DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to Anna University, Chennai)

PERAMBALUR - 621212

REGULATIONS – 2020

CHOICE BASED CREDIT SYSTEM

B.E. COMPUTER SCIENCE AND ENGINEERING

CURRICULUM AND SYLLABUS

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

(Applicable to the students admitted from the Academic year 2020 – 2021)

VISION & MISSION OF THE INSTITUTION

Vision:

An active and committed centre of advanced learning focused on research and training in the fields of Engineering, Technology and Management to serve the nation better.

Mission:

- To develop eminent scholar with a lifelong follow up of global standards by offering UG, PG and Doctoral Programmes.
- To pursue Professional and Career growth by collaborating mutually beneficial partnership with industries and higher institutes of research.
- To promote sustained research and training with emphasis on human values and leadership qualities.
- To contribute solutions for the need based issues of our society by proper ways and means as dutiful citizen.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Vision:

To produce globally competent, socially responsible professionals in the field of Computer Science and Engineering.

Mission:

M1: Impart high quality experiential learning to get expertise in modern software tools

M2: Inculcate industry exposure and build inter disciplinary research skills.

M3: Mould the students to become Software Professionals, Researchers and Entrepreneurs by providing advanced laboratories.

M4: Acquire Innovative skills and promote lifelong learning with a sense of societal and ethical responsibilities

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1	Graduates of the programme will develop proficiency in identifying, formulating, and resolving complex computing problems.
PEO 2	Graduates of the programme will achieve successful careers in the field of computer science and engineering, pursue advanced degrees, or demonstrate entrepreneurial success.
PEO 3	Graduates of the programme will cultivate effective communication skills, teamwork abilities, ethical values, and leadership qualities for professional engagement in industry and research organizations.

PROGRAM OUTCOMES (POs)

PO	GraduateAttribute
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 modeling 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	Analyze, develop and provide solutions to industrial problems in computer domain using programming, data processing and analytical skills.
PSO2	software application-oriented skills to innovate solution to meet the ever-changing demands of IT industry.

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B.E. COMPUTER SCIENCE AND ENGINEERING

REGULATIONS-2020

CHOICE BASED CREDIT SYSTEM

COURSE MATRIX

Semester – I									
Sl. No	**Course Code**	**Name of the Subject**	**Credit**	**L–T–P**	**Internal Assessment**		**End Semester Examination**		**Minimum Passing Marks**
					Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	
1	U20HS101	Communicative English	3	3-0-0	20	14	80	36	50
2	U20MA101	Engineering Mathematics	4	3-1-0	20	14	80	36	50
3	U20PH101	Engineering Physics – I	3	3-0-0	20	14	80	36	50
4	U20CY101	Engineering Chemistry	3	3-0-0	20	14	80	36	50
5	U20BE101	C Programming	3	3-0-0	20	14	80	36	50
6	U20GE101	Engineering Graphics	4	2-0-4	20	14	80	36	50
7	U20BS101	Physics and Chemistry laboratory	2	0-0-4	100*	50			50
8	U20BS102	C Programming Laboratory	2	0-0-4	100*	50			50
Total			**24**						

HS	BS	ES	PC	PE	OE	EEC	Total Credits
3	12	9	--	--	--	--	24

Semester – II									
Sl. No	**Course Code**	**Name of the Subject**	**Credit**	**L–T–P**	**Internal Assessment**		**End Semester Examination**		**Minimum Passing Marks**
					Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	
1	U20HS201	Functional English	3	3-1-0	20	14	80	36	50
2	U20MA201	Advanced Calculus and Ordinary Differential Equations	4	3-1-0	20	14	80	36	50
3	U20PH201	Engineering Physics - II	3	3-1-0	20	14	80	36	50
4	U20GE201	Python Programming	3	1-0-2	20	14	80	36	50
5	U20CS201	Data Structures and algorithms	4	3-0-0	20	14	80	36	50
6	U20EC201	Semiconductor devices	3	0-0-2	20	14	80	36	50
7	U20GE204	Python Programming Laboratory	2	0-0-4	100*	50			50
8	U20CS202	Data Structures Laboratory	2	0-0-4	100*	50			50
Total			**24**						

HS	BS	ES	PC	PE	OE	EEC	Total Credits
3	7	7	7	--	--	--	24

Semester – III									
S. No	**Course Code**	**Name of the Subject**	**Credit**	**L–T–P**	**Internal Assessment**		**End Semester Examination**		**Minimum Passing Marks**
					Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	
1	U20CSMA301	Mathematical Foundation of Computer Science	4	3-1-0	20	14	80	36	50
2	U20CS301	Data Base Management System	3	3-0-0	20	14	80	36	50
3	U20CS302	Computer Organization and Architecture	3	3-0-0	20	14	80	36	50
4	U20CS303	Object Oriented Programming	3	3-0-0	20	14	80	36	50
5	U20EC301	Digital Systems	4	4-0-0	20	14	80	36	50
6	U20CS304	Data Base Management Systems Laboratory	2	0-0-4	100*	50			50
7	U20CS305	Object oriented Programming Laboratory	2	0-0-4	100*	50			50
Total			**21**						

HS	**BS**	**ES**	**PC**	**PE**	**OE**	**EEC**	**Total Credits**
--	4	4	13	--	--	--	21

Semester – IV									
Sl. No	**Course Code**	**Name of the Subject**	**Credit**	**L–T–P**	**Internal Assessment**		**End Semester Examination**		**Minimum Passing Marks**
					Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	
1	U20HS401	Environmental Science and Engineering	3	3-0-0	20	14	80	36	50
2	U20CS401	Software Engineering	3	3-0-0	20	14	80	36	50
3	U20CS402	Design and analysis of algorithm	4	4-0-0	20	14	80	36	50
4	U20EC401	Microprocessors & Micro controllers	3	3-0-0	20	14	80	36	50
5	U20CS403	Operating Systems	3	3-0-0	20	14	80	36	50
6	U20CS404	Computer Networks	3	3-0-0	20	14	80	36	50
7	U20CS405	Operating Systems Laboratory	2	0-0-4	100*	50			50
8	U20CS406	Network Laboratory	2	0-0-4	100*	50			50
Total			**23**						

HS	**BS**	**ES**	**PC**	**PE**	**OE**	**EEC**	**Total Credits**
3	--	3	17	--	--	--	23

Semester – V									
Sl. No	Course Code	Name of the Subject	Credit	L–T–P	Internal Assessment		End Semester Examination		Minimum Passing Marks
					Max Marks	Min Marks	Max Marks	Min Marks	
1	U20MA501	Random Process and Statistics	4	4-0-0	20	14	80	36	50
2	U20CS501	Artificial Intelligence and Expert System	3	3-0-0	20	14	80	36	50
3	U20CS502	Theory of Computation	4	4-0-0	20	14	80	36	50
4	U20CS503	Object Oriented Analysis & Design	3	3-0-0	20	14	80	36	50
5	U20CS504	Internet Programming	3	3-0-0	20	14	80	36	50
6		Open Elective-I	3	3-0-0	20	14	80	36	50
7		Professional Elective-I	3	3-0-0	20	14	80	36	50
8	U20CS505	Object Oriented Analysis and Design Laboratory	2	0-0-4	100*	50			50
9	U20CS506	Internet Programming Laboratory	2	0-0-4	100*	50			50
Total			**27**						

Professional Elective- I	
U20CS511	Principles of Management
U20CS512	Distributed Systems
U20CS513	Social Network Analysis
U20CS514	User Interface Design
U20CS515	Compiler Design

HS	BS	ES	PC	PE	OE	EEC	Total Credits
--	4	--	17	3	3	--	27

Semester – VI									
Sl. No	Course Code	Name of the Subject	Credit	L–T–P	Internal Assessment		End Semester Examination		Minimum Passing Marks
					Max Marks	Min Marks	Max Marks	Min Marks	
1	U20CS601	Cloud Computing	3	3-0-0	20	14	80	36	50
2	U20CS602	Cryptography and Network Security	3	3-0-0	20	14	80	36	50
3	U20CS603	Data Warehousing and Data Mining	3	3-0-0	20	14	80	36	50
4	U20CS604	Machine Learning	3	3-0-0	20	14	80	36	50
5		Professional Elective-II	3	3-0-0	20	14	80	36	50
6	U20CS605	Data Mining Tools Laboratory	2	0-0-4	20	14	80	36	50
7	U20CS606	Security Laboratory	2	0-0-4	100*	50			50
8	U20HS601	Inter Personal Skill	2	0-0-2	100*	50			50
Total			**21**						

Professional Elective- II	
U20CS621	XML and Web Services
U20CS622	Advanced Java Programming
U20CS623	Open Source Systems
U20CS624	Professional Ethics
U20CS625	Computer Vision

HS	BS	ES	PC	PE	OE	EEC	Total Credits
--	--	--	18	3	--	--	21

Semester – VII									
Sl. No	**Course Code**	**Name of the Subject**	**Credit**	**L–T–P**	**Internal Assessment**		**End Semester Examination**		**Minimum Passing Marks**
					Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	
1	U20CS701	Information Storage Management	3	3-0-0	20	14	80	36	50
2	U20CS702	Internet of Things	3	3-0-0	20	14	80	36	50
3	U20CS703	Big Data Analytics	3	3-0-0	20	14	80	36	50
4		Professional elective-III	3	3-0-0	20	14	80	36	50
5		Open Elective-II	3	3-0-0	20	14	80	36	50
6	U20CS704	IoT lab	2	3-0-4	100*	50			50
7	U20CS705	Mini Project	2	3-0-2	100*	50			50
Total			**19**						

Professional Elective- III	
U20CS731	Software Project Management
U20CS732	Digital Image Processing
U20CS733	Deep Learning
U20CS734	Natural Language Processing
U20CS735	Mobile Computing

HS	**BS**	**ES**	**PC**	**PE**	**OE**	**EEC**	**Total Credits**
--	--	--	11	3	3	2	19

Semester – VIII									
Sl. No	**Course Code**	**Name of the Subject**	**Credit**	**L–T–P**	**Internal Assessment**		**End Semester Examination**		**Minimum Passing Marks**
					Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	
1		Professional Elective IV	3	3-0-0	20	14	80	36	50
2		Professional Elective V	3	3-0-0	20	14	80	36	50
3	U20CS801	Project Work	6	0-0-12	100*	50			50
Total			**12**						

Professional Elective IV		**Professional Elective V**	
U20CS841	Software Quality Assurance	U20CS851	Human Computer Interaction
U20CS842	Business Intelligence	U20CS852	Software testing Methodologies
U20CS843	Service Oriented Architecture	U20CS853	Adhoc Networks
U20CS844	Cyber Security	U20CS854	Information Extraction
U20CS845	Multi-core architecture and programming	U20CS855	Mobile and Pervasive Computing

HS	**BS**	**ES**	**PC**	**PE**	**OE**	**EEC**	**Total Credits**
--	--	--	--	6	--	6	12

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING OPEN ELECTIVES Common to All Branches Except COMPUTER SCIENCE AND ENGINEERING		
SL. NO	**SUBJECT CODE**	**NAME OF THE SUBJECT**
1	U20OCS51	Introduction to Data Science
2	U20OCS52	Data Visualization
3	U20OCS53	Web Technology
4	U20OCS54	Distributed Computing
5	U20OCS55	Virtual Reality & Augmented Reality
6	U20OCS71	Robotics and Intelligence System
7	U20OCS72	Smart Sensing
8	U20OCS73	Grid Computing
9	U20OCS74	Information Security
10	U20OCS75	Bio informatics

TOTAL COURSES & CREDITS-SEMESTER WISE

Semester	I	II	III	IV	V	VI	VII	VIII	TOTAL
No of Courses	8	9	7	8	9	8	7	3	59
Credits	24	24	21	23	27	21	19	12	171

SUMMARY

S.No	Subject Area	Credits Per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HS	3	3	-	3	-	-	-	-	**9**
2	BS	12	7	4	-	4	-	-	-	**27**
3	ES	9	7	4	3	-	-	-	-	**23**
4	PC	-	7	13	17	17	18	11	-	**83**
5	PE	-	-	-	-	3	3	3	6	**15**
6	OE	-	-	-	-	3	-	3	-	**6**
7	EEC	-	-	-	-	-	-	2	6	**8**
Total		**24**	**24**	**21**	**23**	**27**	**21**	**19**	**12**	**171**

SEMESTER I

U20HS101	COMMUNICATIVE ENGLISH (COMMON TO ALL BRANCHES)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To enable the engineering students develop their basic communication skills in English for academic and socialpurposes.
- To equip the students with appropriate oral and written communicationskills.
- To inculcate the skills of listening, reading and criticalthinking.
- To integrate English Language learning with employability skills andtraining.
- To enhance the students' proficiency in reading skills enabling them meet the academic demands of theircourse.

UNIT-I GENERAL INTRODUCTION **9**

Listening - Listening to conversations, welcome speeches, lectures and description of equipment. Speaking – introducing one self- family and friends. Reading- practice in skimming- scanning and predicting - Writing – completing sentences. Grammar - WH - Questions- asking and answering - yes or no questions and question tag-Parts of Speech. Prefixes- Suffixes- Tense- Present, past and future tense.Wordformation.

UNIT-II TECHNIQUES OF READING AND WRITING **9**

Reading – purpose of reading-comprehension - pre - reading- post reading - comprehension questions (multiple choice questions and /or short questions/open- ended questions). Writing - Free writing on any given topic (My favorite place / Hobbies / School life, etc.) – Auto biographical writing (writing about one's leisure time activities, hometown, etc.) – Listening- Situational Conversation, Telephonic Conversation. Speaking–sharing information of a personal kind - greeting - taking leave - Grammar– adjectives, prepositions, conjunctions, Articles, Punctuations- Error correction, editing mistakes in grammar, vocabulary,spelling.

UNIT-III GRAMMAR AND SKILL DEVELOPMENT **9**

Reading-Reading general contexts and interpreting graphical representations. Writing- understanding text structure-use of reference words and discourse markers-coherence-jumbled sentences Listening– listening to longer texts and filling up the table-product description-narratives from different sources. Speaking- asking about routine actions and expressing opinions. Grammar-past tense-kinds of noun, verb and adverb, Impersonal Passivevoice.

UNIT-IV READING AND LANGUAGE DEVELOPMENT **9**

Reading- Short reading passages for sentence matching exercises, picking out specific information in a short text. Writing- letter writing, informal or personal letters - e-mails - conventions of personal email- Listening-listening to dialogues or conversations and completing exercises based on them. Speaking-Group Discussion - Grammar- Future tense, synonyms-antonyms-phrasalverbs.

UNIT-V WRITING SKILLS **9**

Reading-Intensivereading–Writing-writingshortessays-dialoguewriting-Listening– listening to talks-conversations- Speaking–Presenting welcome speech and vote of thank. -Grammar-modal verbs-collocations-single wordsubstitutes.

TOTAL: 45 PERIODS

COURSE OUTCOMES

Learners are able to:

- Speak clearly, effortlessly, confidently andappropriately.
- Write coherently with acceptable accuracy, organizing ideaslogically.
- Listen to comprehend different discourses and different genres oftexts.
- Read to comprehend different discourses and different genres oftexts.
- The learner will be able to read and infer, analyze,predict,interpret and draw conclusions any printedtext.

TEXT BOOKS

1. Board of Editors. Using English A Course book for Undergraduate Engineers and Technologists. Orient Black SwanLimited,Hyderabad:2015
2. Richards, C.Jack.Interchange Students'Book-2NewDelhi:CUP,2015.

REFERENCES

1. Bailey,Stephen.AcademicWriting:Apracticalguide for students. New York:Rutledge,2011.
2. Raymond Murphy, Murphy's English Grammar, Cambridge University Press 2004.
3. Meenakshi Raman, Sangeeta Sharma, Technical Communication: English Skills for Engineers, Oxford University Press,2009.

U20MA101	ENGINEERING MATHEMATICS (COMMON TO ALL BRANCHES)	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES

- To handle practical problems arising in the field ofengineering.
- To achieve conceptual understanding and to retain the best traditions of traditionalcalculus.
- To provide the basic tools of calculus mainly for the purpose of modeling the engineeringproblems mathematically and obtainingsolutions.
- To deal with topics such as single variable and multivariableCalculus.
- To play an important role in the understanding of science, engineering, economics and computer science, among otherdisciplines.

UNIT-I EVALUATION AND APPLICATION OF MATRICES 12

Definition - Basic Concepts of Matrices - Eigen values and Eigen vectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigen vectors – Cayley - Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT-II DIFFERENTIAL CALCULUS 12

Limit of a function - Continuity - Derivatives – Differentiation Rules – Mean Value Theorem – Interval of increasing and decreasing functions – Maxima and Minima - Interval of concavity and convexity.

UNIT-III MULTIVARIABLE CALCULUS **12**

Limits and Continuity – Partial derivatives – Total derivative – Differentiation of implicit functions – Jacobian and properties – Taylor's series for functions of two variables – Maxima, Minima and saddle points - Method of Lagrange multipliers.

UNIT-IV INTEGRAL CALCULUS **12**

Definite Integrals and its properties – Fundamental theorem of Calculus - Techniques of integration for Indefinite Integrals using basic integration formulas - Integration by parts – Trigonometric Substitutions – Integration of Rational functions by Partial Fractions.

UNIT-V MULTIPLE INTEGRAL AND THEIR APPLICATIONS 12

Double integrals – Change the order of integration - Polar Coordinates - Area - Change of variables - Triple integrals -Volume -Applications -Areas andVolumes.

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to:

- Express large amounts of data and functions in an organized and concise form apart from diagonalizingmatrices.
- Solve maxima and minima problems usingdifferentiation.
- Apply functions of several variables to solve problems in engineering and technology.
- Evaluate integrals by using Fundamental Theorem ofCalculus.
- Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change the order and change ofvariables.

TEXT BOOKS

1. Grewal B.S., - Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Ed.,2014.
2. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, NewDelhi.

REFERENCES

1. Bali N.P.and Manish Goyal "Engineering Mathematics" (For Semester I) Third Edition, University SciencePress.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons.
3. Fritz John and Richard Courant, "Introduction to Calculus and Analysis" Springer.
4. James Stewart, "Calculus: Early Transcendental", Cengage Learning, 7th Edition, New Delhi,2015.
5. Joel Hass, Christopher Heil and Maurice D.Weir "Thomas' Calculus", 14th Edition, Pearson.

U20PH101	ENGINEERING PHYSICS - I (COMMON TO ALL BRANCHES)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To import knowledge in basic concepts of physics relevant to engineering applications.
- Capability to understand advanced topics inengineering.

UNIT-I SOLID STATE PHYSICS 9

Lattice – unit cell – seven crystal systems -Bravai's lattices – lattice planes – Miller indices – derivation for inter-planar spacing in terms of Miller indices– calculation of number of atoms per unit cell , atomic radius , coordination number and packing factor for SC, BCC, FCC and HCP structures. X-ray diffraction: Bragg's law – diffraction methods: powder and Laue methods. Crystal Growth Techniques: melt growth technique (Bridgman and Czochralski techniques)

UNIT-II ELASTICITY OF MATTER 9

Introduction- Elasticity-Plasticity–Hooke's law – relationship between three moduli of elasticity (qualitative) – stress –strain diagram – Poisson's ratio –factors affecting elasticity. Beam: Internal Bending moment – Cantilever: theory and experiment- Young's modulus: theory and experiment (uniform and non-uniform bending) – I- shaped girders-advantages and applications – twisting couple of a wire or cylinder - torsion pendulum –determination of moment of inertia of disc and rigidity modulus of cylindricalwire.

UNIT-III ULTRASONICS AND ITS APPLICATIONS 9

Introduction-classification of sound- properties of infrasonic, audible and ultrasonic-production: magnetostriction and piezoelectric methods–detection of ultrasonic waves–determination of velocity of sound in liquid (Acoustic grating method). Applications: Engineering and medical field- Non-destructive testing: pulse echo system through transmission and reflection modes. Ultrasonic scanning methods- Sonogram.

UNIT-IV MODERN PHYSICS 9

Black body radiation- Basic Laws – Planck's hypothesis and its radiation law: derivation – deduction of Wien's displacement law and Rayleigh Jean's law from Planck's law – Photons and its properties-Compton Effect – derivation – experimental verification. Photo Electric effect and its Laws - Einstein's Equation - Matter waves–de-Broglie hypothesis - de-Broglie wavelength– Schrodinger's time independent and time dependent wave equations -physical significance of the wave function. Application: particle in one dimensional box-normalization - degenerate and non-degeneratestates.

UNIT-V LASER ANDOPTICAL FIBER 9

Laser: properties–population inversion-pumping methods – Einstein's coefficients- derivation. Types: He-Ne and semiconductor lasers (Homo and Hetero junction) – uses of LASER- Hologram - Construction and Reconstruction Process. Optical fiber: Structure-advantages of optical fiber-Principle and propagation of light through optical fiber–expressions for numerical aperture and acceptance angle–fabrication of optical fiber- types of optical fibers– fiber optical communication system – endoscope – Fiber optic sensors (Qualitative Studyonly).

TOTAL: 45 PERIODS

COURSE OUTCOMES

Learners are able to:

- Assess the elastic behavior of the materials and bending behavior ofbeam.
- Acquire knowledge of NDT and applications ofultrasonics
- Know the development of modern physics and itsapplications.
- Recognize the uses of laser and fiberoptics.
- Distinguish the different crystal systems, structural determination and synthesis ofcrystals.

TEXT BOOKS

1. Marikani, Engineering Physics, PHI, New Delhi,2013.
2. S.Vadivel&A.Pannerselvam, Engineering Physics, Jaitech Publications, 2015 (Revisededition).

REFERENCES

1. Selladurai, Engineering Physics Part-I, PHI learning private limited, New Delhi, 2010.
2. R.K. Gaur, S.L. Gupta, Engineering Physics, Dhanpat Rai publications,2013
3. V.Rajendran, "Engineering Physics", Tata McGraw-Hill. NewDelhi.2011
4. P.K.Palanisamy Engineering Physics. Scitech Publications,2011
5. A.S. Vasudeva, Modern Engineering Physics, Pub. S. Chand, New Delhi,2013.
6. James Patterson · Bernard Bailey,Solid State Physis, Springer Publication,second Edition, 2010.
7. Raymond A. Serway and John Jewett,Jr. , "Physics for Scientist and Engineer with modern Physics", Mary Finch Publication, 9thedition,2014.
8. William T .Silfvast ,"Laser Fundamentals",Second Edition, Cambridge University Press, 2008.

U20CY101	ENGINEERING CHEMISTRY (COMMON TO ALLBRANCHES)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To make the students conversant with basics of polymer chemistry.
- To make the student acquire sound knowledge of second law of thermodynamics and second law based derivations of importance in engineering applications in all disciplines.
- To acquaint the student with concepts of important photo physical and photochemical processes and spectroscopy.
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.

UNIT-I BASICS OF POLYMER **9**

Introduction: Classification of polymers– Natural and synthetic; Thermoplastic and Thermosetting. Functionality– Degree of polymerization. Types and mechanism of polymerization: Addition, condensation and copolymerization. Properties of polymer -Techniques of polymerization: Bulk, emulsion, solution and suspension. Preparation, properties and uses of Nylon6.6, andEpoxyresin.

UNIT-II SURFACE CHEMISTRY AND CATALYSIS 9

Adsorption: Types of adsorption – adsorption of gases on solids – adsorption of solute from solutions – adsorption isotherms – Freundlich's adsorption isotherm– Langmuir's adsorption isotherm –applications of adsorption on pollution abatement. Catalysis: Catalyst – types of catalysis – criteria – autocatalysis – catalytic poisoning and catalytic promoters - acid base catalysis – enzyme catalysis– Michaelis – Menten equation.

UNIT-III CHEMICAL THERMODYNAMICS 9

Terminology of thermodynamics- Second law: Entropy- entropy change foran ideal gas,reversible and irreversible processes; entropy of phase transitions; Clausiusin equality. Free energy and work function: Helmholtz and Gibbs free energy functions -Criteria of spontaneity;Gibbs-Helmholtz equation - Clausius- Clapeyron equation; Maxwell relations – Van't Hoff isotherm and isochore.

UNIT-IV PHOTO CHEMISTRYAND SPECTROSCOPY 9

Photo chemistry: Laws of photo chemistry - Grotthuss–Draper law, Stark– Einstein law and Lambert- Beer Law. Quantum efficiency– determination-Photo processes- Internal Conversion, Inter-system crossing, Fluorescence, Phosphorescence, Chemiluminescence and Photo-sensitization. Spectroscopy: Electro magnetic spectrum- Absorption of radiation–Electronic, Vibrational and rotational transitions. UV-visible and IRspectroscopy.

UNIT-V PHASE RULE AND ALLOYS 9

Phase rule: Introduction, definition of terms with examples, One Component System- water system-Reduced phase rule- Two Component Systems- classification– lead-silver system, zinc-magnesium system.Alloys: Introduction- Definition- Properties of alloys- Significance of alloying, Functions and effect of alloying elements- Ferrous alloys- Nichrome and Stainless steel – heat treatment of steel.

TOTAL: 45 PERIODS

COURSE OUTCOMES

Learners are able to:

- Describe the General Structure of Polymers. Identify and Explain differences between addition and stepwisePolymerization.
- Explain how selected isomers could be used for measurement of surface area of materials or in rationalization of catalysis.
- Derive and Discuss the first and second Law's of thermodynamics.
- Making Possible to apply this knowledge in different areas, other than photo chemistry and spectroscopy.
- Illustrate the phase transition of one component and two component system and types of alloys and their applications in industries.

TEXT BOOKS

1. Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi,2010.
2. Kannan P., Ravikrishnan A., "EngineeringChemistry", Sri Krishna Hi- tech Publishing Company Pvt. Ltd. Chennai,2009.

REFERENCES

1. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand &Company Ltd., New Delhi2010.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company,Ltd.,NewDelhi,2008.
3. GowarikerV.R.,Viswanathan N.V. and JayadevSreedhar, "Polymer Science", NewAgeInternational P (Ltd.,), Chennai,2006.
4. ShashiChawla, "A Text Book of Engineering Chemistry", Dhanapat Rai & Co.(P)Ltd,Delhi,2013.
5. Satya Prakash and Manish Agarwal, "Engineering Chemistry",Khanna Book Publishing Co.(P) Ltd,Delhi,2018.

U20BE101	C PROGRAMMING (COMMON TO ALLBRANCHES)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop applications in C using functions , pointers and structures
- To do input/output and file handling in C.

UNIT-I BASICS OF C PROGRAMMING 9

Introduction to programming paradigms - Structure of C program - C programming: Data Types – Storage classes - Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Pre- processor directives - Compilation process

UNIT-II ARRAYS AND STRINGS 9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode - Two dimensional arrays.- String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.

UNIT-III FUNCTIONS AND POINTERS 9

Introduction to functions: Function prototype, function definition, function call, Built- in functions (string functions, math functions) – Recursion – Example Program: Scientific calculator using built-in functions, Binary Search using recursive functions

– Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers.

UNIT-IV STRUCTURES 9

Structure - Nested structures – Pointer and Structures – Array of structures – Example Program using structures and pointers – Union- Example Program using unions and pointers.

UNIT-V FILE PROCESSING 9

Files – Types of file processing: Sequential access, Random access – Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Transaction processing using random access files – Command line arguments.

TOTAL: 45 PERIODS

COURSE OUTCOMES

Learners are able to:

- Develop simple applications in C using basic constructs
- Design and implement applications using arrays and strings
- Develop and implement applications in C using functions and pointers.
- Develop applications in C using structures.
- Design applications using sequential and random access file processing

TEXT BOOKS

1. Jain P.C. and Monica Jain, "Engineering Chemistry", Reema Thareja, ―Programming in C‖, Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, ―The C Programming language‖, SecondEdition, Pearson Education,2006.

REFERENCES

1. Paul Deitel and Harvey Deitel, ―"C How to Program", Seventh edition, Pearson Publication Juneja, B. L and Anita Seth, "Programming in C", CENGAGE Learning India pvt. Ltd.,2011
2. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press,2009.
3. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia,2011.

U20GE101	ENGINEERING GRAPHICS (COMMON TO ALL BRANCHES)	L	T	P	C
		2	0	4	4

COURSE OBJECTIVES

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

UNIT-I PLANE CURVES AND ORTHOGRAPHIC PROJECTION 6+12

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimension. Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects.

UNIT-II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method (polygonal and circular surfaces) inclined to both theplanes.

UNIT-III PROJECTIONOFSOLIDS 6+12

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

UNIT-IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6+12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple solids – Prisms, pyramids cylinders and cones.

UNIT-V SOMETRIC PROJECTION 6+12

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions.

TOTAL: 30+60 = 90PERIODS

COURSE OUTCOMES

Learners are able to:

- Familiarize with the fundamentals and standards of Engineering graphics
- Perform freehand sketching of basic geometrical constructions and multiple views of objects.
- Project orthographic projections of lines and plane surfaces.
- Draw projections and solids and development of surfaces.
- Visualize and to project isometric and perspective sections of simple solids.

TEXT BOOKS

1. Natrajan K.V., ―A text book of Engineering Graphics‖, Dhanalakshmi Publishers, Chennai,2009.
2. Venugopal K. and Prabhu Raja V., ―Engineering Graphics‖, New Age International (P) Limited,2008.

REFERENCES

1. Bhatt N.D. and Panchal V.M., ―Engineering Drawing‖, Charotar Publishing House, 50th Edition,2010.
2. Basant Agarwal and Agarwal C.M., ―Engineering Drawing‖, Tata McGraw Hill Publishing Company Limited, New Delhi,2008.
3. Gopalakrishna K.R., ―Engineering Drawing‖ (Vol. I&II combined), Subhas Stores, Bangalore,2007.
4. Luzzader, Warren.J. and Duff,John M., ―Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
5. N S Parthasarathy and Vela Murali, ―Engineering Graphics‖, Oxford University, Press, New Delhi,2015.
6. Shah M.B., and Rana B.C., ―Engineering Drawing‖, Pearson, 2nd Edition, 2009.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation –Lettering.

3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

- There will be five questions, each of either or type covering all units of the syllabus.
- All questions will carry equal marks of 20 each making a total of100.
- The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3size.
- The examination will be conducted in appropriate sessions on the same day

U20BS101	PHYSICS AND CHEMISTRY LABORATORY (COMMON TO ALL BRANCHES) PHYSICS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To handle different experiments to test the physics concepts applied in optics, thermal physics, electronics, sound, elasticity and etc..

LIST OF EXPERIMENTS (Any Five Experiments)

1. Determination of velocity of sound and compressibility of liquid using Ultrasonic interferometer
2. Find the Young's modulus by non-uniform bending method
3. Verify of band gap energy of a PN junction semiconductor using PN junction kit
4. Determination of wavelength of Laser and particle size using Laser grating method
5. Determination of rigidity modulus of given wire using Torsion pendulum method
6. Verify the wavelength of mercury spectrum using Spectrometer grating
7. Determination of thickness of a thin specimen using Air wedge method
8. Determination of Young's modulus by uniform bending method

TOTAL: 30 PERIODS

COURSE OUTCOMES

Learners are able to:

1. After completion of the course, the students can able to
2. Apply the basic theory for the corresponding experiment
3. Know the procedure to use physics equipment

TEXT BOOKS

1. Grewal B.S., - Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Ed.,2014.
2. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, NewDelhi.

REFERENCES

1. Dr. P.Mani, "Engineering physics practicals", Dhanam publications, 13th Edition, 2014.
2. Dr. G. Senthilkumar, "Physics Laboratory Manual I & II", VRB publishers,2013.

CHEMISTRY LABORATORY

COURSE OBJECTIVES

- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To acquaint the students with the determination of molecular weight of a polymer by Viscometery.

LIST OF EXPERIMENTS (Any Five Experiments)

1. Determination of DO content of water sample by Winkler's method.
2. Determination of chloride content of water sample by argentometric method.
3. Determination of strength of given hydrochloric acid using pH meter.
4. Determination of strength of HCL using conductivity meter
5. Determination of strength of acids in a mixture using conductivity meter.
6. Determination of molecular weight of polyvinyl alcohol using Ostwald visco meter.

TOTAL :30 PERIODS

COURSE OUTCOMES

- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

		L	T	P	C
U20BS102	**C PROGRAMMINGLABORATORY (COMMON TO ALL BRANCHES)**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES

- To develop programs in C using basic constructs.
- To develop applications in C using strings, pointers, functions, structures.
- To develop applications in C using file processing.

LIST OF EXPERIMENTS

1. Programs using I/O statements and expressions.
2. Programs using decision-making constructs.
3. Write a program to find whether the given year is leap year or Not? (Hint: not every centurion year is a leap. For example 1700, 1800 and 1900 is not a leap year)
4. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
5. Check whether a given number is Armstrong number or not?
6. Populate an array with height of persons and find how many persons are above the average height.
7. Populate a two dimensional array with height and weight of persons and compute the Body

Mass Index of the individuals.

8. Given astring“a$bcd./fg“ find its reverse without changing the position of special characters.(Example input:a@gh%;j andoutput:j@hg%;a)
9. Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions.
10. From a given paragraph perform the following using built-in functions:
11. Find the total number of words.
12. Capitalize the first word of each sentence.
13. Replace a given word with another word.
14. Solve towers of Hanoi using recursion.
15. Sort the list of numbers using pass by reference.
16. Generate salary slip of employees using structures and pointers.
17. Compute internal marks of students for five different subjects using structures and functions.
18. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to:

- Develop C programs for simple applications making use of basic constructs, arrays and strings.
- Develop C programs involving functions, recursion, pointers, and structures.
- Design applications using sequential and random access file processing.

SEMESTER II

U20HS201	**FUNCTIONAL ENGLISH (COMMON TO ALL BRANCHES)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To enable the engineering students develop their basic communication skills in English for academic and social purposes.
- To equip the students with appropriate oral and written communication skills.
- To enhance the skills of listening, reading and critical thinking.
- To integrate English Language learning with training for employability skills.

UNIT-I VOCABULARY AND GRAMMAR 9

Listening-Listening to talks mostly of a scientific/technical. Speaking– Asking for and giving directions-Reading–reading short technical texts from journals- newspapers- Writing- purpose statements–extended definitions–issue-writing instructions – recommendations- Language Development–subject verb agreement -compound words. Technical vocabulary.

UNIT-II TECHNIQUES OF READING AND WRITING 9

Listening: Listening Process; Types of Listening; Intensive vs. Extensive Listening; Barriers to Listening. Speaking – describing a process-Reading – reading longer technical texts- identifying the various transitions in a text- paragraphing- Writing- interpreting charts, graphs- Language Development-vocabulary used informal letters/emails and reports. Homonyms and Homophones-Common Errors. Numerical adjectives.

UNIT-III GRAMMAR AND SKILL DEVELOPMENT 9

Listening- Listening to classroom lectures/ talks on engineering/technology - Speaking –introduction to technical presentations- Reading–longer texts both general and technical, practice in speed reading; Writing- checklists- Describing a process, use of sequence words-Language Development - sequence words- Misspelled words.-use of clauses. Verb forms. Direct/Indirect Speech

UNIT-IV INTERVIEW SKILL AND LANGUAGE DEVELOPMENT 9

Listening- Listening to documentaries and making notes. Speaking – mechanics of presentations-Reading– reading for detailed comprehension- Writing-email etiquette -job application–cover letter–Résumé preparation(via email and hard copy)- analytical essays and issue based essays-- Language Development -finding suitable synonyms-paraphrasing-. –if conditionals.

UNIT-V TECHNICAL WRITING 9

Listening- TED/Ink talks; Speaking–participating in a group discussion - Reading– reading and understanding technical articles Writing– Writing reports- minutes of a meeting- accident and survey-Language Development- Comparative Adjectives.

TOTAL: 45 PERIODS

COURSE OUTCOMES

Learners are able to:

- Use academic and technical vocabulary in relevant contexts. Construct meaningful and grammatically correct sentence.
- Effectively listen and acquire language and content, read fast and understand texts.
- Use oral presentation skills in all professional contexts.
- Demonstrate the understanding of the nature and importance of technical communication Draft various types of technical and business documents like, reports, proposals and business letters.
- Compose documents like job application, book review etc.

TEXT BOOKS

1. Board of editors. Fluency in English A Course book for Engineering Technology. OrientBlackswan,Hyderabad:2016.
2. Sudharshana. N.P and Saveetha.C. English for Technical Communication. Cambridge University Press: NewDelhi,2016.

REFERENCES

1. Barrass, Robert. Scientists Must Write. London:Routledge.2003.
2. Faculty of English. Technical Communication. SASTRA Publication.2017.
3. Raman, Meenakshi & Sangeeta Sharma. Technical Communication: Wren & Martin. High School English Grammar and Composition. (Revised edn.) New Delhi: Chand & Co.1995.

U20MA201	ADVANCED CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS (COMMON TO ALL BRANCHES)	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES

- The objective of this course is to familiarize the prospective engineers with techniques in ordinary differential equations, complex variables and complex integration.
- The Study of Laplace transforms help to solve the differential equations that occur in various branches of engineering disciplines.
- Vector calculus can be widely used for modeling the various laws of physics.
- The various methods of complex analysis can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT-I APPLICATIONS OF ORDINARY DIFFERENTIAL EQUATIONS 12

Basic concepts - Separable differential equations - Exact differential equations - Integrating factors - Linear differential equations – Second order linear differential equations with constant coefficients – Particular Integral using operator method and Method of variation of parameters – Homogenous equation of Euler‘s and Legendre‘s type-Physical Applications-Oscillations of a Spring.

UNIT-II LAPLACE TRANSFORMS 12

Existence conditions – Transforms of elementary functions –Transform of unit step function and unit impulse function – Basic properties – Shifting theorems - Transforms of derivatives and integrals – Transform of periodic functions - Inverse transforms: Convolution theorem (Statement only) and Partial Fractions - Application to solution of linear second order ordinary differential equations with constant coefficients-Unit Step Function-Unit impulse function.

UNIT-III VECTOR CALCULUS AND APPLICATIONS 12

Gradient and directional derivative – Divergence and curl – Irrotational and Solenoidal vector fields – Line integral – Surface integral - Area of a curved surface - Green's, Gauss divergence and Stokes' theorems in evaluating line, surface and volume integrals (Planar, Cylindrical and Spherical Surfaces).

UNIT-IV ANALYTIC FUNCTIONS 12

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian form - Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by function- Bilinear Transformation.

UNIT-V CALCULUS OF COMPLEX FUNCTIONS 12

Complex integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour (No poles on the real axis).

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to:

- deal with advanced level of mathematics and applications that would be essential for their disciplines. The students will learn:
- obtain the solutions of first and second order differential equations that model physical processes.
- Gradient, divergence and curl of a vector point function and related identities. Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.
- The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.
- Analytic functions, conformal mapping and complex integration.
- Laplace transform and inverse transform of simple functions, properties, various related theorems and application to solve the differential equations with constant coefficients.

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition,2014.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi.

REFERENCES

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons.
2. N. P. Bali and Manish Goyal "Engineering Mathematics" (For Semester II) Third Edition, University SciencePress.
3. O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi,2007.
4. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi,2015.
5. Joel Hass, Christopher Heil and Maurice D.Weir Thomas' Calculus, 14th Edition, Pearson.

U20PH201	ENGINEERING PHYSICS - II (COMMON TO ALLBRANCHES)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the basics of electric, thermal, magnetic, super conducting and di electric properties of materials
- To aware about recent trends in physics.

UNIT-I ELECRTON THEORY OF SOLIDS 9

Introduction: types of materials- classical free electron theory: postulates- derivation of electrical conductivity and thermal conductivity- derivation. Wiedemann-Franz law and its verification-merits and demerits of classical free electron theory. Quantum free electron theory: Fermi energy level and its importance-Fermi-Diracdistributionfunctionanditsvariationwithtemperature–density of energy states –carrier concentration in metals -average energy of electrons at 0k.

UNIT-II FUNDAMENTALS OF SEMICONDUCTOR 9

Introduction: properties- Types semiconductors- concept of effective mass of an electron and hole. Intrinsic semiconductor: carrier concentration in an intrinsic semiconductor-derivation –variation of Fermi energy level with temperature - Extrinsic semiconductor: carrier concentration derivation (P and N type semiconductor) - Hall effect–theory and experimental determination of Hall coefficient – Applications.

UNIT-III DIELECTRICS AND FERROELECTRICS 9

Introduction: fundamental definitions in dielectrics–expressions for electronic and ionic polarization mechanisms- orientation polarization – space charge polarization – Langevin – Debye equation – frequency and temperature effects on polarization. Capacitor-energy stored in capacitor- Internal field – Clausius Mossotti relation-dielectric loss –dielectric breakdown – various breakdown mechanisms with characteristics – applications of dielectric materials - Ferro electrics -properties and applications.

UNIT-IV MAGETISM AND SUPER CONDUCTOR 9

MagneticMaterials:Introduction-basicdefinitions–originofmagneticmoment–Bohr magneton - magnetic materials: classification of dia, para, ferro magnetic materials. Ferro magnetic domains-energies involved in the growth of magnetic domains-hysteresis-explanation of hysteresis curve based on domain theory- soft and hard magnetic materials. Superconductings Materials: properties - types - BCS theory of super conductivity-Applications: cryotron and Mag-lev.

UNIT-V NANO MATERIALS **9**

Definition of nano system- Quantum confinement - 0D to 3D Quantum confined nanostructures - density of energy states from 3D to 0D- Preparation: top down and bottom up approaches- PLD - PVD - CVD - Electro deposition- Carbon nanotubes-types - SWCNT and MWCNT, Armchair, Zig-zag and Chiral structures-properties-applications

TOTAL: 45 PERIODS

COURSE OUTCOMES

Learners are able to:

- Select the metals required for specific applications in the area of engineering and technology.
- Distinguish between different types of semiconductor and determination of Hallco-efficient.
- Understand the property of dielectric and ferro electric property of materials.
- Identify different magnetic materials and super conducting materials.
- Understand the idea used in new technologies

TEXT BOOKS

1. V.Rajendran, “Materials Science”, Tata McGraw- Hill, New Delhi,2011.
2. S.Vadivel, A.Pannerselvam, Solid State Physics, Jaitech Publications, 2015 (Revised edition).

REFERENCES

1. Charles Kittel, “Introduction to Solid State Physics”, John Wiley & sons, 7th edition, Singapore(2007).
2. K.Palanisamy, Materials Science. SCITECH Publishers,2011.
3. M.Arumugam, Materials Science. Anuradha publishers,2010.
4. S.O.Pillai, Solid State Physics. New Age International(P) Ltd., publishers, 2009
5. Dr.W.R.Fahrner, "Nanotechnology and Nanoelectronics Materials, Devices, Measurement Techniques", Springer,2005
6. Horst-Gunter Rubahn, "Basics of Nano Technology", Wiley-VCH Verlag Gmbh& Co, 2008.
7. J M D. Coey, “Magnetism and Magnetic Materials”, Combridge University Press,1st edition,2009.
8. V. Pokropivny, R. Lohmus, I. Hussainova, A. Pokropivny, S. Vlassov. Introduction in nanomaterials and nanotechnology. – University of Tartu. – 2007.

U20GE201	PYTHON PROGRAMMING (COMMON TO ALL BRANCHES)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To know the basics of algorithmic problem solving.
- To develop Python programs with conditionals and loops
- To define Python functions and call them.
- To use Python data structures - lists, tuples, dictionaries
- To do input/output with files in Python

UNIT-I ALGORITHMIC PROBLEM SOLVING 9

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT-II DATA, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between twopoints.

UNIT-III CONTROL FLOW, FUNCTIONS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search

UNIT-IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT-V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

TOTAL: 45 PERIODS

COURSE OUTCOMES

Learners are able to:

- Develop algorithmic solutions to simple computational roblems
- Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python Programs.

TEXT BOOKS

1. AllenB.Downey,"ThinkPython:HowtoThinkLikeaComputerScientist‘",2nd edition,Updatedfor Python3,Shroff/O‘Reilly Publishers,2016 (http://greenteapress.com/wp/think-python/)
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python ", Revised and updated for Python 3.2, Network Theory Ltd.,2011.

REFERENCES

1. John V Guttag, "Introduction to Computation and Programming Using Python'", Revised and expanded Edition, MIT Press ,2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd.,2016.
3. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,,2015.
4. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
5. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition,2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC,2013.

U20CS201	DATA STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Apply various non-linear tree data structures in real time applications and projects
- Solve the collision problem using hashing techniques
- Implement and solve problems using heaps
- Design algorithms to solve common graph problems
- Identify the algorithms that are used to solve various problems.

UNIT-I TREE STRUCTURE 9

Tree: Types of Trees - Binary Tree - Representation–Tree Traversals – Expression Trees - Threaded Binary Tree - Application of Trees- Set representation – Union and Find operations.

UNIT-II SEARCH STRUCTURESAND INDEXING 9

Binary Search Tree- AVL Tree - Red-Black Tree- Splay Tree - B-tree - B+ tree - Hashing - Hash functions – Collision resolution techniques: Separate chaining and open addressing.

UNIT-III STACKS AND QUEUES:STACKS 9

Stacks and Queues: Stacks: ADT Stack and its operations: Applications of Stacks: Expression Conversion and evaluation. Queues: ADT Queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each type of Queues.

UNIT-IV GRAPHS 9

Graphs: Representation – Graph traversals – Minimum spanning trees: Prim's algorithm, Kruskal's algorithm – Shortest path algorithms: Dijkstra's algorithm, Floyd Warshall algorithm – Applications of Graphs: Topological sort.

UNIT-V INTRODUCTION TO ALGORITHMDESIGNTECHNIQUES 9

Overview: Greedy Method - Divide and conquer - Dynamic Programming - Backtracking - Branch and bound.

TOTAL: 45 PERIODS

COURSE OUTCOMES

Learners are able to:

- Derive the time and space complexities and justify the correctness of a given algorithm.
- Compare the performances of various Searching and Sorting techniques.
- Create the ADTs and demonstrate the applications of Stacks and Queues.
- Demonstrate the advantages of dynamic memory allocation via linked lists.
- Illustrate about different types of Trees & Graph structures and implement search and Traversal algorithms.

TEXT BOOKS

1. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Silicon Press, New Jersey, Second Edition,2005.

REFERENCES

2. Jean Paul Tremblay and Sorenson, "An Introduction to Data Structures with Applications" McGraw Hill Publishing Company, New Delhi, Second Edition,2007.
3. YedidyahLangsam, Moshe J Augenstein and Aaron M Tanenbaum, "Data Structures using C and C++", Prentice Hall of India/ Pearson Education, New Delhi, 2006.
4. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, New Delhi, Second Edition,2012.
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, MIT Press,2010.

U20EC201	SEMICONDUCTOR DEVICES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Accustom with the basics of semiconductor physics
- Understand the operation, characteristics, parameters and specifications of semiconductor diodes and special diodes
- Discuss the operation and performance of important applications of diodes
- Explainthebipolar,field-effectandmetaloxidesemiconductortransistorconstruction, operation, characteristics and parameters
- Acquaint with the construction, theory and operation of Special semiconductor and display devices

UNIT-I SEMICONDUCTORS 9

History of semiconductor device development - Intrinsic semiconductor - Energy band diagram - Direct and indirect semiconductors - Carrier concentration in intrinsic semiconductor - Extrinsic semiconductors - Carrier concentration in N-type and P-type semiconductors - Semiconductor device materials - Semiconductor devices - Advantages, disadvantages and applications.

UNIT-II SEMICONDUCTOR DIODE 9

Equilibrium PN junction - Forward biased PN junction - Reverse biased PN junction - Current-voltage relationship - Calculation of depletion width - Potential barrier - Diode current - Capacitive effects in PN junction - Energy band structure - Ideal diode and its current-voltage characteristics - Terminal characteristics and parameters.

UNIT-III DIODE CIRCUITS 9

Diode Characteristics and Parameters - Diode Equivalent Circuit - HWR - Precision HWR - FWR - Bridge rectifier - Rectifiers with filter capacitors – Diode Switching Time and Frequency Response - Clippers and Clampers - Voltage multipliers Circuits.

UNIT-IV JUNCTION TRANSISTORS 9

BJT: NPN and PNP - Operations - Early effect - Current equations - Input and Output characteristics of CE, CB, CC. JFETs - Drain and Transfer characteristics - Current equations - Pinch off voltage and its significance - MOSFET - Characteristics - Threshold voltage - Channel length modulation - D - MOSFET - E - MOSFET - Characteristics - Comparison of MOSFET withJFET.

UNIT-V SPECIALSEMICONDUCTOR, POWER DEVICES AND DISPLAY DEVICES 9

Schottky barrier diode - Zener diode - Varactor diode - Tunnel diode - LASER diode - LDR - UJT - SCR - Diac - Triac - LED - LCD - Photo transistor - Solar cell.

TOTAL: 45 PERIODS

COURSE OUTCOMES

Learners are able to:

- Confidence in handling and usage of electronic devices, tools and instruments in engineering applications.
- Know broadly the concepts and functionalities of the electronic devices, tools and instruments.
- Understand use, general specifications and deploy abilities of the electronic devices and assemblies.
- Operate the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices.

TEXT BOOKS

1. David A. Bell, Electronic Devices & Circuits, Oxford University Press, 4th edition, 2006.
2. Donald A Neaman, Semiconductor Physics and Devices, 2nd Edition, Tata Mc GrawHill Inc, 2002.

REFERENCES

1. Adel S. Sedra, Kenneth C. Smith, Microelectronic Circuits: Theory and Applications, Oxford University Press, 7th Edition,2017.
2. Jacob Millman, Christos C Halkias, Satyabrata Jit, Millman's Electronic Devices and Circuits, McGraw Hill Education, 4th Edition,2015.
3. Salivahanan.S, Suresh Kumar.N, Vallavaraj.A, Electronic Devices and circuits, Tata McGraw- Hill, 3rd Edition,2012.
4. Thomas L. Floyd, Electronic Devices, Pearson Education, 7th edition,2008.

U20GE203	ENGINEERING PRACTICESLABORATORY (COMMON TO ALL BRANCHES)	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL) CIVIL ENGINEERING

PRACTICE

Buildings:

- Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

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

Hands-on-exercise:

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

Carpentry using Power Tools only:

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

Hands-on-exercise:

- Wood work, joints by sawing, planning and cutting

MECHANICAL ENGINEERING PRACTICE

Welding:

- Preparation of butt joints, lap joints and T- joints by Shielded metal arcwelding.
- Gas welding practice

Basic Machining:

- Simple Turning and Taper turning
- Drilling Practice

Sheet Metal Work:

- Forming &Bending:
- Model making – Trays and funnels.
- Different type of joints.

Machine assembly practice:

- Study of centrifugal pump

- Study of air conditioner

Demonstration on:

- Smithy operations, upsetting, swaging, setting down and bending. Example –Exercise – Production of hexagonal headed bolt.
- Foundry operations like mould preparation for gear and step conepulley.
- Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS) ELECTRICAL ENGINEERING PRACTICE

- Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- Fluorescent lamp wiring.
- Stair case wiring
- Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
- Measurement of energy using single phase energy meter.
- Measurement of resistance to earth of electrical equipment.

ELECTRONICS ENGINEERING PRACTICE

- Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
- Study of logic gates AND, OR, EX-OR and NOT.
- Generation of Clock Signal.
- Soldering practice – Components Devices and Circuits – Using general purpose PCB.
- Measurement of ripple factor of HWR and FWR.

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to:

- Fabricate carpentry components and pipe connections including plumbing works.
- Use welding equipment's to join the structures.
- Carry out the basic machining operations
- Make the models using sheet metal works
- Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings
- Carry out basic home electrical works and appliances
- Measure the electrical quantities
- Elaborate on the components, gates, soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15Sets.
2. Carpentry vice (fitted to work bench) 15Nos.
3. Standard woodworking tools 15Sets.
4. Models of industrial trusses, door joints, furniture joints 5each
5. Power Tools: (a) Rotary Hammer 2 Nos (b) Demolition Hammer 2 Nos (c) Circular Saw 2 Nos (d) Planer 2 Nos (e) Hand Drilling Machine 2 Nos (f) Jigsaw 2Nos

MECHANICAL

1. Arc welding transformer with cables and holders 5 Nos.
2. Welding booth with exhaust facility 5Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc. 5Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. 2Nos.
5. Centre lathe 2Nos.
6. Hearth furnace, anvil and smithy tools 2Sets.
7. Moulding table, foundry tools 2Sets.
8. Power Tool: Angle Grinder 2Nos
9. Study-purpose items: centrifugal pump, air-conditioner One each

ELECTRICAL

1. Assorted electrical components for house wiring 15Sets
2. Electrical measuring instruments 10Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp 1 each 4. Megger (250V/500V) 1No.
4. Power Tools:
5. Range Finder 2Nos
6. Digital Live-wire detector 2Nos

ELECTRONICS

1. Soldering guns 10Nos.
2. Assorted electronic components for making circuits 50Nos.
3. Small PCBs 10Nos.
4. Multimeters 10Nos.
5. Study purpose items: Telephone, FM radio, low-voltage power supply.

U20GE204	PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.

LIST OF EXPERIMENTS

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton‘s method).
3. Exponentiation (power of a number).
4. Find the maximum of a list of numbers.
5. Linear search and Binary search.
6. Selection sort, Insertion sort.
7. Merge sort
8. First n prime numbers.
9. Multiply matrices.
10. Programs that take command line arguments (wordcount).
11. Find the most frequent words in a text read from a file.
12. Simulate elliptical orbits in Pygmy.
13. Simulate bouncing ball using Pygmy.

TOTAL: 60 PERIODS

PLATFORM NEEDED: Python 3 interpreter for Windows/Linux

COURSE OUTCOMES

Learners are able to:

- Write, test, and debug simple Python programs.
- Implement Python programs with conditionals and loops.
- Develop Python programs step-wise by defining functions and calling them.
- Use Python lists, tuples, dictionaries for representing compound data.
- Read and write data from/to files in Python.

U20CS202	DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To implement linear and non-linear data structures
- To understand the different operations of search rees
- To implement graph traversal algorithms
- To get familiarized to sorting and searching algorithms.

LIST OF EXPERIMENTS

1. Array implementation of Stack and Queue ADTs
2. Array implementation of ListADT
3. Linked list implementation of List, Stack and Queue ADTs
4. Applications of List, Stack and Queue ADTs
5. Implementation of Binary Trees and operations of Binary Trees
6. Implementation of Binary Search Trees
7. Implementation of AVL Trees
8. Implementation of Heaps using Priority Queues.
9. Graph representation and Traversal algorithms
10. Applications of Graphs
11. Implementation of searching and sorting algorithms
12. Hashing – any two collision techniques.

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to:

- Write functions to implement linear and non-linear data structure operations.
- Suggest appropriate linear / non-linear data structure operations for solving a given
- Problem.
- Appropriately use the linear / non-linear data structure operations for a given problem.
- Apply appropriate hash functions that result in a collision free scenario for data storage and Retrieval.

SEMESTER III

U20MA302	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	L	T	P	C
		3	1	0	4

Pre-requisite: Basic ideas of set theory and formal languages

COURSE OBJECTIVES

- To provide mathematical background and sufficient experience on various topics of discrete mathematics like matrix algebra, logic and proofs, combinatory, graphs, algebraic structures, formal languages and finite state automata.
- ThiscoursewillextendstudentʼsLogicalandMathematicalmaturityandabilitytodealwith abstraction and to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

UNIT-I MATRIX ALGEBRA 12

Matrices, Rank of Matrix, Solving System of Equations-Eigen Values and Eigen Vectors-Inverse of a Matrix - Cayley Hamilton Theorem.

UNIT-II BASIC SET THEORY 12

Basic Definitions - Venn Diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion - partitions- Permutation and Combination - Relations-Properties of relations - Matrices of relations - Closure operations on relations - Functions - injective, subjective and objective functions.

UNIT-III MATHEMATICAL LOGIC 12

Propositions and logical operators - Truth table - Propositions generated by a set, Equivalence and implication - Basic laws- Some more connectives - Functionally complete set of connectives- Normal forms - Proofs in Propositional calculus - Predicate calculus

UNIT-IV ALGEBRAIC STRUCTURES 12

Algebraic systems-Examples and general properties, Semi groups and monads, Groups- Sub groups-homomorphism, Isomorphism.

UNIT-V GRAPH THEORY 12

Basic Concepts, Isomorphism and Sub graphs-Planar Graphs, Euler's Formula; Multigraphs and Euler's Circuits- Hamiltonian Graphs- Trees and Connectivity- Chromatic Numbers.

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to:

- Demonstrate skills in solving mathematical Problems
- Comprehend mathematical principals and logic
- Develop the understanding of the mathematical and logical basis to much modern technology.
- Solve Problems using basic Graph Theory.
- Design discrete problems to solve by computers

TEXT BOOKS

1. Mathematical Foundation of Comput er Science ,kindle edition, 2016, by J. Rajendra Prasad,
2. T.Rama Rao ,A. Madana Mohana Rao
3. Discrete Mathematical Structures with Applications to Computer Science, J.P.Tremblay and P.Manohar,Tata McGraw Hill

REFERENCES

1. Kenneth H.Rosen, "Discrete Mathematics and Its Applications", Tata McGraw Hill, Fourth Edition, 2002 (Unit 1,2 & 3).
2. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002. (Unit 4,5)
3. A.Tamilarasi&A.M.Natarajan, "Discrete Mathematics and its Application", Khanna Publishers, 2nd Edition 2005.
4. M.K.Venkataraman "Engineering Mathematics", Volume II, National Publishing Company, 2nd Edition,1989.
5. Graph Theory, by J.A.Bondy and U.S.R.Murthy, springer Verlag (2008).

U20CS301	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

Pre-requisite: Bacic knowledge of database and query concepts

COURSE OBJECTIVES

- To learn the fundamentals of data models and to represent a database system using ER diagrams.
- To study SQL and relational database design.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To understand the fundamental concepts of transaction processing - concurrency control techniques and recovery procedures.
- To have an introductory knowledge about the Storage and Query processing Techniques

UNIT I RELATIONAL DATABASES **9**

Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL

UNIT II DATABASE DESIGN **9**

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT III TRANSACTIONS **9**

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery – Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.

UNIT IV IMPLEMENTATION TECHNIQUES **9**

RAID – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation.

UNIT V DISTRIBUTED DATABASE **9**

Distributed Databases: Architecture, Data Storage, Transaction Processing – Object-based Databases: Object Database Concepts, Object-Relational features, ODMG Object Model, ODL, OQL – XML Databases: XML Hierarchical Model, DTD, XML Schema, XQuery – Information Retrieval: IR Concepts, Retrieval Models, Queries in IR systems.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Classify the modern and futuristic database applications based on size and complexity
- Map ER model to Relational model to perform database design effectively
- Write queries using normalization criteria and optimize queries
- Compare and contrast various indexing strategies in different database systems
- Appraise how advanced databases differ from traditional databases.

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth and Sudarshan. S, “Database System Concepts”, Sixth Edition, McGrawHill, 2010
2. Elmasri, Navathe, “Fundamentals of database system 7th edition”

REFERENCESBOOKS

1. RamezElmasri and ShamkantNavathe, “Fundamentals of Database Systems ”, 6th Edition, Addison-Wesley, 2011
2. Raghu Ramakrishnan,“Database Management System”, Tata McGraw-Hill Publishing Company, 2003

3. Date. C. J, Kannan. A, Swamynathan. S, “An Introduction to Database Systems”, 8th Edition, Pearson Education, 2006
4. Rajesh Narang, “Database Management systems”, PHI Learning pvt. Ltd, New Delhi,2006

U20CS302	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

Pre-requisite: Basic idea of arithmetic and memory operations

COURSE OBJECTIVES

- To make students understand the basic structure and operation of digital computer.
- To understand the hardware-software interface.
- To familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- To familiarize the students with hierarchical memory system including cache memories andVirtual memory.

UNIT-I OVERVIEW & INSTRUCTIONS 9

Eight ideas – Components of a computer system – Technology – Performance – Power wall – Uniprocessors to multiprocessors; Instructions – operations and operands – representing instructions– Logical operations – control operations – Addressing and addressing modes

UNIT-II ARITHMETIC OPERATIONS 9

.ALU - Addition and subtraction – Multiplication – Division – Floating Point operations – Subword parallelism.

UNIT-III PROCESSOR AND CONTROL UNIT 9

Basic MIPS implementation – Building data path – Control Implementation scheme – Pipelining – Pipelined data path and control – Handling Data hazards & Control hazards – Exceptions

UNIT-IV PARALLELISM 9

Instruction-level-parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading – Multicore processors

UNIT-V MEMORY AND I/O SYSTEMS 9

Memory hierarchy - Memory technologies – Cache basics – Measuring and improving cache performance - Virtual memory, TLBs - Input/output system, programmed I/O, DMA and interrupts, I/O processors.

TOTAL: 45 PERIODS

COURSE OUTCOMES

Learners are able to:

- Understand the basics of instructions sets and their impact on processor design
- Design arithmetic and logic unit.
- Design and analyze pipelined control units
- Design a pipeline for consistent execution of instructions with minimum hazards
- Evaluate performance of memory systems.
- Understand parallel processing architectures.

TEXT BOOKS

1. David A. Patterson and John L. Hennessey, "Computer organization and design', Morgan Kauffman Elsevier, Fifth edition, 2014.
2. Carl Hamacher.V, Zvonko G. Vranesic and SafatG.Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2012.

REFERENCES

1. William Stallings "Computer Organization and Architecture", Seventh Edition , Pearson Education, 2006.
2. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
3. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2005.
4. Bali N.P.and Manish Goyal "Engineering Mathematics"(For Semester-I)Third Edition, University Science Press.

U20CS303	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3

Pre-requisite: Basic programming knowledge for reusability concepts.

COURSE OBJECTIVES:

- To get a clear understanding of object-oriented concepts.
- To understand object oriented programming through C++.

UNIT I OVERVIEW **9**

Why Object-Oriented Programming in C++ - Data Types, Variables, Constants, Operators and Expressions –Functions and Pointers- Control Flow, Implementing ADTs in the Base Language.

UNIT II BASIC CHARACTERISTICS OF OOP **9**

Data Hiding and Member Functions- Object Creation and Destruction- Constructors and Destructors in C++, Polymorphism data abstraction: Function overloading and Operator overloading. Iterators and Containers.

UNIT III INHERITANCE **9**

Inheritance-Types of Inheritance-Single, Multilevel, Hierarchical, Multiple and Hybrid Inheritance.

UNIT IV EXCEPTION HANDLING **9**

Exception handling in C++- try, catch and throw statements and various types of exceptions, Templates-function templates and class templates, Generic Programming and STL.

UNIT V STREMS AND FILES **9**

Input Output With Files- Methods of Input and Output Classes- Text mode files- State flags- get and put stream pointers- Binary files- I/O Manipulators.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Understand the basic concepts and functions of OOPS.
- Describe the various concept of Functions and Operator overloading.
- Understanding the principles of inheritance and types.
- Implement Object Oriented Programs using templates and exceptional handling concepts and STL.
- Analyzing the handling formatted I/O and unformatted.
- Ability to implement features of object oriented programming to solve real world problems.

TEXT BOOKS:

1. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003.
2. Herbert Schildt, “Java The complete reference”, 8th Edition, McGraw Hill Education, 2011.

REFERENCES:

1. Ira Pohl, “Object-Oriented Programming Using C++”, Pearson Education Asia, 2003.
2. Bjarne Stroustrup, “The C++ Programming Language”, Pearson Education, 2004.
3. H.M.Deitel, P.J.Deitel, "Java : how to program", Fifth edition, Prentice Hall of India private limited,2003.
4. Cay S. Horstmann, Gary cornell, “Core Java Volume –I Fundamentals”, 9th Edition, Prentice Hall, 2013.

U20EC301	DIGITAL SYSTEMS	L	T	P	C
		4	0	0	4

Pre-requisite: To know knowledge about logic gates and memory

COURSE OBJECTIVES:

- To design digital circuits using simplified Boolean functions
- To analyze and design combinational circuits
- To analyze and design synchronous and asynchronous sequential circuits
- To understand Programmable Logic Devices.
- To write HDL code for combinational and sequential circuits

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 12

Number Systems - Arithmetic Operations - Binary Codes- Boolean Algebra and Logic Gates - Theorems and Properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms - Simplification of Boolean Functions using Karnaugh Map - Logic Gates – NAND and NOR Implementations.

UNIT II COMBINATIONAL LOGIC 12

Combinational Circuits – Analysis and Design Procedures - Binary Adder-Subtractor - Decimal Adder - Binary Multiplier - Magnitude Comparator - Decoders – Encoders – Multiplexers - Introduction to HDL – HDL Models of Combinational circuits.

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC 12

Sequential Circuits - Storage Elements: Latches , Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters - HDL Models of Sequential Circuits.

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC 12

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

UNIT V MEMORY AND PROGRAMMABLE LOGIC 12

RAM – Memory Decoding – Error Detection and Correction - ROM - Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Simplify Boolean functions using KMap.
- Design and Analyze Combinational and Sequential Circuits.
- Implement designs using Programmable Logic Devices.
- Write HDL code for combinational and Sequential Circuits.

TEXT BOOKS

1. M. Morris R. Mano, Michael D. Ciletti, ―Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog‖, 6th Edition, Pearson Education, 2017.
2. Digital principles and Applications ByMalvino Leach and Saha

REFERENCESBOOKS

1. G. K. Kharate, Digital Electronics, Oxford University Press, 2010.
2. John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.
3. Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013.
4. Donald D. Givone, Digital Principles and Design‖, Tata Mc Graw Hill, 2003.

U20CS304	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

Pre-requisite: To learn about sql query and DDL,DML commands

COURSE OBJECTIVES:

- Learn to create and use a database
- Be familiarized with a query language
- Have hands on experience on DDL Commands
- Have a good understanding of DML Commands and DCL commands
- Familiarize advanced SQL queries.
- Be Exposed to different applications

LIST OF EXPERIMENTS

1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Creation of Views, Synonyms, Sequence, Indexes, Save point.
4. Creating an Employee database to set various constraints.
5. Creating relationship between the databases.
6. Study of PL/SQL block.
7. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
8. Write a PL/SQL block that handles all types of exceptions.
9. Creation of Procedures.
10. Creation of database triggers and functions
11. Mini project (Application Development using Oracle/ Mysql)
    a) Inventory Control System.
    b) Material Requirement Processing.
    c) Hospital Management System.
    d) Railway Reservation System.
    e) Personal Information System.
    f) Web Based User Identification System.
    g) Timetable Management System.
    h) Hotel Management System

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to:

- Design and implement a database schema for a given problem-domain
- Populate and query a database
- Create and maintain tables using PL/SQL.
- Prepare reports

U20CS305	OBJECT ORIENTED PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

Pre-requisite: Basic knowledge about inheritance and file access

COURSE OBJECTIVES:

- To get a clear understanding of object-oriented concepts.
- To understand object-oriented programming through C++

LIST OF EXPERIMENTS

C++:

1. Program Using Functions

- functions with default arguments
- implementation of call by value, address, reference

2. Simple Classes For Understanding Objects, Member Functions & Constructors

- classes with primitive data members,
- classes with arrays as data members
- classes with pointers as data members
- classes with constant data members
- classes with static member functions

3. Compile Time Polymorphism

- operator overloading
- function overloading

4. Run Time Polymorphism

- inheritance
- virtual functions
- virtual base classes
- templates

5. File Handling

- sequential access
- random access

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Gain the basic knowledge on Object Oriented concepts.
- Ability to develop applications using Object Oriented Programming Concepts.
- Ability to implement features of object oriented programming to solve real world problems.

SEMESTER IV

U20HS401	ENVIRONMENTAL SCIENCE AND ENGINEERING	L	T	P	C
		3	0	0	3

Pre-requisite: Basic idea about environmental impact and its uses

COURSE OBJECTIVES

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

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 12

Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 12

Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission, Control of SO2, NOX, CO and HC) (b) Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters – physical, chemical and biological; absorption of heavy metals - Water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies – Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES **12**

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Introduction to Environmental Biochemistry: Proteins – Biochemical degradation of pollutants, Bioconversion of pollutants. Field study of local area to document environmental assets – river/forest/grassland/hill/mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT **12**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization environmental ethics: Issues and possible solutions – 12 Principles of green chemistry- nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air act – Water act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme of labeling of environmentally friendly products (Eco mark). Enforcement machinery involved in environmental legislation- central and state pollution control boards- disaster management: floods, earthquake, cyclone and landslides. Public awareness

UNIT V HUMAN POPULATION AND THE ENVIRONMENT **12**

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA)- -GIS-remote sensing-role of information technology in environment and human health – Case studies.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection.
- One will obtain knowledge on the following after completing the course.
- Public awareness of environment at infant stage.
- Ignorance and incomplete knowledge haslead to misconceptions.
- Development and improvement in standard of living has lead to serious environmental disasters.

TEXT BOOKS

1. Gilbert M.Masters, „Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education 2004.
2. 2. Benny Joseph, „Environmental Science and Engineering", Tata Mc Graw-Hill, New Delhi,

REFERENCESBOOKS

1. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standard", Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, „Environmental Encyclopedia", JaicoPubl.,House, Mumbai, 2001.
3. Dharmendra S. Sengar, „Environmental law", Prentice Hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, „Environmental Studies-From Crisis to Cure", Oxford University Press 2005.

U20CS401	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

Pre-requisite: To Learn about basic software life cycle model

COURSE OBJECTIVES

- Understand the phases in a software project
- Understand fundamental concepts of requirements engineering and Analysis Modelling.
- Understand the major considerations for enterprise

UNIT I SOFTWARE PROCESS **9**

Introduction –Software Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWI spiral, evolutionary, prototyping, object oriented and Agile software project management model) – system engineering – computer based system – verification – validation.

UNIT II SOFTWARE REQUIREMENTS **9**

Functional and non-functional - user – system –requirement engineering process – feasibility studies –requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -Software document. Analysis and modelling- data, functional and behavioral models – structured analysis and data dictionary.

UNIT III DESIGN CONCEPTS AND PRINCIPLES **9**

Design process and concepts – modular design – design heuristic – design model and document. Architectural design – software architecture – data design – architectural design– user interface design – user interface design principles. Real time systems - Real time software design. Software Configuration Management (SCM) – Need for SCM – Version control – Introduction to SCM process – Software configuration items - software design with extreme programming – Risk Management.

UNIT IV TESTING **9**

Taxonomy of software testing – levels – test activities – types of software test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large - software testing strategies - testing using extreme programming

UNIT V SOFTWARE PROJECT MANAGEMENT 9

Measures and measurements – S/W complexity and science measure – size measure – data and logic structure measure – information flow measure. Software cost estimation – function point models – COCOMO model- Delphi method.- Defining a Task Network – Scheduling – Earned Value Analysis – Error Tracking – Software changes – program evolution dynamics – software maintenance – Architectural evolution.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Compare and analyze the various lifecycle models of software process
- Design an appropriate analysis model that suits the requirement
- Design software architecture models for various applications
- Implement the strategies for software testing.

TEXT BOOKS

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 8th edition,2015.
2. Design Patterns: Elements of Reusable Object-Oriented Software by Eric Gamma.

REFERENCES BOOKS

1. Ian Sommerville, Software engineering, Pearson education Asia, 9th edition, 2011.
2. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
3. James F Peters and WitoldPedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000
4. Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press.

U20CS402	DESIGN AND ANALYSIS OF ALGORITHM	L	T	P	C
		4	0	0	4

Pre-requisite: To know the basic concepts of algorithm to solve various problems

COURSE OBJECTIVES

- To understand and apply the algorithm analysis techniques.
- To critically analyze the efficiency of alternative algorithmic solutions for the same problem
- To understand different algorithm design techniques.
- To understand the limitations of Algorithmic power.

UNIT I ALGORITHMIC PROBLEM SOLVING 9

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties. Analysis Framework – Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms – Visualization.

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force – Computing an – String Matching - Closest-Pair and Convex-Hull Problems - Exhaustive Search - Travelling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort – Heap Sort - Multiplication of Large Integers – Closest-Pair and Convex - Hull Problems.

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE 9

Dynamic programming – Principle of optimality - Coin changing problem, Computing a Binomial Coefficient – Floyd‘s algorithm – Multi stage graph - Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique – Container loading problem - Prim‘s algorithm and Kruskal's Algorithm – 0/1 Knapsack problem, Optimal Merge pattern - Huffman Trees.

UNIT IV ITERATIVE IMPROVEMENT 9

The Simplex Method - The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs, Stable marriage Problem.

UNIT V COPING WITH THE LIMITATIONS OF ALGORITHM POWER 9

Lower - Bound Arguments - P, NP NP- Complete and NP Hard Problems. Backtracking – n-Queen problem - Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound – LIFO Search and FIFO search - Assignment problem – Knapsack Problem – Travelling Salesman Problem - Approximation Algorithms for NP-Hard Problems – Travelling Salesman problem – Knapsack problem.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Design algorithms for various computing problems.
- Analyze the time and space complexity of algorithms.
- Critically analyze the different algorithm design techniques for a given problem.
- Modify existing algorithms to improve efficiency.

TEXT BOOKS

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2012.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, “Computer Algorithms/ C++”, Second Edition, Universities Press, 2007.

REFERENCES BOOKS

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, Reprint 2006.
3. Harsh Bhasin, “Algorithms Design and Analysis”, Oxford university press, 2015.

U20EC401 **MICROPROCESSOR AND MICROCONTROLLER**

L	T	P	C
3	0	0	3

Pre-requisite: To know about basic microprocessor and its architecture

COURSE OBJECTIVES

- To understand the Architecture of 8086 microprocessor.
- To learn the design aspects of I/O and Memory Interfacing circuits.
- To interface microprocessors with supporting chips.
- To study the Architecture of 8051 microcontroller.
- To design a microcontroller based system.

UNIT I THE 8086 MICROPROCESSOR 9

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation

UNIT II 8086 SYSTEM BUS STRUCTURE 9

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.

UNIT III I/O INTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display, LCD display, Keyboard display interface and Alarm Controller

UNIT IV MICROCONTROLLER 9

Architecture of 8051–Special Function Registers(SFRs)- I/O Pins Ports and Circuits – Instruction set Addressing modes - Assembly language programming.

UNIT VINTERFACING MICROCONTROLLER 9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Understand and execute programs based on 8086 microprocessor.
- Design Memory Interfacing circuits.
- Design and interface I/O circuits.
- Design and implement 8051 microcontroller based systems.

TEXT BOOKS

1. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007. (UNIT I- III)
2. Mohamed Ali Mazidi, Janice GillispieMazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011. (UNIT IV-V)

REFERENCESBOOKS

1. DoughlasV.Hall, "Microprocessors and Interfacing, Programming and Hardware",TMH,2012.
2. A.K.Ray,K.M.Bhurchandi,"Advanced Microprocessors and Peripherals "3rd edition, Tata McGrawHill,2012

U20CS403 **OPERATING SYSTEMS**

L	T	P	C
3	0	0	3

Pre-requisite: Basic concepts of scheduling algorithms and android OS

COURSE OBJECTIVES

- Compare the different operating system structures
- Evaluate the various process scheduling algorithms
- Design algorithms for achieving process synchronization
- Evaluate the various memory management techniques
- Analyze the effectiveness of a file system

UNIT I OPERATING SYSTEM OVERVIEW 9

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

UNIT II PROCESSMANAGEMENT 9

Processes - Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT III STORAGE MANAGEMENT 9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT IV FILE SYSTEMS AND I/O SYSTEMS **9**

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface - File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods.

UNIT V DISTRIBUTED OS **9**

Linux System - Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS - iOS and Android - Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Analyze various scheduling algorithms.
- Understand deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Understand the functionality of file systems.
- Perform administrative tasks on Linux Servers.
- Compare iOS and Android Operating Systems

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc.,

REFERENCESBOOKS

1. Ramaz Elmasri, A. Gil Carrick, David Levine, "Operating Systems – A Spiral Approach", Tata McGraw Hill Edition,2010.
2. Achyut S.Godbole, Atul Kahate, "Operating Systems", Mc Graw Hill Education,2016.
3. AndrewS.Tanenbaum,"ModernOperatingSystems",SecondEdition,PearsonEducation,2004.

U20CS404 **COMPUTER NETWORKS**

L	T	P	C
3	0	0	3

Pre-requisite: Basic knowledge about different network layers

COURSE OBJECTIVES

- Understand the division of network functionalities into layers.
- Be familiar with the components required to build different types of networks
- Be exposed to the required functionality at each layer
- Learn the flow control and congestion control algorithms

UNIT I INTRODUCTION AND PHYSICAL LAYER 9

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

UNIT II DATA-LINK LAYER & MEDIA ACCESS 9

. Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols – HDLCPPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs – Introduction – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT III NETWORK LAYER 9

Network Layer Services – Packet switching – Performance – IPV4 Addresses – Forwarding of IP Packets - Network Layer Protocols: IP, ICMP v4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6Protocol.

UNIT IV TRANSPORT LAYER 9

Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol – Transmission Control Protocol –SCTP.

UNIT V APPLICATION LAYER 9

WWW and HTTP – FTP – Email –Telnet –SSH – DNS – SNMP

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Understand the basic layers and its functions in computer networks.
- Evaluate the performance of a network.
- Understand the basics of how data flows from one node to another.
- Analyze and design routing algorithms.
- Design protocols for various functions in the network.
- Understand the working of various application layer protocols.

TEXT BOOKS

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.

REFERENCESBOOKS

1. 1 Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc.,2012.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education,2013.
3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall,2014.
4. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher,2011.
5. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education,2013.

U20CS405	OPERATING SYSTEM LABORATORY	L	T	P	C
		0	0	4	2

Pre-requisite: Manages the computer's memory and processes, as well as all of its software and hardware.

COURSE OBJECTIVES

- To learn Unix commands and shell programming
- To implement various CPU Scheduling Algorithms
- To implement Process Creation and Inter Process Communication.
- To implement Deadlock Avoidance and Deadlock Detection Algorithms
- To implement Page Replacement Algorithms
- To implement File Organization and File Allocation Strategies

LIST OF EXPERIMENTS

1. Basics of UNIX commands
2. Write programs using the following system calls of UNIX operating system

fork, exec, getpid, exit, wait, close, stat, opendir, readdir

3. Write C programs to simulate UNIX commands like cp, ls, grep, etc.
4. Shell Programming
5. Write C programs to implement the various CPU Scheduling Algorithms
6. Implementation of Semaphores
7. Implementation of Shared memory and IPC
8. Bankers Algorithm for Deadlock Avoidance
9. Implementation of Deadlock Detection Algorithm
10. Write C program to implement Threading & Synchronization Applications
11. Implementation of the following Memory Allocation Methods for fixed partition

    a) First Fit b) Worst Fit c) Best Fit
12. Implementation of Paging Technique of Memory Management
13. Implementation of the following Page Replacement Algorithms

    a) FIFO b) LRU c) LFU
14. Implementation of the various File Organization Techniques
15. Implementation of the following File Allocation Strategies

    a) Sequential b) Indexed c) Linked

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to:

- Compare the performance of various CPU Scheduling Algorithms
- Implement Deadlock avoidance and Detection Algorithms
- Implement Semaphores
- Create processes and implement IPC
- Analyze the performance of the various Page Replacement Algorithms
- Implement File Organization and File Allocation Strategies

U20CS406	NETWORKS LABORATORY	L	T	P	C
		0	0	4	2

Pre-requisite: Basic idea about protocols and their uses

COURSE OBJECTIVES:

- To learn and use network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To learn and use simulation tools.
- To use simulation tools to analyze the performance of various network protocols.

LIST OF EXPERIMENTS

1. Learn to use commands like tcp dump, net stat, ifconfig, nslookup and trace route.
2. Capture ping and trace route PDUs using a network protocol analyzer and examine.
3. Write a HTTP web client program to download a web page using TCP sockets.
4. Applications using TCP sockets: like
5. Echo client and echo server
6. Chat
7. File Transfer
8. Simulation of DNS using UDP sockets.
9. Write a code simulating ARP /RARP protocols.
10. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
11. Study of TCP/UDP performance using Simulation tool.
12. Simulation of Distance Vector/ Link State Routing algorithm.
13. Performance evaluation of Routing protocols using Simulation tool.
14. Simulation of error correction code (like CRC).

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Learners are able to,

- Implement various protocols using TCP and UDP.
- Compare the performance of different transport layer protocols.
- Use simulation tools to analyze the performance of various network protocols.
- Analyze various routing algorithms.
- Implement error correction codes.
- Identify Pocket commands, protocols and routing issues in network.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS: HARDWARE:

- Stand alone desktops 30Nos

SOFTWARE:

- C / C++ / Java / Python /Equivalent Compiler 30
- Network simulator like NS2/Glomosim/OPNET/ Packet Tracer /Equivalent

SEMESTER V

U20MA501	RANDOM PROCESS AND STATISTICS	L	T	P	C
		4	0	0	4

Pre-requisite: Basic Knowledge of Multi Variable Calculus and Partial Differential Equation

COURSE OBJECTIVES

- To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
- To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
- To understand the basic concepts of random processes and its applications.
- To understand the concept of correlation and spectral densities.
- To understand the significance of linear systems with random inputs.

UNIT I PROBABILITY AND RANDOM VARIABLE 12

Axioms of probability - Conditional probability - Total probability – Baye's theorem - Random variable - Probability mass function - Probability density functions- Properties –Moments - Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS 12

Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties - Functions of a random variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 12

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression- Transformation of random variables - Central limit theorem.

UNIT IV CLASSIFICATION OF RANDOM PROCESSES 12

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT V CORRELATION AND SPECTRAL DENSITIES 12

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function –Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
- Apply the concept random processes in engineering disciplines.
- Understand and apply the concept of correlation and spectral densities.
- The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable. Able to analyze the response of random inputs to linear time invariant systems.

TEXT BOOKS

1. Veerarajan, T., 'Engineering mathematics', Tata McGraw-Hill(Education) India Pvt.Ltd, 2006.
2. Ibe, O.C.," Fundamentals of Applied Probability and Random Processes ", 1st Indian Reprint, Elsevier, 2007.
3. Peebles, P.Z., "Probability, Random Variables and Random Signal Principles ", Tata McGraw Hill, 4th Edition, New Delhi, 2002.

REFERENCES

1. Cooper. G.R., McGillem. C.D., "Probabilistic Methods of Signal and System Analysis", Oxford University Press, New Delhi, 3rd Indian Edition, 2012.
2. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes ", Tata McGraw Hill Edition, New Delhi, 2004.
3. Miller. S.L. and Childers. D.G., ―Probability and Random Processes with Applications to Signal Processing and Communications ", Academic Press, 2004.
4. Stark. H. and Woods. J.W., ―Probability and Random Processes with Applications to Signal Processing ", Pearson Education, Asia, 3rd Edition, 2002.
5. Kandasamy P., Thilagavathy K., and Gunavathy K., " Engineering Mathematics" Volume III, S. Chand & Company Ltd., 2011.

U20CS501	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	L	T	P	C
		3	0	0	3

Pre-requisite: Ability to understand complex algorithms. Basic knowledge of Statistics and modeling.

COURSE OBJECTIVES

- To study the idea of intelligent agents and search methods.
- To study about representing knowledge.
- To study the reasoning and decision making in uncertain world.
- To construct plans and methods for generating knowledge.
- To study the concepts of expert systems.

UNIT I INTRODUCTION TO AI 9

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

UNIT II PROBLEM SOLVING METHODS 9

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

UNIT III KNOWLEDGE REPRESENTATION 9

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

UNIT IV FUZZY SYSTEMS 9

Fuzzy Information, Fuzzy Neural Networks, Fuzzy Approaches for Supervised Learning Networks, Fuzzy Generalizations of Unsupervised Learning Methods, Reasoning with Uncertain Information, Pre Processing and Post-Processing Using Fuzzy Techniques, Applications in Biomedical Engineering

UNIT V EXPERT SYSTEM 9

Introduction: Hopfield Network, Learning In Neural Network, Application Of Neural Networks, Recurrent Networks, Distributed Representations, Connectionism AI And Symbolic AI

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

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

TEXT BOOKS

1. S. Russell and P. Norvig ,"Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2009.
2. Bratko, "Prolog: Programming for Artificial Intelligence", Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCES

1. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press, 2009.
3. William F. Clocksin and Christopher S. Mellish,"Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003.

U20CS502 **THEORY OF COMPUTATION**

L	T	P	C
4	0	0	4

Pre-requisite: Students entering this course should have a strong background in discrete mathematics, data structures, and algorithms.

COURSE OBJECTIVES

- Understand various Computing models like Finite State Machine, Pushdown Automata, and
- Turing Machine.
- Be aware of Decidability and Un-decidability of various problems.
- Learn types of grammars.

UNIT I AUTOMATA FUNDAMENTALS **12**

Introduction to formal proof – Additional forms of Proof – Inductive Proofs –Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – Finite Automata with Epsilon Transitions.

UNIT II REGULAR EXPRESSIONS AND LANGUAGES **12**

Regular Expressions – FA and Regular Expressions – Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata

UNIT III CONTEXT FREE GRAMMAR AND LANGUAGES **12**

CFG – Parse Trees – Ambiguity in Grammars and Languages – Normal Forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

UNIT IV PROPERTIES OF CONTEXT FREE LANGUAGES **12**

Definition of the Pushdown Automata – Languages of a Pushdown Automata – Equivalence of Pushdown Automata and CFG, Deterministic Pushdown Automata.

UNIT V UNDECIDABILITY **12**

Non Recursive Enumerable (RE) Language – Undecidable Problem with RE – Undecidable Problems about TM – Post's Correspondence Problem, The Class P and NP.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Compare and analyse various Finite Automata and convert NFA to DFA
- Construct finite automata to regular expression and identify the properties of regular language
- Construct context free grammar for various languages and convert CFG to normal forms
- Develop a Computational model using Turing machine for the given problem.
- Design grammars and recognizers for different formal languages and design PDA
- Determine the decidability and intractability of computational problems

TEXT BOOKS

1. Hopcroft, J.E. Motwani, R. and Ullman, J.D, "Introduction to Automata Theory, Languages and Computations", 2nd Edition, Pearson Education, 2013
2. Introduction to the Theory of Computation" by Michael Sipser

REFERENCES

1. MichealSipser, "Introduction of the Theory and Computation", ThomsonBrokecole, 1997
2. Martin, J., "Introduction to Languages and the Theory of Computation", 3rd Edition, TMH, 2003.
3. Lewis, H. and Papadimitriou, C.H "Elements of the Theory of Computation", 2nd Edition, Pearson Education/PHI, 2003.
4. Greenlaw, "Fundamentals of Theory of Computation, Principles and Practice", Elsevier, 2008

U20CS503	OBJECT ORIENTED ANALYSIS & DESIGN	L	T	P	C
		3	0	0	3

Pre-requisite: Knowledge of Object Paradigm fundamentals and C++, Java or Smalltalk required.

COURSE OBJECTIVES

- Learn the basics of OO analysis and design skills.
- Learn the UML design diagrams.
- Learn to map design to code.
- Be exposed to the various testing techniques.

UNIT I UML DIAGRAMS **9**

Introduction to OOAD – Unified Process - UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

UNIT II DESIGN PATTERNS **9**

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller - Design Patterns – creational - factory method - structural – Bridge – Adapter -behavioral – Strategy – observer.

UNIT III CODING AND TESTING **9**

Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing.

UNIT IV APPLYING DESIGN PATTERNS **9**

System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement - UML class diagrams - UML interaction diagrams - Applying GoF design patterns.

UNIT V CASE STUDY **9**

Case study – the Next Gen POS system, Inception -Use case Modeling - Relating Use cases – include, extend and generalization - Elaboration - Domain Models - Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies - Aggregation and Composition.

COURSE OUTCOMES:

Learners are able to:

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

TOTAL: 45 PERIODS

TEXT BOOKS

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005.
2. Object oriented analysis and design with the unified process by john W.satzinger Robert B.Jackson,cengage learning india

REFERENCES

1. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc-Graw Hill Education, 2010.
2. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable Object-Oriented Software", Addison-Wesley, 1995.
3. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third edition, Addison Wesley, 2003.

U20CS504 **INTERNET PROGRAMMING**

L	T	P	C
3	0	0	3

Pre-requisite: All web developers need a command of HTML, Javascript& CSS. It's also helpful to know a server-side programming language, such as PHP, Microsoft . Net Visual Basic, or Java to develop more complex applications.

COURSE OBJECTIVES

- Learn Java Programming.
- Understand different Internet Technologies.
- Be exposed to java specific web services architecture.

UNIT I JAVA PROGRAMMING **9**

AnoverviewofJava–DataTypes–VariablesandArrays–Operators–ControlStatements– Classes–Objects–Methods –Inheritance-Packages –Abstract classes–Interfaces and Inner classes– Exception handling-Introduction to Threads –Multithreading–String handling– Streams and I/O–Applets.

UNIT II WEBSITES BASICS, HTML5, CSS3, WEB2.0 **9**

Web2.0: Basics-RIA Rich Internet Applications-Collaborations tools- Understanding websites and web servers: Understanding Internet–Difference between websites and webserver-Internet technologies Overview–Understandingthedifferencebetweeninternetandintranet;HTMLandCSS: HTML5.0,XHTML,CSS3.

UNIT III CLIENTSIDE AND SERVERSIDE PROGRAMMING **9**

JavaScript: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling- Validation – Built – inobjects – Event Handling HTML with JavaScript. Servlets: Java Servlet Architecture- Servlet Life Cycle-Form GET and POST actions-Session Handling-UnderstandingCookies-InstallingandConfiguringApacheTomcatWebServer;-DATABASECONNECTIVITY: JDBC perspectives, JDBC program example -JSP: Understanding Java Server Pages-JSP Standard Tag Library(JSTL)-Creating HTML forms by embedding JSPcode.

UNIT IV PHP ANDXML **9**

An introduction to PHP:PHP- Using PHP- Variables- Program control- Built-in functions-ConnectingtoDatabase–UsingCookies-RegularExpressions;XML:BasicXML-DocumentTypeDefinition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed(RSS and ATOM).

UNIT V INTRODUCTION TO AJAX and WEBSERVICES **9**

AJAX: Ajax Client Server Architecture-XML HttpRequest Object-CallBack Methods; WebServices: Introduction- Java web services Basics – Creating, Publishing ,Testing and Describing a Web services(WSDL)-Consuming a webservice, Database Driven webservice from an application–SOAP.

COURSE OUTCOMES:

Learners are able to:

- Implement Java programs.
- Create a basic website using Style Sheets. HTML and Cascading
- DesignandimplementdynamicwebpagewithvalidationusingJavaScriptobjectsand by applying different event handling mechanisms.
- Design rich client presentation using AJAX.
- Design and implement simple webpage in PHP, and to present data in XML format.
- Design and implement server side programs using Servlets and JSP

TOTAL: 45 PERIODS

TEXT BOOKS

1. Deitel and Deitel and Nieto, “Internet and World Wide Web - How to Program”, Prentice Hall,5th Edition, 2011.
2. Herbert Schildt, “Java-The Complete Reference”, Eighth Edition, Mc Graw Hill Professional,2011.

REFERENCES

1. Stephen Wynkoop and John Burke “Running a Perfect Website”, QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications,2009.

U20CS505	OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY	L	T	P	C
		0	0	4	2

Pre-requisite: OOAD is a technical approach for analyzing and designing an application, system, or business by applying object-oriented programming, as well as using visual modeling throughout the software development process to guide stakeholder communication and product quality.

COURSE OBJECTIVES

- To learn the basics of OO analysis and design skills.
- To be exposed to the UML design diagrams.
- To learn to map design to code.
- To be familiar with the various testing techniques

LIST OF EXPERIMENTS

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

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

SUGGESTED DOMAINS FOR MINI-PROJECT:

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

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to:

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

U20CS506	INTERNET PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

Pre-requisite: All web developers need a command of HTML, Javascript& CSS.

COURSE OBJECTIVES

- To learn simple java programs using classes ,object
- To connect JDBC with the help of java programs
- To analyze GUI based swings.

LIST OF EXPERIMENTS

1. Create a web page with the following using HTML a. To embed a map in a web page b. To fix the hot spots in that map c. Show all the related information when the hot spots are clicked.
2. Create a web page with the following. a. Cascading style sheets. b. Embedded style sheets. c. Inline style sheets. Use our college information for the web pages.
3. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
4. Write programs in Java using Servlets: i. To invoke servlets from HTML forms ii. Session tracking using hidden form fields and Session tracking for a hit count
5. Write programs in Java to create three-tier applications using servlets for conducting on-line examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
6. Install TOMCAT web server. Convert the static web pages of programs into dynamic web pages using servlets (or JSP) and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
7. Redo the previous task using JSP by converting the static web pages into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database.
8. Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document
    i. Validate the form using PHP regular expression.
    ii. PHP stores a form data into database.

9. Write a web service for finding what people think by asking 500 people‘s opinion for any consumer product.

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to:

- Construct Web pages using HTML/XML and style sheets.
- Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.
- Develop dynamic web pages using server side scripting.
- Use PHP programming to develop web applications.
- Construct web applications using AJAX and web services.

SEMESTER VI

U20CS601	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

Pre-requisite: need to have proper programming skills for working with several programming languages

COURSE OBJECTIVES

- To understand the concept of cloud computing.
- To appreciate the evolution of cloud from the existing technologies.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.

UNIT I INTRODUCTION 9

Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

UNIT II CLOUD ENABLING TECHNOLOGIES 9

Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish-Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery.

UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE 9

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD 9

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

UNIT V CLOUD TECHNOLOGIES AND ADVANCEMENTS 9

Hadoop – MapReduce – Virtual Box -- Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

COURSE OUTCOMES:

Learners are able to:

- Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- Learn the key and enabling technologies that help in the development of cloud.
- Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
- Explain the core issues of cloud computing such as resource management and security.
- install and use current cloud technologies.
- Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Rittinghouse, John W., and James F. Ransome, “Cloud Computing: Implementation, Management and Security”, CRC Press, 2017.

REFERENCES BOOKS

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, “Mastering Cloud Computing”, Tata Mcgraw Hill, 2013.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach”, Tata Mcgraw Hill, 2009.
3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice)”, O'Reilly, 2009

U20CS602	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
		3	0	0	3

Pre-requisite: Cryptography is a developing innovation, or, in other words organizes security.

COURSE OBJECTIVES

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

UNIT I INTRODUCTION TO CNS **9**

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT II SYMMETRIC KEY CRYPTOGRAPHY 9

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures - Modular arithmetic-Euclid‟s algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution.

UNIT III PUBLIC KEY CRYPTOGRAPHY 9

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler‟s totient function, Fermat‟s and Euler‟s Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT IV MESSAGE AUTHENTICATION AND INTEGRITY 9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509

UNIT V SECURITY PRACTICE AND SYSTEM SECURITY 9

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

COURSE OUTCOMES:

Learners are able to:

- Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
- Apply the different cryptographic operations of symmetric cryptographic algorithms
- Apply the different cryptographic operations of public key cryptography
- Apply the various Authentication schemes to simulate different applications.
- Understand various Security practices and System security standards

TOTAL: 45 PERIODS

TEXT BOOKS

1. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.
2. “Handbook of Applied Cryptography” by Alfred J Menezes and Scott A Vanstone.

REFERENCES BOOKS

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd
2. BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.
3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

U20CS603	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3

Pre-requisite: it compiles and organizes data into a common database.

OBJECTIVES:

- This course deals with evolving multidimensional intelligent model from a typical system, representation of multidimensional data for a data warehouse.
- Discovering the knowledge imbibed in the high dimensional system, finding the hidden interesting patterns in data.
- Gives the idea to evaluate various mining techniques on complex data objects.

UNIT I INTRODUCTION TO DATA WAREHOUSING 9

Evolution of Decision Support Systems- Data warehousing Components –Building a Data warehouse, Data Warehouse and DBMS, Data marts, Metadata, Multidimensional data model, OLAP vs OLTP, OLAP operations, Data cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact constellations.

UNIT II DATA WAREHOUSE PROCESS AND ARCHITECTURE 9

Types of OLAP servers, 3–Tier data warehouse architecture, distributed and virtual data warehouses. Data warehouse implementation, tuning and testing of data warehouse. Data Staging (ETL) Design and Development, data warehouse visualization, Data Warehouse Deployment, Maintenance, Growth, Business Intelligence Overview- Data Warehousing and Business Intelligence Trends - Business Applications- tools-SAS

UNIT III INTRODUCTION TO DATA MINING 9

Data mining-KDD versus data mining, Stages of the Data Mining Process-task primitives, Data Mining Techniques -Data mining knowledge representation – Data mining query languages, Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – 90 Data cleaning, Data transformation, Feature selection, Dimensionality reduction, Discretization and generating concept hierarchies-Mining frequent patterns- association-correlation

UNIT IV CLASSIFICATION AND CLUSTERING 9

Decision Tree Induction - Bayesian Classification – Rule Based Classification –Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods - Clustering techniques – , Partitioning methods- k-means Hierarchical Methods - distance-based agglomerative and divisible clustering, Density-Based Methods – expectation maximization -Grid Based Methods – Model-Based Clustering Methods – Constraint – Based Cluster Analysis – Outlier Analysis

UNIT V DATA WAREHOUSING AND DATA MINING SOFTWARE'S AND APPLICATIONS 9

Mining complex data objects, Spatial databases, temporal databases, Multimedia databases, Time series and Sequence data; Text Mining –Graph mining-web mining-Application and trends in data mining

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- This course gives an introduction to methods and theory for development of data warehouses and data analysis using data mining.
- Data quality and methods and techniques for preprocessing of data.
- Modeling and design of data warehouses.
- Algorithms for classification, clustering and association rule analysis.

TEXT BOOKS:

1. Jiawei Han and MichelineKamber, Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, third edition2011, ISBN: 1558604898. 2
2. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", TataMcGraw Hill Edition, Tenth Reprint 2007.
3. G. K. Gupta, "Introduction to Data Min Data Mining with Case Studies", Easter EconomyEdition, Prentice Hall of India, 2006.

REFERENCES:

1. Mehmedkantardzic,"Dataminingconcepts,models,methods, and lgorithms", Wiley Interscience, 2003.
2. Ian Witten, Eibe Frank, Data Mining; Practical Machine Learning Tools and Techniques, third edition, Morgan Kaufmann, 2011.
3. George M Marakas, Modern Data Warehousing, Mining and Visualization, Prentice Hall, 2003.

U20CS604	MACHINE LEARNING	L	T	P	C
		3	0	0	3

Pre-requisite: Machine Learning is a lucrative career to get into, but it requires a certain amount of practice and experience.

COURSE OBJECTIVES

- To understand the concepts of machine learning
- To appreciate supervised and unsupervised learning and their applications
- To understand the theoretical and practical aspects of Probabilistic Graphical Models
- To appreciate the concepts and algorithms of reinforcement learning
- To learn aspects of computational learning theory

UNIT I INTRODUCTION **9**

Machine Learning - Machine Learning Foundations –Overview – applications - Types of machine learning - basic concepts in machine learning Examples of Machine Learning -Applications - Linear Models for Regression - Linear Basis Function Models - The Bias-Variance Decomposition - Bayesian Linear Regression - Bayesian Model Comparison

UNIT II SUPERVISED LEARNING **9**

Linear Models for Classification - Discriminant Functions -Probabilistic Generative Models - Probabilistic Discriminative Models - Bayesian Logistic Regression. Decision Trees - Classification Trees- Regression Trees - Pruning. Neural Networks -Feed-forward Network Functions - Error Back propagation- Regularization - Mixture Density and Bayesian Neural Networks - Kernel Methods - Dual Representations - Radial Basis Function Networks. Ensemble methods- Bagging- Boosting.

UNIT III UNSUPERVISED LEARNING **9**

Clustering- K-means - EM - Mixtures of Gaussians - The EM Algorithm in General -Model election for latent variable models - high-dimensional spaces -- The Curse of Dimensionality – dimensionality Reduction - Factor analysis - Principal Component Analysis - Probabilistic PCA- Independent components analysis

UNIT IV PROBABILISTIC GRAPHICAL MODELS **9**

Directed Graphical Models - Bayesian Networks - Exploiting Independence Properties – From Distributions to Graphs -Examples -Markov Random Fields - Inference in Graphical Models – Learning –Naive Bayes classifiers-Markov Models – Hidden Markov Models – Inference – Learning- Generalization – Undirected graphical models- Markov random fields- Conditional independence properties - Parameterization of MRFs - Examples - Learning - Conditional random fields (CRFs) - Structural SVMs

UNIT V ADVANCED LEARNING **9**

Sampling – Basic sampling methods – Monte Carlo. Reinforcement Learning- K-Armed Bandit- Elements - Model-Based Learning- Value Iteration- Policy Iteration. Temporal Difference Learning- Exploration Strategies- Deterministic and Non-deterministic Rewards and Actions- Eligibility Traces-Generalization- Partially Observable States- The Setting- Example. Semi - Supervised Learning. Computational Learning Theory - Mistake bound analysis, sample complexity analysis, VC dimension. Occam learning, accuracy and confidence boosting

COURSE OUTCOMES:

Learners are able to:

- To implement a neural network for an application of your choice using an available tool
- To implement probabilistic discriminative and generative algorithms for an application of your choice and analyze the results
- To use a tool to implement typical clustering algorithms for different types of applications
- To design and implement an HMM for a sequence model type of application
- To identify applications suitable for different types of machine learning with suitable justification

TOTAL: 45 PERIODS

TEXT BOOKS

1. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012
2. EthemAlpaydin, “Introduction to Machine Learning”, Prentice Hall of India, 2005

REFERENCESBOOKS

1. Christopher Bishop, “Pattern Recognition and Machine Learning” Springer, 2006
2. Tom Mitchell, "Machine Learning", McGraw-Hill, 1997.
3. Hastie, Tibshirani, Friedman, “The Elements of Statistical Learning” (2nd ed)., Springer, 2008
4. Stephen Marsland, “Machine Learning –An Algorithmic Perspective”, CRC Press, 2009

U20CS605	DATA MINING TOOLS LABORATORY	L	T	P	C
		0	0	4	2

Pre-requisite: discovering patterns/trends/groupings among large sets of data and transforming data into more refined information.

COURSE OBJECTIVES

- Learn how to build a data warehouse and query it (using open source tools like Pentaho Data Integration Tool, Pentaho Business Analytics).
- Learn to perform data mining tasks using a data mining toolkit (such as open source WEKA).
- Understand the data sets and data preprocessing.
- Demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering and regression.
- Exercise the data mining techniques with varied input values for different parameters.
- To obtain Practical Experience Working with all real data sets.
- Emphasize hands-on experience working with all real data sets.

LIST OF EXPERIMENTS

1. Build Data Warehouse and Explore WEKA
2. Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets
3. Demonstrate performing classification on data sets
4. Demonstrate performing clustering on data sets
5. Demonstrate performing Regression on data sets
6. Credit Risk Assessment. Sample Programs using German Credit Data
7. Sample Programs using Hospital Management System
8. Beyond the Syllabus -Simple Project on Data Preprocessing

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to:

- Ability to understand the various kinds of tools.
- Demonstrate the classification, clustering and etc. in large data sets.
- Ability to add mining algorithms as a component to the exiting tools.
- Ability to apply mining techniques for realistic data.

U20CS606	SECURITY LABORATORY	L	T	P	C
		0	0	4	2

Pre-requisite: To develop a system with lessen a number of risks, such as: Theft, and or damage, of critical equipment, chemicals and intellectual property.

COURSE OBJECTIVES

The student should be made to:

- Be exposed to the different cipher techniques
- Learn to implement the algorithms DES, RSA,MD5,SHA-1
- Learn to use network security tools like GnuPG, KF sensor, Net Strumbler

LIST OF EXPERIMENTS

1. Perform encryption, decryption using the following substitution techniques
   (i) Ceaser cipher, (ii) play air cipher iii) Hill Cipher iv) Vigenere cipher
2. Perform encryption and decryption using following transposition techniques
   i) Rail fence ii) row & Column Transformation
3. Apply DES algorithm for practical applications.
4. Apply AES algorithm for practical applications.
5. Implement RSA Algorithm using HTML and JavaScript
6. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
7. Calculate the message digest of a text using the SHA-1 algorithm.
8. Implement the SIGNATURE SCHEME - Digital Signature Standard.
9. Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w. STUDENTSFOCUS.COM STUDENTSFOCUS.COM 83
10. Automated Attack and Penetration Tools Exploring N-Stalker, a Vulnerability Assessment Tool
11. Defeating Malware
    i) Building Trojans ii) Root kit Hunter

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Learners are able to

- Develop code for classical Encryption Techniques to solve the problems.
- Build cryptosystems by applying symmetric and public key encryption algorithms.
- Construct code for authentication algorithms.
- Develop a signature scheme using Digital signature standard.
- Demonstrate the network security system using open source tools

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE: C / C++ / Java or equivalent compiler GnuPG, Snort, N-Stalker or Equivalent
HARDWARE: Standalone desktops - 30 Nos. (or) Server supporting 30 terminals or more.

U20HS601	INTER PERSONAL SKILLS	L	T	P	C
		0	0	2	2

Pre-requisite: Strong interpersonal skills such as negotiating, problem-solving, and knowledge-sharing are the main requirements for many jobs.

COURSE OBJECTIVES

- To enable learners to develop their communicative competence.
- To facilitate them to hone their soft skills.
- To equip them with employability skills to enhance their prospect of placements.

LIST OF EXPERIMENTS

1. Soft Skills

Demonstrating soft-skill capabilities with reference to the following topics:

a. SWOT

b. Goal setting

c. Time management

d. Stress management

e. Interpersonal skills and Intrapersonal skills

f. Presentation skills

g. Group discussions

2. Quantitative Aptitude and Logical Reasoning

Solving problems with reference to the following topics:

a. Vedic maths/shortcuts

b. Allegation and mixture

c. Time, speed and distance: Unit conversion, Average speed, Relative speed, two objects crossing each other in the same direction and opposite direction, Boats and streams, Races and escalators

d. Clocks

e. Calendars

f. Blood relations

g. Cubes and Dices

h. Syllogism (≤3 statements)

i. Ranking and order

j. Data arrangement

k. Company specific aptitude questions

3. Verbal Aptitude

Demonstrating English language skills with reference to the following topics:

a. Critical reasoning

b. Theme detection

c. Verbal analogy

d. Prepositions

e. Articles

f. Cloze test

g. Company specific aptitude questions

TOTAL: 15 PERIODS

COURSE OUTCOMES

Learners are able to

1. Demonstrate capabilities in additional soft-skill areas using hands-on and/or case-study approaches
2. Solve problems of increasing difficulty than those in SSA-I* in given areas of quantitative aptitude and logical reasoning and score 65-70% marks in company-specific internal tests
3. Demonstrate greater than SSA-I level of verbal aptitude skills in English with regard to given topics and score 65-70% marks in company-specific internal tests

SEMESTER VII

U20CS701	INFORMATION STORAGE MANAGEMENT	L	T	P	C
		3	0	0	3

Pre-requisite: Basic components of Storage System Environment, Storage Area Network Characteristics, Components local and remote replication technologies.

COURSE OBJECTIVES

- To understand the basic components of Storage System Environment.
- To understand the Storage Area Network Characteristics and Components.
- To examine emerging technologies including IP-SAN.
- To describe the different backup and recovery topologies and their role in providing disaster recovery and business continuity capabilities.
- To understand the local and remote replication technologies.

UNIT I STORAGE SYSTEMS 9

Introduction to Information Storage and Management: Information Storage, Evolution of Storage Technology and Architecture, Data Center Infrastructure, Key Challenges in Managing Information, Information Lifecycle. Storage System Environment: Components of the Host. RAID: Implementation of RAID, RAID Array Components, RAID Levels, RAID Comparison, RAID Impact on Disk Performance, Hot Spares. Intelligent Storage System: Components, Intelligent Storage Array.

UNIT II STORAGE NETWORKING TECHNOLOGIES 9

Direct-Attached Storage and Introduction to SCSI: Types of DAS, DAS Benefits and Limitations, Disk Drive Interfaces, Introduction to Parallel SCSI, SCSI Command Model. Storage Area Networks: Fiber Channel, SAN Evolution, SAN Components, Fiber Channel Connectivity, Fiber Channel Ports, Fiber Channel Architecture, Zoning, Fiber Channel Login Types, Fiber Channel Topologies. Network Attached Storage: Benefits of NAS, NAS File I/Components of NAS, NAS Implementations, NAS-Implementations, NAS File Sharing Protocols, NAS I/O Operations.

UNIT III ADVANCED STORAGE NETWORKING AND VIRTUALIZATION 9

IP SAN: iSCSI, FCIP.Content-Addressed Storage: Fixed Content and Archives, Types of Archives, Features and Benefits of CAS, CAS Architecture, Object Storage and Retrieval in CAS, CAS Examples. Storage Virtualization: Forms of Virtualization, NIA Storage Virtualization Taxonomy, Storage Virtualization Configurations, Storage Virtualization Challenges, Types of Storage Virtualization.

UNIT IV BUSINESS CONTINUITY 9

Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions. Backup and Recovery: Backup Purpose, Considerations, Granularity, Recovery Considerations, Backup Methods and Process, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

UNIT V REPLICATION **9**

Local Replication: Source and Target, Uses of Local Replicas, Data Consistency, Local Replication Technologies, Restore and Restart Considerations, Creating Multiple Replicas, Management Interface. Remote Replication: Modes of Remote Replication and its Technologies, Network Infrastructure.

COURSE OUTCOMES:

Learners are able to

- Understand the logical and physical components of a Storage infrastructure.
- Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.
- Understand the various forms and types of Storage Virtualization.
- Describe the different role in providing disaster recovery and business continuity capabilities.
- Distinguish different remote replication technologies.

TOTAL: 45 PERIODS

TEXT BOOKS

1. "EMC Corporation, Information Storage and Management, Wiley, India."
2. Information Storage and Management: Storing, Managing, and Protecting Digital Information by Released April 2009 Publisher(s): Wiley

REFERENCESBOOKS

1. "Robert Spalding, ―Storage Networks: The Complete Reference ―, Tata McGraw Hill, Osborne, 2003.",
2. Marc Farley, ―Building Storage Networks‖, Tata McGraw Hill, Osborne, 2001.
3. Meeta Gupta, Storage Area Networks Fundamentals, Pearson Education Limited, 2002

U20CS702	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

Pre-requisite: An interest in computer hardware, software, and the internet of things (IoT) is all that is required.

COURSE OBJECTIVES

- Identify the various IoT elements appropriate to the applications
- Design a portable IoT using Arduino/Raspberry Pi incorporating cloud and analytics
- Implement IoT applications for real-time environment

UNIT I FUNDAMENTALS OF IOT **9**

Introduction - Definition and Characteristics of IoT - Physical design - IoT Protocols - Logical design - IoT communication models, IoT Communication APIs - Enabling technologies - Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates - Domain specific IoTs - IoT Architectural view.

UNIT II ELEMENTS OF IOT **9**

IoT and M2M- difference between IoT and M2M - Software Defined Networks - Network Function Virtualization - IoT systems management – Needs - NETCONF, YANG - IoT design methodology.

UNIT III IOT PROTOCOLS **9**

Sensors and actuators - Communication modules – Zigbee - LoRa - RFID - Wi-Fi - Power sources.

UNIT IV BUILDING IoT WITH CLOUD AND DATA ANALYTICS **9**

IoT platforms – Arduino – Raspberry Pi - Cloud Computing in IoT - Cloud Connectivity - Big Data Analytics - Data Visualization

UNIT V CHALLENGES IN IOT AND CASE STUDIES **9**

Security Concerns and Challenges - Real time applications of IoT – Home automation – Automatic lighting – Home intrusion detection – Cities – Smart parking – Environment – Weather monitoring system – Agriculture – Smart irrigation.

COURSE OUTCOMES:

Learners are able to

- Describe the characteristics, physical and logical designs, domains and architecture.
- Differentiate M2M and IoT, SDN and NFV design methodologies

TOTAL: 45 PERIODS

TEXT BOOKS

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things-A hands-on approach", Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things: Key applications and Protocols”, Wiley Publications 2nd edition , 2013

REFERENCES

1. Raj Kamal, “Internet of Things – Architecture and Design Principles”, Mc Graw Hill Education Pvt. Ltd., 2017
2. Internet of Things and Data Analytics, HwaiyuGeng, P.E, Wiley Publications, 2017
3. Manoel Carlos Ramon, ―Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers‖, Apress, 2014
4. Marco Schwartz, ―Internet of Things with the Arduino Yun‖, Packt Publishing, 2014
5. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley Publications, 2012 .

U20CS703	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

Pre- requisite: Need to learn about Big data frameworks, Hadoop related tools

COURSE OBJECTIVES

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

UNIT I INTRODUCTION TO BIG DATA **9**

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

UNIT II CLUSTERING AND CLASSIFICATION **9**

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

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM **9**

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

UNIT IV STREAM MEMORY **9**

Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics

UNITV NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION **9**

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

COURSE OUTCOMES:

Learners are able to

- Work with big data tools and its analysis techniques
- Analyze data by utilizing clustering and classification algorithms
- Learn and apply different mining algorithms and recommendation systems for largevolumes of data
- Perform analytics on data streams
- Learn NoSQL databases and management

TOTAL: 45 PERIODS

TEXT BOOKS

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

REFERENCES

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

U20CS704	**IOT Lab**	**L**	**T**	**P**	**C**
		3	**0**	**4**	**2**

Pre-requisite: An interest in computer hardware, software, and the internet of things (IoT) is all that is required.

COURSE OBJECTIVES

- To Design a simple Internet of Things (IoT) application using Arduino/Raspberry Pi, sensors and actuators
- To Deploy an IoT application using Arduino/Raspberry Pi and appropriate sensor and actuator
- To Build an IoT system using mobile app as a mini project

LIST OF EXPERIMENTS

1. Turn ON and OFF the LEDs.
2. Identify the objects using IR and PIR sensor.
3. Measure the moisture level of soil using soil moisture sensor.
4. Measure the distance between the ultrasonic sensor and the obstacle.
5. Identify the leakage of gas/smoke in the environment.
6. Measure the humidity and moisture value of the environment.
7. Control a LED using relay switch.

MINI PROJECT

8. Build an IoT system for the following suggested titles but not limited to:
9. Line follower robot
10. Smart weather monitoring system
11. Smart lighting system
12. Smart waste management system
13. Smart parking system

TOTAL: 60 PERIODS

COURSE OUTCOMES

Learners are able to

- Design a simple Internet of Things (IoT) application using Arduino/Raspberry Pi, sensors and actuators
- Deploy an IoT application using Arduino/Raspberry Pi and appropriate sensor and actuator
- Build an IoT system using mobile app as a mini project

PROFESSIONAL ELECTIVES (PE)

ELECTIVE I

U20CS511	PRINCIPLES OF MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization.

PREREQUISITE:

Determine issues of ethics, planning, goal setting, and effective decision-making processes. Explain organizational structure, motivation and group dynamics, and efficient control mechanisms used by organizations.

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Manager Vs Entrepreneur – types of managers – managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization – Sole proprietorship, partnership, company-public and private sector enterprises – Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design – Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V CONTROLLING 9

System and process of controlling – budgetary and non-budgetary control techniques – use of Computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXTBOOKS:

1. Stephen P. Robbins & Mary Coulter, "Management", 10th Edition, Prentice Hall (India) Pvt. Ltd., 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.

REFERENCES:

1. Stephen A. Robbins & David A. Decenzo& Mary Coulter, "Fundamentals of Management" 7th Edition, Pearson Education, 2011.
2. Robert Kreitner&MamataMohapatra, "Management", Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich "Essentials of management" Tata McGraw Hill, 1998.
4. Tripathy PC & Reddy PN, "Principles of Management", Tata McGraw Hill, 1999.

U20CS512	DISTRIBUTED SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To expose the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.
- To discuss multiple levels of distributed algorithms, distributed file systems, distributed databases, security and protection.

PREREQUISITE:

- An important goal of a distributed system is to make it easy for users (and applications) to access and share remote resources.

COURSE OBJECTIVES

- To understand the foundations of distributed systems.
- To learn issues related to clock Synchronization and the need for global state in distributed systems.
- To learn distributed mutual exclusion and deadlock detection algorithms.
- To describe failure recovery and algorithms in Distributed Systems.
- To understand the significance of agreement and fault tolerance in Distributed Systems.
- To learn the characteristics of peer-to-peer and distributed shared memory systems

UNIT I INTRODUCTION **9**

Introduction: Definition –Relation to computer system components –Motivation –Relation to parallel systems – Message-passing systems versus shared memory systems –Primitives for distributed communication –Synchronous versus asynchronous executions –Design issues and challenges. A model of distributed computations: A distributed program –A model of distributed executions –Models of communication networks –Global state – Cuts –Past and future cones of an event –Models of process communications. Logical Time: A framework for a system of logical clocks –Scalar time –Vector time – Physical clock synchronization: NTP.

UNIT II MESSAGE ORDERING & SNAPSHOTS **9**

Message ordering and group communication: Message ordering paradigms –Asynchronous execution with synchronous communication –Synchronous program order on an asynchronous system –Group communication – Causal order (CO) - Total order. Global state and snapshot recording algorithms: Introduction –System model and definitions –Snapshot algorithms for FIFO channels

UNIT III DISTRIBUTED MUTEX & DEADLOCK **9**

Distributed mutual exclusion algorithms: Introduction – Preliminaries – Lamport's algorithm – Ricart-Agrawala algorithm – Maekawa's algorithm – Suzuki–Kasami's broadcast algorithm. Deadlock detection in distributed systems: Introduction – System model – Preliminaries – Models of deadlocks – Knapp's classification – Algorithms for the single resource model, the AND model and the OR model.

UNIT IV RECOVERY & CONSENSUS **9**

Check pointing and rollback recovery: Introduction – Background and definitions – Issues in failure recovery – Checkpoint-based recovery – Log-based rollback recovery – Coordinated check pointing algorithm – Algorithm for asynchronous check pointing and recovery. Consensus and agreement algorithms: Problem definition – Overview of results – Agreement in a failure – free system – Agreement in synchronous systems with failures.

UNIT V P2P & DISTRIBUTED SHARED MEMORY **9**

Peer-to-peer computing and overlay graphs: Introduction – Data indexing and overlays – Chord – Content addressable networks – Tapestry. Distributed shared memory: Abstraction and advantages – Memory consistency models –Shared memory Mutual Exclusion.

COURSE OUTCOMES:

Learners are able to:

- Elucidate the foundations and issues of distributed systems
- Understand the various synchronization issues and global state for distributed systems.
- Understand the Mutual Exclusion and Deadlock detection algorithms in distributed systems
- Describe the agreement protocols and fault tolerance mechanisms in distributed systems.
- Describe the features of peer-to-peer and distributed shared memory systems

TOTAL: 45 PERIODS

TEXT BOOKS

1. Kshemkalyani, Ajay D., and Mukesh Singhal. Distributed computing: principles, algorithms,
2. and systems. Cambridge University Press, 2011.
3. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and
4. Design", Fifth Edition, Pearson Education, 2012.

REFERENCES BOOKS

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
2. Mukesh Singhal and Niranjan G. Shivaratri. Advanced concepts in operating systems. McGraw-Hill, Inc., 1994.
3. Tanenbaum A.S., Van Steen M., "Distributed Systems: Principles and Paradigms", Pearson Education, 2007.
4. Liu M.L., "Distributed Computing, Principles and Applications", Pearson Education, 2004.
5. Nancy A Lynch, "Distributed Algorithms", Morgan Kaufman Publishers, USA, 2003.

U20CS513	SOCIAL NETWORK ANALYSIS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The student should be made to:

- Understand the concept of semantic web and related applications.
- Learn knowledge representation using ontology.
- Understand human behavior in social web and related comm**UNIT-I**es.
- Learn visualization of social networks.

PREREQUISITE:

Social network analysis is a practical method that can reliably monitor the interactions in an online PBL environment. Using SNA can reveal important information about the course, such as the general activity and the active groups.

UNIT I INTRODUCTION **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 -Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

UNIT II MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION **9**

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modeling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships – Aggregating and reasoning with social network data - Advanced representations.

UNIT III EXTRACTION AND MINING COMMUNIT-IES IN WEB SOCIAL NETWORKS **9**

Extracting evolution of Web Community from a Series of Web Archive – Detecting communities in social networks - Definition of community – Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks – Multi Relational characterization of dynamic social network communities.

UNIT IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES **9**

Understanding and predicting human behavior for social communities - User data management -Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation – Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS **9**

Graph theory - Centrality - Clustering - Node-Edge Diagrams – Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams – Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Understand a broad range of network concepts and theories.
- Appreciate how network analysis can contribute to increasing knowledge about diverse aspects of society.
- Analyze social network data using various software packages.

TEXT BOOKS:

1. Peter Mika, “Social Networks and the Semantic Web”, First Edition, Springer 2007.
2. BorkoFurht, “Handbook of Social Network Technologies and Applications”, 1st Edition, Springer, 2010.

REFERENCES:

1. GuandongXu ,Yanchun Zhang and Lin Li, “Web Mining and Social Networking – Techniques and applications”, First Edition Springer, 2011.
2. Dion Goh and Schubert Foo, “Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively”, IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, “Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling”, IGI Global Snippet, 2009.

U20CS514	USER INTERFACE DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the various user interfaces.
- To understand of menus, windows, interfaces and business functions.
- To understand characteristics, components & various controls for windows.
- To understand about various problems in windows design with color, text, and graphics.
- To understand the testing methods.

PREREQUISITE:

- The goal of user interface design is to make digital interaction as simple, fluid, intuitive and efficient as possible. Thus, it must anticipate needs and ensure ease of access, comprehension and use, maximising the user experience.

UNIT I INTRODUCTION **9**

Human–Computer Interface – Characteristics of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.

UNIT II HUMAN COMPUTER INTERACTION **9**

User Interface Design Process – Obstacles –Usability –Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – System Timings – Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice– Navigating Menus– Graphical Menus.

UNIT III WINDOWS **9**

Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– Device– Based Controls Characteristics– Screen – Based Controls – Operate Control – Text Boxes– Selection Control– Combination Control– Custom Control– Presentation Control.

UNIT IV MULTIMEDIA **9**

Text For Web Pages – Effective Feedback– Guidance & Assistance–Internationalization– Accessibility– Icons– Image– Multimedia – Coloring.

UNIT V WINDOWS LAYOUT– TEST **9**

Prototypes – Kinds of Tests – Retest – Information Search – Visualization – Hypermedia – WWW– Software Tools.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Determine which data to display in order to meet user needs.
- Contextualize search, sort, and filter patterns. Create contextually obvious interactions.
- Enable users make social connections through their mobile devices.

TEXT BOOKS:

1. Wilbent. O. Galitz, “The Essential Guide To User Interface Design”, John Wiley& Sons, 2001.
2. Ben Sheiderman, “Design The User Interface”, Pearson Education, 1998.

REFERENCES:

1. Alan Cooper, "The Essential of User Interface Design", Wiley – Dream Tech Ltd., 2002

U20CS515	COMPILER DESIGN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
- Topics include phases of compiler, parsing, syntax directd translation, type checking use of symbol tables, code optimization techniques, intermediate code generation, code generation and data flow analysis

PREREQUISITE:

- knowledge of automata theory, context free languages, computer architecture, data structures and simple graph algorithms, logic or algebra.

UNIT I INTRODUCTION AND LEXICAL ANALYSIS 9

The structure of a compiler, the science of building a compiler, programming language basics

The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT II SYNTAX ANALYSIS 9

Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

UNIT III SYNTAX-DIRECTED TRANSLATION AND INTERMEDIATE-CODE GENERATION 9

Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's. Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

UNIT IV RUN-TIME ENVIRONMENTS AND CODE GENERATION: 9

Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

UNIT V MACHINE-INDEPENDENT OPTIMIZATION 9

The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Demonstrate the ability to design a compiler given a set of language features.
- Demonstrate the the knowledge of patterns, tokens & regular expressions for lexical analysis.
- Acquire skills in using lex tool &yacc tool for devleoping a scanner and parser.
- Design and implement LL and LR parsers 5. Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity.
- Design algorithms to generate machine code.

TEXT BOOKS:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

REFERENCES:

1. Lex &Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly Compiler Construction, Louden, Thomson.

ELECTIVE II

		L	T	P	C
U20CS621	**XML AND WEB SERVICES**	**3**	**0**	**0**	**3**

OBJECTIVES:

- To introduce the basic concepts of XML technology
- To understand the concepts of web services key technologies
- To know the ideas of XML security mechanisms

PREREQUISITE:

- XML Web services provide a way to describe their interfaces in enough detail to allow a user to build aclient application to talk to them.

UNIT I INTRODUCTION **9**

Introduction to internet and WWW – Creating markup with XML: Introduction to XML markup- Parsers and well formed XML documents- Parsing an XML document with msxml- Characters- Markup- CDATA sections- XML namespace- Document Type Definition (DTD) -Schemas.

UNIT II XML TECHNOLOGY **9**

XML path language: Introduction – Nodes - Location paths - Node set operators and functions - Extensible style sheet language transformations - Extensible style sheet language formatting objects - Xlink, XPointer, XInclude and XBase.

UNIT III WEB SERVICES **9**

Evolution of distributed computing- Client/Server applications- CORBA - Java RMI – Microsoft DCOM – Introduction to web services - Building web services architecture: Web services architecture and its core building blocks – Tools of trade - Webs services communication model - Implementing web services

UNIT IV SOAP **9**

Developing web services using SOAP – Anatomy of a SOAP message - SOAP encoding - SOAP Message exchange model – SOAP communication - SOAP messaging - SOAP bindings for Transport protocols - SOAP security - Building SOAP web services

UNIT V DESCRIPTION AND DISCOVERY OF WEB SERVICES AND SECURITY IN WEB SERVICES **9**

Web services description language - Universal description discovery and integration (UDDI) - Programming with UDDI - Inquiry APIs - Publishing APIs - Implementations of UDDI - Web services security: XML encryption-XML signature

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Understand the XML basics to develop Web application
- Describe the various XML technologies
- Explicate the concepts of Web Services and its Infrastructure
- Explain the web services using SOAP
- Acquire knowledge on UDDI, WSDL and XML security mechanisms

TEXTBOOKS:

1. H.M.Deitel, P.J.Deitel, T.R.Nieto, T.M.Lin, XML How to Program, Pearson Education, 2012.
2. Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh, Developing Java WebServices, Wiley Publishing Inc., 2011

		L	T	P	C
U20CS622	**ADVANCED JAVA PROGRAMMING**	**3**	**0**	**0**	**3**

OBJECTIVES:

At the end of this course the learner is expected:

- To be familiarize with RMI and JSP
- To understand the Java Servlets and Database connectivity.
- To know more about the Enterprise Java Bean (EJB) Programming

PREREQUISITE:

You must know at least the basics of how to use a computer, and should be able to start a command line shell. If you are new to programming then Introduction to Programming is strongly recommended. If you already know C++ or any other Object-Oriented language, Java should be easy to pick up.

UNIT I APPLET, AWT AND EVENT HANDLING 9

Applet Basics – Applet architecture – HTML APPLET tag – Passing parameter to AppletgetDocumentBase() and getCodeBase() – AWT classes and Graphics – AWT ControlsEvent Handling – Event Classes – Event Listener Interfaces – Layout Managers – Menus

UNIT II INTRODUCING SWING & JAVA BEANS 9

Exploring Swing – JLabel and ImageIcon, JTextField – The Swing Buttons – JTabbedPane -JScrollPane, JList&JcomboBox – Trees &JTables – What Is a Java Bean? – Advantages of Java Beans – Introspection, Bound and Constrained Properties – Persistence & Customizers

UNIT III RMI & NETWORKING 9

Remote Method Invocation –Settingup Remote Method Invocation – RMI with Applets -Networking Basics – The Networking Classes and Interfaces – InetAddress – Inet4Address and Inet6Address -TCP/IP Client sockets – URL – URL Connection – HttpURLConnection

UNIT IV JDBC **9**

Presentation to JDBC CONNECTION settings – The Concept of JDBC – JDBC Driver Types – JDBC Packages – A Brief Overview of the JDBC Process – Database Connection – Associating the JDBC/ODBC Bridge with the Database – Statement Objects – Result Set.

UNIT V SERVLETS **9**

Background, The Life Cycle of a Servlet & The JSDK-A Simple Servlet – The Servlet API -RolePlay-Servlet Concept – The javax.servlet Package – Reading Servlet Parameters, The javax.servlet.http Package – Handling HTTP Request and Responses – Using Cookies – Session Tracking.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Develop error-free, well-documented Java programs;
- develop and test Java network, search engine, and web framework programs.
- Learn how to write, test, and debug advanced-level Object-Oriented programs using Java.

TEXTBOOKS:

1. Naughton and H.Schildt, (2007), "Java 2-The complete reference", Fifth Edition McGraw Hill.

REFERENCES:

1. Jim Keogh, (2002), "The Complete Reference J2EE", Tata McGraw Hill Edition, New Delhi.
2. Marty Hall, Larry Brown, (2004), "Core Servlets and Java Server Pages", 2nd Edition, Pearson Education.

U20CS623	OPEN SOURCE SYSTEMS	L	T	P	C
		3	0	0	3

Pre-requisite: Basic knowledge of python and mysql

COURSE OBJECTIVES:

- Demonstrate different open source technology like linux,PHP& MySQL with different packages.
- Illustrate linux commands for programmers.
- Explore programs of PHP with MySQL connections.
- Explore programs of PYTHON

UNIT I FOSS PHILOSOPHY AND LINUX PACKAGE **9**

Introduction to Software Terminologies - Overview of Free/Open Source Software - Definition of FOSS & GNU - History of GNU/Linux and the Free Software Movement , Advantages of Free Software and GNU/Linux, FOSS usage , trends and potential - global and Indian-Free Software Licenses(GPL, LGPL, AGPL). Installing software - from source code as well as using binary packages - Understanding build systems - constructing make files and using make, using autoconf and autogen to automatically generate make files tailored for different development environments.

UNIT II OPEN SOURCE NON RELATIONAL DATABASES **9**

NoSQL definition - relational Vs non-relational database - working with NoSQL - Running MongoDB - Getting A Database Connection - Inserting Data into A Collection - Accessing Data From a Query - CouchDB-Developing with CouchDB - Example application - Deploying CouchDB.

UNIT III OPEN SOURCE PROGRAMMING LANGUAGES **9**

PHP: Introduction - Programming in web environment - variables - constants - data types -operators - Statements - Functions - Arrays - OOP - String Manipulation and regular expression - File handling and data storage - PHP and SQL database - PHP and LDAP - PHP Connectivity - Sending and receiving E-mails - Debugging and error handling - Security - Templates.

UNIT IV PYTHON **9**

Syntax and Style - Python Objects - Numbers - Sequences - Strings - Lists and Tuples -Dictionaries - Conditionals and Loops - Files - Input and Output - Errors and Exceptions - Functions - Modules - Classes and OOP - Execution Environment.

UNIT V OPEN SOURCE TOOLS AND TECHNOLOGIES **9**

Web Server: Apache Web server –Google Web server- Working with Web Server - Configuring and Using apache web services MDA: Introduction to MDA - Genesis of MDA - Meta Object Facility - UML -UML Profiles - MDA Applications- case studies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Understand the importance of FOSS.
- Create and manipulate non-relational data bases.
- Write programs using PHP, Python and manipulate SQL data base.
- Configure and use Apache web services, acquire knowledge to develop software models using MDA.

REFERENCES:

1. Mike McGrath, “Linux in easy steps, Fifth Edition”, Tata McGraw-Hill, Fifth Edition 2010.
2. N. B. Venkateshwarlu, “Introduction to Linux: Installation and Programming”, First Edition, BS Publishers, 2006.
3. Steve Suchring, “MySQL Bible”, John Wiley, 2007.
4. Steven Holzner, “PHP: The Complete Reference”, TMH Edition; 2007
5. J.Chris Anderson, “CouchDB : Definitive Guide”, First Edition, O’Reilly series, 2010.
6. Wesley J.Chun, “Core Python Programming”, Prentice Hall, 2007
7. Stephen J. Mellor, Marc Balces, “Executable UMS: A foundation for MDA”, Addison Wesley, 2002.

U20CS624	PROFESSIONAL ETHICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To create awareness on professional ethics and Human Values
- To create awareness on Engineering Ethics providing basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues.
- To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards
- To inculcate knowledge and exposure on Safety and Risk, Risk Benefit Analysis and have an idea about the Collective Bargaining, Confidentiality, Professional, Employee, Intellectual Property Rights
- To have an adequate knowledge about MNC„s, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.

PREREQUISITE:

- Good Ethics is a fundamental requirement of any profession. It is integral to the success of the business as well.

UNIT I HUMAN VALUES 9

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS 9

Senses of "Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT –III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT-IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – 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 – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Understand the core values that shape the ethical behavior of an engineer and Exposed awareness on professional ethics and human values.
- Understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories
- Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
- Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.
- acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives

TEXT BOOK:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, "Fundametals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001
5. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" McGraw Hill education, India Pvt. Ltd.,New Delhi 2013.
6. World Community Service Centre, " Value Education", Vethathiri publications, Erode, 2011

U20CS625	COMPUTER VISION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To review image processing techniques for computer vision
- To understand shape and region analysis
- To understand Hough Transform and its applications to detect lines, circles, ellipses
- To understand three-dimensional image analysis techniques
- To understand motion analysis
- To study some applications of computer vision algorithms

PREREQUISITE:

- Computer vision is a field of artificial intelligence that trains computers to interpret and understand the visual world.

UNIT I IMAGE PROCESSING FOUNDATIONS 9

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture

UNIT II SHAPES AND REGIONS 9

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments

UNIT III HOUGH TRANSFORM 9

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation

UNIT IV 3D VISION AND MOTION 9

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion

UNIT V APPLICATIONS 9

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians

TOTAL:45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Implement fundamental image processing techniques required for computer vision
- Perform shape analysis
- Implement boundary tracking techniques
- Apply chain codes and other region descriptors
- Apply Hough Transform for line, circle, and ellipse detections
- Apply 3D vision techniques
- Implement motion related techniques

TEXT BOOKS:

1. E.R. Davies, “Computer & Machine Vision”, Fourth Edition, Academic Press, 2012.
2. R.Szeliski, “Computer Vision: Algorithms and Applications”, Springer 2011.

REFERENCES:

1. Simon J. D. Prince, “Computer Vision: Models, Learning, and Inference”, Cambridge University Press, 2012.
2. Mark Nixon and Alberto S. Aquado, “Feature Extraction & Image Processing for Computer Vision”, Third Edition, Academic Press, 2012.
3. D. L. Baggio et al., “Mastering OpenCV with Practical Computer Vision Projects”, Packt Publishing, 2012
4. Jan Erik Solem, “Programming Computer Vision with Python: Tools and algorithms for analyzing images”, O'Reilly Media, 2012.

ELECTIVE III

U20CS731	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Deliver successful software projects that support organization's strategic goals
- Match organizational needs to the most effective software development model
- Plan and manage projects at each stage of the software development life cycle (SDLC) Create project plans
- that address real-world management challenges
- Develop the skills for tracking and controlling software deliverables

PREREQUISITE:

- It is necessary for an organization to deliver quality product, keeping the cost within client's budget constrain and deliver the project as per scheduled.

UNIT I BASIC CONCEPTS **9**

Product, Process and Project – Definition – Product Life Cycle – Project Life Cycle Models.

UNIT II FORMAT PROCESS MODELS AND THEIR USE **9**

Definition and Format model for a process – The ISO 9001 and CMM Models and their relevance to Project Management – Other Emerging Models like People CMM.

UNIT III UMBRELLA ACTIVITIES IN PROJECTS **9**

Metrics – Configuration Management – Software Quality Assurance – Risk Analysis.

UNIT IV IN STREAM ACTIVITIES IN PROJECTS **9**

Project Initiation – Project Planning – Execution and Tracking – Project Wind up – Concept of Process/Project Database.

UNIT V ENGINEERING AND PEOPLE ISSUES IN PROJECT MANAGEMENT **9**

Phases (Requirements, Design, Development, Testing, Maintenance, Deployment) – Engineering Activities and Management Issues in Each Phase – Special Considerations in Project Management for India and Geographical Distribution Issues.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Provide how different project contexts will impact upon all aspects of a software development project
- Able to identify and describe the key phases of project management and the key skills associated
- Be able to determine an appropriate project management approach through an evaluation of the business context and project scope and knowledge of agile and traditional project management approaches

- Can demonstrate through application, knowledge of the key project management skills,such as product and work break-down structure, schedule; governance including progress reporting, risk and quality management

TEXT BOOKS:

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Humphrey,Watts,"Managing the Software Process ",Addison Wesley,1986.

REFERENCES:

1. Pressman,Roger,"SoftwareEngineering",A Practitioner" s approach.McGraw Hill,1997.
2. Bob Hughes and Mike Cotterell,"Software Project Management".
3. Wheelwright and Clark,"Revolutionising product development",The Free Press,1993.

U20CS732	DIGITAL IMAGE PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To become familiar with digital image fundamentals
- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
- To learn concepts of degradation function and restoration techniques.
- To study the image segmentation and representation techniques.
- To become familiar with image compression and recognition methods.

PREREQUISITE:

- Image processing is more accurately defined as a means of translation between the human visual system and digital imaging devices.

UNIT-I DIGITAL IMAGE FUNDAMENTALS 9

Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.

UNIT-II IMAGE ENHANCEMENT 9

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.

UNIT-III IMAGE RESTORATION 9

Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering.

UNIT-IV IMAGE SEGMENTATION 9

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT-V IMAGE COMPRESSION AND RECOGNITION 9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.
- Operate on images using the techniques of smoothing, sharpening and enhancement.
- Understand the restoration concepts and filtering techniques.
- Learn the basics of segmentation, features extraction, compression and recognition methods for color models.

TEXT BOOK:

1. E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, Sixth Edition, 2013.

REFERENCES:

1. K. R.Venugopal, Rajkumar, T.Ravishankar, "Mastering C++", Tata McGraw Hill, 2007.
2. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publications, 2006.
3. Bjarne Stroustrup, "The C++ Programming Language", Pearson Education, Fourth Edition, 2013.
4. B.Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.
5. K.S. Easwarakumar, " Object Oriented Data Structures Using C++", Vikas Publication House Pvt Ltd, First Edition, 2008.

U20CS734 NATURAL LANGUAGE PROCESSING

L	T	P	C
3	0	0	3

Pre-requisite: Basic knowledge about lenear algebra and AI techniques

COURSE OBJECTIVES:

- To learn the fundamentals of natural language processing
- To understand the use of CFG and PCFG in NLP
- To understand the role of semantics of sentences and pragmatics
- To apply the NLP techniques to IR applications

UNIT I INTRODUCTION 9

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM -Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT II WORD LEVEL ANALYSIS 9

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT III SYNTACTIC ANALYSIS 9

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.

UNIT IV SEMANTICS AND PRAGMATICS 9

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT V DISCOURSE ANALYSIS AND LEXICAL RESOURCES 9

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Co reference Resolution – Resources: Porter Stemmer,Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus,British National Corpus BNC.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Design an innovative application using NLP components
- Implement a rule based system to tackle morphology/syntax of a language
- Design a tag set to be used for statistical processing for real-time applications
- Compare and contrast the use of different statistical approaches for different types of NLP applications.

TEXT BOOKS:

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

REFERENCES:

1. Breck Baldwin, "Language Processing with Java and LingPipe Cookbook", Atlantic Publisher, 2015.
2. Richard M Reese, "Natural Language Processing with Java", O'Reilly Media, 2015.
3. Nitin Indurkhya and Fred J. Damerau, "Handbook of Natural Language Processing", Second Edition, Chapman and Hall/CRC Press, 2010.
4. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

U20CS735 **MOBILE COMPUTING**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- To serve as an advanced element of learning in the field of wireless communication.
- To throw light on the architecture of different mobile devices.
- To expose the concepts and services of different layers of wireless devices.
- To gain knowledge on different database issues in mobile wireless device.
- To discover the various applications of mobile communication.
- To develop skills of finding solutions and building software for mobile computing applications

PREREQUISITE:

- This course requires you have a general understanding of computer networks. You should also be able to do some basic programming, read pseudo codes, and interpret algorithms.

UNIT I MOBILE COMMUNICATIONS **9**

Introduction to Mobile Communications and Computing: Mobile Computing (MC) – Introduction to MC-Novel applications- Limitations and architecture. GSM: Mobile services- System architecture- Radio interface- Protocols-Localization and calling- Handover- security and new data services.

UNIT II MEDIUM ACCESS CONTROL **9**

Motivation for a specialized MAC (Hidden and exposed terminals, near and far terminals)- SDMA-FDMA- TDMA- CDMA.

UNIT III MOBILE NETWORK LAYER **9**

Mobile IP (Goals- assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations) – Dynamic Host Configuration Protocol (DHCP).

UNIT IV MOBILE TRANSPORT LAYER **9**

Traditional TCP- Indirect TCP- Snooping TCP- Mobile TCP- Fast retransmit/ fast recovery-Transmission /time-out freezing- Selective retransmission-Transaction oriented TCP.

UNIT V MANET **9**

Mobile Ad hoc Networks (MANETs): Overview- Properties of a MANET-Spectrum of MANET applications- Routing and various routing algorithms-Security in MANETs.Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers)- Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Describe the concept of mobile computing and architecture of mobile communication.
- Compare and contrast the architecture and protocol of various wireless devices.
- Monitor the services at different layers of wireless devices.
- Implement the concepts of mobile computing and compare its performance with conventional wired network applications. Provide solutions in real time wireless applications to overcome database issues.
- Apply the concepts of mobile transactions in real time applications.

TEXT BOOKS

1. Jochen Schiller, "Mobile Communications", 2nd Edition, Addison-Wesley, 2008.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing",
3. Wiley Publications, 2008.

REFERENCES

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", Cambridge University Press, 2004.
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill professional,2007.
3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", 2ndEdition, Springer, 2007.

ELECTIVE IV

U20CS841	SOFTWARE QUALITY ASSURANCE	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand software quality assurance activities with tools and techniques.
- To know the standards and components of software quality assurance
- To study the metrics for software quality assurance

PREREQUISITE:

- software quality assurance is important as it defines and measures the adequacy of the software (SW) process, providing evidence that establishes confidence to produce SW products of suitable quality for their intended purposes.

UNIT I ORGANIZING QUALITY MANAGEMENT 9

Quality management framework - Quality program concepts – Organizational aspects of quality program – Quality program organizational relationship-Mapping quality program functions to project organizational entities.

UNIT II STANDARDS USED IN SOFTWARE QUALITY ASSURANCE 9

Software Quality Assurance (SQA) in ISO standards – SQA in IEEE standards –IEEE std 730- 2002- IEEE std 829-1998- IEEE std 1028-1997-ITIL standards - ANSI/EIA standards and RTLA/DO standards

UNIT III SOFTWARE QUALITY ASSURANCE 9

Identifying SQA personnel needs – Characteristics of a good SQA engineer – SQA engineering staff – Pareto principle applied to SQA – Software inspections and walkthroughs – Measurements- Transition of cost to quality - Software audit – Performing the audit – Software safety and its relation to SQA – CMMI – PPQA relationship to SQA

UNIT IV QUALITY MANAGEMENT IN IT 9

ITSM processes – IT best practices – ITSM standards – Process improvement models – Customer requirements – Monitoring and measuring ITSM performance - Procurement quality – IT quality professional – Cost of software quality system – CoSQ system to organization.

UNIT V SQA METRICS 9

Software quality indicators – PSM – CMMI- PSP and TSP – Six sigma - Seven quality control tools: traditional and modern tools-check sheet - Pareto diagram- Histogram - Run chart- Scatter diagram - Control chart

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Describe the quality management framework and related quality program concepts.
- Explain commercial standards and the impact on quality assurance.
- Analyze the relationship of process and product quality assurance (PPQA) to SQA.
- Understand the quality management in information technology.

- Exemplify Software quality metrics methodology and software quality control tools.

TEXT BOOKS:

1. Schulmeyer G. Gordon, Handbook of Software Quality Assurance. London: Artech House Inc, 2008.
2. Daniel Galin, Software Quality Assurance from theory to implementation, Pearson Education Limited, 2009.

REFERENCES:

1. MilindLimaye. Software Quality Assurance, Tata McGraw-Hill Education, 2011
2. Stephen H. Kan. Metrics and Models in Software Quality Engineering, Addison-Wesley Professional, 2003
3. MuraliChemuturi, Mastering Software Quality Assurance: Best Practices, Tools andTechniques for Software Developers, J. Ross Publishing Inc, 2011

U20CS842	BUSINESS INTELLIGENCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- The objective of this course is tolearn Business Intelligence.

PREREQUISITE:

- Great BI helps businesses and organizations ask and answer questions of their data. ... Analysts can leverage BI to provide performance and competitor benchmarks to make the organization run smoother and more efficiently. Analysts can also more easily spot market trends to increase sales or revenue.

UNIT I INTRODUCTION TO BUSINESS INTELLIGENCE 9

Understanding the scope of today's BI solutions and how they fit into existing infrastructure Assessing new options such as SaaS and cloud-based technology. Describe BI, its components & architecture, previewing the future of BI Crafting a better experience for all business users, End User Assumptions, Setting up Data for BI, The Functional Area of BI Tools, Query Tools and Reporting, OLAP and Advanced Analytics, Supporting the requirements of senior executives, including performance management.

UNIT II ELEMENTS OF BUSINESS INTELLIGENCE SOLUTIONS 9

Reports & ad hoc queries; Analyse OLAP data; Dashboards & Scorecards development, Metadata Models; Automated tasks & events; Mobile & disconnected BI; Collaboration capabilities; Real time monitoring capabilities; Software development kit; Consume BI through portals, web applications, Desktop applications.

UNIT III BUILDING THE BI PROJECT 9

Planning the BI project, Project Resources; Project Tasks, Risk Management and Mitigation, Cost-justifying BI solutions and measuring success,

Collecting User Requirements, Requirements-Gathering Techniques; Prioritizing & Validating BI Requirements, Changing Requirements; BI Design and Development, Best Practices for BI Design; Post-Implementation Evaluations, Maintaining Your BI Environment.

UNIT IV REPORTING AUTHORING 9

Building reports with relational vs Multidimensional data models ; Types of Reports – List, crosstabs, Statistics, Chart, map, financial etc; Data Grouping & Sorting, Filtering Reports, Adding Calculations to Reports, Conditional formatting, Adding Summary Lines to Reports. Drill up, drill- down, drill-through capabilities. Run or schedule report, different output forms – PDF, excel, csv, xml etc

UNIT V BI DEPLOYMENT, ADMINISTRATION & SECURITY 9

Centralized Versus Decentralized Architecture, BI Architecture Alternatives, phased & incremental BI roadmap, System Sizing, Measurements and Dependencies, System Sizing, Measurements, and Dependencies. Setting Early Expectations and Measuring the Results. End-User Provisos. OLAP Implementations. Expanding BI Authentication Authorization, Access Permissions, Groups and Roles, Single-sign on Server Administration, Manage Status & Monitoring, Audit, Mail server & Portal integration, Back Up and Restore.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- gain knowledge of Business Intelligence
- build business projects
- generate and manage BI reports
- do BI Deployment, Administration & Security.

TEXT BOOKS:

1. Business Intelligence (IBM ICE Publication).

REFERENCES:

1. Lex http://en.wikipedia.org/wiki/Business_intelligence.
2. http://www.webopedia.com/TERM/B/Business_Intelligence.html.
3. Http://www.cio.com/article/40296/Business_Intelligence_Definition_and_Solutions.

U20CS843 SERVICE ORIENTED ARCHITECTURE L T P C

3 0 0 3

OBJECTIVE

- To gain understanding of the basic principles of service orientation, service oriented analysis techniques, technology underlying the service design, advanced concepts such as service composition, orchestration and Choreography, and various WS-* specification standards

PREREQUISITE:

- SOA encompasses a set of design principles that structure system development and provide means for integrating components into a coherent and decentralized system.

UNIT I FUNDAMENTALS OF SOA 9

Introduction-Defining SOA-Evolution of SOA-Service Oriented Enterprise-Comparing SOA to client-server and distributed internet architectures-Basic SOA Architecture-concepts-Key Service characteristics-Technical Benefits-Business Benefits.

UNIT II COMBINING SOA AND WEB SERVICES 9

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns Web Service Platform-Service Contract-Service Level Data Model-Service Discovery-Service Level Security-Service Level Interaction Patterns-Atomic and Composite Services-Service Enabling Legacy System-Enterprise Service Bus Pattern.

UNIT III MULTI CHANNEL ACCESS AND WEB SERVICES COMPOSITION 9

SOA for Multi-Channel Access-Business Benefits-Tiers-Business Process Management-Web Service Composition-BPEL-RESTFUL Services-comparison of BPEL and RESTFUL Services.

UNIT IV JAVA WEB SERVICES 9

SOA support in J2EE – Java API for XML-based web services(JAX-WS)-Java Architecture for XML binding (JAXB) – Java API for XML Registries(JAXR)-Java API for XML based RPC (JAX-RPC)- Web Services Interoperability-SOA support in .NET – ASP.NET web services – Case Studies- Web Services Enhancements (WSE)

UNIT V WEB SERVICES SECURITY AND TRANSACTION 9

Meta Data Management-Advanced Messaging- Addressing – Reliable Messaging– PoliciesWS-Policy– Security- WS-Security–Notification and Eventing-Transaction Management

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Design, develop and test Web services.
- Learn standards related to Web services: Web Services Description Language (WSDL), Simple Object Access Protocol (SOAP), and Universal Description, Discovery and Integration (UDDI).

TEXT BOOKS:

1. Eric Newcomer, Lomow, “Understanding SOA with Web Services”, Pearson Education, 2005.
2. JamesMcGovern,SameerTyagi,MichaelE Stevens,SunilMathew,”Java Web Services Architecture”,Elsevier,2003.

REFERENCES:

1. Thomas Erl, “Service Oriented Architecture”,Pearson Education,2005
2. SandeepChatterjee, James Webber, “Developing Enterprise Web Services, An Architect’s Guide”, Pearson Education, 2005.
3. Dan Woods and Thomas Mattern, “Enterprise SOA Designing IT for Business Innovation” O’REILLY, First Edition, 2006.
4. Frank Cohen, “FastSOA”, Elsevier, 2007.
5. Jeff Davies, “The Definitive Guide to SOA”,Apress,2007

U20CS844	CYBER SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the concepts of number theory, cryptographic techniques.
- To understand integrity and authentication process.
- To familiarize various cyber threats, attacks, vulnerabilities, defensive mechanisms, security policies and practices.

PREREQUISITE:

- Basics skills to assess security and privacy technologies.

UNIT I INTRODUCTION TO NUMBER THEORY 9

Finite Fields and Number Theory: Modular arithmetic, Euclidian Algorithm, Primality Testing: Fermats and Eulers theorem, Chinese Reminder theorem, Discrete Logarithms

UNIT II CRYPTOGRAPHIC TECHNIQUES 9

Symmetric key cryptographic techniques: Introduction to Stream cipher, Block cipher: DES,AES,IDEA Asymmetric key cryptographic techniques: principles, RSA, ElGamal, Elliptic Curvecryptography, Key distribution and Key exchange protocols.

UNIT III INTEGRITY AND AUTHENTICATION 9

Hash functions, Secure Hash Algorithm (SHA)Message Authentication, Message Authentication Code (MAC), Digital Signature Algorithm : RSA ElGamal based

UNIT IV CYBERCRIMES AND CYBER OFFENSES 9

Classification of cybercrimes, planning of attacks, social engineering: Human based, Computer based: Cyber stalking, Cybercafe and Cybercrimes.

UNIT V CYBER THREATS, ATTACKS AND PREVENTION 9

Phishing, Password cracking, Keyloggers and Spywares, DoS and DDoS attacks, SQL Injection Identity Theft (ID) : Types of identity theft, Techniques of ID theft-SECURITY writing security policies, Internet and email security policies, Compliance and Enforcement of policies.

TOTAL: 45 PERIODS

OUTCOMES:

Learners are able to:

- Know the fundamental mathematical concepts related to security.
- Implement the cryptographic techniques to real time applications.
- Comprehend the authenticated process and integrity, and its implementation
- Know fundamentals of cybercrimes and the cyber offenses.
- Realize the cyber threats, attacks, vulnerabilities and its defensive mechanism.
- Design suitable security policies for the given requirements.
- Exploring the industry practices and tools to be on par with the recent trends

TEXT BOOKS:

1. Cryptography and Network security, William Stallings, Pearson Education, 7th Edition,2016
2. Cyber Security, Understanding cyber crimes, computer forensics and legal perspectives, Nina Godbole,SunitBelapure, Wiley Publications, Reprint 2016
3. Writing Information Security Policies, Scott Barman, New Riders Publications, 2002

REFERENCES:

1. Cyber security for Dummies, Brian Underdahl, Wiley, 2011
2. Cryptography and Network security, Behrouz A. Forouzan ,Debdeep Mukhopadhyay,
3. Mcgraw Hill Education, 2nd Edition, 2011
4. Darryl Gove, "Multicore Application Programming: For Windows, Linux, and Oracle Solaris", Pearson, 2011.
5. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture: A Hardware/ Software Approach", Morgan Kaufmann / Elsevier, 1997.

U20CS845	MULTI-CORE ARCHITECTURE AND PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the recent trends in the field of Computer Architecture and identify performance related parameters
- To appreciate the need for parallel processing
- To expose the students to the problems related to multiprocessing
- To understand the different types of multicore architectures
- To understand the design of the memory hierarchy
- To expose the students to multicore programming

PREREQUISITE:

- The instructions are ordinary CPU instructions (such as add, move data, and branch), but the multiple cores can run multiple instructions at the same time, increasing overall speed for programs amenable to parallel computing.

UNIT I NEED FOR MULTICORE ARCHITECTURES 9

Fundamentals of Computer Design - Measuring and Reporting Performance - Instruction Level

Parallelism and its Exploitation - Concepts and Challenges – Limitations of ILP – Multithreading – SMT and CMP Architectures – The Multicore era.

UNIT II MULTIPROCESSOR ISSUES 9

Symmetric and Distributed Shared Memory Architectures – Cache Coherence Issues – Performance Issues – Synchronization Issues – Models of Memory Consistency - Interconnection Networks – Buses, Crossbar and Multi-stage Interconnection Networks.

UNIT III MULTICORE ARCHITECTURES 9

Homogeneous and Heterogeneous Architectures – Intel Multicore Architectures – SUN CMP architecture – IBM Cell Architecture – GPGPU Architectures.

UNIT IV MEMORY HIERARCHY DESIGN **9**

Introduction - Optimizations of Cache Performance - Memory Technology and Optimizations - Protection: Virtual Memory and Virtual Machines - Design of Memory Hierarchies - Case Studies

UNIT V MULTICORE PROGRAMMING **9**

Parallel Programming models – Shared Memory Programming – Message Passing Interface – Open MP Program Development and Performance Tuning.

TOTAL: 45 PERIODS

OUTCOMES:

Learners are able to:

- Identify the limitations of ILP and the need for multicore architectures
- Discuss the issues related to multiprocessing and suggest solutions
- Point out the salient features of different multicore architectures and how they exploit parallelism
- Critically analyze the different types of inter connection networks
- Design a memory hierarchy and optimize it
- Explain the different parallel programming models
- Develop programs using Open MP and optimize them

TEXT BOOKS:

1. John L. Hennessey and David A. Patterson, “Computer Architecture – A Quantitative Approach”, Morgan Kaufmann / Elsevier, 5th. edition, 2012.
2. Peter S. Pacheco, “An Introduction to Parallel Programming”, Morgan Kaufmann / Elsevier, 2011.

REFERENCES:

1. Michael J Quinn, Parallel Programming in C with MPI and OpenMP, Tata McGraw Hill, 2003.
2. Darryl Gove, “Multicore Application Programming: For Windows, Linux, and Oracle Solaris”, Pearson, 2011.
3. David E. Culler, Jaswinder Pal Singh, “Parallel Computing Architecture: A Hardware/ Software Approach”, Morgan Kaufmann / Elsevier, 1997.

ELECTIVE V

U20CS851	HUMAN COMPUTER INTERACTION	L	T	P	C
		3	0	0	3

OBJECTIVES

- To learn the foundations of Human Computer Interaction.
- To become familiar with the design technologies for individuals and persons with disabilities.
- To be aware of mobile HCI.
- To learn the guidelines for user interface.

PREREQUISITE:

- Learn about basic computer devices with human interaction

UNIT I FOUNDATIONS OF HCI 9

The Human: I/O channels – Memory – Reasoning and problem solving; The Computer: Devices– Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles –elements – interactivity- Paradigms. - Case Studies

UNIT II DESIGN & SOFTWARE PROCESS 9

Interactive Design: Basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design

UNIT III MODELS AND THEORIES 9

HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT IV MOBILE HCI 9

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets,Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. - Case Studies

UNIT V WEB INTERFACE DESIGN 9

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlaysand Virtual Pages, Process Flow - Case Studies

TOTAL: 45 PERIODS

OUTCOMES

Learners are able to:

- Design effective dialog for HCI
- Design effective HCI for individuals and persons with disabilities.
- Assess the importance of user feedback.
- Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
- Develop meaningful user interface.

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rdEdition, Pearson Education, 2004 (UNIT I, II & III)
2. Brian Fling, "Mobile Design and Development", First Edition, O'Reilly Media Inc., 2009(UNIT –IV)
3. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O'Reilly, 2009.(UNIT-V)

U20CS852	SOFTWARE TESTING METHODOLOGIES	L	T	P	C
		3	0	0	3

Pre-requisite: Basic knowledge of test techniques and software programs

COURSE OBJECTIVES:

- To learn the criteria for test cases.
- To learn the design of test cases.
- To understand test management and test automation techniques.
- To apply test metrics and measurements.

UNIT I INTRODUCTION **9**

Testing as an Engineering Activity – Testing as a Process – Testing Maturity Model- Testing axioms – Basic definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design –Defect Examples- Developer/Tester Support of Developing a Defect Repository

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 – domain testing - Random 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 – Additional White box testing approaches- Evaluating Test Adequacy Criteria.

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 – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing – Compatibility testing – Testing the documentation – Website 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- The Structure of Testing Group- .The Technical Training Program.

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:

Learners are able to:

- Design test cases suitable for a software development for different domains.
- Identify suitable tests to be carried out.
- Prepare test planning based on the document.
- Document test plans and test cases designed.
- Use automatic testing tools.
- Develop and validate a test plan.

TEXT BOOKS:

1. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2006.
2. Ron Patton, "Software Testing", Second Edition, Sams Publishing, Pearson Education, 2007.

REFERENCES:

1. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003.
2. Edward Kit, "Software Testing in the Real World – Improving the Process", Pearson Education, 1995.
3. Boris Beizer,"Software Testing Techniques" – 2nd Edition, Van Nostrand Reinhold, New York, 1990.
4. Aditya P. Mathur, "Foundations of Software Testing-Fundamental Algorithms and Techniques", Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

U20CS853	AD-HOC NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study fundamental principles of Adhoc Networks
- To develop a comprehensive understanding of Adhoc network protocols
- To understand current and emerging trends in Wireless Networks

PREREQUISITE:

- Devices in the ad hoc network require a wireless network adapter or chip, and they need to be able to act as a wireless router when connected.

UNIT I AD-HOC MAC **9**

Introduction – Issues in Ad-Hoc Wireless Networks, MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

UNIT II AD-HOC NETWORK ROUTING & TCP **9**

Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based- Ad Hoc Transport Layer Issues. TCP Over Ad Hoc –Feedback based, TCP with explicit link, TCP-Bus, Ad Hoc TCP, and Split TCP.

UNIT III WSN -MAC **9**

Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

UNIT IV WSN ROUTING, LOCALIZATION & QOS 9

Issues in WSN routing – OLSR, AODV- Localization – Indoor and Sensor Network Localization.QoS in WSN.

UNIT V MESH NETWORKS 9

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture –Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Describe the unique issues in ad-hoc networks.
- Describe current technology trends for the implementation and deployment of ad-hoc networks.
- Insight in medium access mechanisms in WLAN and IEEE 802.11-based multi-hop ad-hoc networks
- Broad knowledge on future wireless networks
- Awareness of a few new trends within the area of ad-hoc networks.

TEXT BOOKS:

1. C.Siva Ram Murthy and B.Smanoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2004.
2. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.

U20CS854	INFORMATION EXTRACTION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To use an open source search engine framework and explore its capabilities, represent documents in different ways and discuss its effect on similarity calculations and on search, modify Page Rank and HITS algorithms or Personalization, Semantic or any other aspect, design and implement an innovative feature in a search engine and explain the search components affected by the innovation, design a smart information management system with Information Retrieval components

PREREQUISITE:

- The goal of information extraction (IE) is to transform text into a structured format and thereby reducing the information in a document to a tabular structure.

UNIT I INTRODUCTION 9

Introduction -History of IR- Components of IR - Issues –Open source Search engine Frameworks, The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web

UNIT II INFORMATION RETRIEVAL 9

Boolean and vector-space retrieval models- Term weighting - TF-IDF weighting- cosine similarity – Preprocessing - Inverted indices - efficient processing with sparse vectors – Language Model based IR -

Probabilistic IR –Latent Semantic Indexing - Relevance feedback and query expansion

UNIT III WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING 9

Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement - search engine optimization/spam – Web Search Architectures - crawling - meta-crawlers- Focused Crawling - web indexes –- Near-duplicate detection - Index Compression - XML retrieval

UNIT IV WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH 9

Link Analysis –hubs and authorities - PageRank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity - Hadoop&MapReduce - Evaluation - Personalized search - Collaborative filtering and content-based recommendation of documents and products – handling "invisible" Web - Snippet generation, Summarization, Question Answering, Cross-Lingual Retrieval

UNIT V DOCUMENT TEXT MINING 9

Information filtering; organization and relevance feedback – Text Mining -Text classification and clustering - Categorization algorithms: naive Bayes; decision trees; and nearest neighbor - Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM)

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- gain an understanding of the basic concepts and techniques in Information Retrieval;
- understand the issues involved in providing an IR service on a web scale, including distributed index construction and user modeling for recommendation engines.

TEXT BOOKS:

1. C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval , Cambridge University Press, 2008.
2. Ricardo Baeza-Yates and BerthierRibeiro-Neto, Modern Information Retrieval: The Concepts and Technology behind Search (2nd Edition) (ACM Press Books) 2011.
3. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, Addison Wesley; 1 edition 2009
4. Mark Levene, An Introduction to Search Engines and Web Navigation, Wiley; 2 edition, 2010.

REFERENCES:

1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
2. OphirFrieder Information Retrieval: Algorithms and Heuristics (The Information Retrieval Series)(2nd Edition), Springer; 2nd edition, 2004
3. Manu Konchady, Building Search Applications: Lucene, LingPipe, and Gate Mustru Publishing; First edition,2008

U20CS855	MOBILE AND PERVASIVE COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the fundamental concepts of mobile computing
- To acquire knowledge on mobile technologies and networking
- To know the essentials of pervasive computing

PREREQUISITE:

- There are many benefits to mobile computing including the ability to get directions, entertain yourself when bored, do business, and more, including: Connectivity.

UNIT I PERVASIVE COMPUTING 9

Basics and vision – Architecture and Applications requirements – Smart devices and operating systems, secure services – Smart mobiles, cards and device networks.

UNIT II MOBILE APPLICATIONS 9

History – Mobile Ecosystem – Designing for context – Mobile strategy – Mobile applications – Information Architecture – Design – Mobile Web apps vs Native Apps – Adapting to devices – Supporting devices – Application development on Android and iPhone.

UNIT III MEDIUM ACCESS AND TELECOMMUNICATIONS 9

Frequencies – Signals – Antennas – Signal propagation – Media Access Control: Motivation, SDMA, FDMA, TDMA, CDMA – GSM: Mobile services, System architecture, Protocols, Localization and calling, Handover – GPRS.

UNIT IV WIRELESS NETWORKS 9

Infrared vs radio transmission – Infrastructure and ad hoc networks – WLAN, IEEE 802.11 standards protocols. Piconet- Bluetooth-architecture and services.Wireless Broadband networks and satellites networks.

UNIT V MOBILE NETWORK AND TRANSPORT LAYERS 9

Mobile IP – DHCP – Routing in Mobile ad hoc networks – TCP improvements – TCP over 2.5/3G.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Learners are able to:

- Know the basics of mobile computing with its security and standards
- Explicate the emerging mobile technologies
- Describe the concept of WLAN and mobile network
- Identify the fundamentals of pervasive computing
- Elucidate the applications and operating systems of pervasive computing

TEXT BOOKS:

1. Stefan Poslad, “Ubiquitous Computing: Smart Devices, Environments and Interactions”, Wiley, 2009.
2. Brian Fling, “Mobile Design and Development”, O’Reily, 2009.
3. Jochen Schiller, “Mobile Communications”, 2nd ed., Pearson Education, 2003.

REFERENCES:

1. ZigurdMednieks, Laird Dornin, G,BlakeMeike and Masumi Nakamura “Programming Android”, O’Reilly, 2011.
2. Reto Meier, “Professional Android 2 Application Development”, Wrox Wiley, 2010.
3. Alasdair Allan, “iPhone Programming”, O’Reilly, 2010.
4. Wei-Meng Lee, “Beginning iPhone SDK Progrmming with Objective-C”, Wrox Wiley, 2010.
5. Asoke K Talukder, Hasan Ahmed, Roop R Yavagal, “Mobile Computing”, 2nd ed, Tata McGraw Hill, 2010.
6. Pei Zheng, Lionel M. Ni, “Smart Phone & Next Generation Mobile Computing”, Morgan Kaufmann, 2006.
7. Frank Adelstein, Sandeep KS Gupta, Golden Richard, “Fundamentals of Mobile and Pervasive Computing”, Tata McGraw-Hill, 2005.
8. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
9. JochenBurkhardt et al, Pervasive Computing: Technology and Architecture of Mobile Internet Applications, Pearson Education, 2002.