selection – Developing DSS

UNIT – III KNOWLEDGE MANAGEMENT [9]

Group Decision-Making, Communication, and Collaboration – Communication Support – Collaboration Support: Computer-Supported Cooperative Work – Enterprise Information Systems: Concepts and Definitions – The Evolution of Executive and Enterprise Information Systems – Executives' Roles and Information Needs – Characteristics and Capabilities of Executive Support Systems – Comparing and Integrating EIS and DSS – Introduction to Knowledge Management – Organizational Learning and Transformation – Knowledge Management Initiatives – Approaches to Knowledge Management – Information Technology in Knowledge Management – Knowledge Management Systems Implementation – Roles of People in Knowledge Management – Ensuring Success of Knowledge Management

UNIT – IV KNOWLEDGE ACQUISITION AND INTELLIGENT SYSTEM [9]

Knowledge Engineering – Scope and Types of Knowledge – Methods of Knowledge Acquisition from Experts – Knowledge Acquisition from Multiple Experts – Knowledge Verification and Validation – Representation of Knowledge – Reasoning in Rule-Based Systems – Explanation and Metaknowledge – Expert Systems Development – Knowledge Acquisition and the Internet – Inferencing with Uncertainty – Machine-Learning Techniques – Model and Case-Based Reasoning

UNIT – V MANAGEMENT SUPPORT SYSTEMS [9]

Management Support Systems Overview – Models of MSS Integration – Intelligent DSS -- Intelligent Modeling and Model Management – Integration with the Web, Enterprise Systems, and Knowledge Management – The Impacts of MSS – MSS Impacts on Organizations and Individuals – Decision-Making and the Manager's Job – Issues of Legality, Privacy, and Ethics – Intelligent Systems and Employment Levels – Future of Management-Support Systems

Total = 45 Periods

Course Outcomes: On completion of this course, the student will be able to

CO1: Recognize Simon's four phases of decision making: Intelligence, Design, Choice, and Implementation.

CO2: Identify about the need for computerized support of managerial decision making.

CO3: Discuss the need for Knowledge Management and Acquisition.

CO4: Illustrate the conceptual foundation of the decision support system and methodology and relate them each other.

CO5: Describe the basic concepts of management support system modeling.

Text Book :

- 1 Efrain Turban, Jay E. Aronson, Decision Support Systems and Intelligent Systems, Pearson Education, New Delhi, Seventh Edition 2007.
- 2 Ganesh Natarajan, Sandhya Shekhar, Knowledge management -Enabling Business Growth, Tata McGraw Hill, New Delhi, First Edition, 2002

References :

- 1 George M. Marakas, Decision Support System, Prentice Hall, India, First Edition, 2003.
- 2 Efram A. Mallach, Decision Support and Data Warehouse Systems, Tata McGraw-Hill, New Delhi, Second Edition, 2002.
- 3 Robert H. Bonczek, Foundations of Decision Support Systems, Academic Press New York, Second Edition, 2014.
- 4 www.nptel.ac.in/syllabus/110104021/

SEMESTER - VIII

18CS867

**PERVASIVE COMPUTING
(PROFESSIONAL ELECTIVE - VI)**

L	T	P	C
3	0	0	3

Prerequisite: Basic Knowledge of mobile computing**Objectives:**

- To study the pervasive computing and its applications.
- To know the pervasive computing web based applications.
- To educate voice enabling pervasive computing.
- To learn PDA and its software components in pervasive computing.
- To study user interface issues in pervasive computing.

UNIT – I BASICS OF PERVASIVE COMPUTING [9]

Pervasive computing infrastructure – applications - Device Technology – Hardware, Human – machine Interfaces, Biometrics, and Operating systems – Device Connectivity – Protocols, Security, and Device Management – Pervasive Web Application architecture – Access from PCs and PDAs – Access via WAP.

UNIT– II WEB APPLICATIONS [9]

Pervasive Computing and web based Applications – XML and its role in Pervasive Computing – Wireless Application Protocol (WAP) Architecture and Security – Wireless Mark-Up language (WML) – Introduction.

UNIT – III SPEECH APPLICATIONS [9]

Voice Enabling Pervasive Computing – Voice Standards – Speech Applications in Pervasive Computing and security.

UNIT – IV PERSONAL DIGITAL ASSISTANT [9]

PDA in Pervasive Computing – Introduction – PDA software Components – Standards – Emerging Trends – PDA Device Characteristics – PDA Based Access Architecture.

UNIT – V ADVANCED CONCEPTS [9]

User Interface Issues in Pervasive Computing – Architecture – Smart Card based Authentication Mechanisms – Wearable computing Architecture.

Total =45 Periods**Course Outcomes: On completion of this course, the student will be able to**

CO1: Acquire the knowledge about pervasive computing concepts.

CO2: Identify various web and search applications.

CO3: Summarize the voice standards and speech applications.

CO4: Familiar with PDA and its software components.

CO5: Acquainted with the issues and emerging trends in pervasive computing.

Text Books :

- 1 Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaeck & Klaus Rindtorff, Pervasive Computing Technology and Architecture of Mobile Internet Applications, Addison-Wesley, USA, Third Edition, 2007.
- 2 Uwe Hansman, Lothar Merk, Martin S Nicklous and Thomas Stober, Principles of Mobile Computing, Second Edition, Springer - Verlag, New Delhi, First Edition, 2003.

References :

- 1 Rahul Banerjee, Internetworking Technologies: An Engineering Perspective, Prentice Hall of India, Second Edition, 2004.
- 2 Rahul Banerjee, Lecture Notes in Pervasive Computing, BITS-Pilani, 2012..
- 3 Jochen Burkhardt, Dr. Horst Henn, Stefan Hepper and Klaus Rindtorff, Thomas Schaeck, Pervasive Computing, Addison Wesley, USA, Second Edition 2009.
- 4 F. Adelstein, S.K.S. Gupta, Fundamentals of Mobile and Pervasive Computing, Tata McGraw Hill, New Delhi, First Edition 2005.

	SEMESTER - VIII			
	ETHICAL HACKING		L	T
18CS868	(PROFESSIONAL ELECTIVE - VI)		P	C
			3	0
			0	3

Prerequisite: Basic knowledge of computer networks and operating systems

Objectives:

- To learn the basics of ethical hacking.
- To impart knowledge on foot printing, social engineering and port scanning.
- To study the concepts of Vulnerabilities in operating system.
- To hack web servers and wireless networks.
- To learn about protecting network with security devices.

UNIT – I FUNDAMENTALS OF ETHICAL HACKING [9]

Introduction to Ethical Hacking – Legal and Illegal actions – TCP/IP concepts: Overview of TCP/IP – IP Addressing and Number systems. Networks and Computer Attacks: Malware – Protecting against Malware attacks – Intruder attacks – Physical Security Addressing.

UNIT – II FOOT PRINTING AND PORT SCANNING [9]

Using web tools for Foot Printing – Conducting competitive intelligence – Using DNS zone transfers – Social engineering, Port Scanning – Types of port scans – Scanning tools – Conducting Ping sweeps – Shell scripting.

UNIT – III VULNERABILITIES IN OPERATING SYSTEM [9]

Microsoft OS: Tools to identify vulnerabilities on Microsoft systems – Microsoft OS vulnerabilities – Vulnerabilities in Microsoft services – Linux OS: Review of Linux Fundamentals – Linux OS vulnerabilities – Remote access attacks on Linux systems – Countermeasures against Linux remote attacks.

UNIT – IV HACKING WEB SERVICES AND WIRELESS NETWORKS [9]

Web servers: Web applications, Web application vulnerabilities – Tools of web attackers and security testers – Wireless Networks: Wireless Technology – Wireless Network Standards – Authentication – War driving – Wireless Hacking.

UNIT – V CRYPTOGRAPHY AND NETWORK SECURITY [9]

Cryptography: Basics of Cryptography, Symmetric and Asymmetric algorithms – Public Key Infrastructure, Cryptography attacks – Protecting networks with security devices: Network security devices – Firewalls – Intrusion Detection Systems and Honeypots.

Total =45 Periods

Course Outcomes: On completion of this course, the student will be able to

CO1: Comprehend the concepts of legal and illegal activities on Internet.

CO2: Acquire knowledge on foot printing tools and port scanning concepts.

CO3: Identify vulnerabilities on OS systems and services.

CO4: Outline the concepts of hacking web server and tools to protect web oriented services.

CO5: Impart the knowledge of cryptography algorithms to provide security from attacks.

Text Books :

- 1 Michael T. Simpson and Nicholas Antill, Ethical Hacking and Network defense, Cengage Learning, New Delhi, Third Edition, 2017.
- 2 Ankit Fadia, Ethical Hacking, Macmillan India Ltd, India, Second Edition, 2006.

References :

- 1 Steven Defino, Barry Kaufman and Nick Valenteen, Official Certified Ethical Hacker review guide, Cengage learning New Delhi, Second Edition, 2012.
- 2 Ankit Fadia, The Ethical Hacking Guide to Corporate Security, Macmillan Publishers, India, Second Edition, 2010.
- 3 James S. Tiller, The Ethical Hack: A Framework for Business value Penetration Testing, CRC Press, Florida, First Edition, 2005.
- 4 <https://www.lynda.com/Security-tutorials/...Ethical-Hacking/455716-2.htm>

SEMESTER - VIII

ENTERPRISE RESOURCE PLANNING
(PROFESSIONAL ELECTIVE - VI)

18CS872

L T P C
3 0 0 3**Prerequisite:** Basic Knowledge of mobile computing**Objectives:**

- To know the basics of ERP
- To study the key implementation of ERP.
- To obtain knowledge in business modules of ERP System.
- To know post implementation of ERP.
- To gain knowledge in emerging trends on ERP

UNIT – I BASICS OF ERP [9]

Overview of an Enterprise – Evaluation of ERP-Benefits of ERP– ERP and Related Technologies – Business Process Reengineering (BPR)– Data Warehousing – Data Mining – Online Analytical Processing(OLAP) -Applications of ERP.

UNIT – II ERP IMPLEMENTATION [9]

Implementation – Strategies – Life Cycle – Pre-implementation Tasks –Requirements Definition – Methodologies – Package selection – Project Teams – Process Definitions – Vendors and Consultants – Data Migration – Project management – Post Implementation Activities.

UNIT – III THE BUSINESS MODULES [9]

Business modules in an ERP Package – Finance – Manufacturing – Human Resources – Plant Maintenance – Materials Management – Quality Management – Marketing – Sales, Distribution and Service.

UNIT– IV POST IMPLEMENTATION [9]

ERP Implementation - Maintenance of ERP – Organizational and Industrial impact – Success factors of ERP Implementation – Key success factors – Failure factors of ERP Implementation.

UNIT – V EMERGING TRENDS ON ERP [9]

Extended ERP systems and ERP add-ons – CRM – Benefits of ERP Module – Supply Chain Management (SCM) – Business analytics and Intelligence – Wireless Technology used in ERP – Future trends in ERP- Cloud Computing – SAP and the Internet

Total =45 Periods**Course Outcomes: On completion of this course, the student will be able to**

CO1: Discuss ERP technologies and BPR.

CO2: Identify the strategic importance of Enterprise Resource Planning.

CO3: Analyze and implement ERP in various Sectors.

CO4: Analyze industrial and organizational impacts.

CO5: Demonstrate to engage in life-long learning.

Text Books :

- 1 K.Ganesh, Sanjay mohapatra, S.P.Anbudayashankar, P.Sivakumar, Enterprise Resource Planning: fundamentals of design and implementation, Springer, New York, Second Edition, 2014
- 2 D P Goyal, Enterprise Resource Planning, Tata McGraw-Hill Education, New Delhi, First Edition, 2011.

References :

- 1 Mary Sumner, Enterprise Resource Planning, Pearson Education, New Delhi, First Edition, 2007.
- 2 Jim Mazzullo, SAP R/3 for Everyone, Pearson Education, New Delhi, Second Edition, 2007.
- 3 Vinod Kumar Garg and Venkitakrishnan N K, Enterprise Resource Planning – Concepts and Practice, PHI, New Delhi, Second Edition, 2003.
- 4 Ellen Monk and Bret Wagner, Concepts in Enterprise Resource Planning, Thompson Course Technology, India, Fourth Edition, 2012.

SEMESTER - VIII

18CS873

INFORMATION STORAGE MANAGEMENT
(PROFESSIONAL ELECTIVE - VI)L T P C
3 0 0 3**Prerequisite:** Basic knowledge of Database Management Systems and cloud computing.**Objectives:**

- To illuminate the challenges in data storage and management.
- To illustrate the different networked storage options.
- To explore the various storage systems and Backup and recovery.
- To learn the Cloud computing infrastructure and benefits.
- To know the various information infrastructure and securities.

UNIT – I INTRODUCTION TO STORAGE SYSTEM [9]

Introduction to Information Storage, Virtualization and Cloud Computing – Key Data Center Elements – Compute, Application and Storage Virtualization – Disk Drive and Flash Drive Components and Performance – RAID – Intelligent Storage System and Storage Provisioning.

UNIT – II STORAGE NETWORKING TECHNOLOGIES AND VIRTUALIZATION [9]

Fibre Channel SAN components, FC Protocol and Operations – Block Level Storage Virtualization – iSCSI and FCIP as an IP- SAN Solutions – Converged Networking Option – FCoE – Network Attached Storage (NAS) – Components, Protocol and Operations – File Level Storage Virtualization – Object Based Storage and Unified Storage Platform.

UNIT– III BACKUP, ARCHIVE AND REPLICATION [9]

Business Continuity Terminologies, Planning and Solutions – Clustering and Multi-pathing Architecture to Avoid Single Points of Failure – Backup and Recovery – Methods, Targets and Topologies – Data Deduplication and Backup in Virtualized Environment – Fixed Content and Data Archive – Local and Remote Replications in Classic and Virtual Environments – Threesite Remote Replication and Continuous Data Protection.

UNIT – IV CLOUD COMPUTING CHARACTERISTICS AND BENEFITS [9]

Cloud Enabling Technologies – Characteristics and Benefits of Cloud Computing – Services and Deployment Models – Cloud Computing Infrastructure – Cloud Challenges – Cloud Migration Considerations.

UNIT – V SECURING AND MANAGING STORAGE INFRASTRUCTURE [9]

Security Threats and Counter Measures in Various Domains – Security Solutions for FCSAN, IP-SAN and NAS environments – Security in Virtualized and Cloud Environments – Monitoring and Managing Various Information Infrastructure Components in Classic and Virtual Environments – Information Lifecycle Management (ILM) and Storage Tiering.

Total = 45 Periods**Course Outcomes: On completion of this course, the student will be able to**

CO1: Elucidate logical and physical components of a storage infrastructure and RAID.

CO2: Depict different storage networking technologies.

CO3: Demonstrate the need of backup, archive and replication

CO4: Confer cloud computing characteristics and benefits.

CO5: Summarize the security and monitoring aspects of data center components.

Text Book :

- 1 Somasundaram Gnanasundaram and Alok Shrivastava, Information Storage and Management: Storing, Managing and Protecting Digital Information in Classic Virtualized, and Cloud Environments, EMC Education Services, Wiley India Pvt. Ltd, India, Second Edition, 2012.
- 2 EMC Corporation, Information Storage and Management: Storing, Managing, and Protecting Digital Information, Wiley, India, Second Edition, 2010.

References :

- 1 Marc Farley, Building Storage Networks, Tata McGraw Hill, New Delhi, Second Edition, 2001.
- 2 Robert Spalding, Storage Networks: The Complete Reference, Tata McGraw Hill, New Delhi, First Edition, 2003.
- 3 <http://www.webopedia.com/TERM/R/RAID.html>.
- 4 <https://nptel.ac.in/courses/106/108/106108058>

18HS094	DISASTER MANAGEMENT (OPEN ELECTIVE)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Objectives:

- To understand the students to learn about the aspects of disaster and risk management.
- To understand the different types of Disaster.
- To know the different kinds disaster relief Organization.
- To study the Disaster policy in India.
- To create the awareness about disaster Management.

UNIT – I INTRODUCTION ABOUT DISASTER [9]

Introduction, Nature and Dimension of the challenge, Linking Disaster and Development, Sustainable development, Disruption of development by disasters, causes of Disasters – Development opportunities afforded by disasters – Varied impact on states in India. HAZARDS: Definition, principles, Impact of Disasters, Levels of Disaster, Effect of Disasters, Causal factors, Phases of Disaster.

UNIT – II DIFFERENT TYPES OF DISASTERS [9]

Different calamities – Typology of Disasters: Earthquakes, Tsunamis, Volcanoes, Landslides Tropical cyclones, Floods, Environmental pollution, Deforestation – Desertification, Pest Infestations, Epidemics, Chemical and industrial accidents, Trends in climatology, meteorology and hydrology – seismic activity – Case Study

UNIT – III DISASTER PREVENTION AND CONTROL [9]

United Nations Disaster Relief Coordinator (UNDRO): Disaster relief and management, prevention, preparedness, Stand by capacity – Coordination, cooperation and leadership Continuum from relief to rehabilitation and development – Checklists and reporting formats by UNDMT and international emergency assistance requirement.

UNIT – IV DISASTER MANAGEMENT IN INDIA [9]

Issues – National policy – Historical Framework – Funding mechanisms – Calamity Relief Fund (CRF) – The Disaster management Act 2005 – Indian Agencies for disaster management – National Civil Defense Organization

UNIT – V DISASTER PREPAREDNESS AND PLANNING [9]

Introduction, Objectives – Disaster planning, Strategies for disaster preparedness and planning – Principles, Myths, Factors influencing disaster risk – Assessing risk in a context of uncertainty – Disaster insurance – use of the media in information dissemination – Types of media and their information needs.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Explain the nature and causes of disaster.

CO2: Describe the Various risk and take steps to mitigate various types of disaster.

CO3: Illustrate the various Disaster prevention and control methods.

CO4: Describe the Various policies and act in Management in India.

CO5: Explain recent strategies towards disasters preparedness and planning.

Text Books :

- 1 Satish Modh, Introduction to Disaster Management, Macmillian publishers india ltd, New delhi, Second Edition, 2019
- 2 Pardeep Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, Fourth Edition 2018.

References :

- 1 M. Saravanakumar, Disaster Management, Himalaya Publishing House, New Delhi, Second Edition, 2017
- 2 Singh, Disaster Management: Future Challenges, IK International, New Delhi, Second Edition, 2017.
- 3 Arvind Kumar Disaster Management – Recent Approaches Anmol Publications, New Delhi, First Edition, 2016.
- 4 Sathish Modh, Introduction to Disaster Management, Macmillan, New Delhi, Seventh Edition, 2014

18EC662	MEDICAL ELECTRONICS (OPEN ELECTIVE)	L 3	T 0	P 0	C 3
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Prerequisite: No prerequisites needed for enrolling into the course

Objectives:

- To learn the methods of recording various bio-potentials.
- To understand the design and working of various diagnostic equipment.
- To be familiar with the design and working of various therapeutic equipment.
- To expose the principles and working behind various imaging techniques.
- To gain knowledge about the recent trends in medical instrumentation.

UNIT – I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING [9]

The origin of bio-potentials – Bio-potential electrodes – Carrier, chopper and isolation amplifiers – Transducers for biomedical applications: Strain gauge, piezoelectric transducer, thermocouple, thermistor, biosensors – ECG, EEG, EMG, PCG, ERG and EOG: Lead systems, recording methods, typical waveforms and signal characteristics.

UNIT– II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT [9]

Blood gas analyzers – Electrophoresis – Colorimeter & Photometer – Auto analyzer – Blood flow meter – Cardiac output – Respiratory measurement – Blood pressure measurement – Temperature measurement – Pulse measurement – Blood cell counters: Coulter counters.

UNIT – III THERAPEUTIC EQUIPMENTS [9]

Cardiac pacemakers – DC defibrillator – Dialyzers – Surgical diathermy – Physiotherapy and electrotherapy equipment – Oxygenators – Heart lung machine.

UNIT– IV MEDICAL IMAGING [9]

X-Ray – Computer Axial Tomography – Positron Emission Tomography – MRI and NMR – Ultrasonic Imaging systems.

UNIT– V RECENT TRENDS IN MEDICAL INSTRUMENTATION [9]

Thermograph – Endoscopy unit – LASER in medicine – Biomedical telemetry – Radio-pill – Cardiac catheterization laboratory – Electrical safety of medical equipment.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Describe the recording methods of various bio-potentials.

CO2: Interpret various measurements of bio-chemical and non-electrical parameter.

CO3: Explain different types of therapeutic equipment.

CO4: Discuss the principles of various medical imaging modalities.

CO5: Describe the recent trends in medical instrumentation.

Text Books :

- 1 R.S.Khandpur, Handbook of Biomedical Instrumentation, Tata McGraw Hill, Noida, Third Edition, 2014.
- 2 Leslie Cromwel, Fred J.Weibel, Erich A.Pfeiffer, Biomedical Instrumentation and Measurements, Pearson/Prentice Hall India, New Delhi, Second Edition, 2011.

Reference Books :

- 1 John G.Webster, Medical Instrumentation Application and Design, John Wiley & Sons Inc, United States, Fourth Edition, 2010.
- 2 Joseph J.Carr and John M.Brown, Introduction to Biomedical Equipment Technology, John Wiley & Sons, United States, Fourth Edition, 2008.
- 3 M. Arumugam, Biomedical Instrumentation, Anuradha Publications, Chennai, Second Edition, Reprint 2009.
- 4 R.L. Reka & C. Ravikumar, Biomedical Instrumentation/ Medical Electronics, Lakshmi Publications, Chennai, Second Edition, Reprint 2010.

18ME776	INDUSTRIAL ROBOTICS (OPEN ELECTIVE)	L 3	T 0	P 0	C 3
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Prerequisite: Computer Aided Manufacturing

Objectives:

- To study the fundamentals of industrial robotics.
- To learn the concepts of Robot drive systems and end effectors.
- To acquire the Knowledge on sensors and machine vision.
- To explore the robot kinematics and its programming.
- To implement the robot applications in industrial environment.

UNIT – I FUNDAMENTALS OF ROBOTICS [9]

Robot – Definition – Robot Anatomy – Co-ordinate Systems, Work Envelope, types and classification – Specifications – Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and Their Functions – Need for Robots – Different Applications.

UNIT – II ROBOT DRIVE SYSTEMS AND END EFFECTORS [9]

Pneumatic Drives – Hydraulic Drives – Mechanical Drives – Electrical Drives – D.C. Servo Motors, Stepper Motor, A.C. Servo Motors – Salient Features, Applications and Comparison of all these Drives. End Effectors – Grippers – Mechanical Grippers, Pneumatic and Hydraulic Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT – III SENSORS AND MACHINE VISION [9]

Requirements of a sensor, Principles and Applications of the following types of sensors – Position sensors (Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, Pneumatic Position Sensors), Range Sensors (Triangulation Principle, Structured, Lighting Approach, Time of Flight Range Finders, Laser Range Meters), Proximity Sensors (Inductive, Hall Effect, Capacitive, Ultrasonic and Optical Proximity Sensors), Touch Sensors, (Binary Sensors, Analog Sensors), Wrist Sensors, Compliance Sensors, Slip Sensors. Camera, Frame Grabber, Sensing and Digitizing Image Data – Signal Conversion, Image Storage, Lighting Techniques. Image Processing and Analysis – Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms. Applications – Inspection, Identification, Visual Servoing and Navigation.

UNIT – IV ROBOT KINEMATICS AND ROBOT PROGRAMMING [9]

Forward Kinematics, Inverse Kinematics and Differences – Forward Kinematics and Reverse Kinematics of Manipulators with Two, Three Degrees of Freedom (In 2 Dimensional), Four Degrees of Freedom (In 3 Dimensional) – DH matrices – Deviations and Problems. Teach Pendant Programming, Lead through programming, Robot programming Languages – VAL Programming – Motion Commands, Sensor Commands, End effector commands and Simple Programs.

UNIT – V IMPLEMENTATION AND ROBOT ECONOMICS [9]

RGV, AGV; Implementation of Robots in Industries – Various Steps; Safety Considerations for Robot Operations; Economic Analysis of Robots – Pay back Method, EUAC Method, Rate of Return Method.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- CO1: Explore the working principle and configuration of industrial robots.
 CO2: Apply the concepts of Robot drive systems and end effectors.
 CO3: Investigate the applications of sensors and machine vision. System.
 CO4: Design the robot kinematics and its programming.
 CO1: Examine the robots in industrial applications and evaluate the economics.

Text Books :

- 1 M.P.Groover, Industrial Robotics – Technology, Programming and Applications, McGraw-Hill, Delhi, Second Edition, 2015.
- 2 Yoram Koren, Robotics for Engineers, McGraw-Hill Book Co., Delhi, Second Edition, 2019.

Reference Books :

- 1 Fu.K.S. Gonzalz.R.C., and Lee C.S.G., Robotics Control, Sensing, Vision and Intelligence, McGraw-Hill Book Co., Delhi, Second Edition, 1987.
- 2 Janakiraman.P.A., Robotics and Image Processing, Tata McGraw-Hill, New Delhi, Second Edition, 2013.
- 3 Mittal R. K. and Nagrath, I. J. ,Robotics and Control, Tata McGraw Hill Publishing Company Limited, New Delhi, Second Edition,2004.
- 4 Peter Corke, Robotics, Vision and Control: Fundamental Algorithms in MATLAB' , Springer, Third Edition,2009

18CE091	BASIC CIVIL AND MECHANICAL ENGINEERING (OPEN ELECTIVE)	L 3	T 0	P 0	C 3
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Prerequisite: No prerequisites needed for enrolling into the course

Objectives:

- To introduce surveying and civil engineering materials.
- To illustrate building components and structures.
- To describe the various types of power plants and its working principles.
- To provide knowledge on types of IC Engines and its working principles.
- To illustrate refrigeration and air conditioning systems.

UNIT – I SURVEYING AND CIVIL ENGINEERING MATERIALS [9]

Surveying: Objects – Types – Classification – Principles – Measurements of Distances – Angles – Levelling – Determination of Areas – Illustrative Examples. Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel Sections.

UNIT– II BUILDING COMPONENTS AND STRUCTURES [9]

Foundations: Types, Bearing Capacity – Requirement of Good Foundations- Superstructure – Types of Bridges and Dams - Brick Masonry – Stone Masonry – Beams – Columns – Lintels – Roofing – Flooring – Plastering – Mechanics – Internal and External Forces – Stress – Strain – Elasticity.

UNIT – III POWER PLANT ENGINEERING [9]

Introduction, classification of power plants – working principles of steam, Gas, Diesel, Hydro-electric and Nuclear power plants – merits and demerits- pumps and Turbines – working principles of Reciprocating pumps (single acting and double acting) – Centrifugal pump.

UNIT – IV IC ENGINES [9]

Internal combustion engine as automobile power plant – working principle of Petrol and Diesel Engines – Four stroke and Two stroke cycles – comparison of four stroke and two stroke engines.

UNIT – V REFRIGERATION AND AIR CONDITIONING SYSTEM [9]

Terminology of Refrigeration and Air Conditioning, principle of vapour compression and absorption system – layout of typical domestic, refrigerator – Window and Split type room Air Conditioner.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Calculate the areas, volumes and relative positions of the object and to gain knowledge about the various materials used in construction.

CO2: Describe construction practices and the components of the structures.

CO3: Identify the working principle of various types of power plants, pumps and turbines.

CO4: Summarize the various classification and terminologies of engines, such as two stroke and four stroke petrol and diesel engines.

CO5: Demonstrate refrigeration process and also the working principle of various types of Air Conditioners.

Text Books :

- 1 Ramesh Babu V., Basic Civil and Mechanical Engineering, VRB Publishers, Chennai, First Edition, 2017.
- 2 Shanmugam G and Palanichamy M S., Basic Civil and Mechanical Engineering, McGraw Hill Education Private Ltd, Chennai ,First Edition, 2018.

Reference Books :

- 1 Ramamrutham S., Basic Civil Engineering, Dhanpatrai Publishing Co.(P) Ltd., Third Edition, New Delhi,2013.
- 2 Venugopal K and Prahua Raja V., Basic Mechanical Engineering, Nibras Publishers, First Edition, Chennai, 2018.
- 3 Shantha Kumar S.R.J., Basic Mechanical Engineering, Hi-tech Publications, Mayiladuthurai, First Edition, 2016.
- 4 <https://nptel.ac.in/courses/105/102/105102088/>

18EC763	FUNDAMENTALS OF NANO TECHNOLOGY (OPEN ELECTIVE)	L 3	T 0	P 0	C 3
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Prerequisite: No prerequisites needed for enrolling into the course

Objectives:

- To learn the evolution of Nanotechnology.
- To understand the different diversity techniques in Nano systems.
- To familiarize the different types of Nano particles and its characterization.
- To familiarize the application of Nano technology in biotechnology.
- To gain knowledge about the uses of Nano technology in industrial applications.

UNIT – I INTRODUCTION [9]

Nano science - Evolution - Electron microscopes - Scanning probe microscopes - Optical microscopes for nano technology - X ray diffraction - Associated techniques.

UNIT– II DIVERSITY IN NANO SYSTEMS [9]

Fullerenes - Synthesis and purification - Mass spectrometry and ion/molecule reactions - Chemistry of fullerenes - Endohedral chemistry - Conductivity and super conductivity in doped fullerenes - Carbon nanotubes - Synthesis and purification - Electronic structure - Transport - Mechanical - Physical properties applications - Semiconductor quantum dots - Synthesis and applications.

UNIT – III METAL NANO PARTICLES AND NANO SHELLS [9]

Method of preparation - Characterization - Functions and applications - Core shell nanoparticles: Types of system - Characterization - Functions and applications - Nano shells: Types, characterization, properties and applications.

UNIT– IV EVOLVING INTERFACES IN NANO [9]

Nano biology - Interaction between bio molecules and nano particle surfaces - Applications of nano in biology - Microprobes for medical diagnosis and biotechnology - Current status - Nano sensors - Order from chaos - Applications - Smart dust sensors - Nano medicines various kinds - Future directions

UNIT– V IMPACT OF NANOTECHNOLOGY ON SOCIETY [9]

Introduction - Industrial revolution to Nano revolution - Implications of Nano sciences and Nano technology on society - Issues - Nano policies and institutions - Nanotech and war - Nano arms race - Harnessing nano technology for economic and social development.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Describe the evolution and associated techniques of Nano science.

CO2: Interpret the diversities in Nano systems.

CO3: Illustrate of Nano particles, shells and their Characterization.

CO4: Describe the importance of nanotechnology in biotechnology.

CO5: Outline the applications of nanotechnology in industry and society.

Text Books :

- 1 PradeepT, "Nano: The Essentials, Understanding Nano Science and Nano technology", Tata Mcgraw Hill, New Delhi, First Edition, 2007.
- 2 Mick Wilson, Kamali Kannargare., Geoff Smith, "Nano technology: Basic Science and Emerging technologies", Overseas Press, New York, First Edition, 2005.

Reference Books :

- 1 Nalwa H S, "Encyclopedia of Nano science and Nanotechnology", Vol1-10, American Scientific Publishers, New York, 2004.
- 2 Rao C N R and Govindaraj A, "Nano tubes and Nano wires", Royal Society of Chemistry, London, 2005.
- 3 Richard A L Jones, "Soft Machines: Nanotechnology and Life", Oxford University Press, Boston, 2008
- 4 Charles P. Poole, Frank J. Owens, "Introduction to Nanotechnology", Wiley Inter science, New York, 2003.
- 5 Mark A. Ratner, Daniel Ratner, "Nanotechnology: A gentle introduction to the next Big Idea", Pearson Education, New Delhi, 2003

18HS095	ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING (OPEN ELECTIVE)	L 3	T 0	P 0	C 3
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Prerequisite: No prerequisite needed for enrolling into the course

Objectives:

- To understand the concept of managerial economics for effective management decision making.
- To identify the various functions of demand and supply.
- To analyze the production and cost functions for estimation of cost.
- To evaluate the various determinants of pricing and its methods.
- To study the financial analysis for effective decision making in investment.

UNIT – I INTRODUCTION [9]

Managerial Economics – Relationship with other disciplines – Firms: Types, objectives and goals – Managerial decisions: Types and Process.

UNIT – II DEMAND & SUPPLY ANALYSIS [9]

Demand: Types of demand, Determinants of demand, Demand function, Demand elasticity and Demand forecasting – Supply: Determinants of supply, Supply function and Supply elasticity.

UNIT – III PRODUCTION AND COST ANALYSIS [9]

Production function: Returns to scale, Production optimization, Least cost input and Isoquants – Managerial uses of production function. Cost Concepts: Cost function, Determinants of cost, Short run, Long run cost curves and Estimation of Cost.

UNIT – IV PRICING [9]

Pricing : Meaning, Definition, Determinants of Price, Pricing under different objectives – Market Structures: Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly and Price discrimination Pricing methods in practice.

UNIT – V FINANCIAL & CAPITAL (ELEMENTARY TREATMENT) [9]

Balance sheet and related concepts – Profit & Loss Statement and related concepts – Financial Ratio Analysis Investments – Risks and return evaluation of investment decision – Average rate of return – Payback Period – Net Present Value – Internal rate of return.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Describe the concept and goals of Managerial economics.

CO2: Illustrate the knowledge of forecasting the demand and supply in the management.

CO3: Analyze the price discrimination of the product among the competitors.

CO4: Explain the market structure for determining the pricing methods.

CO5: Estimate the Financial statements to understand the return on Investment.

Text Books :

- 1 A. Ramachandra Arysri and V. V. Ramana Murthy, Engineering Economics and Financial Accounting, Tata Mc-Graw Hill, New Delhi, Fourteenth Reprint, 2016.
- 2 R.L. Varshney and K.L. Maheswari, Managerial Economics, Sultan Chand & Sons, Twenty First Edition. 2015

References :

- 1 A. Samuelson Paul and W.D. Nordhaus, Economics, Tata McGraw-Hill, New Delhi, Twenty Edition, 2014.
- 2 McGuigan, Moyer and Harris, Managerial Economics : Applications, Strategy and Tactics, Thomson South Western, Tenth Edition, 2016.
- 3 Paresh Shah, Basic Financial Accounting for Management, Oxford University Press, New Delhi, Seventh Edition, 2015.
- 4 Nordhaus and Samuelson, Economics, Tata McGraw- Hill, New Delhi, Twenty Edition, 2014

18EC613	DIGITAL IMAGE PROCESSING (OPEN ELECTIVE)	L 3	T 0	P 0	C 3
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Prerequisite: No prerequisite needed for enrolling into the course

Objectives:

- To learn the fundamental representation of an images.
- To familiar with the concept of various transforms using images.
- To understand the various techniques of image enhancement and restoration.
- To exposed the knowledge about image segmentation and representation.
- To learn about image compression techniques.

UNIT – I DIGITAL IMAGE FUNDAMENTALS [9]

Elements of digital image processing systems – Elements of visual perception – Basic relationship between pixels: Connectivity, Distance measure – Brightness – Contrast – Hue – Saturation – Mach band effect – Color image fundamentals: RGB – HSI models – Conversion from RGB to HSI – Image sampling – Quantization – Dither.

UNIT – II IMAGE TRANSFORMS [9]

2D transforms – DFT – DCT – DST – Walsh – Hadamard – Slant – Haar transform – DWT: Haar wavelet, Daubechies wavelet – CWT: Hermitian wavelet, Poisson wavelet.

UNIT – III IMAGE ENHANCEMENT AND RESTORATION [9]

Spatial domain enhancement: Gray level transformations – Histogram modification and specification techniques – Image averaging – Directional smoothing – Median – Geometric mean – Harmonic mean – Contra harmonic mean filters – Homomorphic filtering – Color image enhancement – Image restoration: Degradation model – Unconstrained restoration and constrained restoration – Inverse filtering – Wiener filtering – Geometric transformations.

UNIT- IV IMAGE SEGMENTATION AND REPRESENTATION [9]

Line and point detection, Edge detection, Edge linking via Hough transform – Morphological operations – Thresholding – Region based segmentation – Region growing – Region splitting and merging – Representation: Chain codes, Signatures, Boundary segments, Skeletons.

UNIT – V IMAGE COMPRESSION [9]

Need for data compression – **Lossless** compression: Huffman coding, run length coding, bit plane coding, LZW coding. Lossy compression: Vector quantization, Block truncation coding – Applications: Satellite image processing – Image forensic science.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Describe the fundamentals in digital imaging.

CO2: Apply various image transformation techniques.

CO3: Apply image enhancement and restoration techniques on various images.

CO4: Demonstrate the image segmentation and representation techniques.

CO5: Know the image compression techniques and image processing applications.

Text Books :

- 1 Rafael C Gonzalez, Richard E Woods, Digital Image Processing, Pearson Education, US, Fourth Edition, 2018.
- 2 Jayaraman .S, Esakkirajan.S, Veerakumar T, Digital Image Processing, Tata Mcgraw Hill, New Delhi, Second Edition, 2020.

References :

- 1 Anil K- Jain, Fundamentals of Digital Image Processing, Pearson Education, New Delhi, First Edition, 2015.
- 2 Kenneth R.Castleman, Digital Image Processing, Pearson,Second reprint, New Delhi, 2008.
- 3 William K Pratt, Digital Image Processing: PIKS Scientific Inside, John Wiley, New Delhi, Fourth Edition, 2006.
- 4 David Salomon, Data Compression: The Complete Reference, Springer - Verlag, New York, Third Edition, 2011.
- 5 <http://nptel.ac.in/courses/117105079/>

18CE096	SOLID WASTE MANAGEMENT (OPEN ELECTIVE)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Objectives:

- To introduce technical aspects of environment.
- To describe the components of municipal solid waste management and waste characterization
- To discuss the solid waste collection systems, and processing of solid wastes.
- To illustrate the different methods of treatment of solid waste management.
- To describe various disposal methods of solid waste management.

UNIT– I INTRODUCTION TO ENVIRONMENT [9]

Ecosystem – meaning–Types – Components – Structure – Functions, Levels of organization in nature – Food chain and Trophic structure, Biogeochemical Cycles, Energy flow.

UNIT – II MUNICIPAL SOLID WASTE [9]

Definition – Sources and types of solid waste – composition and its determinants of Solid waste – factors influencing generation – quantity assessment of solid wastes – methods of sampling and characterization.

UNIT– III COLLECTION AND TRANSFER [9]

Collection: Collection of Solid waste – collection system, equipments – factors affecting collection – collection routes preparation of master schedules. Transfer and Transport: Need for transfer operation – transfer stations – types – transport means and methods – location of transport stations – Manpower requirement – collection routes: Transfer stations – selection of location, types & design requirements, operation & maintenance.

UNIT – IV TREATMENT METHODS [9]

Various methods of refuse processing, recovery, recycle and reuse, composting – aerobic and anaerobic, incineration, pyrolysis and energy recovery.

UNIT – V DISPOSAL METHODS [9]

Impacts of open dumping, site selection, sanitary land filling – design criteria and design examples, leachate and gas collection systems, leachate treatment.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Discuss and analyze technical aspects of environment.

CO2: Examine the sources solid waste, methods of sampling and characterization of solid waste.

CO3: Select the appropriate method for solid waste collection and transportation processing.

CO4: Evaluate treatment methods according to properties of municipal solid waste.

CO5: Examine various disposal methods according to properties of municipal solid waste.

Text Books :

1 Bhatt, M. S. and Asherllliyan., Solid Waste Management, Synergy Books India, New Delhi, First Edition, 2012.

2 Williams, Paul T., Waste Treatment and Disposal, John Wiley and Sons, Hoboken, First Edition, 2005.

References :

1 Vesiland, A., Solid Waste Engineering, Thompson Books, Singapore, First Edition, 2002.

2 Tchobanoglous, G. Frank Kreith., Hand Book of Solid Waste Management, McGraw-Hill, Inc, New York, Second Edition, 2002.

3 Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Govt. of India, New Delhi, 2000.

4 <https://nptel.ac.in/courses/105/106/105106056/>

18ME097	INDUSTRIAL SAFETY ENGINEERING (OPEN ELECTIVE)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Objectives:

- To study the importance of personal and industrial safety hazards in industry.
- To explore the safety aspect of industrial machines.
- To demonstrate the Safety measures in welding and gas handling equipments.
- To apply health and welfare measures during inspection and testing of industrial environment.
- To estimate the hazardous and risks in industries through various techniques.

UNIT – I INTRODUCTION [9]

Concepts of safety – hazard classification – chemical, physical, mechanical, ergonomics, biological and noise hazards – fire properties – solid, liquid and gases – fire chemistry and its control – first aid – cardio pulmonary resuscitation (CPR) – personal protection.

UNIT – II SAFETY IN MAINTENANCE OF MACHINES [9]

Basic principle of machine guarding during maintenance – machine guarding, types, fixed guard, interlock guard, automatic guard, trip guard, electron eye, positional control guard, fixed guard fencing – guard construction – guard opening – lathe – drilling – boring – milling – grinding – shaping – sawing – shearing – presses – forge hammer – flywheels – shafts – couplings – gears - sprockets wheels and chains – pulleys and belts – authorized entry to hazardous installations – benefits of good guarding systems.

UNIT – III SAFETY IN WELDING AND GAS CUTTING [9]

Gas welding and oxygen cutting, resistances welding, arc welding and cutting – common hazards – training, safety precautions in brazing, soldering and metalizing – explosive welding, selection, care and maintenance of the associated equipment and instruments – safety in generation, distribution and handling of industrial gases – colour coding – leak detection-pipe line safety – storage and handling of gas cylinders.

UNIT – IV SAFETY IN INSPECTION AND TESTING [9]

Heat treatment operations, electro plating, paint shops, sand and shot blasting, safety in inspection and testing, hydro testing, valves, boiler drums and headers, pressure vessels, air leak test, steam testing, safety in radiography, personal monitoring devices, radiation hazards, engineering and administrative controls, health and welfare measures in engineering industry.

UNIT – V HAZARD ANALYSIS AND RISK MANAGEMENT [9]

Hazard identification and control – HAZOP, job safety analysis – fault tree analysis – event tree analysis – failure modes and effect analysis – safety audit – safety survey – plant inspection – past accident analysis. Overall risk analysis – disasters management plan – emergency planning – onsite and offsite emergency planning – risk management.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Identify the safety and hazards risk for personal and industrial environment.

CO2: Apply safety aspects to industrial machine functional environments.

CO3: Construct the Safety measures in welding and gas handling equipments.

CO4: Demonstrate the health and hazardous risk in inspection and testing in industry.

CO5: Evaluate hazard and risks using various techniques in industries.

Text Books :

- 1 Blake, R.P., Industrial Safety, PHI Publications, New Delhi, Second Edition, 2000.
- 2 Raghavan, K.V. and Khan A.A., Methodologies in Hazard Identification and Risk Assessment Manual by CLRI, Second Edition, 2019.

References :

- 1 Lees, F.P., Loss Prevention in Process Industries, Butterworth Heinemann, Second Edition, 1996.
- 2 Health and safety in welding and allied processes, welding Institute Hi tech publishing Limited, UK, 1989.
- 3 Major hazard control - A practical manual, ILO, Geneva, 1988.
- 4 Krishnan, N.V., Safety management in industry, Jaico publishing house, Bombay, 1977.

18EE711	EMBEDDED SYSTEMS (OPEN ELECTIVE)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Objectives:

- To learn and understand the fundamental concept of embedded systems.
- To Study the embedded networks.
- To understand the concepts of software development Process.
- To understand the functions of RTOS.
- To learn system design concepts.

UNIT – I INTRODUCTION TO EMBEDDED SYSTEMS [9]

Embedded System Vs General Computing System – Classification of embedded systems – Functional building blocks of embedded systems – Structural units in embedded processor – Selection of processor & memory devices – Processor interfacing with memory and I/O units – Embedded hardware units – PIC16F877A: Architecture – Instruction set.

UNIT – II EMBEDDED NETWORKS [9]

Introduction to I/O device ports & buses – Serial communication using I²C, CAN, SPI, USB and PROFIBUS buses – Parallel communication using PCI, PCI-X buses, ARM bus – Internet enabled systems – Wireless and mobile system protocols.

UNIT – III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT [9]

Introduction to embedded software development process and tools – Host and target machines – linking and locating software – Embedded Product Development Life Cycle – objectives, different phases of EDLC, Modeling of EDLC – Fundamental issues in hardware and software Co-design – Data Flow Graph – state machine model.

UNIT – IV REAL TIME OPERATING SYSTEMS [9]

Introduction to basic concepts of RTOS – Task, process & threads – Context switching – Multiprocessing and Multitasking – Preemptive and non-preemptive scheduling – Round Robin scheduling – Task communication – shared memory, message passing – Interprocess communication – semaphores, Message queue, Mailbox, pipes – priority inversion – priority inheritance.

UNIT – V RTOS BASED EMBEDDED SYSTEM DESIGN [9]

Basic Functions and Types of RTOS – Interrupt routines in RTOS – Case Study of Washing Machine – Automotive Application – Smart card system – ATM machine – Digital camera.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Illustrate the fundamentals of embedded systems.

CO2: Outline the various types of embedded communication protocols.

CO3: Explain the concept of software development process and tools.

CO4: Describe the functions of real time operating systems.

CO5: Apply the knowledge of embedded product development.

Text Books :

- 1 Rajkamal.P. Embedded System – Architecture, Programming, Design, Tata McGraw Hill Education Private Limited, New Delhi, Third Edition, 2016.
- 2 John B.Peatman, Design With PIC microcontroller, Pearson Education, India, First Edition, 2009.

References :

- 1 Frank Vahid and Tony Givargi, Embedded System Design - A Unified Hardware & Software Introduction, John Wiley, New Jersey, Third Edition, 2011.
- 2 David E.Simon, An Embedded software primer, Pearson Education, India, First Edition, 2007.
- 3 Steve Heath Embedded System Design, Elsevier, India, Second Edition, 2003.
- 4 Wayne wolf, Computers as components: Principles of embedded computing system design, Morgan Kaufmann publishers, USA, Third Edition, 2012.

18HS001	PRINCIPLES OF MANAGEMENT (OPEN ELECTIVE)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Objectives:

- To explain the historical background and fundamentals of management thought.
- To discuss about various concepts of planning.
- To describe the various concepts of Organizational structure.
- To illustrate the various management leadership concepts.
- To develop the emerging concepts of management thought and philosophy.

UNIT – I OVERVIEW OF MANAGEMENT [9]

Definition of Management – Importance of management – Management functions – Levels of management – Role of managers – Management a science or an art – Evolution of Management thought: Scientific management and Administrative Principles of management – Ethical issues in Management.

UNIT – II PLANNING [9]

Planning: Meaning, purpose, Steps and Types of Plans - Management by objectives (MBO) – Decision Making: Types of Decisions, steps in Rational Decision making, Common difficulties in Management Decision Making.

UNIT – III ORGANISING [9]

Nature and purpose of organizing : Organization structure, Process and Principles of organizing – Line & Staff authority – Departmentation – Span of Control – Centralization and Decentralization – Delegation of authority – Staffing : Sources of Recruitment, Selection process – Training methods – Performance appraisal methods.

UNIT – IV DIRECTING [9]

Creativity and Innovation – Motivation and Satisfaction: Motivation Theories – Leadership: Leadership theories and Styles – Communication: Barriers to communication, Principles of effective Communication

UNIT – V CONTROLLING [9]

Steps in a control Process: Need for control system, Budgetary and Non-Budgetary control techniques, Problems of the control system, Essentials of effective control system, and Benefits of control.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Explain the fundamentals of Management thoughts and the conceptual frame work of Management.

CO2: Discuss the various concepts of planning, MBO and Strategy to help solving managerial problems.

CO3: Explain the concepts of organizing, Delegation and Decision making.

CO4: Describe the management concepts and styles in Leading.

CO5: Illustrate the various controlling and emerging concepts in management thought and philosophy.

Text Books :

- 1 L.M.Prasad, Principles and Practices of Management, Sultan Chand & Sons, New Delhi, Eleventh Edition, 2015.
- 2 P.C.Tripathi and Reddy Principles of Management, McGraw Hill , New Delhi, Eighth Edition, 2015.

References :

- 1 Hellriegel, Slocum & Jackson, Management A Competency Based Approach, Thomson South Western, London, Fifteenth Edition, 2017.
- 2 Harold Koontz, Heinz Weihrich and mark V Cannice, Management – A Global Entrepreneurial Perspective, Tata McGraw Hill, New Delhi, Twelveth Edition, 2014.
- 3 Andrew J. Dubrin, Essentials of Management, Thomson South western, London, Tenth edition, 2014.
- 4 Robbins S.P., Fundamentals of Management, Pearson, New Delhi, Second Edition, 2003

18HS098	HUMAN RESOURCE MANAGEMENT (OPEN ELECTIVE)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Objectives:

- To enable the students to understand the various HR functions in-depth.
- To familiarize students with contemporary practices.
- To study the various tool and techniques of HR ethical manner.
- To enable the students to understand the challenges in domestic and IHRM.
- To manage the manpower to attract , motivate and attract them to retain the organization

UNIT – I INTRODUCTION [9]

Nature and Scope of Human Resource Management (HRM) – Meaning and Definition of HRM – Objectives and Functions of HRM – Models of HRM – HR policies – HRM in the changing environment.

UNIT – II STAFFING [9]

Human Resource Planning – Job Analysis – Job Description – Job Specification – Recruitment – Selection – Induction – Placement – Social networking.

UNIT – III TRAINING AND EXECUTIVE DEVELOPMEN [9]

Types of training methods – purpose – benefits & resistance – Executive Development Programme – Benefits – Self Development – Knowledge Management – Case study.

UNIT– IV INTERNATIONAL HRM [9]

Domestic versus international Human Resource management – Perspective and practices of International Human Resource Management – Competencies required for International Managers – Changing roles of HR during the transition from Local to Global.

UNIT – V PERFORMANCE EVALUATION AND CONTROL PROCESS [9]

Compensation plan – Reward – Motivation – Method of Performance Evaluation – Feedback – Industry practices. Promotion, Demotion, Transfer and Separation – Implication of job change. The control process – Importance – Methods – Requirement of effective control systems grievances – Causes – Implications – Redressed methods.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Describe the Various policies and systems for all HR sub-functions.

CO2: Analyze the factors to deal with multi-cultural workforce.

CO3: Estimate the training methods for developing workforce to meet dynamic environment.

CO4: Explain the performance of workforce in organization.

CO5: Illustrate the different competencies required for managing global workforce.

Text Books :

- 1 K.Aswathappa, Human Resource and Personnel Management- Text and Cases, Tata McGraw Hill, New Delhi, Eighth Edition, 2016
- 2 Biswajeet Pattanayak, Human Resource Management, Prentice Hall of India, New Delhi, Fourth Edition, 2015.

References :

- 1 Gary Dessler, Human Resource Management, Prentice Hall of India, New Delhi, Fifth Edition, 2013.
- 2 Bernardin H John, Human Resource Management-An experiential Approach, Tata McGraw Hill, New Delhi, Third Edition, 2015
- 3 Luis R.Gomez-Mejia, David B.Balkin, Robert L Cardy, Managing Human Resource, PHI Learning, New Delhi, 2014
- 4 Eugence Mckenna and Nic Beach, Human Resource Management, Pearson Education Limited, New Delhi, 2012.

18CE867	MUNICIPAL WASTE AND MANAGEMENT (OPEN ELECTIVE)	L 3	T 0	P 0	C 3
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Prerequisite: No prerequisite needed for enrolling into the course

Objectives:

- To provide comprehensive overview of municipal waste and management.
- To learn about on-site storage and processing of solid waste.
- To provide knowledge on collection and transportation of waste.
- To impart knowledge about the processing of municipal solid waste.
- To impart knowledge about safe disposal of municipal solid waste.

UNIT – I SOURCES AND TYPES OF MUNICIPAL SOLID WASTES [9]

Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes-characteristics – methods of sampling and characterization- Effects of improper disposal of solid wastes – public health effects- Principle of solid waste management – social & economic aspects - Public awareness-Role of NGOs- Legislation.

UNIT – II ON-SITE STORAGE AND PROCESSING [9]

On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

UNIT – III COLLECTION AND TRANSFER [9]

Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions – Usage GPS in route optimization – Application of GIS in collection and transfer of waste.

UNIT – IV OFF-SITE PROCESSING [9]

Objectives of waste processing – Physical Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

UNIT – V TREATMENT & DISPOSAL [9]

Dumping of solid waste, Building Demolition and Construction Waste; sanitary landfills – site selection, design and operation of sanitary landfills – Leachate collection & treatment.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Characterize the solid waste based on source, type and composition and also emphasize the effects of its improper disposal.

CO2: Identify and suggest suitable on-site processing methods.

CO3: Identify the suitable method for collection, segregation and transportation of solid waste.

CO4: Select and adopt the suitable off-site processing techniques according to Indian conditions.

CO5: Identify and suggest appropriate disposal methods for solid and wastes.

Text Books :

- 1 Tchobanoglous, G. and Frank Kreith., Hand Book of Solid Waste Management, McGraw-Hill, Inc, New Delhi, Second Edition, 2002.
- 2 Ramachandra, T. V., Management of Municipal Solid Waste, TERI Press, New Delhi, First Edition, 2009.

References :

- 1 Worrell, William A. and Arne Vesilind, P., Solid Waste Engineering, Cengage Learning Asia PTE Limited, Singapore, Second Edition, 2012.
- 2 Rao, M.N, Sultana, Razia Kota, and Sri Harsha., Solid and Hazardous Waste Management: Science and Engineering, Butterworth-Heinemann, Burlington, First Edition, 2016.
- 3 John Pichtel., Waste Management Practices: Municipal, Hazardous, and Industrial, CRC Press, Florida, Second Edition, 2014.
- 4 Freeman, H. M., Standard Handbook of Hazardous Waste Treatment and Disposal, McGraw-Hill, Inc, Noida, Second Edition, 1997.

18AU769	INTELLIGENT VEHICLES TECHNOLOGY (OPEN ELECTIVE)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Objectives:

- To become familiar with various driver assistance systems.
- To comprehend the telematics in automotive systems.
- To recognize the automotive safety and security systems.
- To study about the comfort systems.
- To acquire the knowledge in various adaptive control systems.

UNIT – I DRIVER ASSISTANCE SYSTEMS [9]

Introduction, driver support systems – driver information, driver perception, driver convenience, driver monitoring. Vehicle support systems – general vehicle control, vehicle status monitoring and automated highway systems.

UNIT – II TELEMATICS [9]

Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition and application of Internet of Things (IoT) in automotive industry.

UNIT – III SAFETY SYSTEMS & SECURITY SYSTEMS [9]

Airbags, seat belt tightening system, collision avoidance and warning systems, child lock, antilock braking systems. Anti-theft technologies, smart card system and number plate coding.

UNIT – IV COMFORT SYSTEMS [9]

Active suspension systems, requirement and characteristics, different types, power steering, collapsible and tiltable steering column and power windows.

UNIT – V ADAPTIVE CONTROL SYSTEMS [9]

Adaptive cruise control, adaptive noise control, anti-spin regulation, traction control systems and cylinder cut-off technology and autonomous driving.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Identify the various systems involved in driver support systems and their working principle.

CO2: Familiarize with global positioning systems, geographical information systems and navigation systems.

CO3: Comprehend the constructional and working features of safety systems and security systems.

CO4: Recognize about the various comfort systems.

CO5: Acquire about the various adaptive control systems.

Text Book :

- 1 Ljubo Vlacic, Michel Parent and Fumio Harashima, Intelligent Vehicle Technologies, Butterworth-Heinemann publications, Oxford, 2001.
- 2 Ronald K Jurgen, Navigation and Intelligent Transportation Systems – Progress in Technology, Automotive Electronics Series, SAE, USA, 1998.

Reference Books :

- 1 Richard Bishop, Intelligent Vehicle Technology and Trends, Artech House, London, 2005.
- 2 William B Riddens, Understanding Automotive Electronics, Butterworth-Heinemann, Woburn, Eighth Edition, 2017.
- 3 Robert Bosch, Automotive Handbook, Bentley Publishers, Cambridge, Ninth Edition, 2014.
- 4 Bechhold, Understanding Automotive Electronics, SAE, 1998.

18CE866	ARCHITECTURE PLANNING ASPECTS (OPEN ELECTIVE)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Objectives:

- To emphasis on architectural and functional aspects with respect to planning and design of building.
- To provide fundamental knowledge about natural and built environment.
- To explain the need and importance of building services.
- To describe the various stages of planning techniques and management.
- To illustrate building construction techniques, construction planning and management.

UNIT – I FUNDAMENTALS OF ARCHITECTURE [9]

Architect and Civil engineer – Definitions – Architecture – aesthetic – planning – Designing – Creating – Erecting – Constructing – Executing – Integrated approach in the design of building – Construction to architecture – History of designed architecture – understanding Basic elements or Primary elements – form – Ordering principles of design

UNIT – II ENVIRONMENTAL PLANNING AND DESIGN [9]

Ecosystem – natural and man-made ecosystem – Ecological principles–Concepts of Environmental Impact Analysis – Environmental considerations in planning and design – Thermal comfort, ventilation and air movement – Principles of lighting and illumination – Climate responsive design – Solar architecture – Principles of architectural acoustics – Green Building – Concepts and Rating – ECBC – Building Performance Simulation and Evaluation – Environmental pollution – types, causes, controls and abatement strategies.

UNIT– III SERVICES, INFRASTRUCTURE AND TRANSPORTATION [9]

Building Services – Water supply; Sewerage and drainage systems – Sanitary fittings and fixtures – Plumbing systems – Principles of internal and external drainage system – Principles of electrification of buildings – Intelligent Buildings – Elevators and Escalators – standards and uses – Air-Conditioning systems – Firefighting Systems – Building Safety and Security systems.

UNIT – IV PLANNING TECHNIQUES AND MANAGEMENT [9]

Tools and techniques of Surveys – Physical, Topographical, Land use and Socioeconomic Surveys – Methods of non-spatial and spatial data analysis – Graphic presentation of spatial data – Application of G.I.S and Remote Sensing techniques in urban and regional planning – Decision support system and Land Information System.

UNIT – V BUILDING MATERIALS, CONSTRUCTION AND MANAGEMENT [9]

Building construction techniques – methods and details – Building systems and prefabrication of building elements – Principles of Modular Coordination – Estimation, specification, valuation, professional practice – Construction planning and equipment – Project management techniques – PERT - CPM.

Total = 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

CO1: Describe the fundamentals of architecture, basic elements of design and methods of visual composition.

CO2: Analyze various design strategies of building for different types of climatic zones by assessing the effects of site, sun and wind in building response.

CO3: Demonstrate plumbing systems; and architectural considerations and their coordination with other services and architectural designs and fire safety measures.

CO4: Develop complete knowledge on planning techniques and management.

CO5: Discuss building construction techniques, the application of modularization and prepare project schedule through identification of critical tasks and path in a project.

Text Books :

- 1 Francis D.K. Ching., Architecture-Form, Space and Order, Van Nostrand Reinhold Company, New York, Fourth Edition, 2014.
- 2 Hirasakar, G. K., The Great Ages of World Architecture, DhanpatRai Publications, New Delhi, Twenty Second Edition, 2018.

References :

- 1 Paul Alan Johnson., The Theory of Architecture – Concepts and themes, Van Nostrand Reinhold Co, New York, First Edition, 1994.
- 2 Yatin Pandya., Elements of Space making, Mapin Publishing Pvt Ltd, Ahmedabad, First Edition, 2014.
- 3 Peter Gossel., Modern Architecture A-Z, Taschen GmbH Publisher, Cologne, Illustrated Edition, 2015.
- 4 <https://nptel.ac.in/courses/124/107/124107011/>