

SRI VENKATESWARA COLLEGE OF ENGINEERING
(An Autonomous Institution, Affiliated to Anna University, Chennai)
SRIPERUMBUDUR TK. - 602 117
REGULATION – 2016
B.TECH. INFORMATION TECHNOLOGY
CURRICULUM AND SYLLABUS

SEMESTER I

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	HS16151	Technical English – I	3	1	0	4
2	MA16151	Mathematics – I	3	1	0	4
3	PH16151	Engineering Physics – I	3	0	0	3
4	CY16151	Engineering Chemistry – I	3	0	0	3
5	GE16151	Computer Programming	3	0	0	3
6	GE16152	Engineering Graphics	2	0	3	4
PRACTICALS						
7	GE16161	Computer Practices Laboratory	0	0	3	2
8	GE16162	Engineering Practices Laboratory	0	0	3	2
9	GE16163	Physics and Chemistry Laboratory - I	0	0	2	1
TOTAL			17	2	11	26

SEMESTER II

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	HS16251	Technical English – II	3	1	0	4
2	MA16251	Mathematics – II	3	1	0	4
3	PH16251	Engineering Physics – II	3	0	0	3
4	CY16251	Engineering Chemistry – II	3	0	0	3
5	CS16201	Digital Principles and System Design	3	0	0	3
6	CS16202	Programming and Data Structures I	3	0	0	3
PRACTICALS						
7	GE16262	Physics and Chemistry Laboratory - II	0	0	2	1
8	CS16211	Digital Laboratory	0	0	3	2
9	CS16212	Programming and Data Structures Laboratory –I	0	0	3	2
TOTAL			18	2	8	25

SEMESTER III

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	MA16351	Mathematics - III (Common to all branches)	3	1	0	4
2	CS16301	Programming and Data Structures II (Common to CS &IT)	3	0	0	3
3	CS16302	Operating Systems (Common to CS, EE, EC & IT)	3	0	0	3
4	IT16301	Computer Organization and Architecture	3	0	0	3
5	EC16351	Analog and Digital Communication (Common to CS & IT)	3	0	0	3
6	GE16451	Environmental Science and Engineering (Common to all branches)	3	0	0	3
PRACTICALS						
7	CS16311	Programming and Data Structures Laboratory II (Common to CS& IT)	0	0	3	2
8	CS16312	Operating Systems Laboratory (Common to CS & IT)	0	0	3	2
9	EC16361	Analog and Digital Communication Laboratory	0	0	3	2
TOTAL			18	1	9	25

SEMESTER IV

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	MA16453	Probability and Queuing Theory (Common to CS & IT)	3	1	0	4
2	EC16504	Microprocessors and Microcontrollers (Common to EC,CS & IT)	3	0	0	3
3	IT16401	Paradigms of Algorithm Design	3	0	0	3
4	CS16402	Database Management Systems (Common to CS & IT)	3	0	0	3
5	IT16402	Software Engineering Methodologies	3	0	0	3
6	IT16403	IT Essentials	3	0	0	3
PRACTICALS						
7	EC16512	Microprocessors and Microcontrollers Laboratory (Common to EC, CS & IT)	0	0	3	2
8	CS16412	Database Management Systems Laboratory (Common to CS & IT)	0	0	3	2
9	IT16411	Mini Project	0	0	3	2
TOTAL			18	1	9	25

SEMESTER V

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS16401	Computer Networks (Common to CS, EE, EC & IT)	3	0	0	3
2	IT16501	Graphics and Multimedia	3	0	0	3
3	CS16502	Object Oriented Analysis and Design (Common to CS & IT)	3	0	0	3
4	EC16651	Digital Signal Processing (Common to CS & IT)	3	1	0	4
5	IT16502	Web Programming	3	0	0	3
6	IT16503	Computational Intelligence	3	1	0	4
PRACTICALS						
7	CS16411	Networks Laboratory (Common to CS & IT)	0	0	3	2
8	IT16511	Web Programming Laboratory	0	0	3	2
9	IT16512	Case Tools Laboratory	0	0	3	2
TOTAL			18	2	9	26

SEMESTER VI

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	IT16601	Information and Coding Theory	3	0	0	3
2	IT16602	Mobile Computing (Common to CS & IT)	3	0	0	3
3	IT16603	Software Testing And Quality Assurance (Common to CS & IT)	3	0	0	3
4	IT16604	Automata and Compiler Design	3	1	0	4
5	IT16605	Service Oriented Architecture	3	0	0	3
6		Elective - I	3	0	0	3
PRACTICALS						
7	IT16611	Mobile Application Development Laboratory (Common to CS & IT)	0	0	3	2
8	IT16612	Automata and Compiler Laboratory	0	0	3	2
9	GE16661	Interview and Career Skills Laboratory (Common to all branches)	0	0	4	2
TOTAL			18	1	10	25

SEMESTER VII

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	IT16701	Internet of Things (Common to CS, EE, EC& IT)	3	0	0	3
2	IT16702	Information Security	3	0	0	3
3	IT16703	Big Data Analytics	3	0	0	3
4	IT16704	Cloud Computing	3	0	0	3
5		Elective - II	3	0	0	3
PRACTICALS						
6	IT16711	IoT Laboratory	0	0	3	2
7	IT16712	Information Security Laboratory	0	0	3	2
8	IT16713	Cloud Computing and Big Data Laboratory	0	0	3	2
9	IT16714	Project Work Phase I	0	0	3	2
TOTAL			15	0	12	23

SEMESTER VIII

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1		Elective III	3	0	0	3
2		Elective IV	3	0	0	3
3		Elective V	3	0	0	3
PRACTICALS						
4	IT16811	Project Work Phase II	0	0	12	6
TOTAL			9	0	12	15

ELECTIVE I

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	IT16001	Free and Open Source Software	3	0	0	3
2	IT16002	Data Science using Python	3	0	0	3
3	IT16003	Functional Programming using SCALA	3	0	0	3
4	IT16004	Statistical Analysis using R- Programming	3	0	0	3
5	IT16005	Digital Image Processing (Common to CS, EE, EC & IT)	3	0	0	3
6	CS16016	User Interface Technologies (Common to CS & IT)	3	0	0	3

ELECTIVE II

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	IT16006	Multimedia Compression Techniques	3	0	0	3
2	EC16703	Embedded and Real Time Systems (Common to EC & IT)	3	0	0	3
3	EC16017	Ad hoc and Sensor Networks (Common to CS, EC & IT)	3	0	0	3
4	IT16007	Cognitive Radio Networks	3	0	0	3
5	EC16801	Wireless Networks (Common to CS, EC & IT)	3	0	0	3

ELECTIVE III

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS16009	Bio Informatics (Common to CS & IT)	3	0	0	3
2	CS16003	Business Intelligence (Common to CS & IT)	3	0	0	3
3	IT16008	Deep Learning	3	0	0	3
4	IT16009	Grid Computing	3	0	0	3
5	IT16010	Computer Vision	3	0	0	3
6	IT16011	Next Generation Cloud	3	0	0	3

ELECTIVE IV

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	IT16012	Security Principles and Techniques	3	0	0	3
2	IT16013	Cyber Forensics	3	0	0	3
3	IT16014	Information System Security Engineering and Management	3	0	0	3
4	IT16015	Ethical Hacking (Common to CS & IT)	3	0	0	3
5	IT16016	Digital Forensic Tools and Techniques (Common to CS & IT)	3	0	0	3

ELECTIVE V

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	GE16701	Total Quality Management (Common to all branches except CE & BT)	3	0	0	3
2	GE16001	Professional Ethics (Common to all branches except CE & BT)	3	0	0	3
3	CS16704	Resource Management Techniques (Common to CS & IT)	3	0	0	3
4	MG16851	Principles of Management (Common to AE, CS, EE, EC, IT and ME)	3	0	0	3
5	IT16017	Software Project Management (Common to EC & IT)	3	0	0	3

OBJECTIVES:

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.
- To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading and writing leading to effective and efficient communication.

UNIT I**9 + 3**

Listening – Introducing learners to GIE – Types of listening – Listening to audio (verbal & sounds); Speaking – Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family / friend; Reading – Skimming a reading passage – Scanning for specific information – Note-making; Writing – Free writing on any given topic (My favourite place / Hobbies / School life, etc.) – Sentence completion – Autobiographical writing (writing about one’s leisure time activities, hometown, etc.); Grammar – Prepositions – Reference words – Wh-questions – Tenses (Simple); Vocabulary – Word formation – Word expansion (root words / etymology); E-materials – Interactive exercises for Grammar & Vocabulary – Reading comprehension exercises – Listening to audio files and answering questions.

UNIT II**9 + 3**

Listening – Listening and responding to video lectures / talks; Speaking – Describing a simple process (filling a form, etc.) – Asking and answering questions – Telephone skills – Telephone etiquette; Reading – Critical reading - Finding key information in a given text - Sifting facts from opinions; Writing – Biographical writing (place, people) – Process descriptions (general/specific) – Definitions – Recommendations – Instructions; Grammar – Use of imperatives - Subject-verb agreement; Vocabulary – Compound words – Word Association (connotation); E-materials – Interactive exercises for Grammar and Vocabulary – Listening exercises with sample telephone conversations / lectures – Picture-based activities.

UNIT III**9 + 3**

Listening – Listening to specific task - focused audio tracks; Speaking – Role-play – Simulation – Group interaction – Speaking in formal situations (teachers, officials, foreigners); Reading – Reading and interpreting visual material; Writing – Jumbled sentences – Coherence and cohesion in writing – Channel conversion (flowchart into process) – Types of paragraph (cause and effect / compare and contrast / narrative / analytical) - Informal writing (letter/e-mail/blogs) - Paraphrasing; Grammar -Tenses (Past) - Use of sequence words - Adjectives; Vocabulary – Different forms and uses of words, Cause and effect words; E-materials – Interactive exercises for Grammar and Vocabulary – Excerpts from films related to the theme and follow up exercises – Pictures of flow charts and tables for interpretations.

UNIT IV**9 + 3**

Listening – Watching videos / documentaries and responding to questions based on them; Speaking – Responding to questions – Different forms of interviews – Speaking at different types of interviews; Reading – Making inference from the reading passage – Predicting the content of a reading passage; Writing – Interpreting visual materials (line graphs, pie charts etc.) – Essay

writing – Different types of essays; Grammar – Adverbs – Tenses – future time reference; Vocabulary – Single word substitutes – Use of abbreviations and acronyms; E-materials – Interactive exercises for Grammar and Vocabulary – Sample interviews – film scenes -dialogue writing.

UNIT V

9 + 3

Listening – Listening to different accents, Listening to Speeches/Presentations, Listening to broadcast and telecast from Radio and TV; Speaking – Giving impromptu talks, Making presentations on given topics; Reading – Email communication – Reading the attachment files having a poem/joke/proverb – Sending their responses through email; Writing – Creative writing, Poster making; Grammar – Direct and indirect speech; Vocabulary – Lexical items (fixed / semi fixed expressions); E-materials – Interactive exercises for Grammar and Vocabulary – Sending emails with attachment – Audio / video excerpts of different accents – Interpreting posters.

TOTAL (L:45 + T:15) : 60 PERIODS

OUTCOMES:

Learners should be able to

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.
Listen/view and comprehend different spoken discourses/excerpts in different accents.

REFERENCES:

1. Department of English, Anna University. Mindscapes: English for Technologists and Engineers. Orient Blackswan, Chennai. 2012
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011
3. Goodale, Malcolm, Professional Presentations Video Pack: A Video Based Course Cambridge University Press; Pap/Vhs edition 1998)
4. Downes, Colm, Cambridge English for Job-hunting, Cambridge University Press, New Delhi. 2008
5. Murphy, Raymond, Intermediate English Grammar with Answers, Cambridge University Press, 2000.
6. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi. 2006
7. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005.
8. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi. 2001.
9. Thomson, A.J. Practical English Grammar 1&2 Oxford 1986.

EXTENSIVE Reading (Not for Examination)

Kalam, Abdul. Wings of Fire. Universities Press, Hyderabad. 1999.

WEBSITES:

1. <http://www.usingenglish.com>
2. <http://www.uefap.com>

TEACHING METHODS:

- Lectures
- Activities conducted individually, in pairs and in groups like self introduction, peer introduction, group poster making, grammar and vocabulary games, etc.
- Discussions
- Role play activities
- Short presentations
- Listening and viewing activities with follow up activities like discussion, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc.

EVALUATION PATTERN:

3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like

- Project
- Assignment
- Reviews
- Creative writing
- Poster making, etc.

All the four skills are to be tested with equal weightage given to each.

- ✓ Speaking assessment: Individual speaking activities, Pair work activities like role play, Interview, Group discussions
- ✓ Reading assessment: Reading passages with comprehension questions graded from simple to complex, from direct to inferential
- ✓ Writing assessment: Writing paragraphs, essays etc. Writing should include grammar and vocabulary.
- ✓ Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content.

OBJECTIVES:

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/she will be familiar with the limitations of using infinite series approximations for solutions arising in mathematical modelling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concept of improper integrals of Gamma, Beta and error functions which are needed in engineering applications
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I MATRICES**9+3**

Eigen values and Eigen vectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigen vectors – Statement and Applications of Cayley-Hamilton Theorem – Diagonalization of matrices– Reduction of a quadratic form to canonical form by orthogonal transformation-Nature of quadratic forms.

UNIT II SEQUENCE AND SERIES**9+3**

Sequences: Definition and examples - Series: Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D’Alembert’s ratio test – Alternating series – Leibnitz’ test – Series of positive and negative terms – Absolute and conditional convergence.

UNIT III APPLICATION OF DIFFERENTIAL CALCULUS**9+3**

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolute as envelope of normals.

UNIT IV DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES**9+3**

Limits and Continuity - Partial derivatives – Total derivatives – Differentiation of implicit functions – Jacobians and properties– Taylor’s series for functions of two variables – Maxima and Minima of functions of two variables – Lagrange’s method of undetermined multipliers.

UNIT V MULTIPLE INTEGRALS**9+3**

Double integrals in Cartesian and polar coordinates – Change of order of integration – Area enclosed by plane curves - Change of variables in double integrals – Area of a curved surface - Triple integrals – Volume of solids.

TOTAL: (L: 45+T:15): 60 PERIODS**OUTCOMES:**

- This course equips the students to have basic knowledge and understanding of fundamental calculus and application of matrices relevant to Engineering problems.

TEXT BOOKS:

1. Erwin Kreyszig, Advanced engineering mathematics, 8th Edition, John Wiley, 1999.
2. Bali N. P and Manish Goyal, “A Text book of Engineering Mathematics”, Eighth Edition, Laxmi Publications Pvt Ltd., (2011).
3. Grewal. B.S, “Higher Engineering Mathematics”, 41st Edition, Khanna Publications, Delhi, (2011).

REFERENCES:

1. Dass, H.K., and Er.Rajnish Verma, “Higher Engineering Mathematics”, S.Chand Private Ltd.,(2011).
2. Glyn James, “Advanced Modern Engineering Mathematics”, 3rd Edition, Pearson Education, (2012).
3. Peter V.O’Neil, “Advanced Engineering Mathematics”, 7th Edition, Cengage learning, (2012).
4. Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company New Delhi, (2008).
5. Sivarama Krishna Das P. and Rukmangadachari E., “Engineering Mathematics”, Volume I, Second Edition, Pearson Publishing, 2011.

OBJECTIVES:

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I CRYSTAL PHYSICS**9**

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures (qualitative treatment)- Crystal growth techniques –solution, melt (Bridgman and Czochralski) and vapour growth techniques(qualitative)

UNIT II PROPERTIES OF MATTER AND THERMAL PHYSICS**9**

Elasticity- Hooke's law - Relationship between three moduli of elasticity (qualitative) – stress - strain diagram – Poisson's ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever –Young's modulus by uniform bending- I-shaped girders Modes of heat transfer- thermal conductivity- Newton's law of cooling - Linear heat flow – Lee's disc method – Radial heat flow – Rubber tube method – conduction through compound media (series and parallel)

UNIT III QUANTUM PHYSICS**9**

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton Effect. Theory and experimental verification – Properties of Matter waves – G.P Thomson experiment -Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box - Electron microscope - Scanning electron microscope - Transmission electron microscope.

UNIT IV ACOUSTICS AND ULTRASONICS**9**

Classification of Sound- decibel- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies. Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications – Sonogram.

UNIT V PHOTONICS AND FIBRE OPTICS**9**

Spontaneous and stimulated emission- Population inversion -Einstein's A and B coefficients - derivation. Types of lasers – Nd: YAG, CO₂, Semiconductor lasers (homojunction & heterojunction)- Industrial and Medical Applications. Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – attenuation, dispersion, bending - Fibre Optical Communication system (Block diagram) - Active and passive fibre sensors- Endoscope.

TOTAL: 45 PERIODS

OUTCOMES:

- Working knowledge of fundamental physics and basic engineering principles to include advanced knowledge in one or more engineering disciplines
- The ability to formulate, conduct, analyzes, and interprets experiments in engineering physics
- To understand and to compute problems in Quantum Physics
- Use modern engineering physics techniques and tools
- To enhance knowledge about photonics and optical fiber communication system

TEXT BOOKS:

1. Gaur R.K. and Gupta S.L. Engineering Physics. Dhanpat Rai publishers, 2009
2. Arumugam M. Engineering Physics. Anuradha publishers, 2010.

REFERENCES:

1. Searls and Zemansky. University Physics, 2009.
2. Gasiorowicz, Stephen, Quantum Physics, John Wiley & Sons, 2000.
3. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009.
4. Palanisamy P.K. Engineering Physics. SCITECH Publications, 2011.
5. Pandey B.K., Chaturvedi.S. Engineering Physics, Cengage Learning India Pvt.Ltd, 2012.

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 photophysical 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.
- To acquaint the students with the basics of nano materials, their properties and application

UNIT I POLYMER CHEMISTRY**9**

Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Types and mechanism of polymerization: Addition (Free Radical, cationic and anionic); condensation and copolymerization. Properties of polymers: T_g, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension. Preparation, properties and uses of Nylon 6,6, and Epoxy resin.

UNIT II CHEMICAL THERMODYNAMICS**9**

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

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY**9**

Photochemistry: Laws of photochemistry - Grothus-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: Electromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and rotational transitions. UV-visible and IR spectroscopy – principles, instrumentation (Block diagram only).

UNIT IV 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; Non-ferrous alloys – brass and bronze.

UNIT V NANOCHEMISTRY

9

Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. nanoparticles: nano cluster, nano rod, nanotube(CNT) and nanowire. Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition, laser ablation; Properties and applications.

TOTAL: 45 PERIODS

OUTCOMES:

The knowledge acquired on basics of polymer chemistry, second law of thermodynamics, photochemical reactions, basics of spectroscopy, phase diagrams and Nano-materials will enable the students to prepare and take up the further courses in the higher semesters as well as higher studies.

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., "Engineering Chemistry", 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 Delhi 2010.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2008.
3. Gowariker V.R. , Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science", New Age International P (Ltd.), Chennai, 2006.
4. Ozin G. A. and Arsenault A. C., "Nanotechnology: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.

OBJECTIVES:**The students should be made to:**

- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT I INTRODUCTION**8**

Generation and Classification of Computers- Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.

UNIT II C PROGRAMMING BASICS**10**

Problem formulation – Problem Solving - Introduction to ‘ C’ programming –fundamentals – structure of a ‘C’ program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in ‘C’ – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.

UNIT III ARRAYS AND STRINGS**9**

Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String-String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

UNIT IV FUNCTIONS AND POINTERS**9**

Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays- Example Problems.

UNIT V STRUCTURES AND UNIONS**9**

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

TOTAL: 45 PERIODS**OUTCOMES:****At the end of the course, the student should be able to:**

- Design C Programs for problems.
- Write and execute C programs for simple applications

TEXT BOOKS:

1. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2. Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition, Oxford University Press, 2009.
3. Yashavant P. Kanetkar. “Let Us C”, BPB Publications, 2011.

REFERENCES:

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

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.

CONCEPTS AND CONVENTIONS (Not for Examination)**1**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HAND SKETCHING**5+9**

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, Scales: Construction of Diagonal and Vernier scales.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES**5+9**

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

UNIT III PROJECTION OF SOLIDS**5+9**

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

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES**5+9**

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

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS**6+9**

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

COMPUTER AIDED DRAFTING (Demonstration Only)**3**

Introduction to drafting packages and demonstration of their use.

TOTAL: 75 PERIODS

OUTCOMES:

On Completion of the course the student will be able to

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Do orthographic projection of lines and plane surfaces.
- Draw projections and solids and development of surfaces.
- Prepare isometric and perspective sections of simple solids.
- Demonstrate computer aided drafting.

TEXT BOOKS:

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.

REFERENCES:

1. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
2. Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.
4. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.
5. Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers,Chennai, 2009.
6. BasantAgarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

Publication of Bureau of Indian Standards:

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

Special points applicable to University Examinations on Engineering Graphics:

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

The examination will be conducted in appropriate sessions on the same day

OBJECTIVES:**The student should be made to:**

- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Be familiar with programming in C.
- Learn to use Arrays, strings, functions, structures and unions.

LIST OF EXPERIMENTS:

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

TOTAL: 45 PERIODS**OUTCOMES:****At the end of the course, the student should be able to:**

- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Stand alone desktops with C compiler 30 Nos.

(or)

Server with C compiler supporting 30 terminals or more.

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)**I CIVIL ENGINEERING PRACTICE****9****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 household 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.

II MECHANICAL ENGINEERING PRACTICE**13****Welding:**

- Preparation of arc welding of butt joints, lap joints and tee joints.
- Gas welding practice

Basic Machining:

- Simple Turning and Taper turning
- Drilling Practice

Sheet Metal Work:

- Forming & Bending:
- Model making – Trays, funnels, etc.
- 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 cone pulley.
- Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE

10

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

IV ELECTRONICS ENGINEERING PRACTICE

13

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

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to fabricate carpentry components and pipe connections including plumbing works.
- Ability to use welding equipments to join the structures.
- Ability to fabricate electrical and electronics circuits.

REFERENCES:

1. Jeyachandran K., Natarajan S. & Balasubramanian S., “A Primer on Engineering Practices Laboratory”, Anuradha Publications, 2007.
2. Jeyapooan T., Saravanapandian M. &Pranitha S., “Engineering Practices Lab Manual”, VikasPuplishing House Pvt.Ltd, 2006.
3. Bawa H.S., “Workshop Practice”, Tata McGraw – Hill Publishing Company Limited, 2007.
4. Rajendra Prasad A. &Sarma P.M.M.S., “Workshop Practice”, SreeSai Publication, 2002.
5. Kannaiah P. &Narayana K.L., “Manual on Workshop Practice”, Scitech Publications, 1999.

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. 15 Sets
2. Carpentry vice (fitted to work bench) 15 Nos.
3. Standard woodworking tools 15 Sets
4. Models of industrial trusses, door joints, furniture joints 5 each
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 2 Nos.

MECHANICAL

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

ELECTRICAL

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

ELECTRONICS

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

PHYSICS LABORATORY – I**OBJECTIVES:**

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

LIST OF EXPERIMENTS:

1. a) Determination of Wavelength, and particle size using Laser.
b) Determination of acceptance angle in an optical fiber.
2. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
3. Determination of wavelength of mercury spectrum – spectrometer grating.
4. Determination of thermal conductivity of a bad conductor – Lee’s Disc method.
5. Determination of Young’s modulus by Non uniform bending method.
6. Determination of specific resistance of a given coil of wire – Carey Foster’s Bridge.

OUTCOMES:

The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Diode laser, lycopodium powder, glass plate, optical fiber.
2. Ultrasonic interferometer
3. Spectrometer, mercury lamp, grating
4. Lee’s Disc experimental set up
5. Traveling microscope, meter scale, knife edge, weights.
6. Carey foster’s bridge set up (vernier Caliper, Screw gauge, reading lens are required for most of the experiments)

CHEMISTRY LABORATORY - I**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 viscometry.

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 acids in a mixture using conductivity meter.
5. Estimation of iron content of the water sample using spectrophotometer (phenanthroline / thiocyanate method).
6. Determination of molecular weight of polyvinylalcohol using Ostwald viscometer
Conductometric titration of strong acid vs strong base.

TOTAL: 30 PERIODS

REFERENCES:

1. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New York 2001.
2. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogels Textbook of practical organic chemistry", LBS Singapore 1994.
3. Jeffery G.H., Bassett J., Mendham J. and Denny vogels R.C, "Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
4. Kolthoff I.M., Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980

OBJECTIVES:

- To make learners acquire listening and speaking skills in both formal and informal contexts.
- To help them develop their reading skills by familiarizing them with different types of reading strategies.
- To equip them with writing skills needed for academic as well as workplace contexts.
- To make them acquire language skills at their own pace by using e-materials and language lab components.

UNIT I**9+3**

Listening - Listening to informal conversations and participating; Speaking - Opening a conversation (greetings, comments on topics like weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading; Writing - Effective use of SMS for sending short notes and messages - Using 'emoticons' as symbols in email messages; Grammar - Regular and irregular verbs - Active and passive voice; Vocabulary - Homonyms (e.g. 'can') - Homophones (e.g. 'some', 'sum'); E-materials - Interactive exercise on Grammar and vocabulary – blogging; Language Lab - Listening to different types of conversation and answering questions.

UNIT II**9+3**

Listening - Listening to situation based dialogues; Speaking - Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); Reading - Reading a short story or an article from newspaper, Critical reading, Comprehension skills; Writing - Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his / her success, thanking one's friends / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials – Interactive exercises on Grammar and vocabulary, Extensive reading activity (reading stories / novels), Posting reviews in blogs – Language Lab - Dialogues (Fill up exercises), Recording students' dialogues.

UNIT III**9+3**

Listening - Listening to the conversation - Understanding the structure of conversations; Speaking - Conversation skills with a sense of stress, intonation, pronunciation and meaning – Seeking information – expressing feelings (affection, anger, regret, etc.); Reading - Speed reading – reading passages with time limit - Skimming; Writing - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading articles from journals - Format for journal articles – elements of technical articles (abstract, introduction, methodology, results, discussion, conclusion, appendices, references) - Writing strategies; Grammar - Conditional clauses – Cause and effect expressions; Vocabulary - Words used as nouns and verbs without any change in the spelling (e.g. 'rock', 'train', 'ring'); E-materials - Interactive exercise on Grammar and vocabulary - Speed Reading practice exercises; Language Lab - Intonation practice using EFLU and RIE materials – Attending a meeting and writing minutes.

UNIT IV**9+3**

Listening - Listening to a telephone conversation, Viewing model interviews (face-to-face, telephonic and video conferencing); Speaking - Role play practice in telephone skills - listening and responding, - asking questions, -note taking – passing on messages, Role play and mock interview for grasping interview skills; Reading - Reading the job advertisements and the profile of the company concerned – scanning; Writing - Applying for a job – cover letter - resume preparation – vision, mission and goals of the candidate; Grammar - Numerical expressions - Connectives (discourse markers); Vocabulary - Idioms and their meanings – using idioms in sentences; E-materials – Interactive exercises on Grammar and Vocabulary - Different forms of resumes- Filling up a resume / cover letter; Language Lab - Telephonic interview – recording the responses - e-resume writing.

UNIT V**9+3**

Listening - Viewing a model group discussion and reviewing the performance of each participant - Identifying the characteristics of a good listener; Speaking - Group discussion skills – initiating the discussion – exchanging suggestions and proposals – expressing dissent/agreement – assertiveness in expressing opinions – mind mapping technique; Reading - Note making skills – making notes from books, or any form of written materials - Intensive reading; Writing – Checklist - Types of reports – Feasibility / Project report – report format – recommendations / suggestions – interpretation of data (using charts for effective presentation); Grammar - Use of clauses; Vocabulary – Collocation; Ematerials- Interactive grammar and vocabulary exercises - Sample GD - Pictures for discussion, Interactive grammar and vocabulary exercises; Language Lab - Different models of group discussion.

TOTAL(L:45+T:15): 60 PERIODS**OUTCOMES:****Learners should be able to**

- Speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies.
- Write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- Read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation.
- Listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings.

REFERENCES:

1. Department of English, Anna University. Mindscapes: English for Technologists and Engineers. Orient Blackswan, Chennai. 2012.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011.
3. Goodale, Malcolm, Professional Presentations Video Pack: A Video Based Course Cambridge University Press; Pap/Vhs edition 1998).
4. Downes, Colm, Cambridge English for Job-hunting, Cambridge University Press, New Delhi. 2008.
5. Murphy, Raymond, Intermediate English Grammar with Answers, Cambridge University Press 2000.

6. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi. 2006
7. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005
8. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi. 2001
9. Thomson, A.J. Practical English Grammar 1&2 Oxford 1986.

WEBSITES:

1. <http://www.usingenglish.com>
2. <http://www.uefap.com3>.
3. <https://owl.english.purdue.edu/owl/>
4. www.learnenglishfeelgood.com/esl-printables-worksheets.html

TEACHING METHODS:

- Lectures
- Activities conducted individually, in pairs and in groups like individual writing and presentations, group discussions, interviews, reporting, etc
- Long presentations using visual aids
- Listening and viewing activities with follow up activities like discussions, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc
- Projects like group reports, mock interviews etc using a combination of two or more of the language skills

EVALUATION PATTERN:

3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like

- Project
- Assignment
- Report
- Creative writing, etc.

All the four skills are to be tested with equal weightage given to each.

- ✓ Speaking assessment: Individual presentations, Group discussions.
- ✓ Reading assessment: Reading passages with comprehension questions graded following Bloom's taxonomy.
- ✓ Writing assessment: Writing essays, CVs, reports etc. Writing should include grammar and vocabulary.
- ✓ Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content graded following Bloom's taxonomy.

OBJECTIVES:

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To acquaint the student with the concepts of vector calculus needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated

UNIT I VECTOR CALCULUS**9+3**

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS**9+3**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT III LAPLACE TRANSFORM**9+3**

Laplace transform – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions - Derivatives and integrals of transforms - Transforms of unit step function and impulse functions – Transform of periodic functions. Inverse Laplace transform -Statement of Convolution theorem – Initial and final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

UNIT IV ANALYTIC FUNCTION**9+3**

Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: $w = z+k$, kz , $1/z$, z^2 , ez and bilinear transformation.

UNIT V COMPLEX INTEGRATION**9+3**

Complex integration –Statement and applications of Cauchy's integral theorem and Cauchy's integral formula –Taylor's and Laurent's series expansions – Singular points– Residues – Cauchy's residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).

TOTAL(L:45+T:15):60 PERIODS**OUTCOMES:**

- The subject helps the student to develop the fundamental and basic concepts in vector calculus, ODE, Laplace Transforms and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

TEXT BOOKS:

1. Erwin Kreyszig, Advanced engineering mathematics, 8th Edition, John Wiley, 1999.
2. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth edition, Laxmi Publications Pvt Ltd., (2011).
3. Grewal. B.S, "Higher Engineering Mathematics", 41stEdition, Khanna Publications, Delhi, (2011).

REFERENCES:

1. Dass, H.K., and Er.Rajnish Verma, "Higher Engineering Mathematics", S.Chand Private Ltd.,(2011).
2. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, (2012).
3. Peter V.O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage learning, (2012).
4. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company New Delhi, (2008).
5. Sivarama Krishna Das P. and Rukmangadachari E., "Engineering Mathematics", Volume I, Second Edition, PEARSON Publishing, 2011.

OBJECTIVES:

- To enrich the understanding of various types of materials and their applications in engineering and technology.

UNIT I CONDUCTING MATERIALS**9**

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS**9**

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – compound semiconductors - direct and indirect band gap- derivation of carrier concentration in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration — Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS**9**

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites and its applications Superconductivity: properties – Type I and Type II superconductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS**9**

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Clausius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – Ferro electricity and applications.

UNIT V ADVANCED ENGINEERING MATERIALS**9**

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, Nanomaterials– Preparation -pulsed laser deposition – chemical vapour deposition – Applications – NLO materials –Birefringence- optical Kerr effect – Classification of Biomaterials and its applications.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Arumugam M., Materials Science. Anuradha publishers, 2010.
2. Pillai S.O., Solid State Physics. New Age International (P) Ltd., publishers, 2009.

REFERENCES:

1. Palanisamy P.K. Materials Science. SCITECH Publishers, 2011.
2. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009.
3. Pandey B.K., Chaturvedi.S. Engineering Physics, Cengage Learning India Pvt.Ltd, 2012.
4. Kittel, Charles, Introduction to Solid State Physics, JOHN WILEY ,India,2010.
5. Dekker, Adrianus J. Electrical Engineering Materials, Prentice-Hall Of India; 2002.

OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

UNIT I WATER TECHNOLOGY**9**

Introduction to boiler feed water-requirements-formation of deposits in steam boilers and heat exchangers- disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) prevention of scale formation -softening of hard water -external treatment zeolite and demineralization - internal treatment boiler compounds (phosphate, calgon, carbonate, colloidal) - caustic embrittlement -boiler corrosion-priming and foaming- desalination of brackish water –reverse osmosis.

UNIT II ELECTROCHEMISTRY AND CORROSION**9**

Electrochemical cell - redox reaction, electrode potential- origin of electrode potential- oxidation potential- reduction potential, measurement and applications - electrochemical series and its significance - Nernst equation (derivation and problems). Corrosion- causes- factors- types- chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method. Paints- constituents and function. Electroplating of Copper and electroless plating of nickel.

UNIT III ENERGY SOURCES**9**

Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusion- differences between nuclear fission and fusion- nuclear chain reactions nuclear reactor power generator- classification of nuclear reactor- light water reactor- breeder reactor- solar energy conversion- solar cells- wind energy. Batteries and fuel cells: Types of batteries- alkaline battery- lead storage battery nickel-cadmium battery- lithium battery- fuel cell H₂ -O₂ fuel cell- applications.

UNIT IV ENGINEERING MATERIALS**9**

Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth. Refractories: definition, characteristics, classification, properties – refractoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of alumina, magnesite and silicon carbide, Portland cement- manufacture and properties - setting and hardening of cement, special cement- waterproof and white cement–properties and uses. Glass - manufacture, types, properties and uses.

UNIT V FUELS AND COMBUSTION

9

Fuel: Introduction- classification of fuels- calorific value- higher and lower calorific values- coal-analysis of coal (proximate and ultimate)- carbonization manufacture of metallurgical coke (Otto Hoffmann method) – petroleum manufacture of synthetic petrol (Bergius process)- knocking-octane number - diesel oil- cetane number - natural gas- compressed natural gas(CNG)- liquefied petroleum gases(LPG)- producer gas- water gas. Power alcohol and bio diesel. Combustion of fuels: introduction- theoretical calculation of calorific value- calculation of stoichiometry of fuel and air ratio- ignition temperature, explosive range - flue gas analysis (ORSAT Method).

TOTAL: 45 PERIODS

OUTCOMES:

- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

1. Vairam S, Kalyani P and Suba Ramesh.,“Engineering Chemistry”., Wiley India PvtLtd.,New Delhi., 2011.
2. DaraS.S,UmareS.S.“Engineering Chemistry”, S. Chand & Company Ltd., New Delhi , 2010.

REFERENCES:

1. Kannan P. and Ravikrishnan A., “Engineering Chemistry”, Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2009.
2. AshimaSrivastava and Janhavi N N., “Concepts of Engineering Chemistry”, ACME Learning Private Limited., New Delhi., 2010.
3. RenuBapna and Renu Gupta., “Engineering Chemistry”, Macmillan India 27 Publisher Ltd., 2010.
4. Pahari A and Chauhan B., “Engineering Chemistry”., Firewall Media., New Delhi., 2010.

OBJECTIVES:**The student should be made to:**

- Learn the various number systems.
- Learn Boolean Algebra
- Understand the various logic gates.
- Be familiar with various combinational circuits.
- Be familiar with designing synchronous and asynchronous sequential circuits.
- Be exposed to designing using PLD

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES**9**

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

UNIT II COMBINATIONAL LOGIC**9**

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

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC**9**

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

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC**9**

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

UNIT V MEMORY AND PROGRAMMABLE LOGIC**9**

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

TOTAL: 45 PERIODS**OUTCOMES:****At the end of this course, the student will be able to:**

- Perform arithmetic operations in any number system.
- Simplify the Boolean expression using K-Map and Tabulation techniques.
- Use boolean simplification techniques to design a combinational hardware circuit.
- Design and Analysis of a given digital circuit – combinational and sequential.
- Design using PLD.

TEXT BOOKS:

1. Morris Mano M. and Michael D. Ciletti, “Digital Design”, IV Edition, Pearson Education, 2008.

REFERENCES:

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

OBJECTIVES:**The student should be made to:**

- Be familiar with the basics of C programming language.
- Be exposed to the concepts of ADTs
- Learn linear data structures – list, stack, and queue.
- Be exposed to sorting, searching, hashing algorithms

UNIT I C PROGRAMMING FUNDAMENTALS- A REVIEW 9

Conditional statements – Control statements – Functions – Arrays – Preprocessor - Pointers - Variation in pointer declarations – Function Pointers – Function with Variable number of arguments

UNIT II C PROGRAMMING ADVANCED FEATURES 9

Structures and Unions - File handling concepts – File read – write – binary and Stdio - File Manipulations.

UNIT III LINEAR DATA STRUCTURES – LIST 9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operation (Insertion, Deletion, Merge, Traversal).

UNIT IV LINEAR DATA STRUCTURES – STACKS, QUEUES 9

Stack ADT – Evaluating arithmetic expressions- other applications- Queue ADT – circular queue implementation – Double ended Queues – applications of queues.

UNIT V SORTING, SEARCHING AND HASH TECHNIQUES 9

Sorting algorithms: Insertion sort - Selection sort - Shell sort - Bubble sort - Quick sort - Merge sort - Radix sort – Searching: Linear search –Binary Search Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL: 45 PERIODS

OUTCOMES:**At the end of the course, the student should be able to:**

- Use the control structures of C appropriately for problems.
- Implement abstract data types for linear data structures.
- Apply the different linear data structures to problem solutions.
- Critically analyse the various algorithms.

TEXT BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, Pearson Education, 1988.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 1997.

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, McGraw Hill, 2002.
2. Reema Thareja, "Data Structures Using C", Oxford University Press, 2011.
3. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 1983.
4. Stephen G. Kochan, "Programming in C", 3rd edition, Pearson Ed.,

PHYSICS LABORATORY – II**OBJECTIVES:**

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

LIST OF EXPERIMENTS (Any FIVE Experiments):

1. Determination of Young's modulus by uniform bending method.
2. Determination of band gap of a semiconductor.
3. Determination of Coefficient of viscosity of a liquid –Poiseuille's method.
4. Determination of Dispersive power of a prism – Spectrometer.
5. Determination of thickness of a thin wire – Air wedge method.
6. Determination of Rigidity modulus – Torsion pendulum.

OUTCOMES:

The students will have the ability to test materials by using their knowledge of applied physics principles in optics and properties of matter.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Traveling microscope, meter scale, Knife edge, weights.
2. Band gap experimental set up
3. Burette, Capillary tube, rubber tube, stop clock, beaker and weighing balance.
4. Spectrometer, prism, sodium vapour lamp.
5. Air-wedge experimental set up.
6. Torsion pendulum set up. (Vernier Caliper, Screw gauge, reading lens are required for most of the experiments).

CHEMISTRY LABORATORY - II**OBJECTIVES:**

- To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

LIST OF EXPERIMENTS:

1. Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Estimation of copper content of the given solution by EDTA method.
4. Estimation of iron content of the given solution using potentiometer.
5. Estimation of sodium present in water using flame photometer.
6. Corrosion experiment – weight loss method.
7. Conductometric precipitation titration using BaCl_2 and Na_2SO_4 .
8. Determination of CaO in Cement.

TOTAL: 30 PERIODS

REFERENCES:

1. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New York, 2001.
2. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel's Textbook of practical organic chemistry, LBS Singapore ,1994.
3. Jeffery G.H, Bassett J., Mendham J. and Denny R.C., "Vogel's Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
4. Kolthoff I.M. and Sandell E.B. et al. Quantitative chemical analysis, McMillan, Madras 1980.

Laboratory classes on alternate weeks for Physics and Chemistry.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Potentiometer	-	5 Nos
2. Flame photo meter	-	5 Nos
3. Weighing Balance	-	5 Nos
4. Conductivity meter	-	5 Nos

Common Apparatus: Pipette, Burette, conical flask, porcelain tile, dropper (30 Nos each)

OBJECTIVES:**The student should be made to:**

- Understand the various logic gates.
- Be familiar with various combinational circuits.
- Understand the various components used in the design of digital computers.
- Be exposed to sequential circuits
- Learn to use HDL

LIST OF EXPERIMENTS:

1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters.
3. Design and implementation of combinational circuits using MSI devices:
 - 4 – bit binary adder / subtractor
 - Parity generator / checker
 - Magnitude Comparator
 - Application using multiplexers
4. Design and implementation of sequential circuits:
 - Shift –registers
 - Synchronous and asynchronous counters
5. Coding combinational / sequential circuits using HDL.
6. Design and implementation of a simple digital system (Mini Project).

TOTAL: 45 PERIODS**OUTCOMES:****At the end of this course, the student will be able to:**

- Use boolean simplification techniques to design a combinational hardware circuit.
- Design and Implement combinational and sequential circuits.
- Analyze a given digital circuit – combinational and sequential.
- Design the different functional units in a digital computer system.
- Design and Implement a simple digital system.

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS**HARDWARE:**

1. Digital trainer kits 30
2. Digital ICs required for the experiments in sufficient numbers 96

SOFTWARE:

1. HDL simulator.

OBJECTIVES:

The students should be made to:

- Be familiar with c programming
- Be exposed to implementing abstract data types
- Learn to use files
- Learn to implement sorting and searching algorithms.

LIST OF EXPERIMENTS:

1. C Programs using Conditional and Control Statements
2. C Programs using Arrays, Strings and Pointers and Functions
3. Representation of records using Structures in C – Creation of Linked List – Manipulation of records in a Linked List
4. File Handling in C – Sequential access – Random Access
5. Operations on a Stack and Queue – infix to postfix – simple expression evaluation using stacks - Linked Stack Implementation – Linked Queue Implementation
6. Implementation of Sorting algorithms
7. Implementation of Linear search and Binary Search.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Design and implement C programs for implementing stacks, queues, linked lists.
- Apply good programming design methods for program development.
- Apply the different data structures for implementing solutions to practical problems.
- Develop searching and sorting programs.

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS:

Standalone desktops with C compiler 30 Nos.

or

Server with C compiler supporting 30 terminals or more.

OBJECTIVES:

- To introduce Fourier series analysis that finds tremendous applications in engineering and also to analyze boundary value problems.
- To acquaint the student with Fourier transform techniques used to tackle problems in communication and heat transfer.
- To introduce the effective mathematical tools for the solutions of partial differential equations for linear and non-linear systems.
- To develop Z transform techniques for discrete time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations – Singular integrals -- Solutions of standard types of first order partial differential equations - Lagrange's linear equation – Linear homogeneous partial differential equations of second and higher order with constant coefficients.

UNIT II FOURIER SERIES 12

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

Classification of PDE – Method of separation of variables - Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction (excluding insulated edges).

UNIT IV FOURIER TRANSFORMS 12

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity. Finite Fourier transforms, finite Fourier sine and cosine transforms.

UNIT V Z -TRANSFORMS AND DIFFERENCE EQUATIONS 12

Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction, long division method and residues) – Convolution theorem - Formation of difference equations – Solution of difference equations using Z-transform.

TOTAL (L: 45 + T: 15): 60 PERIODS

OUTCOMES:

- The understanding of the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India, 2011.
2. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
3. Narayanan.S., Manicavachagom Pillay. T.K and Ramanaiah. G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt. Ltd.1998.

REFERENCES:

1. Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2007.
2. Glyn James, "Advanced Modern Engineering Mathematics", 4th Edition, Pearson Education, 2011.
3. Veerarajan. T., "Transforms and Partial Differential Equation", Tata McGraw Hill Publishing Company Limited, New Delhi, 2012.
4. Ray Wylie. C and Barrett.L.C, "Advanced Engineering Mathematics" Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.
5. Peter V.O' Neil, "Advanced Engineering Mathematics", Cengage Learning India pvt. Ltd. 7th Edition, New Delhi, 2012.

CS16301

PROGRAMMING AND DATA STRUCTURES II

L T P C

(Common to CS & IT)

3 0 0 3

OBJECTIVES:

- Be familiar with the C++ concepts of abstraction, encapsulation, constructor, polymorphism, overloading and Inheritance.
- Be familiar to tree and heap data structures.
- Be exposed to graph algorithms.
- Learn to apply Tree and Graph structures.

UNIT I OBJECT ORIENTED PROGRAMMING FUNDAMENTALS 9

C++ Programming features - Data Abstraction - Encapsulation - Class -Object - Constructors – Static members – Constant members – Member functions – Pointers – References - Role of this pointer – Storage classes – Function as arguments - String Handling.

UNIT II OBJECT ORIENTED PROGRAMMING CONCEPTS 9

Dynamic memory allocation - Nested classes - Polymorphism – Compile time and Run time polymorphisms – Function overloading – Operator overloading - Inheritance – Virtual Functions - Abstract class.

UNIT III C++ PROGRAMMING ADVANCED FEATURES 9

Generic Programming - Function template - Class template - Exception handling - Standard template libraries – containers – iterators – function adaptors – allocators - File handling concepts.

UNIT IV TREE AND ITS APPLICATIONS 9

Trees – Binary Tree – Binary Search Tree - AVL trees – B-Trees – Splay trees – Heaps - Binomial Heaps– File indexing using B+ tree – Threaded binary tree – Huffman coding - Disjoint Sets.

UNIT V GRAPH AND ITS APPLICATIONS 9

Representation of Graphs – Breadth-first search – Depth-first search -Topological sort – Minimum Spanning Trees – Kruskal and Prim algorithm – Shortest path algorithm – Dijkstra’s algorithm – Bellman-Ford algorithm – Floyd - Warshall algorithm - Euler circuit - Travelling salesman problem - Biconnectivity – Network flow problem.

TOTAL: 45 PERIODS

OUTCOMES:

- Design problem solutions using Object Oriented Techniques.
- Apply the concepts of data abstraction, encapsulation and inheritance for problem solutions.
- Use the control structures of C++ appropriately.
- Critically analyse the various algorithms.
- Apply the different data structures to problem solutions.

TEXT BOOKS:

1. Bjarne Stroustrup, “The C++ Programming Language”, 4th Edition, Addison-Wesley Professional, 2013.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, 4th Edition, Pearson Education, 2014

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, Mc Graw Hill, 2002.
2. Michael T Goodrich, Roberto Tamassia, David Mount, “Data Structures and Algorithms in C++”, 7 th Edition, Wiley Publishers, 2004.

OBJECTIVES:**The student should be made to:**

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

UNIT I OPERATING SYSTEMS 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 PROCESS MANAGEMENT 9

Processes-Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication; Threads- Overview, Multicore Programming, Multithreading Models; Windows 7 - Thread and SMP Management. CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation. Case study: Process scheduling in Linux

UNIT III PROCESS SCHEDULING AND SYNCHRONIZATION 9

Process Synchronization: The critical-section problem – Synchronization hardware – 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 IV STORAGE MANAGEMENT 9

Main Memory-Contiguous Memory Allocation, Segmentation, Paging, 32 and 64 bit architecture Examples; Virtual Memory- Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT V I/O SYSTEMS 9

Mass Storage Structure- Overview, Disk Scheduling and Management; File System Storage-File Concepts, Directory and Disk Structure, Sharing and Protection; File System Implementation- File System Structure, Directory Structure, Allocation Methods, Free Space Management, I/O Systems.

TOTAL (L:45): 45 PERIODS

OUTCOMES:**At the end of the course, the student should be able to:**

- Design various Scheduling algorithms.
- Apply the principles of concurrency.
- Design deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Design and Implement a prototype file system.

- Perform administrative tasks on Linux Servers.

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2012.
2. William Stallings, “Operating Systems – Internals and Design Principles”, 7th Edition, Prentice Hall, 2011.

REFERENCES:

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Addison Wesley, 2001.
2. Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw Hill Education”, 1996.

IT16301	COMPUTER ORGANISATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To make students understand the basic structure and operation of digital computer
- To understand the hardware-software interface
- To familiarize the student with arithmetic and logic unit and implementation of fixed point and floating point arithmetic operations.
- To expose the students to the concept of pipelining
- To familiarize the students with hierarchical memory system including cache memory and virtual memory
- To expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I BASIC COMPUTER ORGANIZATION AND DESIGN 9

Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, Complete computer description, Design of Basic computer, design of Accumulator Unit. Register Transfer Language, Register transfer, Bus and Memory transfer, Arithmetic Micro-operations, Logic Micro-operations, Shift Microoperations, Arithmetic Logic Shift.

UNIT II ALU AND CU 9

ALU - Addition and subtraction – Multiplication – Division – Floating Point operations –Subword parallelism. CPU- General Register Organization, Stack Organization, Instruction format, Addressing Modes, data transfer and manipulation, Program Control, Reduced Instruction Set Computer (RISC).

UNIT III ALU AND CU 9

Basic MIPS implementation – Building datapath – Control Implementation scheme – Pipelining – Pipelined datapath and control – Handling Data hazards & Control hazards – Exceptions, The ARM Cortex-A8 and Intel Core i7 Pipelines.

UNIT IV 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.

UNIT V MULTICORES, MULTIPROCESSORS, AND CLUSTERS 9

Shared Memory Multiprocessors, Clusters and Other Message-Passing Multiprocessors Hardware Multithreading, SISD, MIMD, SIMD, SPMD, and Vector, Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers, and Other Message-Passing Multiprocessors.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Design arithmetic and logic unit.
- Design and analyse pipelined control units
- 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.

REFERENCES:

1. V. Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organisation", VI edition, McGraw-Hill Inc, 2012.
2. William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2006.
3. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
4. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2005.
5. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.
6. <http://nptel.ac.in/>.

EC16351

ANALOG AND DIGITAL COMMUNICATION
(Common to CS & IT)

L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand analog and digital communication techniques.
- Learn data and pulse communication techniques.
- Be familiarized with source and Error control coding.
- Gain knowledge on multi-user radio communication.

UNIT I ANALOG COMMUNICATION

9

Noise: Source of Noise - External Noise- Internal Noise-. Introduction to Communication Systems: Modulation – Types - Need for Modulation. Theory of Amplitude Modulation - Evolution and Description of SSB Techniques - Theory of Frequency and Phase Modulation – Comparison of various Analog Communication System (AM – FM – PM).

UNIT II DIGITAL COMMUNICATION

9

Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK) Minimum Shift Keying (MSK) – Phase Shift Keying (PSK) – BPSK – QPSK – 8 PSK – 16 PSK - Quadrature Amplitude Modulation (QAM) – 8QAM – 16 QAM – Bandwidth Efficiency– Comparison of various Digital Communication System (ASK– FSK – PSK – QAM).

UNIT III DATA AND PULSE COMMUNICATION

9

Data Communication: History of Data Communication - Standards Organizations for Data Communication- Data Communication Circuits - Data Communication Codes - Error Detection and Correction Techniques - Data communication Hardware - serial and parallel interfaces.

Pulse Communication: Pulse Amplitude Modulation (PAM) – Pulse Time Modulation (PTM) – Pulse code Modulation (PCM) - Comparison of various Pulse Communication System (PAM – PTM – PCM).

UNIT IV SOURCE AND ERROR CONTROL CODING

9

Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, channel coding theorem, Error Control Coding, linear block codes, cyclic codes, convolution codes, viterbi decoding algorithm.

UNIT V MULTI-USER RADIO COMMUNICATION

9

Advanced Mobile Phone System (AMPS) - Global System for Mobile Communications (GSM) – Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse - Channel Assignment and Handover - Overview of Multiple Access Schemes - Satellite Communication – Bluetooth.

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Apply analog and digital communication techniques.
- Use data and pulse communication techniques.
- Analyze Source and Error control coding.
- Utilize multi-user radio communication.

TEXT BOOKS:

1. Wayne Tomasi, “Advanced Electronic Communication Systems”, 6th Edition, Pearson Education,2009.

REFERENCES:

1. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2004
2. Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2007
3. H.Taub, D L Schilling and G Saha, "Principles of Communication", 3rd Edition, Pearson Education, 2007.
4. B. P.Lathi, "Modern Analog and Digital Communication Systems", 3rd Edition, Oxford University Press, 2007.
5. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.
6. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, Prentice Hall of India, 2002.
7. B.Sklar, "Digital Communication Fundamentals and Applications" 2nd Edition Pearson Education 2007.

OBJECTIVES:

- To study about the natural Eco systems and the facts about Environment.
- To find and implement the 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 human beings; envision the surrounding environment, its functions and its value.
- To study about the Biodiversity, Natural resources
- To study the impacts of social issues on Environment

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, Types of Biodiversity: 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 10

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, NO_x, 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 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – **Water resources:** Use and 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

7

From unsustainable to sustainable development – urban problems related to energy – Water conservation, Rain Water Harvesting, Watershed Management – Resettlement and Rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization
Environmental Ethics: Issues and possible solutions – 12 Principles of Green chemistry- Nuclear accidents and Holocaust, case studies. – Wasteland reclamation – Consumerism and waste products – Environment Protection 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 (Ecomark). 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

6

Population growth, variation among nations – population explosion – Family welfare programme – Environment and Human health – Human Rights – Value education – HIV / AIDS – Women and Child welfare –Environmental Impact Analysis (EIA) – GIS - remote sensing - Role of Information Technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

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 environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in standard of living of Human beings.

TEXT BOOKS:

1. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd edition, Pearson Education, 2004.
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

REFERENCES:

1. Trivedi.R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, 3rd edition, BPB publications, 2010.
2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., 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.

LABORATORY II
(Common to CS & IT)**OBJECTIVES:**

- Be familiarized with good programming design methods, particularly Top- Down design.
- Getting exposure in implementing the different data structures using C++.
- Appreciate recursive algorithms.

LIST OF EXPERIMENTS:**Implementation in the following topics:**

1. Constructors and Destructor.
2. Friend Function and Friend Class.
3. Polymorphism and Function Overloading.
4. Overload Unary and Binary Operators Both as Member Function and Non Member Function.
5. Inheritance.
6. Virtual Functions.
7. Class Templates and Function Templates.
8. Exception Handling Mechanism.
9. Standard Template Library concept.
10. File Stream classes.
11. Binary Search Tree with Tree traversal Techniques – Preoder, Postorder and Inorder.
12. AVL trees
13. Heaps
14. Breadth-first search and Depth-first search
15. Minimum Spanning Trees – Kruskal and Prim algorithm

Shortest Path Algorithms - Dijkstra's algorithm, Floyd - Warshall algorithm.

TOTAL: 45 PERIODS

OUTCOMES:**At the end of the course, the student should be able to:**

- Design and implement C++ programs for manipulating stacks, queues, linked lists, trees, and graphs.
- Apply good programming design methods for program development.
- Apply the different data structures for implementing solutions to practical problems.
- Develop recursive programs using trees and graphs.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C++ compiler 30 Nos.

(or)

Server with C++ compiler supporting 30 terminals or more.

TEXT BOOKS:

1. Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education, 2007.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 2nd Edition, Pearson Education, 2005

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, Mc Graw Hill, 2002.
2. Michael T Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7 th Edition, Wiley Publishers, 2004.

OBJECTIVES:**The student should be made to:**

- Learn shell programming and the use of filters in the UNIX environment.
- Be exposed to programming in C using system calls.
- Learn to use the file system related system calls.
- Be exposed to process creation and inter process communication.
- Be familiar with implementation of CPU Scheduling Algorithms, page replacement algorithms and Deadlock avoidance

LIST OF EXPERIMENTS:

1. Basics of UNIX commands.
2. Shell Programming.
3. Implement the following CPU scheduling algorithms
 - a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies
 - a) Sequential b) Indexed c) Linked
5. Implement Semaphores
6. Implement all File Organization Techniques
 - a) Single level directory b) Two level c) Hierarchical d) DAG
7. Implement Bankers Algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement e all page replacement algorithms
 - a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique of memory management.
12. Implement Threading & Synchronization Applications

Development of a reasonably sized dynamically loadable kernel module for Linux kernel

TOTAL: 45 PERIODS

OUTCOMES:**At the end of the course, the student should be able to**

- Implement deadlock avoidance, and Detection Algorithms
- Compare the performance of various CPU Scheduling Algorithm
- Critically analyze the performance of the various page replacement algorithms
- Create processes and implement IPC
- Demonstrate individual competence in building medium size operating system components

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C / C++ / Java / Equivalent compiler 30 Nos. (or)

Server with C / C++ / Java / Equivalent compiler supporting 30 terminals

OBJECTIVES:**The student should be made to:**

- Explore digital communications with a software radio to understand how each component works together.
- Know details about analog to digital conversion, modulation, pulse shaping, and noise analysis.

LIST OF EXPERIMENTS:

1. Signal Sampling and reconstruction
2. Pulse Position Modulation and Demodulation / Pulse Width Modulation and Demodulation
3. Amplitude modulation and demodulation
4. Frequency modulation and demodulation
5. Pulse code modulation and demodulation.
6. Delta & Adaptive Delta Modulation and Demodulation
7. Line Coding Schemes
8. BFSK modulation and Demodulation (Hardware (Kit based) & Simulation using MATLAB / SCILAB / Equivalent)
9. BPSK modulation and Demodulation (Hardware & Simulation using MATLAB/SCILAB/ Equivalent)
10. M-ary FSK, M-ary PSK and DPSK schemes (Simulation)
11. Error control coding schemes (Simulation)
12. Spread spectrum communication (Simulation)
13. Communication link simulation
14. TDM and FDM

TOTAL: 45 PERIODS**OUTCOMES:**

- To develop necessary skill in designing, analyzing and constructing digital electronic circuits.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

- i) Kits for Signal Sampling, TDM, AM, FM, PCM, DM and Line Coding Schemes.
- ii) Software Defined Radio platform for link simulation studies
- iii) MATLAB / SCILAB for simulation experiments.
- iv) PCs - 10 Nos.
- v) Signal generator / Function generators / Power Supply / CRO / Bread Board each -15 nos.
- vi) IC 555, Resistors, Capacitors, BC107.

MA16453

PROBABILITY AND QUEUING THEORY
(Common to CS & IT)

L T P C
3 1 0 4

OBJECTIVES:

- To provide the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of science and engineering

UNIT I RANDOM VARIABLES

12+ 3

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions.

UNIT II TWO - DIMENSIONAL RANDOM VARIABLES

8 + 3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables.

UNIT III RANDOM PROCESSES

9 + 3

Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions.

UNIT IV QUEUEING MODELS

8 + 3

Markovian queues – Birth and Death processes – Single and multiple server queueing models – Little's formula - Queues with finite waiting rooms - Finite source models

UNIT V ADVANCED QUEUEING MODELS

8 + 3

M/G/1 queue – Pollaczek Khinchin formula - M/D/1 and M/EK/1 as special cases – Series queues – Open Jackson networks.

TOTAL: 60 PERIODS

OUTCOMES:

- The students will have a fundamental knowledge of the probability concepts.
- Acquire skills in analyzing queueing models.
- It also helps to understand and characterize phenomenon which evolve with respect to time in a probabilistic manner.

TEXT BOOKS:

1. Ibe. O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007
2. Gross. D. and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student edition, 2004.

REFERENCES:

1. Robertazzi, "Computer Networks and Systems: Queueing Theory and performance evaluation", Springer, 3rd Edition, 2006.
2. Taha H.A., "Operations Research", Pearson Education, Asia, 8th Edition, 2007.
3. Veerarajan. T, "Probability, statistics and random processes", McGraw Hill Publishers, 3rd edition, 2011.
4. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2004.
5. Yates R.D. and Goodman. D. J., "Probability and Stochastic Processes", Wiley India Pvt. Ltd., Bangalore, 2nd Edition, 2012.

EC16504	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	C
	(Common to CS, EC & IT)	3	0	0	3

OBJECTIVES:

- Study the Architecture of 8086 microprocessor.
- Learn the design aspects of I/O and Memory Interfacing circuits.
- Study about communication and bus interfacing
- Study the Architecture of 8051 microcontroller.

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 – IO programming – Introduction to Multiprogramming – System Bus Structure - Multiprocessor configurations – Introduction of Architecture, of Pentium Processor

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.

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 V INTERFACING MICROCONTROLLER 9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor.

TOTAL (L:45): 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Design and implement programs on 8086 microprocessor.
- Design I/O circuits.
- Design Memory Interfacing 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.
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, “The 8051 Microcontroller and Embedded Systems: Using Assembly and C”, Second Edition, Pearson Education, 2011

REFERENCES:

1. Douglas V.Hall, “Microprocessors and Interfacing, Programming and Hardware:;TMH, 2012

OBJECTIVES:

- To provide foundation on designing algorithms, complexity analysis of algorithms, and computational complexity.
- To learn the basics of Parallel algorithm and genetic algorithm.

UNIT I FUNDAMENTALS**9**

Algorithms - The Importance of Developing Efficient Algorithms - Analysis of Algorithms Order - Computational Complexity-sorting , searching, hashing, selection problem.

UNIT II ALGORITHM STRATEGY**9**

Divide-and-Conquer - Sorting -Searching- Strassen's Matrix Multiplication Algorithm Arithmetic with Large Integers. Dynamic Programming - Binomial co-efficient - Floyd's Algorithm for Shortest Paths - Chained Matrix Multiplication - Dynamic Programming and Optimization Problems- Optimal Binary Search Trees - The Traveling Salesperson Problem.

UNIT III DESIGN TECHNIQUES**9**

Greedy Approach - Minimum Spanning Trees-scheduling - The Greedy Approach versus Dynamic Programming: The Knapsack Problem – Backtracking - Using a Monte Carlo Algorithm - The Sum-of-Subsets Problem - Graph Coloring - The Hamiltonian Circuits Problem - Branch-and-Bound - Best-First Search.

UNIT IV NP-COMPLETENESS**9**

NP-completeness – Polynomial Time - Polynomial Time Verification - Reducibility - NP-completeness proofs - Approximation Algorithms - Vertex-Cover problem – Travelling-Salesman problem.

UNIT V PARALLEL ALGORITHMS AND GENETIC ALGORITHM**9**

Parallel Architectures - The PRAM Model - Designing Algorithms for the CREW PRAM Model - Designing Algorithms for the CRCW PRAM Model - Genetic Algorithm - Travelling salesperson, Genetic Programming - Artificial ant and Financial trading application.

TOTAL: 45 PERIODS**OUTCOMES:****On Completion of the course, the students should be able to:**

- Analyze algorithms to determine the computational complexity
- Solve problems using different algorithm strategies

TEXT BOOKS:

1. Foundations of Algorithms, Richard E Neapolitan, 5th Edition, Jones & Bartlett Learning, 2014.
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein, “Introduction to Algorithms”, PHI Learning Private Limited, 2012.

REFERENCES:

1. S.Sridhar, "Design and Analysis of Algorithms", Oxford University Press, First Edition, 2015.
2. Steven S Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2010.
3. Robert Sedgewick and Kevin Wayne, —Algorithms, Fourth Edition, Pearson Education, 2011.

CS16402

DATABASE MANAGEMENT SYSTEMS

L T P C

(Common to CS & IT)

3 0 0 3

OBJECTIVES:

- To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- To learn about the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.
- 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 – Relational Calculus - SQL fundamentals - Advanced SQL features - Triggers- Embedded SQL– Dynamic SQL - Database connectivity.

UNIT II DATABASE DESIGN

9

Entity-Relationship Model – E-R Diagrams - Functional Dependencies – Non-loss Decomposition – Functional Dependencies – 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 TRANSACTION MANAGEMENT

9

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit -- Save Points – Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Recovery Isolation Levels.

UNIT IV IMPLEMENTATION TECHNIQUES

9

Overview of Physical Storage Media – 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 – Catalog Information for Cost Estimation - Query Optimization.

UNIT V ADVANCED TOPICS

9

Introduction to Distributed databases - Cloud Databases - Data warehouse and Mining - Mobile Databases - XML Databases - Multimedia Databases.

TOTAL: 45 PERIODS

OUTCOMES:

- To design database using E-R modeling and apply normalization techniques over it.
- To manage the transactions that happens in a database.
- To analyze the recent advancements in databases.
- To design and implement database for real world applications

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Conceptsl, Sixth Edition, Tata McGraw Hill, 2010.
2. C.J.Date, A.Kannan, S.Swamynathan, —An Introduction to Database Systemsl, Eighth Edition, Pearson Education, 2006 Book 2.

REFERENCES:

1. Ramez Elmasri, Shamkant B. Navathe, —Fundamentals of Database Systemsl, Sixth Edition, Pearson Education, 2010.
2. Raghu Ramakrishnan, Johannes Gehrke —Database Management Systemsl, Fourth Edition, Tata Mc Graw Hill, 2010.
3. G.K.Gupta, —Database Management Systemsl, Tata McGraw Hill, 2011.
4. Carlos Coronel, Steven Morris, Peter Rob, —Database Systems: Design, Implementation and Managementl, Ninth Edition, Cengage Learning, 2011.

OBJECTIVES:**The student should be made to**

- Understand the roles of software process
- Understand how an iterative, incremental development process leads to faster delivery of more useful software
- Understand the essence of agile development methods

UNIT I SOFTWARE PROCESS AND SOFTWARE REQUIREMENT ANALYSIS 9

Generic process model, Process Assessment and Improvement, Prescriptive Process models, Specialized Process models, Personal and Team Process models. Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

UNIT II SOFTWARE DESIGN 9

System Modeling -Context models-Interaction models-Structural models-Behavioral models-Model driven engineering, Architectural Design - Architectural design decisions-Architectural views-Architectural patterns-Application architecture- User Interface Design: Interface analysis, Interface Design. Software Testing.

UNIT III AGILE SOFTWARE DEVELOPMENT 9

Agile methods - Agile development techniques - Agile project management - Scaling agile methods.

UNIT IV AGILE PRODUCT MANAGEMENT WITH SCRUM 9

Understanding product owner role - Envisioning the product - Working with product backlog - Planning the release.

UNIT V ADVANCED SOFTWARE ENGINEERING 9

Software Reuse - Component based Software Engineering - Distributed Software Engineering - Service - oriented Software Engineering - Systems Engineering - Systems of Systems

TOTAL: 45 PERIODS**OUTCOMES:****At the end of the course, the student should be able to**

- guide a real-world software development project to successful completion.
- manage software Projects responding to change and involving customer in the development process.
- analyse different software engineering methodologies.

TEXT BOOKS:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Seventh Edition, Mc Graw-Hill International Edition, 2010.
2. Ian Sommerville, "Software Engineering", 10th Edition, Pearson Education Asia, 2016.
3. Roman Pichler, "Agile Product Management with Scrum Creating Products that Customers Love", Pearson Education, 2012

REFERENCES:

1. Ken Schwaber , "Agile Project Management with Scrum" , Microsoft Press, 2014"
2. Tilak Mitra , " Practical Software Architecture: Moving from System Context to Deployment" , IBM press, 2016
3. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.

OBJECTIVES:

- To know the difference between data and information
- To introduce the concept of Internet, Networks and its working principles.
- To know scripting languages.
- To understand various applications related to Information Technology.

UNIT I INTRODUCTION**9**

Data and Information, Acquisition of Data – Text – Image – Audio - Video, Internet Application, E-commerce, Business Information Systems, Social Impact of Information Technology.

UNIT II WEB ESSENTIALS**9**

Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server.

UNIT III SCRIPTING ESSENTIALS**9**

Need for Scripting languages - Types of scripting languages - Client side scripting - Server side scripting - PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and MySQL - PHP and HTML - Cookies - Simple PHP scripts.

UNIT IV NETWORKING ESSENTIALS**9**

Fundamental computer network concepts - Types of computer networks - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching - Network components.

UNIT V MOBILE COMMUNICATION ESSENTIALS**9**

Cell phone working fundamentals - Cell phone frequencies & channels - Digital cell phone components - Generations of cellular networks - Cell phone network technologies / architecture - Voice calls & SMS.

TOTAL: 45 PERIODS**OUTCOMES:****On Completion of the course, the students should be able to:**

- Design and deploy web-sites, simple web-applications
- Create simple database applications
- Describe the basics of networking and mobile communications

TEXT BOOKS:

1. V. Rajaraman, "Introduction to Information Technology", PHI Learning , Second Edition, 2013
2. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'REILLY, 2014.
3. James F. Kurose, —Computer Networking: A Top-Down Approach, Sixth Edition, Pearson, 2012.

REFERENCES:

1. Gottapu Sasibhushana Rao, "Mobile Cellular Communication", Pearson, 2012.
2. R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.
3. it-ebooks.org

EC16512

MICROPROCESSORS AND MICROCONTROLLERS

L T P C

LABORATORY

(Common to EC, CS & IT)

0 0 3 2

OBJECTIVES:

The student should be made to:

- Introduce ALP concepts and features
- Write ALP for arithmetic and logical operations in 8086 and 8051
- Differentiate Serial and Parallel Interface
- Interface different I/Os with Microprocessors
- Be familiar with MASM

LIST OF EXPERIMENTS:

8086 Programs using kits and MASM

1. Basic arithmetic and Logical operations
2. Move a data block without overlap
3. Code conversion, decimal arithmetic and Matrix operations.
4. Floating point operations, string manipulations, sorting and searching
5. Password checking, Print RAM size and system date
6. Counters and Time Delay

Peripherals and Interfacing Experiments

7. Traffic light control
8. Stepper motor control
9. Digital clock
10. Key board and Display
11. Printer status
12. Serial interface and Parallel interface
13. A/D and D/A interface and Waveform Generation

8051 Experiments using kits and MASM

14. Basic arithmetic and Logical operations
15. Square and Cube program, Find 2's complement of a number
16. Unpacked BCD to ASCII
17. Mini project using modern microcontrollers.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Write ALP Programmes for fixed and Floating Point and Arithmetic
- Interface different I/Os with processor
- Generate waveforms using Microprocessors
- Execute Programs in 8051
- Explain the difference between simulator and Emulator

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE:

- 8086 development kits - 30 nos
- Interfacing Units - Each 10 nos
- Microcontroller - 30 nos

SOFTWARE:

- Intel Desktop Systems with MASM - 30 nos
- 8086 Assembler
- 8051 Cross Assembler

IT16411

MINI PROJECT

L T P C

0 0 3 2

OBJECTIVES:

- The student should be able to design and develop a working model using the concepts studied in Operating System, Software Engineering Methodologies and Database Management System courses.

Sample Mini Projects:

Creating own operating system

Creating Virtual Machines

Migration in Virtual Machines

Applications using Parallel Processing

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Design and implement a model for a given problem-domain
- Prepare reports.

CS16401	COMPUTER NETWORKS	L T P C
	(Common to CS, EE, EC & IT)	3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand the concepts of network architecture and transmission medium.
- Perform and understand methods for error detection and correction of data.
- Be exposed to various addressing schemes and routing protocols.
- Learn the flow control and congestion control algorithms.
- Be familiar with real time applications of networks.

UNIT I FUNDAMENTALS & SIGNAL TRANSMISSION 9

Fundamentals : Building a network – Requirements – Layering and protocols – OSI Model – Internet Architecture – Performance – Network Topology ; Physical Layer: Data and Signals – Digital Transmission – Analog Transmission – Multiplexing and Spread Spectrum - Transmission Media

UNIT II MEDIA ACCESS & LOGICAL LINK CONTROL 9

Framing – Error Detection and Correction – Media access control – Ethernet (802.3) – Wireless LANs – 802.11 – Bluetooth – Switching and bridging – Flow control.

UNIT III ROUTING & ADDRESSING SCHEMES 9

Basic Internetworking (IP, CIDR, ARP, DHCP, ICMP) – Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, Ipv6), Multicast – addresses – multicast routing (DVMRP, PIM)

UNIT IV END TO END COMMUNICATION 9

Overview of Transport layer – UDP – Reliable byte stream (TCP) – Connection management – Flow control – Retransmission – Queueing Disciplines – TCP Congestion control – Congestion avoidance (DECbit, RED)

UNIT V APPLICATION LAYER PROTOCOLS 9

Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS - SNMP - Multimedia applications

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Choose the required functionality at each layer for given application
- Detect and Correct the error in the frame
- Apply the knowledge of addressing scheme and various routing protocols in data communication to select optimal path.
- Trace the flow of information from one node to another node in the network
- Develop real time applications of networks

TEXT BOOKS:

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.
2. Behrouz A. Forouzan, “Data Communications and Networking”, Fourth Edition, McGrawHill, 2011.

REFERENCES:

1. James F. Kurose, Keith W. Ross, “Computer Networking - A Top-Down Approach Featuring the Internet”, Fifth Edition, Pearson Education, 2009.
2. Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.
3. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, Mc Graw Hill Publisher, 2011.

IT16501	GRAPHICS AND MULTIMEDIA	L	T	P	C
		3	0	0	3

OBJECTIVES

- To explore the fundamental concepts in 2D and 3D computer graphic models.
- To understand 2D raster graphics techniques, 3D modeling, geometric transformations, 3D viewing and rendering.
- To learn about multimedia building blocks of text, images, sound, animation, and video.
- To develop an understanding of the process of developing multimedia.

UNIT I INTRODUCTION 9

Overview of graphics systems – Raster scan, Random scans, Output primitives –2D concepts- Points and Lines, Line drawing algorithms, Circle and Ellipse generating algorithms.

UNIT II TWO DIMENSIONAL TRANSFORMATION AND VIEWING 9

Two dimensional geometric transformations – Matrix representations and Homogeneous Coordinates, Composite transformations; Two dimensional viewing – Viewing pipeline, Viewing coordinate reference frame; Window-to-Viewport coordinate transformation, Clipping operations- Point, Line, Polygon, Curve and Text clipping.

UNIT III THREE DIMENSIONAL TRANSFORMATION AND VIEWING 9

Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations – Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects, Splines. Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations, Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping. Color Models – RGB, YIQ, CMY, HSV.

UNIT IV MULTIMEDIA BASICS 9

Introduction: Definition, application, elements, Text, Image, Audio, Video –types, representations, standards, file formats.

UNIT V MULTIMEDIA DEVELOPMENT 9

Software Life cycle, Addie Model, Conceptualization, Content collection and processing, flow line, script, storyboard, implementation, Authoring metaphors, Testing and feedback, final delivery, Case Study: study of CBT on sound in multimedia.

TOTAL : 45 PERIODS

OUTCOMES:

Students should be able to:

- Explain, discuss and solve simple problems in the basic representation, handling of multimedia data (images, audio and animation), and the basic components of a 3D-environment.

TEXT BOOKS:

1. Donald Hearn, M.Pauline Baker, “Computer Graphics”, PHI, 2014.
2. Ranjan Parekh, “Principles of Multimedia”, Second Edition, Mcgraw Hill, 2012.

REFERENCES:

1. F .S. Hill, “Computer Graphics using OPENGL”, Second edition, Pearson Education 2014.
2. John F. Hughes , Andries van Dam, Morgan McGuire , David F. Sklar, James D. Foley , Steven K. Feiner , Kurt Akeley , “Computer Graphics: Principles and Practice”, 3rd Edition, Addison Welsey Professional, 2013.
3. Prabhat K Andleigh, Kiran Thakrar, “Multimedia systems design”, First Edition, PHI, 2015.
4. Ze-Nian Li and Mark S.Drew, “Fundamentals of Multimedia”, First Edition, Pearson Education, 2007.

CS16502	OBJECT ORIENTED ANALYSIS AND DESIGN (COMMON TO CS & IT)	L	T	P	C
		3	0	0	3

OBJECTIVES:

The Student should be made to:

- Learn the basics of OO Analysis and Design skills.
- Learn the UML diagrams for Modeling.
- Learn Design Patterns.
- Learn Layered Architecture.
- Learn to map design to code.
- Learn OO testing techniques.

UNIT I INTRODUCTION & INCEPTION 9

Object-Oriented Analysis and Design - Iterative, Evolutionary, and Agile : Unified Process, Iterative and Evolutionary Development, Waterfall Lifecycle, How to do Iterative and Evolutionary Analysis and Design, Agile Methods and Attitudes, Agile Modeling, Agile UP, UP Phases, UP Disciplines - Case Studies : The NextGen POS System, The Monopoly Game System - Inception is Not the Requirements Phase - Evolutionary Requirements, - Use Cases – Relating Use Cases - Other Requirements

UNIT II ELABORATION - BASICS 9

Domain Models - System Sequence Diagrams - Operation Contracts - Logical Architecture and UML Package Diagrams - UML Interaction Diagrams - UML Class Diagrams - Designing for Visibility - Refactoring.

UNIT III ELABORATION - DESIGN PATTERNS 9

GRASP: Designing Objects with Responsibilities, Polymorphism, Pure Fabrication - Object Design Examples with GRASP : What is a Use Case Realization, Use Case Realizations for the NextGen Iteration - Applying GoF Design Patterns : Adapter, Factory, Singleton (GoF), Strategy (GoF), Composite (GoF), Facade (GoF), Observer/Publish-Subscribe/Delegation Event Model

UNIT IV ELABORATION – DYNAMIC MODELING 9

UML Activity Diagrams and Modeling - UML State Machine Diagrams and Modeling - Domain Model Refinement - Logical Architecture Refinement - Designing a Persistence Framework with Patterns - UML Deployment and Component Diagrams

UNIT V OBJECT ORIENTED TESTING 9

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

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

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

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. Paul C. Jorgensen, "Software Testing:- A Craftsman's Approach", Third Edition, Auerbach Publications, Taylor and Francis Group, 2008.

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, a n d 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.

EC16651

**DIGITAL SIGNAL PROCESSING
(COMMON TO CS & IT)**

L T P C
3 1 0 4

OBJECTIVES:

- To learn discrete Fourier transform and its properties.
- To know the characteristics of IIR and FIR filters learn the design of infinite and finite impulse response filters for filtering undesired signals.
- To understand Finite word length effects.
- To study the concept of Multirate and adaptive filters.

UNIT I SIGNALS AND SYSTEMS

9

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – concept of aliasing-Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution – Correlation.

UNIT II FREQUENCY TRANSFORMATIONS

9

Introduction to DFT – Properties of DFT – relationship among z transform, DTFT and DFT-Circular Convolution - Filtering methods based on DFT –FFT Algorithms - Decimation – in – time Algorithms, Decimation – in – frequency Algorithms – Use of FFT in Linear Filtering – DCT – Use and Application of DCT.

UNIT III IIR FILTER DESIGN

9

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation in analog domain.

UNIT IV FIR FILTER DESIGN

9

Structures of FIR – Transversal, linear phase and polyphase realization- Linear phase FIR filter – Fourier Series - Filter design using windowing techniques, (Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques

UNIT V FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS

9

Binary fixed point and floating point number representations – Comparison - Quantization noise -truncation and rounding – quantization noise power- input quantization error- coefficient quantization error – limit cycle oscillations-dead band-Overflow error- signal scaling-Scaling to prevent overflow.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Apply DFT for the analysis of digital signals & systems
- Design IIR and FIR filters
- Characterize finite Word length effect on filters

TEXT BOOKS:

1. John G. Proakis and Dimitris G.Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, Fourth Edition, Pearson Education, Prentice Hall, 2007.

REFERENCES:

1. Emmanuel C.Ifeachor, and Barrie.W.Jervis, “Digital Signal Processing”, Second Edition, Pearson Education, Prentice Hall, 2002.
2. Sanjit K. Mitra, “Digital Signal Processing – A Computer Based Approach”, Third Edition, Tata Mc Graw Hill, 2007.
3. A.V.Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.
4. Andreas Antoniou, “Digital Signal Processing”, Tata McGraw Hill, 2006.

IT16502	WEB PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To create simple web pages and to learn about client side validation.
- To create dynamic web pages using server side scripting.
- To understand MVC concept using Strut, Hibernate and Spring.

UNIT I INTRODUCTION TO WORLD WIDE WEB 9

Introduction to WWW and WWW architecture, internet protocols, overview of HTTP, Generation of dynamic web pages, Java Fundamentals - Data types- Class - Object – I/O Streams - File handling concepts

UNIT II FEATURES OF JAVA 8

Interfaces - Packages - Threads - Exception handling - Applets - Swing Framework – Reflection – JDBC

UNIT III PROGRAMMING FOR USER INTERFACE 9

JavaScript Fundamentals - Evolution of AJAX - AJAX Framework - Web applications with AJAX - AJAX with PHP - AJAX with Databases – Angular JS.

UNIT IV SERVER SIDE PROGRAMMING 9

Servlet Overview - Life cycle of a Servlet - Handling HTTP request and response – Using Cookies - Session tracking - JDBC - Java Beans - Advantages - Enterprise Java Beans - EJB Architecture- Type of Beans - EJB Transactions

UNIT V APPLICATION DEVELOPMENT ENVIRONMENT 10

Overview of MVC architecture - Java Server Faces: Features - Components - Tags - Struts: Working principle of Struts - Building model components - View components - Controller components - Forms with Struts - Presentation tags - Developing Web applications - Hibernate: Configuration Settings - Mapping persistent classes - Working with persistent objects - Concurrency - Transactions - Caching - Queries for retrieval of objects - Spring: Framework- Controllers - Developing simple applications.

TOTAL : 45 PERIODS

OUTCOMES

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

- Design and implement an interactive web site(s) with regard to issues of usability, accessibility and internationalization
- Explain the functions of clients and servers on the Web, and describe the strengths and weaknesses of the client-server internet approaches to web design and implementation
- Design and implement a client-server internet application that accommodates specific requirements and constraints, based on analysis, modeling or requirements specification

TEXT BOOKS:

1. Deitel, Deitel, Goldberg. "Internet & World Wide Web How To Program". Fifth edition, Pearson Education, 2012.
2. Cay S. Horstmann, “Core Java Volume I—Fundamentals”, 10th Edition, Prentice Hall, 2015.

REFERENCES:

1. Marty Hall and Larry Brown, "Core Servlets And Javasever Pages", Second Edition, Pearson education.
2. Bryan Basham, Kathy Siegra, Bert Bates. "Head First Servlets & JSP", Second Edition, O'reily .
3. Uttam K Roy, 'Web Technologies', Oxford University Press, 2011.

IT16503	COMPUTATIONAL INTELLIGENCE	L	T	P	C
		3	1	0	4

OBJECTIVES

- To learn search strategies and to understand the concepts of game playing
- To represent and infer knowledge using predicate logic
- To understand basic concepts of data mining
- To introduce the concepts of Expert Systems
- To learn evolutionary computation, neural networks, fuzzy systems

UNIT I PROBLEM SOLVING METHODS 9

Problems, Problem Spaces and Search - problem characteristics -production system characteristics-Heuristic Search Techniques – Generate and Test- Hill Climbing- Best First Search- Problem Reduction-Constraint Satisfaction Problems – Game Playing – Minimax procedure - Alpha-Beta Pruning.

UNIT II KNOWLEDGE REPRESENTATION 9

Knowledge representation-Using Predicate logic- Representing Simple Facts- Representing Instance – Computable Functions and Predicates -Resolution, Knowledge Inference – Backward chaining, Forward chaining.

UNIT III DATA MINING 9

Fundamentals – Data reduction – Classification - Decision tree Induction –Learning - Supervised Learning –Unsupervised Learning – Reinforcement Learning –Associations-Frequent Itemset Mining Methods, Clustering- Partitioning methods - Hierarchical methods-Data Mining Applications.

UNIT IV EXPERT SYSTEMS 9

Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics. , Expert systems shells- Typical expert systems - MYCIN, DART, XOON.

UNIT V ADVANCED TOPICS 9

Evolutionary Computation- Genetic Algorithms –Crossover- Mutation, Genetic programming ; Evolutionary Programming- Operators- Parameters- Implementations; Neural Networks – Multi layer Feed Forward Neural Network-Applications of Neural Networks- Fuzzy Systems-Fuzzy Sets – Fuzzy Logic and Reasoning – Creating a bot – Weather Monitoring bot.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Design and implement an expert system that operates in a realistic problem domain
- Represent concepts and logic computationally in several different ways and compare and contrast the capabilities and limitations these representations
- Design solutions for problems involving uncertain inputs or outcomes
- Apply heuristic search to optimization problems

TEXT BOOKS:

1. Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Third edition, McGraw Hill, 2008.

REFERENCES:

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.
2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Pearson Education, 2007.
3. Andries .P. Engelbrecht, "Computational Intelligence: An Introduction", Second Edition, John Wiley & Sons, 2012.
4. https://en.wikipedia.org/wiki/Wikipedia:Creating_a_bot.
5. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2014.

OBJECTIVES:**The student should be made to:**

- Learn socket programming.
- Be familiar with simulation tools.
- Have hands on experience on various networking protocols.

LIST OF EXPERIMENTS:

1. Study of Socket Programming and Client – Server model
2. Applications using TCP Sockets
 1. Date and Time server & client
 2. Echo server & client, etc
 3. Chat
3. Applications using UDP Sockets
 1. DNS
 2. DHCP
4. Simulation of Stop and Wait Protocol and Sliding Window Protocol.
5. Simulation of ARP /RARP protocols.
6. Simulation of PING and TRACEROUTE commands
7. Write a program to implement RPC (Remote Procedure Call)
8. Write a program to implement subnetting and find the subnet for a given ip.
9. Using Cisco Packet Tracer, do the following
 - a). Establish a Local Area Network (LAN) with 4 hosts and a switch/Hub
 - b). Connect two LANs using multi-router topology with static routes
10. Study of Network simulator (NS).and Simulation of Congestion Control Algorithms using NS
11. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
 - i. Link State routing protocol
 - ii. Distance vector routing protocol

Configuration of proxy server

TOTAL: 45 PERIODS

OUTCOMES:**At the end of the course, the student should be able to**

- Use simulation tools
- Implement the various protocols.

- Analyse the performance of the protocols in different layers.
- Analyze various routing algorithms

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:

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

HARDWARE:

Standalone desktops 30 Nos

REFERENCES:

1. UNIX® Network Programming Volume 1, Third Edition: The Sockets Networking API By W. Richard Stevens, Bill Fenner, Andrew M. Rudoff.

IT16511

WEB PROGRAMMING LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVES

- To create simple web sites.
- To create dynamic web pages using server side scripting and to perform client side validation
- To create modern java web applications using struts MVC framework.
- To build spring based applications
- To understand object/relational mapping (ORM) in Java applications using Hibernate.

List of Experiments

1. Creation of HTML Files
2. Working with Client Side Scripting
3. Creating Applications using java core features, applets, Swing framework, Method Invocation using reflection, Threads
4. Implementation of servlets
5. Creating application using JDBC and JSP
6. Developing application using java bean and EJB
7. Developing Web enabled application using struts framework
8. Implement simple hibernate applications
9. Implement RMI using Spring framework

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Create Simple Websites with dynamic web pages
- Create modern web applications

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:

Java, MySQL or Equivalent, Apache Server

HARDWARE:

Standalone desktops

30 Nos

OBJECTIVES

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

List of Experiments**To develop a web based application using the 12 concepts listed below.**

1. To develop a problem statement.
2. Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).
3. Identify Use Cases and develop the Use Case model.
4. Identify the business activities and develop an UML Activity diagram.
5. Identify the conceptual classes and develop a domain model with UML Class diagram.
6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
7. Draw the State Chart diagram.
8. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
9. Implement and test the technical services layer.
10. Implement and test the domain objects layer.
11. Implement and test the user Interface layer.
12. Draw Component and Deployment diagrams.

Suggested domains:

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. Conference Management System

TOTAL: 45 PERIODS**OUTCOMES:****At the end of the course, the student should be able to:**

- Draw UML design diagrams.
- Map design to code.
- implement various testing techniques

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**SUGGESTED SOFTWARETOOLS:**

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

OBJECTIVES

- Be familiar with the methods for generation of codes and their decoding techniques.
- Understand error-control coding.
- Be aware of compression and decompression techniques.
- Be familiar with coding for secure communication

UNIT I INFORMATION THEORY 9

Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding - Joint and conditional entropies, Mutual information -Discrete memory less channels – BSC, BEC – Channel capacity, Shannon limit.

UNIT II SOURCE CODING 9

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MPEG Audio Layers I,II,III, Dolby AC, Atmos - Speech: Channel Vocoder, Linear Predictive Coding, Image Compression.

UNIT III CHANNEL AND NOISY CODING 9

Discrete memory less channel - Classification of channels & channel capacity - Calculation of channel capacity - Decoding schemes - Fano's inequality -Shannon's fundamental theorem - Capacity of a band limited Gaussian channel. Implication of the information capacity theorem - Information capacity of colored noise channel - Rate distortion theory - Data compression.

UNIT IV ERROR CONTROL CODING 9

Linear Block codes – Syndrome Decoding – Minimum distance consideration – cyclic codes – Generator polynomial – Parity check polynomial – Encoder for cyclic codes – calculation of syndrome, Convolutional codes, turbo codes, viterbi algorithm.

UNIT V CODING FOR SECURE COMMUNICATION 9

Introduction to cryptography-Overview of Encryption Techniques – operations used – Symmetric Cryptography – DES - IDEA – RC Ciphers – Asymmetric Algorithms – RSA Algorithm – PGP- One-way Hashing - Elliptic Curve Cryptography-Diffie-Hellman Key Agreement Protocol-Chaos Functions – Quantum Cryptography – Biometric encryption-Cryptanalysis.

TOTAL : 45 PERIODS**OUTCOMES:****On completion of this course, the students should be able to:**

- Derive equations for entropy mutual information and channel capacity for all types of channels.
- Distinguish between different types error correcting codes based on probability of error and bit Energy to noise ratio.
- Design a digital communication system by selecting an appropriate error correcting codes for a particular application.
- Explain various methods of generating and detecting different types of error correcting codes
- Formulate the basic equations of linear block codes.
- Compare the performance of digital communication system by evaluating the probability of error for different error correcting codes

TEXT BOOKS:

1. Simon Haykin, "Communication Systems", Fourth Edition, John Wiley and Sons, 2001.
2. R Bose, "Information Theory, Coding and Cryptography", Fifth Edition, Tata Mcgraw Hill, 2009.

REFERENCES:

1. Fred Halsall, "Multimedia Communications, Applications Networks Protocols and Standards", Pearson Education, Asia 2002.
2. Khalid Sayood, "Introduction to Data Compression", Fifth Edition, Elsevier, 2017.

IT16602	MOBILE COMPUTING (Common to CS & IT)	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the fundamentals of mobile computing
- To infer knowledge about the various technologies used in mobile communication
- To learn about development environment used in Mobile devices

UNIT I INTRODUCTION 7

Mobility of bits and bytes, Beginning of wireless, Mobile computing, Dialogue control, Networks, Middleware and gateway, Application and services, Developing mobile computing application, Security in mobile computing, Standards, Mobile computing architecture, Mobile computing through telephony.

UNIT II WIRELESS TECHNOLOGIES 9

Bluetooth, RFID, WIMAX, Mobile IP, GSM,GPRS,CDMA, 3G,4G and 5G networks.

UNIT III WIRELESS LAN AND INTELLIGENT NETWORKS 12

Introduction-Advantages, IEEE 802.11 standards, Architecture, Mobility, Deploying wireless LAN, Mobile Ad hoc and Sensor network, Security, Wireless access in vehicular environment, Wireless local loop, Hyper LAN , Wi-Fi versus 3G,Wireless Application Protocol, Fundamentals of call Processing, Intelligence in networks,SS#7 signaling, IN conceptual model, soft switch, programmable networks, Technologies and interfaces for IN,SS7 security, MAPsec, Virtual Private Network.

UNIT IV COMPUTING IN MOBILE ENVIRONMENT 8

Client Programming, Programming for palm OS, Wireless device with Symbian OS,J2ME,Wireless device with Windows CE, Wireless device with Android OS.

UNIT V APPLICATIONS 9

Voice over Internet and Convergence, SMS, CODEC, Networked Multimedia Applications, Issues in Multimedia delivery over the internet, Multimedia Networking Protocols, Security issues in mobile computing, Next generation networks, **APP DEVELOPMENT** : Native, Hybrid, Android Application development - SDK, Features of SDK, Android Application Components, software stack structure.

TOTAL : 45 PERIODS

OUTCOMES:

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

- To develop a working understanding of the characteristics and limitations of mobile hardware devices including their user-interface modalities
- To develop applications that are mobile-device specific.

TEXT BOOKS:

1. Asoke Talukder, Hasan Ahmed and Roopa R yavagal “Mobile computing Technology, Application and service creation”, Second edition, McGraw Hill, 2010.
2. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson, 2004.

REFERENCES:

1. “Beginning for Android 4 Application Development “, Wei Meng Lee, Wiley –India Edition, 2012.
2. Zigurd Mednieks, Laird Dornin, G, Blake Meike and Masumi Nakamura, “Programming Android”, O’Reilly, 2011.

IT16603	SOFTWARE TESTING & QUALITY ASSURANCE	L	T	P	C
	(Common to CS & IT)	3	0	0	3

OBJECTIVES

- To understand mathematical foundations of software testing.
- To comprehend the phases of software testing
- To know the managerial aspects of software testing
- To understand software quality management process and quality management models
- To learn software quality metrics, assurance and various software standards

UNIT I INTRODUCTION TO SOFTWARE TESTING 9

Software testing lifecycle, software specifications, program correctness and verification, Failures, errors and faults, testing taxonomy.

UNIT II TEST DATA GENERATION 9

Test generation concepts, Functional and structural criteria, Test Oracle design, Test Driver design, Test outcome analysis.

UNIT III MANAGEMENT OF SOFTWARE TESTING 9

Metrics for software testing, tools – Scripting tools, record-and-replay tools, performance testing tools, oracle design tools, exception discovery, collaborative tools.

UNIT IV SOFTWARE QUALITY 9

Defining Software Quality, Software Quality factors, Components of software quality assurance system, pre project software quality components- Contract Review - Development and Quality Plans, integrating quality activities in project life cycle.

UNIT V STANDARDS, CERTIFICATION AND ASSESSMENT 9

Need for standards, SQA Standards – ISO9001 Certification , bootstrap methodology, SPICE project and process assessment, Organizing for Quality Assurance -Management and its Role in Quality Assurance - SQA Unit & other actors, introduction to Six Sigma.

TOTAL : 45 PERIODS

OUTCOMES:

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

- To analyze different approaches to software testing and quality assurance, and select optimal solutions for different situations and projects;
- evaluate the work of peers constructively by following proven methods of peer-review, and by using the principles of research ethics.

TEXT BOOKS:

1. Ali Mili, Fairouz Tchier , “Software Testing: Concepts and Operations”, John wiley & sons, 2015.
2. Daniel Galin, “Software Quality Assurance: From Theory to Implementation”, Pearson Addison-Wesley, Second Edition, 2012.

REFERENCES:

1. Jeff Tian, “Software Quality Engineering: Testing, Quality Assurance, and Quantifiable”, Wiley, 2006.
2. Srinivasan Desikan and Gopalswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, 2006.
3. Ron Patton, “Software Testing”, Second Edition, Sams Publishing, Pearson Education, 2007.

OBJECTIVES

- To learn the design principles and tools of the compiler.
- To learn the various analysis techniques
- To learn how to obtain specific object code from source language
- To learn how to optimize the code

UNIT I INTRODUCTION TO FINITE AUTOMATA 9

Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NFA – Finite Automaton with ϵ - moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NFA's with and without ϵ -moves – Equivalence of finite Automaton and regular expressions – Minimization of DFA.

UNIT II LEXICAL AND SYNTAX ANALYSIS 12

Lexical Analysis-Translators -The Phases of Compiler-Errors Encountered in Different Phases-compiler Construction Tools, Role of Lexical Analyzer-Specification and Recognition of Tokens-Thompson Construction –LEX.

Syntax Analysis-Role of the Parser- Top Down Parsing - Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-SLR Parser, YACC.

UNIT III SYNTAX DIRECTED TRANSLATION 9

Syntax Directed Definitions--Intermediate Code Generation-Representation and Implementation -Types And Declarations --Type Checking –Control Flow Statements-Back Patching –Procedures.

UNIT IV CODE OPTIMIZATION AND RUN TIME ENVIRONMENT 9

Code Optimization -Principal Sources of Optimization-DAG- Optimization of Basic Blocks-Global Data Flow Analysis.

Run-time Environment- Source Language Issues-Storage Organization-Storage Allocation-Parameter Passing-Symbol Tables-Dynamic Storage Allocation

UNIT V CODE GENERATION 6

Issues -Design of Code Generator -Addresses in the Target Code -Basic Blocks in Flow Graph -Simple Code Generator -Peephole Optimization -Machine Independent Optimization

TOTAL (L:45): 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Understand deterministic and non-deterministic machines.
- Formulate and Understand the analysis phase of the compiler
- Use the different compiler construction tools
- Apply the various optimization techniques.
- Design code generators for the specified machine.

Text Books:

1. John. E. Hopcroft, Rajiv Motwani and Jeffrey D Ullman, “Introduction to Automata Theory, Languages and Computation”, Third Edition, Pearson Education, 2014.
2. Alfred Aho, Ravi Sethi and Jeffrey D Ullman, “Compilers Principles, Techniques and Tools”, Second Edition, Pearson Education, 2013.

References:

1. Alexander Meduna, Petr Zemek,” Regulated Grammars and Automata”, Springer, 2014.
2. Torben Mogensen, “Basics of Compiler Design”, Springer, 2010.

IT16605	SERVICE ORIENTED ARCHITECTURE	L	T	P	C
		3	0	0	3

OBJECTIVES

- To learn XML fundamentals and to build applications based on XML.
- To know the basic principles of Service Oriented Architecture, its components and techniques.
- Be familiar with the web service standards and elements for realizing SOA.
- To acquire knowledge on mapping of SOA and Cloud Computing.

UNIT I INTRODUCTION TO XML 9

XML document structure- Well formed and valid documents- Namespaces- DTD- XML Schema- X-Files- Parsing XML- XML Transformation and XSL.

UNIT II SOA BASICS 9

Roots of SOA – Characteristics of SOA – Comparing SOA to client-server and distributed Internet architectures – Anatomy of SOA- How components in an SOA interrelate – Principles of service orientation.

UNIT III WEB SERVICES AND SOA 9

Web services Architecture– Service descriptions – WSDL- Messaging with SOAP –Message exchange Patterns - Coordination –Atomic Transactions – Business activities – Orchestration – Choreography – Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer.

UNIT IV ENTERPRISE PLATFORMS AND SOA 9

Service Oriented Analysis- Service Oriented Design- Service Modeling- SOA platform basics- 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) , RESTful web services, Web Services Interoperability Technologies (WSIT), SOA support in .NET – ASP.NET web services.

UNIT V RECENT TRENDS IN SOA 9

SOA business process design- WS-BPEL Language basics- WS-Policy, WS-Security- WS-coordination- Mapping of SOA and Cloud computing, Case Study: Travel Insurance

TOTAL (L:45): 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Understand the entities involved and the roles defining their interactions
- Identify the current technologies used to implement a SOA, in particular Web services.
- Implement a SOA, in particular building distributed systems using Web services technology and Java

TEXT BOOKS:

1. Ron Schmelzer et al. “ XML and Web Services”, Pearson Education, 2002.
2. Thomas Erl, “Service Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2016.

REFERENCES:

1. David S.Linthicum, ”Cloud Computing and SOA Convergence in Your Enterprise”, Pearson Addison-Wesley Information Technology Series, 2010.
2. Frank P.Coyle, “XML, Web Services and the Data Revolution”, Pearson Education,

2002.

3. Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.
4. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.
5. James McGovern, Sameer Tyagi, Michael E. Stevens, Sunil Mathew, "Java Web Services Architecture", Morgan Kaufmann Publishers, 2011.

IT16611	MOBILE APPLICATION DEVELOPMENT LABORATORY (COMMON TO CS & IT)	L	T	P	C
		3	0	0	3

OBJECTIVES

- To learn the basics of mobile application development
- To get accustomed to Android platform
- To develop skills in developing basic Android applications

List of Experiments

1. Install the Android SDK and developer tools and build a test project to confirm that those tools are properly installed and configured.
2. Develop an application that uses GUI components, Font and Colours
3. Develop an application that uses Layout Managers and event listeners.
4. Develop a native calculator application.
5. Write an application that draws basic graphical primitives on the screen.
6. Develop an application that makes use of database.
7. Implement an application that implements Multi threading.
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Mini Project

Suggested list of Projects:

1. Secure Digi Locker Application
2. Android Campus Recruitment System
3. Automated Canteen Ordering System using Android
4. Android Customer Relationship Management System
5. Android Employee Tracker
6. Android Graphical Information System
7. Smart Health Consulting Android System
8. Android Based Universal Ticketing Project
9. Android Civil Administration Reporting Project
10. Student Faculty Document Sharing Android Project
11. Android Patient Tracker

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Design and implement various mobile applications using emulators
- Deploy applications to hand-held devices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE REQUIREMENTS

Android SDK.

OBJECTIVES

- To learn tools for compiler design
- To design the specification of language constructs
- To understand code generation

List of Experiments

1. Input acceptance using DFA, NFA, Basic Regular Expression
2. Conversion of NFA to DFA.
3. Design a Lexical Analyzer.
4. Implement various parsers.
5. Generation of machine code from abstract syntax tree.
6. Exercises using Lexical Analyzer generating tools.

TOTAL: 45 PERIODS**OUTCOMES:****At the end of the course, the student should be able to:**

- Understand the design of a compiler given features of the languages.
- Implement practical aspects of automata theory.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**SOFTWARE REQUIREMENTS**

Lex, Yacc.

OBJECTIVES

- To enable learners to build confidence and enhance their language proficiency.
- To expose learners to the use of professional English.
- To equip them with employability skills.
- To expose learners to build entrepreneurship skills

UNIT I LISTENING AND SPEAKING SKILLS 12

Conversation Skills – Types - Small Talk, Face-to-Face and Telephonic, Formal and Informal Conversations – Skills in presenting ideas and collating information during Conference Calls (one –to-one and technical group / team) – Academic and Workplace Situations – Conversing with Faculty /Guests/Officials/Employers and Employees – Group Discussion – Etiquette and Dos and Don'ts, Turn-taking –Presentation Skills – Seminars and Projects using Digital Tools; Mock Interview – Etiquette and Dos and Don'ts – Audio-Visual interface for enhancement of Listening and Speaking Skills

UNIT II READING / SPEED READING, CRITICAL THINKING AND WRITING SKILLS 12

Reading Comprehension – General and Scientific Texts/Articles/Case Studies from different or relevant fields of study for analysis and critical thinking; Employability Skills – Writing Job Applications – Cover Letter accompanying Résumé – Types of Business Letters and Email Writing and Etiquette; Writing Reports – Statement of Purpose – Writing Articles for Publication Style and Format – Creating Blogs or Company Profiles – Speed Reading of Voluminous Reports / Documents and Exacting Necessary Information and Abstract Preparation including Dissemination

UNIT III ENGLISH FOR PROFESSIONAL EXAMINATIONS 12

Sentences, Paragraphs and Reading Comprehension – Vocabulary Building – General and Technical Terms – Contextual Meaning – Spelling – Subject-Specific Words – Usage and User-Specific Terminology

UNIT IV SOFT SKILLS 12

Analysis – Personality Grooming; Crisis Management – Problem Solving and Finding Solutions; Negotiation Skills – Persuading and Convincing, Briefing; Stress Management – Case Studies.

UNIT V ENTREPRENEURSHIP SKILLS 12

Developing Leadership Qualities and Team Work; Goal Setting and Real-Life Scenarios; Fundamentals of Entrepreneurial Skills – Marketing Strategies - Microcosmic and Macrocosmic Levels of Product Sales and Survey – Sector / Industry Appraisal and Appreciation (Review and Understanding State of the Nation / Economy / Environment / Sector Reports Published) - Interaction & Understanding Role of Multi-Lateral Financial / Institutional / Industrial Agencies such as World Bank, ADB, UNDP, CII etc. – Understanding Role of Governmental & Para / Quasi-Governmental Organizations such as Trade & Commerce, MSME (Micro Small & Med Scale Enterprises), Energy Development Authorities - Opportunities available w/ institutions to secure Capital / Loans for pursuing entrepreneurial efforts – Interaction with Incubation Centers in higher learning institutes like IIT – Madras / Bombay etc.

TOTAL : 60 PERIODS

Teaching Methods:

1. To be totally learner-centric with minimum teacher intervention as the course revolves around practice.
2. Suitable audio/video samples from Podcast/YouTube to be used for illustrative purposes.
3. Portfolio approach for writing to be followed. Learners are to be encouraged to blog, tweet, text and email employing appropriate language.
4. GD/Interview/Role Play/Debate could be conducted off the laboratory (in a regular classroom) but learners are to be exposed to telephonic interview and video conferencing.
5. Learners are to be assigned to read/write/listen/view materials outside the classroom as well for gaining proficiency and better participation in the class.
6. Learners to form team(s), select a module of external Industrial / Institutional interaction and prepare a short-thesis/project proposal.

OUTCOMES

At the end of the course, learners should be able to

- Take international examination such as IELTS and TOEFL
- Make presentations and Participate in Group Discussions.
- Successfully answer questions in interviews.

LAB INFRASTRUCTURE		
S.No	Description of Equipment (minimum configuration)	Qty Required
1	Server	1 No
	• PIV System	
	• 1 GB RAM / 40 GB HDD	
	• OS: Win 2000 server	
	• Audio card with headphones	
• JRE 1.3		
2	Client Systems	60 No's
	• PIII or above	
	• 256 or 512 MB RAM / 40 GB HDD	
	• OS: Win 2000	
	• Audio card with headphones	
• JRE 1.3		
3	Handicam	1 No
4	CC TV + Microphone	2 No Nos
5	Television 46"	1 No
6	Collar mike	1 No
7	Cordless mike	1 No
8	Audio Mixer	1 No
9	DVD recorder/player	1 No
10	LCD Projector with MP3/CD/DVD provision for Audio/video facility	1 No

Evaluation:

Internal: 20 marks

Record maintenance: Students should write a. a Cover letter and a Resume or SoP, b. Project Proposal.

External: 80 marks

Online Test (IELTS, TOEFL, MCQs)	-	35 marks
Interview	-	15 marks
Presentation	-	15 marks
Group Discussion	-	15 marks

Note on Internal and External Evaluation:

1. Interview – mock interview can be conducted on one-on-one basis.
 - a. Speaking on a topic - extempore or predetermined, role play: convincing a customer to buy his product.
 - b. Telephonic conversation- fixing an official appointment / placing an order / enquiring and so on.
3. Presentation – should be extempore on simple topics.
4. Discussion – topics of different kinds; general topics, and case studies.

REFERENCES :

1. Business English Certificate Materials, Cambridge University Press.
2. Graded Examinations in Spoken English and Spoken English for Work downloadable materials from Trinity College, London.
3. International English Language Testing System Practice Tests, Cambridge University Press.
4. Interactive Multimedia Programs on Managing Time and Stress.
5. Personality Development (CD-ROM), Times Multimedia, Mumbai.
6. Robert M Sherfield and et al. “Developing Soft Skills” 4th ed , New Delhi: Pearson Education, 2009.

Web Sources:

<http://www.slideshare.net/rohitjsh/presentation-on-group-discussion>
http://www.washington.edu/doit/TeamN/present_tips.html
<http://www.oxforddictionaries.com/words/writing-job-applications>
<http://www.kent.ac.uk/careers/cv/coveringletters.htm>
http://www.mindtools.com/pages/article/newCDV_34.html

TED Talks

IT16701	INTERNET OF THINGS (Common to CS, EC, EE & IT)	L T P C 3 0 0 3
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OBJECTIVES

- To understand the state of the art - Internet of Things architecture.
- To learn about IoT protocols.
- To understand the integration of IoT and Cloud.
- To apply the concept of Internet of Things in the real world scenario.

UNIT I INTRODUCTION & CONCEPTS 9

Introduction and evolution of IoT from internet, IOT Physical Devices & Endpoints - Basic building blocks and Exemplary IOT Device: Raspberry Pi, Linux on Raspberry Pi, Raspberry Pi Interfaces - Serial, SPI, I2C, Programming Raspberry Pi with Python - Controlling LED with Raspberry Pi, Interfacing an LED and Switch with Raspberry Pi, Interfacing a Light Sensor (LDR) with Raspberry Pi, Other IoT Devices - Arduino with embedded C, Intel Galileo, pcDuino, BeagleBone Black, Cubieboard.

UNIT II IoT PROTOCOLS 9

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT-Software Defined Networking, Network Function Virtualization, IoT Protocol Stack, IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee, 6LowPAN.

UNIT III IoT PLATFORMS DESIGN METHODOLOGY 9

IoT Design Methodology- Purpose & Requirements Specification, Process Specification, Domain Model Specification, Information Model Specification, Service Specifications, IoT Level specification, Functional View Specification, Operational View Specification, Device & Component Integration, Application Development, Case Study on IoT System for Weather Monitoring.

UNIT IV IoT PHYSICAL SERVERS & CLOUD OFFERINGS 9

Introduction to Cloud Storage Models & Communication APIs, WAMP - AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework – Django - Django Architecture, Starting Development with Django, Designing a RESTful Web API, Amazon Web Services for IoT - Amazon EC2, Amazon AutoScaling, Amazon S3, Amazon RDS, Amazon DynamoDB, Amazon Kinesis, Amazon SQS, Amazon EMR, SkyNet IoT Messaging Platform.

UNIT V IoT TOOLS 9

Introduction, Chef- Setting up Chef, Chef Case Studies - Multi-tier Application Deployment, Hadoop Cluster, Storm Cluster, Puppet, Puppet Case Study - Multi-tier Deployment, NETCONF-YANG Case Studies - Steps for IoT device Management with NETCONF-YANG, Managing Smart Irrigation IoT System with NETCONF-YANG, Managing Home Intrusion Detection IoT System with NETCONF-YANG.

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Understand the vision of IoT from a global context.
- Learn the use of Devices, Gateways and Data Management in IoT.
- Build state of the art architecture in IoT.

TEXT BOOKS:

1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things :A hands on approach”, First Edition, Universities Press, 2015.
2. Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2012.

REFERENCES:

1. Dieter Uckelmann Mark Harrison; Florian Michahelles, “Architecting the Internet of Things “, Springer, 2011.

OBJECTIVES

- To give an insight into the key principles of information security.
- To learn about various threats facing organizations
- To understand key laws that shape the field of information security

UNIT I INTRODUCTION**9**

Introduction to Information security, CNSS security model, –Introduction to Data and Network Security - Critical characteristics of information –Components of an information system –Balancing information security and access - The SDLC and Security SDLC- NIST – Need for Security.

UNIT II CRYPTOGRAPHY**9**

Foundations- Cipher methods - Cryptographic Algorithms-symmetric and asymmetric encryption – Cryptographic tools – Digital Signature, Digital certificates, Hybrid cryptographic systems, steganography, protocols for secure communication.

UNIT III SECURITY TECHNOLOGY**9**

Introduction- Access control- firewall, protecting remote connections- Intrusion Detection and Prevention system –Honey pots, Honey Nets and Padded cell systems, scanning and analysis tools, Digital forensics.

UNIT IV LEGAL ETHICAL & PROFESSIONAL ISSUES**9**

Law and Ethics in Information Security- International law and legal bodies, Ethical differences across cultures, ethics and education, deterring unethical and illegal behavior- codes of ethics at professional organization.

UNIT V IMPLEMENTATION OF INFORMATION SECURITY**9**

Information Security project management, Technical and Non technical aspects of implementation, IS standards and certifications- ISO 27001, NIST Models, NSTISS, VISA International Security Model, Maintenance Models.

TOTAL : 45 PERIODS**OUTCOMES:****Upon completion of the course, students will be able to**

- Understand the laws prevalent in the field of Security.
- Identify threats of various forms.

TEXT BOOKS:

1. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, fifth edition, Cengage learning , 2015.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Fourth Edition, Prentice Hall, 2007.

REFERENCES:

1. Mark Rhodes- Ousley ,“Information Security: The complete Reference”, Second Edition Mcgraw Hill, 2013.
2. William Stallings, “Cryptography and Network Security: Principles and Practices”, Seventh Edition, Pearson Education, 2017.
3. Matt Bishop, “Computer Security: Art and Science”, First Edition, Addison-Wesley Professional, 2003.

OBJECTIVES

- To understand the concept of big data.
- To learn about various practical data analytics with R and Hadoop.
- To learn about big data frameworks.

UNIT I INTRODUCTION TO BIG DATA 9

Introduction to Big Data Analytics – Challenges and limitations of big data analytics- Conventional Systems - Nature of Data, Evolution Of Analytic Scalability - Intelligent data analysis- Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

UNIT II MINING DATA STREAMS 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.

UNIT III INTRODUCTION TO BIG DATA ANALYTICS & R PROGRAMMING 9

Analyzing, Visualization and Exploring the Data, Statistics for Model Building and Evaluation, Introduction to R and RStudio, Basic analysis in R, Intermediate R, Intermediate analysis in R, Advanced Analytics - K-means clustering, Association rules-Speedup, Linear Regression, Logistic Regression, Naïve Bayes, Decision Trees, Time Series Analysis, Text Analysis.

UNIT IV HADOOP 9

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop, Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features.

UNIT V FRAMEWORKS 9

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications.

TOTAL : 45 PERIODS**OUTCOMES:**

Upon completion of the course, students will be able to

- Implement the concepts of big data in R and Hadoop.

TEXT BOOKS:

1. Vignesh Prajapati, “Big Data Analytics with R and Hadoop”, Packt Publishing, 2014.
2. Stephan Kudyba, “Big Data, Mining, and Analytics: Components of Strategic Decision Making”, First Edition, CRC Press, 2014.

REFERENCES:

1. Michael Minelli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
2. Dr. Mark Gardener, "Beginning R: The Statistical Programming Language" (Wrox), 2013
3. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
4. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
6. Zikopoulos, Paul, Chris Eaton, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", Tata McGraw Hill Publications, 2011.
7. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilly Media, 2012.
8. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012.

OBJECTIVES

- To provide comprehensive knowledge of fundamental concepts of cloud computing
- To understand service models, deployment models and virtualization
- To learn programming and software environments of Cloud
- To shed light on the security issues in Cloud

UNIT I INTRODUCTION**9**

Introduction – Scalable Computing over the Internet-System Models for Distributed and Cloud Computing – Design Principles of Computer Clusters-Cluster Job and Resource Management-Cloud Computing Architecture – The Cloud Reference Model – Cloud Characteristics – Cloud Deployment Models: Public, Private, Community, Hybrid Clouds - Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing.

UNIT II VIRTUALIZATION**9**

Introduction, Virtualized Environment characteristics, Server Virtualization Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – Virtualization for data center automation - Virtualization Management- Storage Virtualization – Network Virtualization.

UNIT III CLOUD COMPUTING MECHANISM**9**

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

UNIT IV PROGRAMMING MODEL AND SECURITY**9**

Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write. Security: Data Security and Storage - Cloud Infrastructure security: network, host and application level – Cloud Security Mechanisms (Encryption, PKI, SSO, IAM).

UNIT V CASE STUDIES & TOOLS**9**

Case Studies of Top Supercomputer Systems – Virtualization : Xen, VMWare, Microsoft Hyper-V – Examples of Cloud Service Providers(SaaS,PaaS,IaaS)-Emerging Cloud software Environments: Open Source Eucalyptus and Nimbus - Open Nebula, Sector/Sphere and Open Stack.

TOTAL : 45 PERIODS**OUTCOMES:****The student will be able to:**

- Understand service models, deployment models and virtualization
- Learn programming and software environments of Cloud
- Understand security issues in Cloud

TEXT BOOKS:

1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, “Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet”, First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.
2. Thomas Erl , Ricardo Puttini, Zaigham Mahmood,” Cloud Computing: Concepts, Technology & Architecture”, First Edition, Prentice Hall,2013.

REFERENCES:

1. Jason Venner, “Pro Hadoop- Build Scalable, Distributed Applications in the Cloud”, A Press, 2009
2. Tom White, “Hadoop The Definitive Guide”, First Edition. O’Reilly, 2009.
3. Tim Master, Subra Kumaraswamy, Shahed Latif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O’ Reily Media, Sep 2009.

OBJECTIVES

To build a simple IoT application and to perform the predictive analysis on gathered data.

LIST OF EXPERIMENTS**Raspberry Pi exercises**

1. Peripheral interfacing with IoT kit

Working with LED, SWITCH and BUZZER

Movement Detection with PIR

Simulation of Traffic Light

Controlling LED intensity using pwm signal

Working with servo motor

2. I2C Communication and SPI Communication for displaying atmospheric temperature and pressure

3. Controlling peripheral device with Mobile devices

Controlling LED using Bluetooth

Sending sensor data to user through SMS and Email

4. Designing GUI for capturing and analysing sensor data from IoT kit

5. Developing Video Surveillance application using IoT

Machine Learning

6. Exercises to understand the data collected from sensors.

Predictive Analysis

7. Exercises to perform predictive analysis.

8. A project to be implemented covering all IoT phases using Raspberry Pi / Arduino.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Understand the process of creating a simple IoT application
- Perform analysis on data.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

IoT Kit - 15 Nos.

Cloud Infrastructure like Azure, AWS, etc.,

IT16712

INFORMATION SECURITY LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVES

- To learn about secure coding practices.
- To implement security controls.
- To learn techniques specific to mitigating the occurrence of common software vulnerabilities.

LIST OF EXPERIMENTS

Exercises to perform

- i) Input Validation for an application on a trusted system.
- ii) Output encoding
- iii) Authentication and password management.
- iv) Session Management.
- v) Access Control.

Implementation

- i) Cryptographic techniques.
- ii) Error handling and logging.
- iii) Data Protection.

Implement encryption for transmission of all sensitive information.
Secure File Management.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Implement security controls
- Understand and implement secure coding practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Java, C, C++ or any Open Source tool

REFERENCES:

1. OWASP SCP Quick Reference guide V 2

IT16713

**CLOUD COMPUTING AND BIG DATA
LABORATORY**

**L T P C
0 0 3 2**

OBJECTIVES

- Be exposed to tool kits for cloud environment.
- Learn to run virtual machines of different configuration.
- Learn to use Hadoop.

LIST OF EXPERIMENTS

Use Eucalyptus or Open Nebula or equivalent to set up the cloud and demonstrate.

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
2. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
3. Install a C compiler in the virtual machine and execute a sample program.
4. Show the virtual machine migration based on the certain condition from one node to the other.
5. Find procedure to install storage controller and interact with it.
6. Find procedure to set up the one node Hadoop cluster.
7. Mount the one node Hadoop cluster using FUSE.
8. Write a program to use the API's of Hadoop to interact with it.
9. Programs to demonstrate the use of Hadoop Map Reduce, Pig and Hive.
10. Programs to demonstrate the use of SPARK for near-real time processing.
11. Analyze large data sets using various algorithms in Mahout.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Use Hadoop
- Run virtual machines of different configuration

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE

Eucalyptus or Open Nebula or equivalent
SPARK, Pig, Hive, Hadoop

HARDWARE

Standalone desktops 30 Nos

IT16001	FREE AND OPEN SOURCE SOFTWARE	L	T	P	C
		3	0	0	3

OBJECTIVES

- To be exposed to the context and operation of free and open source software (FOSS) communities and associated software projects.
- To be familiar with participating in a FOSS project
- To learn scripting languages like Python or Perl
- To learn some important FOSS tools and techniques

UNIT I INTRODUCTION 9

Introduction to Open sources – Need of Open Sources, Advantages of Open Sources–FOSS usage, Free Software Movement, Certification courses issues -Global and Indian, Application of Open Sources, Commercial aspects of open source movement, Introduction to Open Source Hardware.

UNIT II SHELL SCRIPTING 9

Introduction to Linux Operating System -Kernel Mode- User Mode, Development with Linux: GNU products- Development tools, Kernel Operations, Processes: Basic Concepts- Basic System Calls- Scheduling – Personalities – Cloning, Signals: Sending Signals-signal Handling- Complementary System Calls.

UNIT III PYTHON 9

Python Basics- Python Objects – Numbers, Sequences: Strings, Lists and Tuples, Mapping and Set Types, Conditionals and loops. Files: Input and Output.

UNIT IV PERL 9

Perl background – Perl overview , Perl parsing rules – Variables and Data, Statements and Control structures – Subroutines, Packages, **CASE STUDY:** Government Policy toward Open Source (E- Governance).

UNIT V JSON 9

JSON Overview - Datatypes, Arrays, Objects, Schemas, Parsing, Stringify, JSONP, JSON with MongoDB

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Understand the operation of FOSS Communities
- Familiarize with Python, Perl and JSON

TEXT BOOKS:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003.
2. Wesley J. Chun, “Core Python Programming”, Second Edition, Pearson Education, 2007.

REFERENCES:

1. Alicia Gibb, “Building Open Source Hardware”, Addison Wesley, 2015.
2. w3schools.org
3. Martin C. Brown, “Perl: The Complete Reference”, Second Edition, McGrawHill, Indian Reprint 2009.

IT16002

DATA SCIENCE USING PYTHON

L T P C
3 0 0 3

OBJECTIVES

- To understand the fundamentals of data science.
- To explore data and to produce visualizations.
- To form and test hypotheses about data.
- To learn different ways of getting data into Python and into the right formats.
- To use existing data to develop prediction models for new data.

UNIT I INTRODUCTION 9

Data Science-Python –the basics- visualizing data-matplotlib, bar charts, line charts, scatterplots, linear algebra- Vectors, Matrices.

UNIT II STATISTICS AND PROBABILITY 9

Statistics- describing a single set of data, correlation, Simpson’s Paradox, Correlation and causation, Probability –Dependence and Independence, Conditional Probability, Bayes theorem, random variables, continuous distributions, normal distribution, Central Limit Theorem, Hypothesis & Inference- statistical hypothesis testing, flipping a coin example, p-values, confidence intervals, p-hacking, running an A/B test example, Bayesian Inference, Gradient Descent-idea, estimation, stochastic.

UNIT III WORKING WITH DATA 9

Reading files, Scraping the web, using APIs, using twitter API example, Exploring Data – cleaning and munging, manipulating data, rescaling, dimensionality reduction.

UNIT IV MACHINE LEARNING 9

Over fitting and under fitting, Feature Extraction and Selection, K- Nearest Neighbors, Naïve Bayes, Simple Linear, Multiple and Logistic Regression.

UNIT V ADVANCED TOPICS 9

Decision Trees, Neural Networks, Clustering, Natural Language Processing, Recommender Systems, MapReduce.

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Develop prediction models for new data
- Test hypotheses about data

TEXT BOOKS:

1. Joel Grus, “Data Science from Scratch- First Principles with Python”, O’reily, First edition, 2015.
2. Wes mckinney, “Python for data analysis”, O’reily 2012.

REFERENCES:

1. Alexandre Devert, “Matplotlib Plotting Cook book”, Packt Publishing, 2014.
2. Cathy O’Neil, Rachel Schutt, “Doing Data Science -Straight Talk from the Frontline”, O’Reilly Media, 2013.

IT16003	FUNCTIONAL PROGRAMMING USING SCALA	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the principles of functional programming.
- To write purely functional programs using pattern matching and higher-order functions.
- To combine functional programming with objects and classes.
- To design immutable data structures.
- To understand generic types for functional programs.

UNIT I INTRODUCTION 9

Introduction to functional programming – Need for scala – Scala interpreter - Defining variables and functions - Writing scripts – Loops – Arrays – tuples- sets – maps – arrays – File manipulations – Case studies.

UNIT II CLASSES 9

Classes and Objects – Basic types and Operators –Wrappers – Functional objects – constructors – method overloading – implicit conversions - Case studies.

UNIT III INHERITANCE 9

Built-in Control Structures - Functions and Closures- Control Abstraction - Composition and Inheritance – Abstract classes – Overriding methods and fields – polymorphism and dynamic binding - Case studies.

UNIT IV HIERARCHY OF SCALA 9

Primitives – Bottom types – Traits- Thin vs rich interfaces – Packages and Imports- Putting code in packages - Access modifiers – Package imports - Assertions and Unit Testing - Case studies.

UNIT V PATTERN MATCHING 9

Pattern Matching – pattern guards – pattern overlaps - Sealed classes - Working with Lists – types, operations and pattern –Parallel programming: Collections – sequence and maps – mutable and immutable collections - Stateful Objects - Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- To write purely functional programs using pattern matching and higher-order functions.
- To combine functional programming with objects and classes.

TEXT BOOKS:

1. Martin Odersky, Lex Spoon and Bill Venners , “Programming in Scala, A comprehensive step-by-step guide”, Third Edition, Artima press, 2010.

REFERENCES:

1. Dean Wampler, Alex Payne , “Programming Scala, Scalability = Functional Programming + Objects”, 2nd Edition ,O'Reilly Media, 2014.
2. Paul Chiusano and Runar Bjarnason, “Functional Programming in Scala”, Manning, 2014.

IT16004	STATISTICAL ANALYSIS USING R	L	T	P	C
	PROGRAMMING	3	0	0	3

OBJECTIVES

- To learn data structures such as matrices, lists, factors, and data frames.
- To create a variety of graphic displays.
- To understand the concepts of probability and statistics.
- To build statistical models.

UNIT I INTRODUCTION 9

Introduction to R-Basic Syntax-data Types-variables-Operators-Decision Making-Loops-Functions-Strings-Vectors-Lists-Matrices-Arrays-Factors-Data Frames-Packages-Data Reshaping.

UNIT II DATASET AND GRAPHICS 9

Input and Output-Entering Data from the Keyboard-CSV file-Excel File-Binary File-XML file-JSON file-Web Data-Database-Graphics-Pie Charts-Bar Charts-Box Plots-Dot plots-Histograms-Line Graphs- Scatter plots-Kernel density plots-Writing plot to a file-Changing graphical parameters.

UNIT III PROBABILITY 9

Introduction-Sample Space -Events-Counting Methods-Conditional probability -Independent Events-Bayes Rule-Random Variables-Probability distribution-Discrete and continuous Distribution-Multivariate Distribution.

UNIT IV STATISTICS 9

Regression-Linear-Multiple-Logistic-Poisson-Analysis of Covariance-Time Series Analysis-Nonlinear Least Square-Decision Tree-Random Forest-Survival Analysis-t-Test-Chi Square Test,ANOVA.

UNIT V ADVANCED METHODS 9

Advanced methods for missing data-Steps in dealing with missing data-Identifying missing values-Exploring missing value patterns-Understanding the sources and impact of missing data-rational Approaches for dealing with incomplete data-Lit wise deletion-Multiple Imputation-Advanced Graphics-Lattice Package-ggPlot2 Package-Interactive graphs.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Understand statistical models
- Use data structures

TEXT BOOKS:

1. Paul Teetor, "R Cookbook", O'reily, 2011.

REFERENCES:

1. Robert I Kabacoff, "R in Action: Data Analysis and Graphics with R", Manning Publications, 2015.
2. G. Jay Kerns,"Introduction to Probability and Statistics Using R", First Edition, 2010.

IT16005	DIGITAL IMAGE PROCESSING (Common to CS, EE, EC & IT)	L	T	P	C
		3	0	0	3

OBJECTIVES

- To get exposed to different image enhancement techniques
- To learn about image transformation and color image analysis
- To learn about image classification
- To study various applications of image processing

UNIT I INTRODUCTION 9

Introduction-Origins, Examples of Fields, fundamental steps, Components, Fundamentals-Elements of Visual Perception, Image Sensing & Acquisition, Sampling and Quantization, Relationship between Pixels, Mathematical Tools – Spatial , Vector and Matrix operations.

UNIT II IMAGE ENHANCEMENT 9

Histogram Processing, Fundamentals of Spatial Filtering- Smoothing, Sharpening, Frequency domain- Smoothing and Sharpening, Filters – Homo-morphic Filtering, Noise Models, Inverse filtering, Wiener filtering, Geometric Mean Filter.

UNIT III IMAGE TRANSFORMATION 9

Transforms: Matrix-based - correlation, Fourier related, Walsh- Hadamard, Slant, Haar, Wavelet, Color: Models, Transformations, Image smoothing and sharpening, Noise in color images.

UNIT IV MIDDLE & HIGH LEVEL IMAGE PROCESSING 9

Basic Morphological algorithms: Hole filling, Convex hull, Pruning, Edge Detection-Basic, Thresholding-Foundation and Segmentation - Region Growing and Region Splitting & Merging, Active contours- image segmentation using Snakes, Feature Extraction-Preprocessing, Feature descriptors - Boundary, Region and Principal components, Pattern classification: Statistical classifiers –Bayes classifier, Neural Networks and Deep learning: Multilayer Feedforward Neural Networks , Deep Convolutional Neural Networks.

UNIT V APPLICATIONS 9

Face Recognition, Finger print Recognition, Gait Recognition, Location of dark contaminants in cereals, recent developments in In-Vehicle Vision systems.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Analyze general terminology of digital image processing.
- Implement image process and analysis algorithms.
- Apply image processing algorithms in practical applications

TEXT BOOKS:

1. Rafael C.Gonzalez and Richard E.Woods, —Digital Image Processing, Fourth Edition, Pearson Education, 2017.
2. E. R. Davies, “Computer & Machine Vision”, Fourth Edition, Academic Press, 2012.

REFERENCES:

1. S.Sridhar, “Digital Image Processing”, Oxford University Press, 2011.
2. Anil K.Jain, “Fundamentals of Digital Image Processing”, Prentice Hall of India, 2011.

CS16016	USER INTERFACE TECHNOLOGIES (COMMON TO CS & IT)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To Understand the Concepts and Architecture of the World Wide Web.
- To Understand and Practice Markup Language.
- To Understand and Practice Embedded Dynamic Scripting on Client-Side Internet Programming.
- To Understand and Practice Web Development Techniques on Client-Side.

UNIT I INTRODUCTION TO WWW 6

Introduction to computer networks – Internet Standards – Introduction to WWW – WWW architecture – SMTP – POP3 – File Transfer Protocol – Overview of HTTP , HTTP request – response – Generation of dynamic web pages.

UNIT II UI DESIGN 12

HTML5: What is HTML5 – Features of HTML5 – Semantic Tags – New Input Elements and tags – Media tags(audio and video tags) – Designing Graphics using Canvas API – Drag and Drop features – Geolocation API – Web Storage (Session and local Storage).

CSS3: What is CSS3 – Features of CSS3 – Implementation of border radius ,box shadow, Image border, custom web font, backgrounds – Advanced text effects(shadow) – 2D and 3D Transformations – Transition to elements – Animations to text and elements

UNIT III RESPONSIVE WEB DESIGN (RWD) 9

Responsive Design: What is RWD – Introduction to RWD Techniques – Fluid Layout, Fluid Images and Media queries – Introduction to RWD Framework – Twitter Bootstrap – Bootstrap background and Features – Getting Started with Bootstrap – Demystifying Grids – OffCanvas – Bootstrap Components – JS Plugins - Customization

UNIT IV INTRODUCTION TO JAVASCRIPT 12

Introduction – Core features – Datatypes and Variables – Operators, Expressions and Statements – Functions & Scope – Objects – Array, Date and Math related Objects – Document Object Model – Event Handling – Browser Object Model – Windows and Documents – Form Handling and Validations.

Object-Oriented Techniques in JavaScript – Classes – Constructors and Prototyping (Sub Classes and Super Classes) – JSON – Introduction to AJAX

UNIT V INTRODUCTION TO JQUERY 6

Introduction – jQuery Selectors – jQuery HTML – Animations – Effects – Event Handling – DOM – jQuery DOM Traversing, DOM Manipulation – jQuery AJAX

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Acquire knowledge about functionalities of World Wide Web.
- Explore markup languages features and create interactive web pages using them.
- Learn and design Client-side validation using scripting languages.

- Acquire knowledge about Open source JavaScript libraries.
- Able to design Front-end web page.

TEXT BOOKS:

1. Harvey & Paul Deitel & Association, Harvey Deitel and Abbey Deitel, “Internet and World Wide Web – How to Program” ,Fifth Edition, Pearson Education, 2011
2. Achyut S Godbole and Atul Kahate, “Web Technologies”, Second Edition, Tata McGraw Hill, 2012.

REFERENCES:

1. Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition Tata McGraw Hill, 2013
2. David Flanagan, “JavaScript: The Definitive Guide, Sixth Edition”, O’Reilly Media, 2011
3. Bear Bibeault and Yehuda Katz, “jQuery in Action”, January 2008
4. Web link for Responsive Web Design – <https://bradfrost.github.io/this-is-responsive/>
5. Ebook link for JavaScript - https://github.com/jasonzhuang/tech_books/tree/master/js

IT16006	MULTIMEDIA COMPRESSION TECHNIQUES	L	T	P	C
		3	0	0	3

OBJECTIVES

To provide in-depth knowledge about

- Data Compression
- Text Compression and Audio Compression
- Image and Video Compression

UNIT I INTRODUCTION 9

Introduction to Compression Techniques – Lossless Compression, Lossy Compression, Measure of Performance, Mathematical preliminaries for lossless compression- Models- Physical model, Probability model, Markov model, Composite source model.

UNIT II DATA COMPRESSION 9

Huffman coding- Minimum Variance Huffman codes, Extended Huffman codes, Non binary Huffman Codes, Applications of Huffman coding, Context Based Compression- prediction with partial match, burrows-Wheeler Transform, Associative Coder of Buyanovsky.

UNIT III AUDIO COMPRESSION 9

Digital audio - audio compression techniques - μ Law and A Law companding, ADPCM. Speech compression- waveform codecs-source codecs- hybrid codecs-Shorten compressor MPEG-1 audio layers.

UNIT IV IMAGE COMPRESSION 9

Image Transforms – orthogonal transforms- DCT, JPEG , progressive image compression- JBIG, JBIG2 standards , Vector quantization, Differential lossless compression –DPCM Wavelet based compression- Filter banks, DWT, Multiresolution decomposition, SPIHT and EZW Coders, JPEG 2000 standard.

UNIT V VIDEO COMPRESSION 9

Motion Compensation, Video Signal Representation – MPEG Video Coding– H.261, H.263, H.264 Standards, Compression issues in ATM Networks, Compression algorithm for Packet Video.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Apply various video compression algorithms for practical applications.
- Employ various audio and speech compression techniques for practical applications.

TEXT BOOKS:

1. Khalid Sayood, “Introduction to Data Compression”, Fifth Edition, Elsevier,2017
2. David Salomon, “Data Compression – The Complete Reference” Fifth Edition, Springer Verlag New York Inc., 2010.

REFERENCES:

1. Yun Q. SHI, Huifang Sun,“Image and Video cOMPRESSSION FOR Multimedia Engineering Fundamentals, Algorithms and standards”, CRC Press, Second Edition, 2008.
2. John. W. Woods, “Multidimensional Signal, Image and Video Processing and Coding”, Academic Press, 2011.

EC16703	EMBEDDED AND REAL TIME SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES

The student should be made to:

- Learn the architecture and programming of ARM processor.
- Be familiar with the embedded computing platform design and analysis
- Be exposed to the basic concepts and overview of real time Operating system.
- Learn the system design techniques and networks for embedded systems to industrial applications

UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS 9

Complex systems and micro processors– Embedded system design process – Overview on formalisms for system design –Design example: Model train controller– Instruction sets preliminaries – ARM Processor – CPU: programming input and output– supervisor mode, exceptions and traps – Co–processors– Memory system mechanisms – CPU performance– CPU power consumption– Introduction to Embedded Industrial CPUs for rugged environment

UNIT II EMBEDDED COMPUTING PLATFORM DESIGN 9

The CPU Bus–Memory devices and systems–Designing with computing platforms – consumer electronics architecture – platform–level performance analysis – Components for embedded programs– Models of programs– Assembly, linking and loading – compilation techniques– Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size– Program validation and testing.

UNIT III PROCESSES AND OPERATING SYSTEMS 9

Introduction – Kernel, Threads –Multiple tasks and multiple processes – Multirate systems– Preemptive real–time operating systems– Priority based scheduling– Interprocess communication mechanisms – Evaluating operating system performance– power optimization strategies for processes – GPOS versus RTOS- Classification of RTOS- Example Real time operating systems–POSIX–Windows CE.

UNIT IV SYSTEM DESIGN TECHNIQUES AND NETWORKS 9

Design methodologies– Design flows – Requirement Analysis – Specifications–System analysis and architecture design – Quality Assurance techniques– Distributed embedded systems –Multiprocessors–CPUs, accelerators,MPSoCs– Overview on Internet of (robotic) Things–Ubiquitous computing.

UNIT V CASE STUDY 9

Data compressor – Alarm Clock – Audio player – Software modem–Digital still camera – Telephone answering machine–Engine control unit – Video accelerator–Embedded systems in industrial applications– challenges and trends.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Describe the architecture and programming of ARM processor.
- Outline the concepts of embedded systems
- Explain the basic concepts and idea about real time Operating system design
- Use the system design techniques to develop software for embedded systems
- Differentiate between the general purpose operating system and the real time operating system
- Model real-time consumer/industrial applications using embedded-system concepts

TEXT BOOKS:

1. Marilyn Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Third Edition “Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.

REFERENCES:

1. Jonathan W.Valvano, “Embedded Microcomputer Systems Real Time Interfacing”, Third Edition Cengage Learning, 2012.

2. David. E. Simon, “An Embedded Software Primer”, 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.

3. Raymond J.A. Buhr, Donald L.Bailey, “An Introduction to Real-Time Systems- From Design to Networking with C/C++”, Prentice Hall, 1999.

4. C.M. Krishna, Kang G. Shin, “Real-Time Systems”, International Editions, Mc Graw Hill 1997

5. K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, Dream Tech Press, 2005.

6. Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata Mc Graw Hill, 2004.

OBJECTIVES:

- Understand the design issues in ad hoc and sensor networks.
- Learn the different types of MAC protocols.
- Be familiar with different types of adhoc routing protocols.
- Be expose to the TCP issues in adhoc networks.
- Learn the architecture and protocols of wireless sensor networks.

UNIT I INTRODUCTION**9**

Background of Sensor Network Technology. Mobile adhoc networks and wireless sensor networks. Difference between mobile ad-hoc and sensor networks. Applications of mobile adhoc networks and sensor networks- Design challenges in adhoc and wireless sensor networks, Enabling technologies for wireless sensor networks.

UNIT II MAC PROTOCOLS FOR ADHOC WIRELESS NETWORKS**9**

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN ADHOC WIRELESS NETWORKS**9**

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT IV WIRELESS SENSOR NETWORK AND MAC PROTOCOLS**9**

Single node architecture - Hardware Components, Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Gateway Concepts. MAC Protocols for WSN, Issues in designing MAC Protocol for WSNs, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, IEEE 802.15.4

UNIT V WSN ROUTING, LOCALIZATION & QOS**9**

Issues in designing routing protocols for WSN, Classification of Routing Protocols, Unicast, Broadcast and Multicast. Localization – properties, approaches, single hop localization and positioning in multihop environment. Transport layer and QoS in WSN, Optimization Goals and Figures of Merit

TOTAL:45 PERIODS

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

- Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks.
- Analyze the protocol design issues of ad hoc and sensor networks .
- Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues .
- Evaluate the QoS related performance measurements of ad hoc and sensor networks.

TEXT BOOKS:

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.
2. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.

REFERENCES:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication -2002.
3. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, and Applications", John Wiley, 2007.
4. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

IT16007

COGNITIVE RADIO NETWORKS

L T P C

3 0 0 3

OBJECTIVES

- To enable the student to understand the evolving paradigm of cognitive radio communication and the enabling technologies for its implementation.
- To enable the student to understand the essential functionalities and requirements in designing software defined radios and their usage for cognitive communication.
- To expose the student to the evolving next generation wireless networks and their associated challenges.

UNIT I SOFTWARE DEFINED RADIO AND ITS ARCHITECTURE 9

Definitions and potential benefits, software radio architecture evolution, technology tradeoffs and architecture implications. Essential functions of the software radio, basic SDR, hardware architecture, Computational processing resources, software architecture, top level component interfaces, interface topologies among plug and play modules.

UNIT II COGNITIVE RADIOS AND ITS ARCHITECTURE 9

Marking radio self-aware, cognitive techniques –position awareness, environment awareness in cognitive radios, optimization of radio resources, Artificial Intelligence Techniques, Cognitive Radio –functions, components and design rules, Cognition cycle –orient, plan, decide and act phases, Inference Hierarchy, Architecture maps, Building the Cognitive Radio Architecture on Software defined Radio Architecture.

UNIT III SPECTRUM SENSING AND IDENTIFICATION 9

Primary Signal Detection: Energy Detector, Cyclostationary Feature Detector, Matched Filter ,Cooperative Sensing , Definition and Implications of Spectrum Opportunity, Spectrum Opportunity Detection , Fundamental Trade-offs: Performance versus Constraint , MAC Layer Performance Measures, Global Interference Model, Local Interference Model, Fundamental Trade-offs: Sensing Accuracy versus Sensing Overhead.

UNIT IV USER COOPERATIVE COMMUNICATIONS 9

User Cooperation and Cognitive Systems, Relay Channels: General Three -Node Relay Channel, Wireless Relay Channel , User Cooperation in Wireless Networks: Two-User Cooperative Network, Cooperative Wireless Network , Multihop Relay Channel.

UNIT V INFORMATION THEORETICAL LIMITS ON CR NETWORKS 9

Types of Cognitive Behavior, Interference-Avoiding Behavior: Spectrum Interweave, Interference-Controlled Behavior: Spectrum Underlay, Underlay in Small Networks: Achievable Rates, Underlay in Large Networks: Scaling Laws, Interference-Mitigating Behavior: Spectrum Overlay, Opportunistic Interference Cancellation, Asymmetrically Cooperating Cognitive Radio Channels.

TOTAL : 45 PERIODS

OUTCOMES:

- To learn the hardware and software architecture of software defined radio
- Design the wireless networks based on the cognitive radios.
- understand of cognitive radio architecture
- have a better understanding of cognitive techniques

TEXT BOOKS:

1. Alexander M. Wyglinski, Maziar Nekovee, And Y. Thomas Hou, “Cognitive Radio Communications And Networks -Principles And Practice”, Elsevier Inc., 2010.
2. Bruce Fette, “Cognitive Radio Technology”, Elsevier, Second edition, 2009.

REFERENCES:

1. Kwang-Cheng Chen and Ramjee Prasad, ” Cognitive Radio Networks” , John Wiley & Sons Ltd,2009.
2. Khattab, Ahmed, Perkins, Dmitri, Bayoumi, Magdy, “Cognitive Radio Networks -From Theory to Practice”, Springer Series: Analog Circuits and Signal Processing, 2009.
3. J. Mitola, “ Cognitive Radio: An Integrated Agent Architecture for software defined radio”, Doctor of Technology thesis, Royal Inst. Technology, Sweden 2000.
4. Simon Haykin, “Cognitive Radio: Brain –empowered wireless Communications”, IEEE Journal on selected areas in communications, Feb 2005.
5. Ian F. Akyildiz, Won –Yeol Lee, Mehmet C. Vuran, Shantidev Mohanty, “ NeXt generation / dynamic spectrum access / cognitive radio wireless networks: A Survey Elsevier Computer Networks, May 2006.

EC16801

WIRELESS NETWORKS
(Common To CS,EC & IT)

L T P C
3 0 0 3

OBJECTIVES:

- To study about Wireless networks, protocol stack and standards.
- To study about fundamentals of 3G Services, its protocols and applications.
- To study about evolution of 4G Networks, its architecture and applications

UNIT I WIRELESS LAN

9

Introduction to wireless LANs - IEEE 802.11 WLANs - Physical Layer- MAC sublayer- MAC Management Sublayer- Wireless ATM - HIPERLAN- BRAN- Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security WiMax.

UNIT II WIRELESS WIDE AREA NETWORK

9

Overview of UTRAN Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IW MSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA) - LTE network architecture and protocol.

UNIT III INTERWORKING BETWEEN WLANS AND 3G WWANS

9

Interworking objectives and requirements, Schemes to connect WLANs and 3G Networks, Session Mobility, Interworking Architectures for WLAN and GPRS, System Description, Local Multipoint Distribution Service, Multi-channel Multi-point Distribution system.

UNIT IV ADHOC & SENSOR NETWORKS

9

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

UNIT V 4G & BEYOND

9

4G features and challenges, Technology path, IMS Architecture, Convergent Devices, 4G technologies, Advanced Broadband Wireless Access and Services, Multimedia, MVNO.

TOTAL:45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Conversant with the latest 3G/4G and WiMAX networks and its architecture.
- Design and implement wireless network environment for any application using latest wireless protocols and standards.
- Implement different type of applications for smart phones and mobile devices with latest network strategies.

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications" Second Edition, Pearson Education 2012.
2. Vijay Garg, "Wireless Communications and Networking", First Edition, Elsevier 2007.

REFERENCES:

1. Clint Smith. P.E., and Daniel Collins, "3G Wireless Networks", 2nd Edition, Tata McGraw Hill, 2007.
2. Kaveth Pahlavan, K. Prashanth Krishnamuorthy, "Principles of Wireless Networks", Prentice Hall of India, 2006.
3. William Stallings, "Wireless Communications and Networks" Prentice Hall of India, 2nd Ed., 2007.
4. Dharma Prakash Agrawal & Qing-An Zeng, "Introduction to Wireless and Mobile Systems", Thomson India Edition, 2nd Ed., 2007.
5. Gary. S. Rogers & John Edwards, "An Introduction to Wireless Technology", Pearson Education, 2007.
6. Sumit Kasera and Nishit Narang, "3G Networks– Architecture, Protocols and Procedures", Tata McGraw Hill, 2007.

OBJECTIVES:**The Student should be made to:**

- Exposed to the need for Bioinformatics technologies
- Learn the applications of data mining and warehousing techniques
- Be familiar with Pattern Matching and Visualization
- Learn microarray analysis

UNIT I INTRODUCTION**9**

Bioinformatics technologies – Needs for Bioinformatics - Overview of Bioinformatics technologies Structural bioinformatics – Data format and processing – Secondary resources and applications – Role of Structural bioinformatics - Biological Data Integration System.

UNIT II DATAWAREHOUSING & DATAMINING IN BIOINFORMATICS**9**

Bioinformatics data – Introduction to Data warehousing- data warehousing architecture – Importance of Data warehousing- data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics.

UNIT III MODELING FOR BIOINFORMATICS**9**

Hidden Markov modeling for biological data analysis – Sequence identification – Sequence classification – multiple alignment generation – Comparative modeling – Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks - Molecular modeling – Computer programs for molecular modeling.

UNIT IV PATTERN MATCHING AND VISUALIZATION**9**

Gene regulation – motif recognition – motif detection – strategies for motif detection – Visualization – Fractal analysis – DNA walk models – one dimension – two dimension – higher dimension – Game representation of Biological sequences – DNA, Protein, Amino acid sequences.

UNIT V MICROARRAY ANALYSIS**9**

Microarray technology for genome expression study – image analysis for data extraction – pre-processing – segmentation – gridding – spot extraction – normalization, filtering – cluster analysis – gene network analysis – Compared Evaluation of Scientific Data Management Systems – Cost Matrix – Evaluation model - Benchmark – Tradeoffs.

TOTAL: 45 PERIODS**OUTCOMES:****Upon completion of the course, students will be able to**

- Develop models for biological data.
- Apply pattern matching techniques to bioinformatics data – protein data genomic data.
- Apply micro array technology for genomic expression study

TEXT BOOKS:

1. Yi-Ping Phoebe Chen (Ed), "BioInformatics Technologies", First Indian Reprint, Springer Verlag, 2007.

REFERENCES:

1. Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2003.
2. Arthur M Lesk, "Introduction to Bioinformatics", Second Edition, Oxford University Press, 2005

CS16003	BUSINESS INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES

- Be exposed with the basic rudiments of business intelligence system
- Understand the modeling aspects behind Business Intelligence
- Understand of the business intelligence life cycle and the techniques used in it
- Be exposed with different data analysis tools and techniques
- Apply the business intelligence in different domain.

UNIT I BUSINESS INTELLIGENCE 9

Definition, concept and need for Business Intelligence, Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

UNIT II KNOWLEDGE DELIVERY 9

The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports, automated reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message

UNIT III BUSINESS INTELLIGENCE IN KNOWLEDGE STORAGE AND RETRIEVAL 9

Querying data from data servers using SQL -Restructuring transactional files - Recoding alphanumeric and date variables -Date transformation into time periods -Data Import and Transformation - Linear Regression - Regression Output - Regression Transformation - Logistic Regression - Logistic Regression Output.

UNIT IV BUSINESS INTELLIGENCE APPLICATIONS 9

Marketing models – Logistic and Production models – Application of business intelligence in neural networks-application of business intelligence in artificial intelligence -Case study

UNIT V FUTURE OF BUSINESS INTELLIGENCE 9

Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Use the ETL concepts, tools and techniques to perform Extraction, Transformation, and Loading of data.
- Report the usable data by using various reporting concepts, techniques/tools, and use charts, tables for reporting in BI.
- Use Analytics concepts like data mining, Exploratory and statistical techniques for predictive analysis in Business Intelligence.
- Demonstrate application of concepts in BI.

TEXT BOOKS:

1. Efraim Turban, Ramesh Sharda, Dursun Delen, “Decision Support and Business Intelligence Systems”, 9th Edition, Pearson 2013.
2. GalitShmueli, Nitin R. Patel and Peter C. Bruce, —Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner, Wiley, 2007.

REFERENCES:

1. Larissa T. Moss, S. Atre, “Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making”, Addison Wesley, 2003.
2. David Loshin Morgan, Kaufman, “Business Intelligence: The Savvy Manager’s Guide”, Second Edition, 2012.
3. Cindi Howson, “Successful Business Intelligence: Secrets to Making BI a Killer App”, McGraw-Hill, 2007.
4. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, “The Data Warehouse Lifecycle Toolkit”, Wiley Publication Inc.,2007.

IT16008	DEEP LEARNING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To learn feed forward deep networks
- To understand convolutional networks and sequence modeling
- To study probabilistic models and auto encoders
- To expose the students to various deep generative models
- To study the various applications of deep learning

UNIT I APPLIED MATH AND MACHINE LEARNING BASICS 9

Linear Algebra - Norms, Singular Value Decomposition, the Moore-Penrose Pseudoinverse, Probability and Information Theory, Machine Learning Basics

UNIT II INTRODUCTION TO DEEP NETWORKS: MODERN PRACTICES 9

Deep Feedforward Networks, Regularization for Deep Learning, optimization for Training Deep Models

UNIT III MODERN PRACTICES 9

Convolutional Networks, Sequence Modeling: recurrent and recursive Nets, Practical methodology, Linear Factor Models, Autoencoders, Representation Learning, Monte Carlo methods, Confronting the partition function.

UNIT IV INTRODUCTION TO DEEP GENERATIVE MODELS 9

Approximate Inference, Deep Generative Models - Boltzmann Machines, Restricted Boltzmann Machines, Deep Belief Networks, Deep Boltzmann Machines, Convolutional Boltzmann Machines, Back-Propagation through Random Operations, Directed Generative Nets, Generative Stochastic Networks, Evaluating Generative Models.

UNIT V DEEP LEARNING FRAMEWORK AND APPLICATIONS 9

Introduction to TensorFlow, MXNET, TORCH, Applications of Deep Learning – TEXT, IMAGE, SPEECH.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Understand deep generative models
- Develop applications of deep learning

TEXT BOOKS:

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press, 2016.

REFERENCES:

1. Li Deng, Dong Yu, "Deep Learning: Methods and Applications", Now publishers, 2014.
2. Special Issue on deep learning for speech and language processing, IEEE Transaction on Audio, Speech and Language Processing, vol. 20, iss. 1, pp. 7 – 54, 2012.

IT16009

GRID COMPUTING

L T P C
3 0 0 3

OBJECTIVES

- To understand Grid Architecture.
- To understand different types of grids.
- To know Grid standards.
- To acquire the knowledge of Grid computing in various areas.

UNIT I INTRODUCTION 9

Parallel and Distributed Computing - Cluster Computing - Grid Computing Anatomy and Physiology of Grid - Web and Grid Services.

UNIT II FRAMEWORK 9

Architecture – Implementation of Grid Architecture – Grid Services OGSI, OGSA, WSRF – Grid Resource and Service Management –Resource Management Framework – Service Negotiation and Acquisition Protocol – Layers of Grid Computing – Building Reliable Services - Grid Monitoring – Sensors and Sensor Management - Grid Security – WS Security – GSI.

UNIT III DATA AND KNOWLEDGE GRID 9

DATA Source – Collective Data Services - Data Management – Collective Data Management – Federation Services – Representing Knowledge – Processing Knowledge - Knowledge Oriented Grid.

UNIT IV GRID MIDDLEWARE 9

List of Globally Available Toolkits – GT3 – Architecture Details – Grid Service Container – OGSI Implementation – Security Infrastructure - System Level Services – Hosting Environments Programming Model.

UNIT V APPLICATIONS 9

Scientific – Medical – Bioinformatics – Federated Computing – ERM – Multiplayer Games - Collaborative Science – Grid Computing for SAS, Case Study.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Learn the architecture of grid
- Understand applications of grid

TEXT BOOKS:

Ian Foster, Carl Kesselman, “The Grid 2: Blueprint for a New Computing Infrastructure”, Elsevier Series, Second edition, 2006.

REFERENCES:

1. Srikumar Venugopal, Krishna Nadiminti, Hussein Gibbins and Rajkumar Buyya, “Designing a Resource Broker for Heterogeneous Grids, Software: Practice and Experience”, Wiley Press, New York, USA, 2008.
2. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, “Grid Computing: Making the Global Infrastructure a Reality”, Wiley, 2003. 4. Maozhen Li, Mark Baker, “The Grid: Core Technologies”, Wiley, 2005.
3. SAS Documentation, Grid Computing in SAS 9.3 second edition, 2012.

OBJECTIVES

- To understand the concepts of low level and intermediate level vision
- To understand Hough Transform and its applications.
- To understand three-dimensional image analysis techniques.
- To understand motion analysis.
- To study some applications of computer vision.

UNIT I LOW LEVEL VISION 9

Nature of Vision, Basic Imaging operations- gray scale image, binary image, convolutional and point spread function, sequential vs. parallel operations, Thresholding – Adaptive Thresholding.

UNIT II INTERMEDIATE LEVEL VISION 9

Texture analysis – Binary Shape analysis, connectedness, object labeling and counting, size filtering, distance functions, skeletons and thinning, boundary tracking procedures, Hough Transform – generalized, spatial Matched Filtering, Hough Transform (HT) for line detection, GHT for ellipse detection.

UNIT III 3D VISION 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

UNIT IV MOTION 9

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**OUTCOMES:**

Upon completion of the course, students will be able to

- Understand concepts of 3D vision and motion
- Develop applications in computer vision

TEXT BOOKS:

1. E. R. Davies, “Computer & Machine Vision”, Fourth Edition, Academic Press, 2012.

REFERENCES:

1. R. Szeliski, “Computer Vision: Algorithms and Applications”, Springer 2011.
2. Simon J. D. Prince, “Computer Vision: Models, Learning, and Inference”, Cambridge University Press, 2012.
3. Mark Nixon and Alberto S. Aquado, “Feature Extraction & Image Processing for Computer Vision”, Third Edition, Academic Press, 2012.
4. D. L. Baggio et al., “Mastering OpenCV with Practical Computer Vision Projects”, Packt Publishing, 2012.
5. Jan Erik Solem, “Programming Computer Vision with Python: Tools and algorithms for analyzing images”, O'Reilly Media, 2012.

OBJECTIVES

- To learn specialized cloud architectures
- To understand Unikernels
- To study the basics of containers

UNIT I SPECIALIZED CLOUD ARCHITECTURES 9

Direct I/O Access Architecture , Direct LUN Access Architecture, Dynamic Data Normalization Architecture , Elastic Network Capacity Architecture , Cross-Storage Device Vertical Tiering Architecture , Intra-Storage Device Vertical Data Tiering Architecture , Load Balanced Virtual Switches Architecture , Multipath Resource Access Architecture , Persistent Virtual Network Configuration Architecture , Redundant Physical Connection for Virtual Servers Architecture , Storage Maintenance Window Architecture .

UNIT II UNIKERNELS 9

Dockerized containers, Unikernel application stack, MirageOS, HaLVM, LING, ClickOS, Rumprun, OSv, IncludeOS, Ecosystem elements, Limitations.

UNIT III CONTAINERS 9

Containers Vs VMs, Docker and Containers, Docker Fundamentals, Docker Architecture, Connecting Containers to the World , Linking Containers , Managing Data with Volumes and Data Containers, Common Docker Commands.

UNIT IV MICROSERVICES 9

Autonomous Services ,Small Services, Benefits- Independent Deployments, Continuous Innovation, Improved Scale and Resource Utilization , Technology Diversity , Small Focused Teams , Fault Isolation , Challenges, Encapsulation , DevOps Principles and Culture , Automation , Monitoring , Fault Tolerance.

UNIT V CONTAINERS ON AZURE - BASICS 9

VMs, Containers, and Processes , Containers on Azure , Creating an Azure VM with Docker, Service Orchestration and Connectivity- Orchestration, Provisioning , Scheduling and Cluster Management - Docker Swarm, Kubernetes, Apache Mesos, Using Apache Mesos to Run Diverse Workloads , Service Discovery - Service Registration, Service Lookup, Service Registry, Technologies, Application/API Gateway, Overlay Networking.

TOTAL (L:45): 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Understand various specialized cloud architectures
- Understand the concept of containers

TEXT BOOKS:

1. Zaigham Mahmood, Thomas Erl, Ricardo Puttini , “Cloud Computing: Concepts, Technology & Architecture”, Prentice Hall, 2013.
2. Russell Pavlicek, “Unikernels Beyond Containers to the Next Generation of Cloud”, O’Reilly Media, 2017.

REFERENCES:

1. Adrian Mouat, “Using Docker, Developing and Deploying Software with Containers”, O’Reilly Media, 2015.
2. Daniel Fernandez, Trent Swanson, Boris Scholl, “Microservices with Docker on Microsoft Azure”, Addison-Wesley Professional, June 2016.

		L	T	P	C
IT16012	SECURITY PRINCIPLES AND TECHNIQUES	3	0	0	3
OBJECTIVES					

- To understand the fundamentals of computer security.
- To explore the principles of software security.
- To learn about OS & Database security.
- To learn the principles of mobile and cloud computing security.

UNIT I COMPUTER SECURITY TECHNOLOGY AND PRINCIPLES 9

Computer Security Concepts - Threats, Attacks, and Assets - Security Functional Requirements - Fundamental Security Design Principles - Attack Surfaces and Attack Trees - Computer Security Strategy , Cryptographic Tools - Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions , Public-Key Encryption , Digital Signatures and Key Management , Random and Pseudorandom Numbers Case study: Encryption of Stored Data.

UNIT II AUTHENTICATION AND ACCESS CONTROL 9

Electronic User Authentication Principles , Password-Based Authentication, Token-Based Authentication, Biometric Authentication , Remote User Authentication, Security Issues for User Authentication, Access Control Principles, Discretionary Access Control, Role-Based Access Control, Attribute-Based Access Control, Case study - Security Problems for ATM Systems, RBAC System for a Bank.

UNIT III SOFTWARE SECURITY 9

Malicious Software - Types of Malicious Software , Advanced Persistent Threat , Propagation – Infected Content - Viruses- Vulnerability Exploit - Worms- Social Engineering – SPAM E-Mail, Trojans – System Corruption – Attack Agent – Zombie, Bots – Information Theft – Keyloggers, Phishing, Spyware – Stealthing – Backdoors, Rootkits, Countermeasures, Writing safe code - Buffer Overflow - Stack Overflows - Defending Against Buffer Overflows , Software security issues - Handling Program Input, Writing Safe Program Code, Interacting with the Operating System and Other Programs.

UNIT IV OS AND DATABASE SECURITY 9

The Need for Database Security - SQL Injection Attacks ,Database Access Control, Inference, Database Encryption, Introduction to Operating System Security - System Security Planning, Operating Systems Hardening, Application Security, Security Maintenance, Linux/UNIX Security, Windows Security, Virtualization Security.

UNIT V MOBILE AND CLOUD COMPUTING SECURITY 9

Cloud Security Risks and Countermeasures, Data Protection in the Cloud, Cloud Security as a Service. GSM and UMTS-Security architecture & Attacks, Vulnerabilities in Cellular Services, Cellular Jamming,Attacks & Mitigation, Security in Cellular VoIP Services, Mobile application security.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- To understand security issues in software, OS, database, mobile and cloud computing.

TEXT BOOKS:

1. William Stallings, Lawrie Brown, "Computer Security: Principles and Practice", 3rd Edition Pearson, 2015.
2. S. Kami Makki, Peter Reiher, Kia Makki, Niki Pissinou, Shamila Makki, "Mobile and Wireless Network Security and Privacy", Springer, 2007.

REFERENCES:

1. Nouredine Boudriga, "Security of Mobile Communications", CRC Press, 2010.
2. Mark Stamp, "Information Security: Principles and Practice", Second Edition, Wiley, 2011.
3. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Prentice Hall, 2007.
4. Sean Smith, John Marchesini, "The Craft of System Security", Addison-Wesley Professional, 2008.

IT16013

CYBER FORENSICS

L T P C
3 0 0 3

OBJECTIVES

- To understand the fundamentals of Computer Forensics and computing Investigations.
- To recognize the legal underpinnings and critical laws affecting forensics
- To apply the tools and methods to uncover hidden information in digital systems.
- To learn about current licensing and certification requirements to build the career in digital forensic.

UNIT I INTRODUCTION 9

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

UNIT II INVESTIGATIVE SMART PRACTICES 9

Forensics Investigative Smart Practices –Time and Forensics –Incident closure.

UNIT III LAWS AND PRIVACY CONCERNS 9

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

UNIT IV DATA ACQUISITION AND REPORT WRITING 9

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

UNIT V TOOLS AND CASE STUDIES 9

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

TOTAL (L:45): 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Understand the skill set needed to build a career in forensics.

TEXT BOOKS:

1. Michael Graves, —Digital Archaeology: The Art and Science of Digital Forensics, Addison-Wesley Professional, 2014.
2. Darren R. Hayes, —Practical Guide to Computer Forensics Investigation, Pearson, 2015.

REFERENCES:

1. Albert J. Marcella and Frederic Guillosoy, —Cyber Forensics: From Data to Digital Evidence, Wiley, 2015.
2. Bill Nelson, Amelia Phillips and Christopher Steuart, —Guide to Computer Forensics and Investigations, Fourth Edition, Cengage, 2013.

IT16014	INFORMATION SYSTEM SECURITY ENGINEERING AND MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES

- To provide fundamental knowledge, skills, techniques, and tools required by IT security professionals
- To understand access control, physical security, cryptography, application security, and operations security.
- To facilitate the up-to-date understanding required to stay one step ahead of evolving threats, standards, and regulations.

UNIT I INTRODUCTION 9

Security Engineering, Protocols, Access control, Cryptography- the vingere, one-time pad, Block cipher, one way functions, asymmetric primitives, Random oracle model, symmetric crypto primitives, modes of operation, hash functions, asymmetric crypto primitives, Multilevel and multi lateral security.

UNIT II MANAGEMENT OF INFORMATION SECURITY 9

Principles of Information Security Management – Applying Project Management to Security – Project Management Tools – Planning for Security: The Role of Planning – Precursors to Planning – Strategic Planning – Information Security Governance – Information Security Policy, Standards, and Practices – Planning for Information Security Implementation.

UNIT III MANAGEMENT IN ORGANIZATION 9

Developing the Security Program: Organizing for Security – Placing Information Security within an Organization – Components of the Security Program – Information Security Roles and Titles – Implementing Security Education, Training and Awareness Program – Security Management Models: Blueprints, Frameworks, and Security Models – Access Control Models – Security Architecture Models – Security Management Models – Security Management Practices: – Benchmarking – Performance Measures in Information Security Management. – Personnel and Security: Staffing the Security Function – Information Security Professional Credentials – Security Considerations for Non employees – Employment Policies and Practices.

UNIT IV SECURITY MANAGEMENT CONCEPTS AND PRINCIPLES 9

Measuring ROI on security- Security patch management- Purposes of Information Security management- The building blocks of information security- Human side of information security-Security management- Securing new information technology.

UNIT V MANAGING THE DEVELOPMENT OF SECURE SYSTEMS 9

Managing security project, Methodology, Security requirement engineering, Risk management, Managing the team, System Evaluation and Assurance.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Understand the threats prevalent in modern digital world.

TEXT BOOKS:

1. Micki Krause, Harold F.Tripton, “Information Security Management Handbook”, Auerbach Publications, 2012.
2. Ross J. Anderson, “Security Engineering: A Guide to Building Dependable Distributed Systems”, 2nd Edition, Wiley publications, 2008.

REFERENCES:

1. Michael Whitman and Herbert Mattord, "Principles of Information Security", Fifth Edition, Cengage Learning, 2015.
2. Thomas R. Peltier, "Information Security Policies and Procedures", 2nd Edition, Auerbach Publications, 2004.

OBJECTIVES

- To understand numerous methods of real-world information intelligence
- To learn about vulnerability scanners
- To understand techniques used to sniff traffic across a network
- To familiarize with the methodologies that can be used to hack into a target
- To appreciate the wide variety of attacks that can be performed against a wireless network

UNIT I INTRODUCTION TO HACKING 99

Terminologies, Categories of Penetration Test, Writing Reports, Structure of a Penetration Testing Report, Vulnerability Assessment Summary, Risk Assessment, Methodology, Linux Basics: File Structure, Cron Job, Users, Common Applications, BackTrack, Services.

UNIT II INFORMATION GATHERING, TARGET ENUMERATION AND PORT SCANNING TECHNIQUES 99

Active, Passive and Sources of information gathering, Copying Websites Locally, NeoTrace, Cheops-ng, Intercepting a Response, WhatWeb, Netcraft, Basic Parameters, Xcode Exploit Scanner, Interacting with DNS Servers, Fierce, Zone Transfer with Host Command and Automation, DNS Cache Snooping- Attack Scenario, Automating Attacks, SNMP - Problem, Sniffing Passwords, SolarWinds Toolset, sweep, Brute Force and Dictionary- Tools, Attack, Enumeration, Intelligence Gathering Using Shodan, Target enumeration and Port Scanning Techniques.

UNIT III VULNERABILITY ASSESSMENT & NETWORK SNIFFING 99

Introduction to Vulnerability Assessment - Pros and Cons, NMap, Updation of database, Testing SCADA Environments with Nmap, Nessus, **Sniffing**: Types, Hubs versus Switches, Modes, MITM Attacks, ARP Protocol Basics- working, Attacks, DoS Attacks, Dsniff tool, Using ARP Spoof to Perform MITM Attacks, Sniffing the Traffic with Dsniff, Sniffing Pictures with Drifnet, Urlsnarf and Webspay, Sniffing with Wireshark, Ettercap- ARP Poisoning, Hijacking Session with MITM Attack, ARP Poisoning with Cain and Abel, Sniffing Session Cookies with Wireshark, Hijacking the Session, SSL Strip: Stripping HTTPS Traffic, Requirements, Automating Man in the Middle Attacks, DNS Spoofing, DHCP Spoofing.

UNIT IV BASICS OF EXPLOITATION 99

Remote Exploitation : Understanding Network Protocols, Attacking Network Remote Services, Common Target Protocols, tools for cracking network remote services, Attacking SMTP, Attacking SQL Servers, Client Side Exploitation Methods: E-Mails Leading to Malicious Attachments & Malicious Links, Compromising Client Side Update, Malware Loaded on USB Sticks, **Postexploitation**: Acquiring Situation Awareness, Privilege Escalation, Maintaining Access, Data Mining, Identifying and Exploiting Further Targets, Windows Exploit Development Basics.

UNIT V WIRELESS & WEB HACKING 99

Wireless Hacking : Requirements, Aircracking, Hidden SSIDs, Monitor Mode, Monitoring Tool- Beacon Frames on Wireshark, Airodump-ng, Wireless Adapter in Monitor Mode, Determining the Target, Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng, Capturing Packets and Four-Way Handshake, **Web Hacking** : Attacking the Authentication, Brute Force and Dictionary Attacks, Types of Authentication, Crawling Restricted Links, Testing for the Vulnerability, Authentication Bypass with Insecure Cookie Handling, SQL injection, XSS – DOM based, BeEF, CSRF, Bypassing CSRF and BeEF with XSS, Vulnerability in FCKeditor, efront.

TOTAL : 45 PERIODS

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

- Understand the core concepts related to malware, hardware and software vulnerabilities and their causes
- Understand ethics behind hacking and vulnerability disclosure
- Appreciate the Cyber Laws and impact of hacking
- Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies

TEXT BOOKS:

1. Rafay Baloch ,“Ethical Hacking and Penetration Testing Guide”, CRC Press, 2015.

REFERENCES:

1. Patrick Engebretson, “The Basics of Hacking and Penetration Testing : Ethical Hacking and Penetration Testing Made Easy”, Syngress Media, Second Revised Edition, 2013.
2. Michael T. Simpson, Kent Backman, James E. Corley, “Hands On Ethical Hacking and Network Defense”, Cengage Learning, 2012.

- Employ fundamental computer theory in the context of computer forensics practices.

TEXT BOOKS:

1. Richard Boddington, "Practical Digital Forensics", Packt Publishing, 2016.

REFERENCES:

1. Cory Altheide and Harlan Carvey, "Digital Forensics with Open Source Tools", Syngress, 2011.
2. Harlan Carvey, "Windows Forensic Analysis Toolkit: Advanced Analysis Techniques for Windows 7", Syngress Publishing, 2012.

GE16701	TOTAL QUALITY MANAGEMENT	L	T	P	C
	(Common To All Branches Except CE & BT)	3	0	0	3

OBJECTIVES:

- To facilitate the understanding of Quality Management principles and process

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality.

UNIT II TQM PRINCIPLES 9

Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal- Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating by Analytical Hierarchical Processing(AHP)

UNIT III TQM TOOLS AND TECHNIQUES I 9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Industrial case studies on DFMEA and PFMEA

UNIT IV TQM TOOLS AND TECHNIQUES II 9

Control Charts - Process Capability - Quality Function Development (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, Quality Auditing - QS 9000/TS16949 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

TOTAL:45 PERIODS

OUTCOMES:

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

- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOKS:

1. Dale H. Besterfield, et al., "Total quality Management", Pearson Education Asia, Third Edition, Indian Reprint 2006.

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
2. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
3. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

GE16001	PROFESSIONAL ETHICS	L	T	P	C
	(Common To All Branches Except CE & BT)	3	0	0	3

OBJECTIVES:

- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES 10

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 – Stress and emotional 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 8

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

TOTAL:45 PERIODS

OUTCOMES:

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

- Ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society

TEXT BOOKS:

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, "Fundamentals 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" Mc Graw Hill education, India Pvt. Ltd., New Delhi 2013.
6. World Community Service Centre, ,, Value Education", Vethathiri publications, Erode, 2011

Web sources:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

MG16851

**PRINCIPLES OF MANAGEMENT
(COMMON TO AE,CS,EE,EC,IT & ME)**

**L T P C
3 0 0 3**

OBJECTIVES:

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

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management –Nature of Management-Management as Science or Art-Management and Administration-Evolution of Management-Contribution of Taylor and Fayol– Manager Vs Entrepreneur - types of managers - managerial roles and skills-Types of Business Organisation-Organization Culture and Environment.

UNIT II PLANNING 9

Nature and purpose of planning – Steps Involved in planning process – Types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques-Forecasting – 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 by different strategies – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection process, 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

UNIT V CONTROLLING 9

System and process of controlling – Requirements for effective control - budgetary and non-budgetary control techniques – use of computers and IT in handling the information – Productivity problems and management – control of overall performance – direct and preventive control – reporting.

TOTAL:45 PERIODS

OUTCOMES:

1. Students will be able to practice various managerial roles in the enterprise, apply various managerial approaches to handle complex situations, identify various business organizations and design planning process to reach the decided organizational objectives.
2. Students will be able to formulate strategies for the betterment of the organization as demanded by the environment and the current scenario existing in the organization, group activities, and able to effectively execute various human resource planning activities as required by the organization
3. Students can able to execute the appropriate motivational and leadership techniques as demanded by the situation

4. Students will be able to apply various control techniques to solve the productivity problems and effectively utilize various communication methods in the organization

TEXT BOOKS:

1. Stephen P. Robbins & Mary Coulter, "Management", 10th Edition, Prentice Hall (India) Pvt. Ltd., 2009.
2. M. Govindarajan and S. Natarajan, "Principles of Management", BPB Publications, New Delhi, 2009.
3. 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 & Mamata Mohapatra, "Management", Biztantra, 2008.
3. Tripathy PC & Reddy PN, "Principles of Management", Tata McGraw Hill, 1999.
4. Harold Koontz & Heinz Weihrich "Essentials of management" Tata Mc Graw Hill, 1998.

IT16017

SOFTWARE PROJECT MANAGEMENT

(Common to EC & IT)

L T P C

3 0 0 3

OBJECTIVES

- To understand the roles of the project manager
- To understand the threats and opportunities in project management
- To gain expertise in size, effort and cost estimation techniques
- To understand how to approach non-technical problems
- To appreciate management issues like team structure, group dynamics

UNIT I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT 9

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

UNIT II PROJECT EVALUATION 9

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

UNIT III ACTIVITY PLANNING 9

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

UNIT IV MONITORING AND CONTROL 9

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

UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS 9

Introduction – Understanding Behavior – Organizational Behavior - Selecting the Right Person for the Job – Instruction in the Best Methods – Motivation – The Oldham –Hackmann Job Characteristics Model – Working in Groups – Becoming a Team –Decision Making – Leadership – Organizational Structures – Stress – Health and Safety – Process Group view, Tools - web-based project management tool, Scrum-based task management board.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Understand the activities in step wise frameworks
- Estimate project duration
- Understand the ethics in handling people

TEXT BOOKS:

1. Bob Hughes, Mike Cotterell, —Software Project Management, Fifth Edition, Tata McGraw Hill, 2011.

REFERENCES:

1. <http://projectmanagementacademy.net/articles/five-traditional-process-groups/>
2. Karen Brown, Nancy Lea Hyer, “Managing Projects: A Team-Based Approach”, first edition, Tata McGraw Hill, 2013.
3. Andrew Stellman, Jennifer Greene - Head First PMP, 3rd Edition O'Reilly Media 2013.