SRI VENKATESWARA COLLEGE OF ENGINEERING
(An Autonomous Institution, Affiliated to Anna University, Chennai)
SRIPERUMBUDUR T.K- 602 117
REGULATION – 2016
B.E. COMPUTER SCIENCE AND ENGINEERING
CURRICULUM AND SYLLABUS (I - VIII Semesters)

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	EC16504	Microprocessors and Microcontrollers (Common to CS, EC & IT)	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	EC16512	Microprocessors and Microcontrollers Laboratory (Common to CS, EC & IT)	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	CS16401	Computer Networks (Common to CS, EE, EC & IT)	3	0	0	3
3	CS16402	Database Management Systems(Common to CS & IT)	3	0	0	3
4	CS16403	Design and Analysis of Algorithms	3	0	0	3
5	CS16404	Computer Architecture (Common to CS & EC)	3	0	0	3
6	CS16405	Software Engineering	3	0	0	3
PRACTICALS						
7	CS16411	Networks Laboratory (Common to CS & IT)	0	0	3	2
8	CS16412	Database Management Systems Laboratory(Common to CS & IT)	0	0	3	2
9	CS16413	Software Engineering Laboratory	0	0	3	2
		TOTAL	**18**	**1**	**9**	**25**

SEMESTER V

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	MA16551	Discrete Mathematics	3	1	0	4
2	CS16501	Internet Programming	3	1	0	4
3	CS16502	Object Oriented Analysis and Design(Common to CS & IT)	3	0	0	3
4	CS16503	Theory of Computation	3	0	0	3
5	CS16504	Computer Graphics	3	0	0	3
PRACTICALS						
6	CS16511	Internet Programming Laboratory	0	0	3	2
7	CS16512	Computer Graphics Laboratory	0	0	3	2
8	GE16661	Interview and career skills laboratory (common to all branches)	0	0	4	2
		TOTAL	**15**	**2**	**10**	**23**

SEMESTER VI

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS16601	Machine Learning	3	0	0	3
2	IT16602	Mobile Computing (Common to CS & IT)	3	0	0	3
3	CS16602	Compiler Design	3	0	0	3
4	EC16651	Digital Signal Processing (Common to CS & IT)	3	1	0	4
5	CS16603	Artificial Intelligence	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	CS16611	Compiler Laboratory	0	0	3	2
9	CS16612	Artificial Intelligence Laboratory	0	0	3	2
		TOTAL	**18**	**1**	**9**	**25**

SEMESTER VII

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS16701	Cryptography and Network Security (Common To CS & EC)	3	0	0	3
2	CS16702	Graph Theory and Applications	3	0	0	3
3	CS16703	Distributed Systems and Cloud Computing	3	0	0	3
4	CS16704	Resource Management Techniques (Common To CS & IT)	3	0	0	3
5		Elective II	3	0	0	3
6		Elective III	3	0	0	3
PRACTICALS						
7	CS16711	Security Laboratory	0	0	3	2
8	CS16712	Cloud Computing Laboratory	0	0	3	2
9	CS16713	Mini Project	0	0	3	2
		TOTAL	**18**	**0**	**9**	**24**

SEMESTER VIII

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS16801	Multi – Core Architectures and Programming	3	0	0	3
2		Elective IV	3	0	0	3
3		Elective V	3	0	0	3
PRACTICALS						
4	CS16811	Project Work	0	0	12	6
		TOTAL	**9**	**0**	**12**	**15**

SEMESTER VI - Elective I (Fundamentals – I)

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS16001	Scripting Languages	3	0	0	3
2	IT16603	Software Testing and Quality Assurance (Common to CS & IT)	3	0	0	3
3	EC16801	Wireless Networks (Common to CS, EC & IT)	3	0	0	3
4	CS16002	Information Retrieval Techniques	3	0	0	3
5	CS16016	User interface Technologies(Common to CS & IT)	3	0	0	3

SEMESTER VII - Elective II (Fundamentals – II)

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS16003	Business Intelligence (Common to CS & IT)	3	0	0	3
2	CS16004	Data Analytics (Common to CS & EE)	3	0	0	3
3	EC16017	Ad hoc and Sensor Networks (Common to CS, EC & IT)	3	0	0	3
4	CS16005	Green Computing	3	0	0	3

SEMESTER VII - Elective III (Application – I)

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS16006	Software Defined Radio Networks	3	0	0	3
2	IT16005	Digital Image Processing (Common to CS, EE, EC & IT)	3	0	0	3
3	CS16007	Real Time Operating Systems	3	0	0	3
4	CS16008	Social Network Analysis	3	0	0	3
5	IT16701	Internet of Things (Common to CS, EE, EC& IT)	3	0	0	3

SEMESTER VIII - Elective IV (Application – II)

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS16009	Bio Informatics (Common to CS & IT)	3	0	0	3
2	CS16010	Natural Language Processing	3	0	0	3
3	IT16015	Ethical Hacking (Common to CS & IT)	3	0	0	3
4	IT16016	Digital Forensic Tools and Techniques (Common to CS & IT)	3	0	0	3
5	CS16011	Advanced Software Engineering	3	0	0	3

SEMESTER VIII - Elective V (General Management)

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	MG16851	Principles of Management (Common to AE, CS, EE, EC, IT & ME)	3	0	0	3
3	CS16012	Enterprise Resource Planning	3	0	0	3
4	GE16001	Professional Ethics (Common to all branches except CE & BT)	3	0	0	3

HS16151 **TECHNICAL ENGLISH – I** **L T P C**
3 1 0 4

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, Cambrideg 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.

✓ 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.

MA16151 **MATHEMATICS - I** **L T P C**
3 1 0 4

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.

PH16151 ENGINEERING PHYSICS – I

L	T	P	C
3	0	0	3

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 IIIQUANTUM 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 IVACOUSTICS 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.

CY16151 ENGINEERING CHEMISTRY – I

L	T	P	C
3	0	0	3

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: Tg, 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., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.

GE16151 COMPUTER PROGRAMMING

L	T	P	C
3	0	0	3

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.

GE16152 ENGINEERING GRAPHICS

L	T	P	C
2	0	3	4

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., "AtextbookofEngineeringGraphics",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

GE16161 COMPUTER PRACTICES LABORATORY

L	T	P	C
0	0	3	2

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.

GE16162 ENGINEERING PRACTICES LABORATORY

L	T	P	C
0	0	3	2

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:

(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
b) Study of pipe connections requirements for pumps and turbines.
c) Preparation of plumbing line sketches for water supply and sewage works.
d) Hands-on-exercise:
Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

a) Study of the joints in roofs, doors, windows and furniture.
b) Hands-on-exercise:
Wood work, joints by sawing, planning and cutting.

II MECHANICAL ENGINEERING PRACTICE 13

Welding:

a) Preparation of arc welding of butt joints, lap joints and tee joints.
b) Gas welding practice

Basic Machining:

a) Simple Turning and Taper turning
b) Drilling Practice

Sheet Metal Work:

a) Forming & Bending:
b) Model making – Trays, funnels, etc.
c) Different type of joints.

a) Study of centrifugal pump
b) Study of air conditioner

a) Smithy operations, upsetting, swaging, setting down and bending.
Example – Exercise – Production of hexagonal headed bolt.
b) Foundry operations like mould preparation for gear and step cone pulley.
c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

IIIELECTRICAL 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.

IVELECTRONICS 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. Jeyapoovan 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	
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	

GE16163 PHYSICS AND CHEMISTRY LABORATORY – I

L	T	P	C
0	0	2	1

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

HS16251 **TECHNICAL ENGLISH II** **L T P C**
3 1 0 4

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'); Ematerials - 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, Cambrideg 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.

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.

✓ 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.

MA16251 **Mathematics II** **L T P C**
3 1 0 4

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 parallelopipeds.

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 IIILAPLACE 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, z2, 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
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.

PH 16251	ENGINEERING PHYSICS – II	L	T	P	C
		3	0	0	3

OBJECTIVES:

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

UNIT ICONDUCTING 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 IISEMICONDUCTING 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 – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – Ferro electricity and applications.

UNIT VADVANCED 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.

CY16251 ENGINEERING CHEMISTRY II

L	T	P	C
3	0	0	3

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 IWATER 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 IIELECTROCHEMISTRY 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 VFUELS 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.

CS16201 DIGITAL PRINCIPLES AND SYSTEM DESIGN L T P C
3 0 0 3

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 IICOMBINATIONAL 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.

CS16202 PROGRAMMING AND DATA STRUCTURES I

L	T	P	C
3	0	0	3

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.

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.,

GE 16262 PHYSICS AND CHEMISTRY LABORATORY – II L T P C
0 0 2 1

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.

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, percelain tile, dropper (30 Nos each)

CS16211 **DIGITAL LABORATORY** **L T P C**
0 0 3 2

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.

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

SOFTWARE:

1. HDL simulator.

CS16212 PROGRAMMING AND DATA STRUCTURES LABORATORY I

L	T	P	C
0	0	3	2

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.

MA16351	MATHEMATICS - III (Common to all branches)	L	T	P	C
		3	1	0	4

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 IVFOURIER 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.

CS16302	OPERATING SYSTEMS	L	T	P	C
	(Common to CS, EE, EC & IT)	3	0	0	3

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 systems.
- 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.

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: 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. Doughlas V.Hall, “Microprocessors and Interfacing, Programming and Hardware:,TMH, 2012

EC16351 ANALOG AND DIGITAL COMMUNICATION L T P C
(Common to CS & IT) 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) – PhaseShift 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.

GE16451 ENVIRONMENTAL SCIENCE AND ENGINEERING (Common to all branches) **L T P C 3 0 0 3**

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 SO_2, 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 IIINATURAL 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 IVSOCIAL 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.

CS16311 **PROGRAMMING AND DATA STRUCTURES LABORATORY II** **(Common to CS & IT)** **L T P C**
0 0 3 2

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++ complier 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

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.

CS16312	OPERATING SYSTEMS LABORATORY (Common to CS & IT)	L	T	P	C
		0	0	3	2

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 complier 30 Nos. (or)

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

EC16512 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY (Common to EC, CS & IT) **L T P C**
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
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

MA16453 **PROBABILITY AND QUEUING THEORY** **L T P C**
(Common to CS & IT) **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: 45 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.

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.

CS16402	DATABASE MANAGEMENT SYSTEMS (Common to CS & IT)	L	T	P	C
		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 Concepts‖, Sixth Edition, Tata McGraw Hill, 2010.
2. C.J.Date, A.Kannan, S.Swamynathan, ―An Introduction to Database Systems‖, Eighth Edition, Pearson Education, 2006Book 2

REFERENCES:

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

CS16403 DESIGN AND ANALYSIS OF ALGORITHMS L T P C
3 0 0 3

OBJECTIVES:

- Learn the algorithm analysis techniques.
- Become familiar with the different algorithm design techniques.
- Understand the limitations of Algorithm power.

UNIT I INTRODUCTION 9

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

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force - Closest-Pair and Convex-Hull Problems-Exhaustive Search - Travelling Salesman Problem - Knapsack Problem - Assignment problem.

Divide and conquer methodology – Merge sort – Quick sort – Binary search – Multiplication of Large Integers – Strassen's Matrix Multiplication-Closest-Pair and Convex-Hull Problems.

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE 9

Computing a Binomial Coefficient – Warshall's and Floyd' algorithm – Optimal Binary Search Trees –Knapsack Problem and Memory functions.

Greedy Technique– Prim's algorithm- Kruskal's Algorithm-Dijkstra's Algorithm-Huffman Trees.

UNIT IV ITERATIVE IMPROVEMENT 9

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

UNIT V COPING WITH THE LIMITATIONS OF ALGORITHM POWER 9

Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees-P, NP and NP-Complete Problems--Coping with the Limitations - Backtracking – n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem-Branch and Bound – Assignment problem – Knapsack Problem – Travelling Salesman Problem- Approximation Algorithms for NP – Hard Problems – Travelling Salesman problem – Knapsack problem.

TOTAL : 45 PERIODS

OUTCOMES:

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

TEXT BOOKS:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.

REFERENCES:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, Reprint 2006.
3. Donald E. Knuth, “The Art of Computer Programming”, Volumes 1& 3 Pearson Education, 2009.
4. Steven S. Skiena, “The Algorithm Design Manual”, Second Edition, Springer, 2008.
5. http://nptel.ac.in/

CS16404	COMPUTER ARCHITECTURE	L	T	P	C
	(Common to CS & EC)	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 implmenatation of fixed point and floating point arithmetic operations.
- To expose to the students the concept of pipelining
- To familiarize the students with hierarchical memory system including cache memory and virtual memory
- To expose the studnts with different ways of communicating with I/O devices and standard I/O interfaces

UNIT I OVERVIEW & INSTRUCTIONS 9

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

UNIT II ARITHMETIC OPERATIONS 9

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

UNIT III PROCESSOR AND CONTROL UNIT 9

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

UNIT IV PARALLELISM 9

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

UNIT V MEMORY AND I/O SYSTEMS 9

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

TOTAL: 45 PERIODS

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 / lsevier, 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/.

CS16405 **SOFTWARE ENGINEERING** **L T P C**
3 0 0 3

OBJECTIVES:

The student should be made to*:*

- Understand generic models to structure the software development process.
- Understand fundamental concepts of requirements engineering and Analysis modeling.
- Understand the major considerations for enterprise integration and deployment.
- Learn various testing and maintenance measures and to know the quality Metrics of various Software‘s.
- Analyze the requirements and apply them in a suitable process model.

UNIT I SOFTWARE PROCESS AND PROJECT MANAGEMENT 9

Software Engineering Process Paradigms- Project management Process and Project Metrics - Software estimation Empirical estimation models- planning Risk analysis -Software project scheduling and Tracking.

UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION 9

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 III SOFTWARE DESIGN 9

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

UNIT IV TESTING AND IMPLEMENTATION 9

Software testing fundamentals-Internal and external views of Testing-white box testing- basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques**:** Coding practices-Refactoring.

UNIT V SOFTWARE QUALITY ASSURANCE 9

Software Quality Assurance -Quality Metrics and Models, Software Reliability Theory -Software Maintenance -Software Configuration Management - Reverse Engineering and Re-engineering, Introduction to CASE Tools and Case Studies.

TOTAL (L:45): 45 PERIODS

OUTCOMES:

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

- Identify the key activities in managing a software project. Compare different process models.
- Concepts of requirements engineering and Analysis Modeling.
- Apply systematic procedure for software design and deployment.
- Compare and contrast the various testing and quality assurance techniques.
- Analyze the requirements and apply them in a suitable process model**.**

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", 9th Edition, Pearson Education Asia, 2011.

REFERENCES:

1. David J. Anderson and Eli Schragenheim, ―Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results‖, Prentice Hall, 2003.
2. Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning Private Limited ,2009.
3. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.
4. Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt Ltd, 2007.
5. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited, 2007.
6. Daniel Galin, Software quality assurance- from theory to implementation, Pearson Education, 2009.

CS16411	NETWORKS LABORATORY	L	T	P	C
	(Common to CS & IT)	0	0	3	2

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
    a. Date and Time server & client
    b. Echo server & client, etc
    c. Chat
3. Applications using UDP Sockets
    a. DNS
    b. 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. 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.

CS16412 DATABASE MANAGEMENT SYSTEMS LABORATORY L T P C
(Common to CS & IT) 0 0 3 2

OBJECTIVES:

OBJECTIVES

The student should be made to:

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

LIST OF EXPERIMENTS:

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

TOTAL: 45 PERIODS

OUTCOMES:

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

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

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE:

Standalone desktops 30 Nos.

(or)

Server supporting 30 terminals or more.

SOFTWARE:

Front end: VB/VC ++/JAVA or Equivalent

Back end: Oracle / SQL / MySQL/ PostGress / DB2 or Equivalent.

CS16413 SOFTWARE ENGINEERING LABORATORY L T P C
0 0 3 2

OBJECTIVES:

- To understand the software engineering methodologies for project development.
- To gain knowledge about open source tools for Computer Aided Software Engineering.
- To develop an efficient software using case tools.

LIST OF EXPERIMENTS:

Academic domain

1. Course Registration System
2. Student marks analyzing system

Railway domain

3. Online ticket reservation system
4. Platform assignment system for the trains in a railway station

Medicine domain

5. Expert system to prescribe the medicines for the given symptoms
6. Remote patient monitoring

Finance domain

7. ATM system
8. Inventory maintenance

Human Resource management

9. Quiz System
10. E-mail Client system.

E-Commerce

11. Online shopping and order tracking (E-shopping)
12. Automated online assistant.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Understand the software engineering methodologies for project development.
- Gain knowledge about open source tools for Computer Aided Software Engineering.
- Develop efficient software using case tools.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE: Argo UML / StarUML / UMLGraph / Topcased or Equivalent.

HARDWARE: Standalone desktops 30 Nos.

MA16551	DISCRETE MATHEMATICS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To extend student's Logical and Mathematical maturity and ability to deal with abstraction and to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

UNIT I LOGIC AND PROPOSITION 9+3

Propositional Logic – Propositional equivalences – Normal forms – Principal Conjunctive Normal Forms – Principal Disjunctive Normal Forms – Inference Theory.

UNIT II PROOF TECHNIQUES 9+3

Predicates and Quantifiers – Nested Quantifiers – Introduction to proofs – Proof methods and strategy – Mathematical induction – Strong induction and well ordering

UNIT III COMBINATORICS 9+3

The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.

UNIT IV ALGEBRAIC STRUCTURES 9+3

Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields

UNIT V LATTICES AND BOOLEAN ALGEBRA 9+3

Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems –Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra.

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

OUTCOMES:

Upon completion of the course, students will be able to

- Have knowledge of the concepts needed to test the logic of a program.
- Have an understanding in identifying structures on many levels.
- Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
- Be aware of the counting principles.
- Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.

TEXT BOOKS:

1. Tremblay J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata Mc Graw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7 th Edition, Tata Mc Graw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.

REFERENCES:

1. Ralph.P.Grimaldi., "Discrete and Combinatorial Mathematics: An Applied Introduction", 4 th Edition, Pearson Education Asia, Delhi, 2007.
2. Thomas Koshy., "Discrete Mathematics with Applications", Elsevier Publications, 2006.
3. Seymour Lipschutz and Mark Lipson., "Discrete Mathematics", Schaum‟s Outlines, Tata Mc Graw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

C**S16501**	**INTERNET PROGRAMMING**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

OBJECTIVES:

The Student should be made to:

- Learn java programming
- Understand different Internet Technologies
- Be exposed to java specific web services architecture

UNIT I JAVA PROGRAMMING 9+3

An overview of Java – Data Types – Variables and Arrays – Operators – Control Statements – Classes – Objects – Methods – Inheritance - Packages – Abstract classes – Interfaces and Inner classes – Exception handling - Introduction to Threads – Multithreading – String handling – Streams and I/O – Applets.

UNIT II WEB ESSENTIALS: CLIENTS, SERVERS, AND COMMUNICATION, MARKUP LANGUAGES 9+3

Basic Internet Protocols-WWW-HTTP Request and HTTP Response Message-Web Clients-Web Servers-An introduction to HTML-Fundamental HTML Elements-List-Tables-Frames-Forms-Creating HTML documents-cascading Style Sheets.

UNIT III CLIENT SIDE PROGRAMMING: THE JAVASCRIPT LANGUAGE AND HOST OBJECTS-DOM 9+3

Introduction to JavaScript-Basic Syntax-variables and Data Types-Statements-Operators-Literals – Fucntions-Objects-Arrays-Built in Objects-Host Objects: An Overview-Document Tree-DOM Event Handling.

UNIT IV SERVER SIDE PROGRAMMING- JAVA SERVLETS AND XML 9+3

Introduction to Servlets-Architecture- Servlet Life Cycle-Parameter Data-Sessions-Cookies-URL Rewriting- Running Servlet with DB-Representing Web Data: An overview of XML and NameSpace-JavaScript And XML(AJAX).

UNIT V SEPERATING PROGRAMMING AND PRESENTATIONS: JSP, PHP AND ADVANCED WEB SERVICES 9+3

Introduction to Java Server Pages--Basic JSP and Expression Language- Running JSP Applications with DB -PHP Overview-Running Simple PHP application with DB-Web Services: Describing Web Services with WSDL - Representing Data Types-XML Schema-Communicating Object Data With SOAP.

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

OUTCOMES:

Upon completion of the course, students will be able to

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

TEXT BOOKS:

1. Herbert Schildt, " The Complete Reference Java 2", Mc Graw Hill Education, Fifth Edition
2. Jeffrey C.Jackson,"Web Technologies-A Computer Science Perspective", Pearson Education, 2007)

REFERENCES:

1. Stephen Wynkoop and John Burke "Running a Perfect Website", QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.
3. Jeffrey C and Jackson, "Web Technologies A Computer Science Perspective", Pearson Education, 2011.
4. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.
5. Paul Dietel and Harvey Deitel, "Java How to Program", , 8th Edition Prentice Hall of India.
6. Mahesh P. Matha, "Core Java A Comprehensive Study", Prentice Hall of India, 2011.
7. Uttam K.Roy, "Web Technologies", Oxford University Press, 2011.

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.

CS16503	THEORY OF COMPUTATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

The student should be made to:

- Understand various Computing models like Finite State Machine, Pushdown Automata, and Turing Machine.
- Learn Formalism, regular expressions and types of grammars.
- Understand equivalence and various properties of the computing models Be aware of Decidability and Un-decidability of various problems

UNIT I FINITE AUTOMATA 9

Basic Mathematical Notation and Techniques - Introduction to Formal Proofs - If-then proofs-If and only if proofs- Proving equivalences about sets- Proof by contradiction and contrapositive – Inductive proofs - Central concepts of Automata – Finite Automata (FA) –Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Equivalence of NFA and DFA – Applications of Automata- Finite Automata with Epsilon transitions- Equivalence of NFA's with and without Epsilon transitions- Equivalence of Epsilon NFA and DFA.

UNIT II REGULAR EXPRESSIONS AND LANGUAGES 9

Regular expressions – Algebraic laws for Regular Expressions - Equivalence of Finite Automaton and Regular expressions – Converting DFA's to Regular expression – Converting Regular expression to Automata- Applications of Regular Expressions.

Properties of Regular Languages -Pumping Lemma for Regular languages – Closure properties of Regular languages – Equivalence and Minimization of Automata.

UNIT III CONTEXT FREE GRAMMARS AND PUSHDOWN AUTOMATA 9

Introduction to Grammar— Types of Grammar- Context Free Grammars -Derivations and Languages -Parse Trees– Relationship between derivations, recursive inference and parse trees- Applications of CFG- Ambiguity in Grammars and Languages.

Pushdown Automata- Definitions – Moves – Instantaneous Descriptions – Languages of PDA - Equivalence of Pushdown automata and CFG- Deterministic Pushdown Automata.

UNIT IV PROPERTIES OF CONTEXT FREE LANGUAGES AND TURING MACHINES 9

Simplification of CFG – Elimination of Null productions - Unit productions - Useless symbols – Chomsky Normal Form (CNF) – Greibach Normal Form (GNF)- Pumping lemma for CFL- Closure properties of CFL.

Definitions of Turing Machines –Programming Techniques for Turing machine – Multi head, Multi tape and Non Deterministic Turing Machines - The Halting problem – Chomskian hierarchy of languages.

UNIT V UNDECIDABILITY 9

Recursive and recursively enumerable languages - A language that is not Recursively Enumerable –An undecidable problem that is RE- Undecidable problems about Turing Machine – Post's Correspondence Problem –The classes P and NP - NP completeness -Polynomial time reductions- Tractable and Intractable problems - Case Studies - L-systems - Cellular Automata -DNA Computing - Membrane Computing.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Design Finite State Machine, Pushdown Automata, and Turing Machine.
- Explain the Decidability or Undecidability of various problems.

TEXT BOOKS:

1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.

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REFERENCES:

1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.
2. Thomas A. Sudkamp," An Introduction to the Theory of Computer Science, Languages and Machines", Third Edition, Pearson Education, 2007.
3. Raymond Greenlaw an H.James Hoover, " Fundamentals of Theory of Computation, Principles and Practice", Morgan Kaufmann Publishers, 1998.
4. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.
5. J. Martin, "Introduction to Languages and the Theory of computation" Third Edition, Tata Mc Graw Hill, 2007
6. Peter Linz, "An Introduction to Formal Language and Automata", Third Edition, Narosa Publishers, New Delhi, 2002.
7. Kamala Krithivasan and Rama. R, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education 2009
8. Hopcroft J.E., and Ullman J.D, "Introduction to Automata Theory, Languages and Computations", First Edition, Pearson Education, 2008.

CS16504	COMPUTER GRAPHICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The Student should be made to:

- Gain knowledge about graphics hardware devices and software used.
- Understand the two dimensional graphics and their transformations.
- Understand the three dimensional graphics and their transformations.
- Appreciate illumination and color models.
- Be familiar with understand clipping techniques.

UNIT I INTRODUCTION 9

Survey of computer graphics, Overview of graphics systems – Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.

UNIT II TWO DIMENSIONAL GRAPHICS 9

Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; widow-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms.

UNIT III THREE DIMENSIONAL GRAPHICS 9

Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations - Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces.
TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations; Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.

UNIT IV ILLUMINATION AND COLOUR MODELS 9

Light sources - basic illumination models – halftone patterns and dithering techniques; Properties of light - Standard primaries and chromaticity diagram; Intuitive colour concepts - RGB colour model - YIQ colour model - CMY colour model - HSV colour model - HLS colour model; Colour selection.

UNIT V ANIMATIONS & REALISM 9

ANIMATION GRAPHICS: Design of Animation sequences – animation function – raster animation – key frame systems – motion specification –morphing – tweening. COMPUTER GRAPHICS REALISM: Tiling the plane – Recursively defined curves – Koch curves – C curves – Dragons – space filling curves – fractals – Grammar based models – fractals – turtle graphics – ray tracing.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Design two dimensional graphics.
- Apply two dimensional transformations.
- Design three dimensional graphics.
- Apply three dimensional transformations.
- Apply Illumination and color models.
- Apply clipping techniques to graphics.
- Design animation sequences.

TEXT BOOKS:

1. John F. Hughes, Andries Van Dam, Morgan Mc Guire ,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley ,"Computer Graphics: Principles and Practice", , 3rd Edition, Addison-Wesley Professional,2013.
2. Donald Hearn and Pauline Baker M, "Computer Graphics", Prentice Hall, New Delhi, 2007 .

REFERENCES:

1. Donald Hearn and M. Pauline Baker, Warren Carithers,"Computer Graphics With Open GL", 4th Edition, Pearson Education, 2010.
2. Jeffrey McConnell, "Computer Graphics: Theory into Practice", Jones and Bartlett Publishers, 2006.
3. Hill F S Jr., "Computer Graphics", Maxwell Macmillan" , 1990.
4. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, Kelvin Sung, and AK Peters, Fundamental of Computer Graphics, CRC Press, 2010.
5. William M. Newman and Robert F.Sproull, "Principles of Interactive Computer Graphics", Mc Graw Hill 1978.
6. http://nptel.ac.in/

CS16511	INTERNET PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVES:

The student should be made to:

- Be familiar with Web page design using HTML/XML and style sheets
- Be exposed to creation of user interfaces using Java frames and applets.
- Learn to create dynamic web pages using server side scripting.
- Learn to write Client Server applications.
- Be familiar with the frameworks JSP Strut, Hibernate, Spring
- Be exposed to creating applications with AJAX

LIST OF EXPERIMENTS:

IMPLEMENT THE FOLLOWING:

WEBPAGE CONCEPTS

1. Create a web page with the following using HTML
   a. To embed a map in a web page
   b. To fix the hot spots in that map
   c. Show all the related information when the hot spots are clicked.
2. Create a web page with the following.
   a. Cascading style sheets.
   b. Embedded style sheets.
   c. Inline style sheets. Use our college information for the web pages.
3. Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document.

SOCKETS & SERVLETS

4. Write programs in Java using sockets to implement the following:
   a. HTTP request
   b. FTP
   c. SMTP
   d. POP3
5. Write a program in Java for creating simple chat application with datagram sockets and datagram packets.
6. Write programs in Java using Servlets:
   a. To invoke servlets from HTML forms
   b. To invoke servlets from Applets
7. Write programs in Java to create three-tier applications using servlets for conducting on-line examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.

8. Write a program to lock servlet itself to a particular server IP address and port number. It requires an init parameter key that is appropriate for its servlet IP address and port before it unlocks itself and handles a request

9. Session tracking using hidden form fields and Session tracking for a hit count

Install TOMCAT web server. Convert the static webpages of programs 1&2 into dynamic web pages using servlets (or JSP) and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

ADVANCE CONCEPTS:

10. Implement a simple program using following frameworks

a. JSP Struts Framework

b. Hibernate c. Spring

11.Explore the following application in AJAX: Searching in real time with live searches, Getting the answer with auto complete, Chatting with friends ,Dragging and dropping with Ajax, Getting instant login feedback, Ajax-enabled popup menus, Modifying Web pages on the fly.

12.Write a web services for finding what people think by asking 500 people's opinion for any consumer product

13.Write a web services for predicting for any product sales

TOTAL: 45 PERIODS

OUTCOMES:

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

- Design Web pages using HTML/XML and style sheets
- Create user interfaces using Java frames and applets.
- Create dynamic web pages using server side scripting.
- Write Client Server applications.
- Use the frameworks JSP Strut, Hibernate, Spring
- Create applications with AJAX

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:

- Java, Dream Weaver or Equivalent, MySQL or Equivalent, Apache Server

HARDWARE:

- Standalone desktops 30 Nos

CS16512	COMPUTER GRAPHICS LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVES:

The student should be made to:

- Understand graphics programming
- Be exposed to creation of 3D graphical scenes using open graphics library suits
- Be familiar with image manipulation, enhancement
- Learn to create animations
- To create a multimedia presentation/Game/Project.

LIST OF EXPERIMENTS:

IMPLEMENT THE EXERCISES USING C / OPENGL / JAVA

1. Implementation of Algorithms for drawing 2D Primitives
   – Line (DDA, Bresenham) - all slopes Circle (Midpoint)
2. 2D Geometric transformations using C
   - Translation
   - Rotation Scaling
   - Reflection Shear
   - Window-Viewport
3. Composite 2D Transformations
4. Line Clipping using C
5. 3D Transformations - Translation, Rotation, Scaling using OpenGL
6. 3D Projections – Parallel, Perspective using OpenGL
7. Creating 3D Scenes using OpenGL
8. Creating Fractals using OpenGL
9. Image Editing and Manipulation - Basic Operations on image using any image editing software, Creating gif animated images, Image optimization.
10. 2D Animation – To create Interactive animation using any authoring tool.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Create 3D graphical scenes using open graphics library suits
- Implement image manipulation and enhancement
- Create 2D animations using tools

REFERENCE:

spoken-tutorial.org

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

SOFTWARE:

C, C++, Java, OpenGL

HARDWARE:

Standalone desktops - 30 Nos.

(or)

Server supporting 30 terminals or more.

GE16661 INTERVIEW AND CAREER SKILLS LABORATORY (Common to All Branches)

L	T	P	C
0	0	4	2

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
6. 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.

INFRASTRUCTURE

S.No	Description of Equipment (minimum Configuration)	Qty
	Server	
	• PIV System	1 No
1	• 1 GB RAM / 40 GB HDD • OS: Win 2000 server	
	• Audio card with headphones	
	• JRE 1.3	
	Client Systems	
	• PIII or above	60 No's
2	• 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 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 P3/CD/DVD provision	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
2. so on.
3. Presentation – should be extempore on simple topics.
4. Discussion – topics of different kinds; general topics, and case studies.

REFERENCES :

5. Business English Certificate Materials, Cambridge University Press.
6. Graded Examinations in Spoken English and Spoken English for Work downloadable materials from Trinity College, London.
7. International English Language Testing System Practice Tests, Cambridge University Press.
8. Interactive Multimedia Programs on Managing Time and Stress.
9. Personality Development (CD-ROM), Times Multimedia, Mumbai.
10. 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 Talk

CS16601	MACHINE LEARNING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To provide the students with an in-depth introduction of the

- To provide the students with an in-depth introduction of the basic concepts and techniques of machine learning.
- To enable the students to gain knowledge of parameter estimation methods.
- To introduce different non-parametric methods and dimensionality reduction techniques.
- To make the students sound with the concept of discriminative learning methods.
- To enable the learners to understand decision tree algorithms and mixture of experts.

UNIT I INTRODUCTION 9

Machine Learning-Learning Associations, Classification, Regression, Unsupervised learning, Reinforcement learning; Bayesian Decision Theory-Classification-Losses and Risks- Discriminant Functions and Surfaces.

UNIT II PARAMETER ESTIMATION 9

Maximum Likelihood Estimation-Gaussian case (Normal Density); Evaluating an Estimator:Bias and Variance; Parametric Classification; Regression; Tuning Model Complexity-Bias-Variance Dilemma; Model Selection.

UNIT III NON-PARAMETRIC METHODS 9

Non parametric methods: Classification - K-Nearest neighbor; Regression - Smoothing models ; Clustering - K-means –Hierarchical clustering –Dimensionality reduction - Principal Component Analysis-Fisher Discriminant Analysis – Independent Component Analysis.

UNIT IV DISCRIMINATIVE LEARNING MODELS 9

Logistic regression – Perceptrons - Artificial neural networks– Back propagation Algorithm-Training Procedures and Tuning Network Size; Support Vector Machines -Linear and Non-Linear cases-Support Vector Regression.

UNIT V TREE MODELS AND COMBINING CLASSIFIERS 9

Decision trees – Classification trees - Regression trees –Pruning; Combining Multiple Learners-Voting- Generating Diverse Learners-Model Combination Schemes-Voting-Error-Correcting Output Codes-Random Forests-Bagging-Boosting-Mixture of Experts.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Explain theory underlying machine learning.
- Estimate parameters for an underlying distribution.
- Compare classification with clustering and to reduce the dimension of features.
- Construct algorithms to learn discriminative models.
- Apply decision tree and committee of experts methods.

TEXT BOOKS:

1. Alpaydin, Ethem, "Introduction to machine learning", MIT press, 2014.
2. S.Theodoridis, K.Koutroumbas, Pattern recognition–Fourth edition, Academic Press, 2009.
3. Watt, Jeremy, Reza Borhani, and Aggelos Katsaggelos. Machine Learning Refined: Foundations, Algorithms, and Applications. Cambridge University Press, 2016.

REFERENCES:

1. Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, "Learning from Data", MLBook Publishers, 2012.
2. P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012.
3. K. P. Murphy, "Machine Learning: A probabilistic perspective", MIT Press, 2012.
4. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.
5. D. Barber, "Bayesian Reasoning and Machine Learning", Cambridge University Press, 2012.
6. M. Mohri, A. Rostamizadeh, and A. Talwalkar, "Foundations of Machine Learning", MIT Press, 2012.
7. T. M. Mitchell, "Machine Learning", McGraw Hill, 1997.
8. S. Russel and P. Norvig, "Artificial Intelligence: A Modern Approach", Third Edition, Prentice Hall, 2009.

IT16602	MOBILE COMPUTING (COMMON TO CS & IT)	L 3	T 0	P 0	C 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 the course, students will be able to

- 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.

CS16602	COMPILER DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- The student should be made to: Learn the design principles of a Compiler. Learn the various parsing techniques and different levels of translation Learn how to optimize and effectively generate machine codes

UNIT I INTRODUCTION TO COMPILERS 9

Translators-Compilation and Interpretation-Language processors -The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-, interpretation, bootstrapping, data structures in compilation-Compiler Construction Tools .

UNIT II LEXICAL ANALYSIS 9

Need and Role of Lexical Analyzer-Lexical Errors-Expressing Tokens by Regular Expressions- -Language for Specifying Lexical Analyzers-LEX-Structure of LEX Specification – LEX library-Regular Expressions in LEX -Design of Lexical Analyzer for a sample Language.

UNIT III SYNTAX ANALYSIS 9

Need and Role of the Parser-Context Free Grammars -Top Down Parsing -General Strategies-Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item- Construction of SLR Parsing Table -Introduction to LALR Parser – Error Handling and Recovery in Syntax Analyzer-YACC-Structure of YACC Grammar- Actions – Ambiguity and Conflicts- YACC library – Tokens in YACC-Design of a syntax Analyzer for a Sample Language ..

UNIT IV SYNTAX DIRECTED TRANSLATION & RUN TIME ENVIRONMENT 9

Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute Definitions- Design of predictive translator – Type Systems-Specification of a simple type checker **RUN-TIME ENVIRONMENT:** Source Language Issues-Storage Organization-Storage Allocation Parameter Passing-Symbol Tables-Dynamic Storage Allocation.

UNIT V CODE OPTIMIZATION AND CODE GENERATION 9

Principal Sources of Optimization-DAG- Optimization of Basic Blocks-Global Data Flow Analysis- Efficient Data Flow Algorithms-Issues in Design of a Code Generator – A Simple Code Generator Algorithm.

TOTAL: 45 PERIODS

OUTCOMES:

- At the end of the course, the student should be able to: Design and implement a prototype compiler. Apply the various optimization techniques. Use the different compiler construction tools.

TEXT BOOKS:

1. Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, “Compilers – Principles, Techniques and Tools”, 2 nd Edition, Pearson Education, 2007.

REFERENCES:

1. Randy Allen, Ken Kennedy, “Optimizing Compilers for Modern Architectures: A Dependence-based Approach”, Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, “Advanced Compiler Design and Implementation, “Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, “Engineering a Compiler”, Morgan Kaufmann Publishers Elsevier Science, 2004.
4. Charles N. Fischer, Richard. J. LeBlanc, “Crafting a Compiler with C”, Pearson Education, 2008.

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.

CS16603	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Introduce the concepts of Expert Systems and machine learning

UNIT I INTRODUCTION TO Al AND PRODUCTION SYSTEMS 9

Introduction to AI - Problem formulation, Problem Definition - Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics - Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.

UNIT II REPRESENTATION OF KNOWLEDGE 9

Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using Ontology, Structured representation of knowledge.

UNIT III KNOWLEDGE INFERENCE 9

Knowledge representation - Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory - Bayesian Network - Dempster - Shafer theory.

UNIT IV PLANNING AND MACHINE LEARNING 9

Basic plan generation systems – Strips - Advanced plan generation systems – Goal Stack Planning, Nonlinear planning, Hierarchical Planning, Learning - Machine learning - Learning from observation - Inductive learning – Decision trees, Neural Networks, Explanation based learning

UNIT V EXPERT SYSTEMS 9

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

TOTAL: 45 PERIODS

OUTCOMES:

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

- Identify problems that are amenable to solution by AI methods.
- Identify appropriate AI methods to solve a given problem.
- Formalize a given problem in the language/framework of different AI methods.
- Implement basic AI algorithms.
- Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.

TEXT BOOKS:

1. Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, 3rd Edition, Mc Graw Hill- 2008.
2. Stuart Russel and Peter Norvig “AI – A Modern Approach”, 3rd Edition, Pearson Education 2009.

REFERENCES:

1. Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, 2007.
2. Deepak Khemani “Artificial Intelligence”, Tata Mc Graw Hill Education 2013.
3. http://nptel.ac.in

IT16611	MOBILE APPLICATION DEVELOPMENT LABORATORY (COMMON TO CS & IT)	L	T	P	C
		0	0	3	2

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

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.

SOFTWARE REQUIREMENTS

Android SDK

CS16611	COMPILER LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVES:

- Be exposed to compiler writing tools.
- Learn to implement the different Phases of compiler
- Be familiar with control flow and data flow analysis
- Learn simple optimization techniques

LIST OF EXPERIMENTS:

1. Implementation of Symbol Table
2. Develop a lexical analyzer to recognize a few patterns in C.

(Ex. identifiers, constants, comments, operators etc.)

3. Implementation of Lexical Analyzer using Lex Tool
4. Generate YACC specification for a few syntactic categories.
    a) Program to recognize a valid arithmetic expression that uses operator +, - , * and /.
    b) Program to recognize a valid variable which starts with a letter followed by any
    c) number of letters or digits.
    d) c)Implementation of Calculator using LEX and YACC
5. Convert the BNF rules into Yacc form and write code to generate Abstract Syntax Tree.
6. Implement type checking
7. Implement control flow analysis and Data flow Analysis
8. Implement any one storage allocation strategies(Heap,Stack,Static)
9. Construction of DAG
10. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler.The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.
11. Implementation of Simple Code Optimization Techniques (Constant Folding., etc.)

TOTAL: 45 PERIODS

OUTCOMES:

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

- Implement the different Phases of compiler using tools
- Analyze the control flow and data flow of a typical program
- Optimize a given program
- Generate an assembly language program equivalent to a source language program

LIST OF EQUIPMENT:

- Standalone desktops with C / C++ compiler and Compiler writing tools

(Or)

- Server with C / C++ compiler and Compiler writing tools (LEX and YACC) supporting 30 terminals or more.

CS16612	ARTIFICIAL INTELLIGENCE LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVES:

- Design and implement methods of solving problems using Artificial Intelligence.
- Implement various Expert Systems and machine learning strategies

LIST OF EXPERIMENTS:

1. Implement Breadth, Depth first Search (for 8 puzzle problem or Water Jug problem or any AI search problem)
2. Implement Best First Search (for 8 puzzle problem or Water Jug problem or any AI search problem)
3. Implement Min-max search trees and alpha beta pruning
4. Perform Simple list operations in PROLOG
5. Implement Propositional calculus related problem in PROLOG
6. Implement First order logic related problem in PROLOG
7. Implement Forward chaining and Backward chaining reasoning algorithm
8. Implementation of a Planning problem with STRIPS representation
9. Implement Certainty Factor problem
10. Implement Learning using neural networks
11. Implement Decision trees
12. Design and implementation of Expert System to diagnose diseases/faults in appliances

TOTAL: 45 PERIODS

OUTCOMES:

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

- Implement appropriate AI methods to solve a given problem.
- Implement basic AI algorithms.
- Implement and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports

LIST OF EQUIPMENT:

- Standalone desktops with C / C++/JAVA and Prolog

(Or)

- Server with C / C++/JAVA ,Prolog supporting 30 terminals or more.

CS16701	CRYPTOGRAPHY AND NETWORK SECURITY (COMMON TO CS & EC)	L	T	P	C
		3	0	0	3

OBJECTIVES

- Understand OSI security architecture and classical encryption techniques.
- Acquire fundamental knowledge on the concepts of finite fields and number theory.
- Understand various block cipher and stream cipher models.
- Describe the principles of public key cryptosystems, hash functions and digital signature.

UNIT I INTRODUCTION & NUMBER THEORY 11

Services, Mechanisms and attacks-the OSI security architecture- FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid‟s algorithm-Finite fields-Polynomial Arithmetic –Prime numbers-Fermat‟s and Euler‟s theorem-Testing for primality -The Chinese remainder theorem- Discrete logarithms.Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).

UNIT II BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY 9

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

UNIT III HASH FUNCTIONS AND DIGITAL SIGNATURES 9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS – EI Gamal – Schnorr.

UNIT IV SECURITY PRACTICE & SYSTEM SECURITY 8

Authentication applications – Kerberos – X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Secured Coding - OWASP/SANS Top Vulnerabilities.

UNIT V E-MAIL, IP & WEB SECURITY 8

E-mail Security: Security Services for E-mail-attacks possible through E-mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IPSecurity: Overview of IPSec - IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: Secure Socket layer & Transport Layer Security.

TOTAL:45 PERIODS

OUTCOMES:

- Compare various Cryptographic Techniques
- Design Secure applications
- Inject secure coding in the developed applications

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security, 6 th Edition, Pearson Education, March 2013. (UNIT I,II,III,IV).
2. OWASP top ten security vulnerabilities: http://xml.coverpages.org/OWASPTopTen.pdf (UNIT IV).
3. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002. (UNIT V).
4. S Bose, P Vijaya Kumar, Cryptography and Network Security, 1 Edition, Pearson Education India, 2016. [Problems]

REFERENCES:

1. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2007.
2. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
3. Charles Pfleeger, "Security in Computing", 4 th Edition, Prentice Hall of India, 2006.
4. Ulysess Black, "Internet Security Protocols", Pearson Education Asia, 2000.
5. Charlie Kaufman and Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication in Public World", PHI 2002.
6. Bruce Schneier and Neils Ferguson, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
7. Douglas R Simson "Cryptography – Theory and practice", First Edition, CRC Press, 1995

CS16702	GRAPH THEORY AND APPLICATIONS	L	T	P	C
		3	0	0	3

OBJECTIVES

The student should be made to:

- Be familiar with the most fundamental Graph Theory topics and results.
- Be exposed to the techniques of proofs and analysis.
- Be familiar with different types of graphs and its enumeration.
- Be familiar with trees, fundamental circuits and planarity.
- Be familiar with matrices, coloring, covering and partitioning.

UNIT I INTRODUCTION, PATHS & CIRCUITS 9

Introduction: Graphs - Applications of Graphs - Finite and Infinite graphs - Incidence and Degree - Isolated Vertex - Pendant Vertex and Null graph - History of Graph Theory. Paths and Circuits: Isomorphism - Subgraphs - Walks, Paths and Circuits - Connectedness - Components - Euler graphs - Hamiltonian Paths and Circuits - The Travelling Salesman Problem.

UNIT II TREES, FUNDAMENTAL CIRCUITS, CUT-SETS & CUT-VERTICES 9

Trees and Fundamental Circuits: Trees - Properties of Trees - Pendant Vertices in a Tree - Distance and Centers in a Tree – Rooted and Binary Trees - On Counting Trees - Spanning trees - Fundamental circuits - Finding All Spanning Trees of a Graph - Spanning trees in a weighted graph - Cut sets - Properties of a Cut-set - All cut sets ina graph - Fundamental Circuits and Cut-Sets - Connectivity and Separability - Network flows - 1-Isomorphism - 2-Isomorphism.

UNIT III PLANAR & DUAL GRAPHS, VECTOR SPACES OF A GRAPH 9

Combinational Vs. Geometric Graphs - Planar graphs - Kuratowski's Two Graphs - Different Representation of a Planar Graph - Detection of Planarity - Geometric Dual - Combinatorial dual - Criteria of Planarity - Thickness and Crossings. Vector Spaces of a Graph: Sets with One Operation - Sets with Two Operations - Modular Arithmetic and Galois Fields - Vectors and Vector Spaces - Vector Space Associated with a Graph - Basics Vectors of a Graph - Circuit and Cut-Set Subspaces - Orthogonal Vectors and Spaces - Intersection and Join of W and Ws.

UNIT IV MATRICES, COLORING , COVERING AND PARTITIONING 9

Incidence Matrix - Submatrices of A(G) - Circuit Matrix - Fundamental Circuit Matrix and Rank of B - Application to a Switching Network - Cut-Set Matrix - Relationships among Af, Bf and Cf. Path Matrix, Adjaceny Matrix. Chromatic number - Chromatic partitioning - Chromatic polynomial - Matchings - Coverings - The Four color problem.

UNIT V DIRECTED GRAPHS & ENUMERATION OF GRAPHS 9

Directed graphs: Directed Graphs - Types of Digraphs - Digraphs and Binary Relations - Directed paths and Connectedness - Euler graphs - Trees with Directed Edges - Fundamental Circuits in Digraphs - Matrices A, B and C of digraphs, Adjacency Matrix of a Digraph, Paired Comparisions and Tournaments - Acyclic Digraphs and Decyclization. Enumeration of Graphs: Types of Enumeration - Counting Labelled and Unlabelled Trees - Polya's Counting Theorem - Graph Enumeration with Polya's Theorem.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Write precise and accurate mathematical definitions of objects in graph theory.
- Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.
- Validate and critically assess a mathematical proof.
- Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.
- Reason from definitions to construct mathematical proofs.

TEXT BOOKS:

1. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.

REFERENCES:

1. Clark J. and Holton D.A, "A First Look at Graph Theory", Allied Publishers, 1995.
2. Gary Chartrand, Ortrud R.Oellermann,"Introduction to Graph Theory", Tata McGraw-hill, 2005.
3. Douglas B West, "Introduction to Graph Theory", Prentice-Hall of India, 2005.
4. Frank Harary, "Graph Theory", Prentice-Hall of India, 1988.

CS16703 DISTRIBUTED SYSTEMS AND CLOUD COMPUTING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide the students with an in-depth introduction of the
- To enable the students to know about the basic concepts of distributed systems.
- To understand the concept various distributed file systems and how it is managed in a distributed network.
- To make the students to know about how the virtualization concepts is involved in cloud computing.
- To make the students sound with the concept of cloud programming and software environments
- To enable the learners to understand the security issues in distributed and cloud computing.

UNIT I INTRODUCTION TO DISTRIBUTED SYSTEMS 9

Introduction to Distributed Systems – Shared Memory and Distributed Memory Systems – Inter process communication – Remote Invocation – Indirect Communication – Distributed Objects – CORBA.

UNIT II SYNCHRONIZATION AND DISTRIBUTED FILE SYSTEMS 9

Time and Global states – Coordination and Agreement. Distributed File Systems – Sun network file system – Andrew file systems. Peer to Peer Systems – Napster – Routing Overlay's – Tapestry – Ocean store.

UNIT III CLOUD COMPUTING AND VIRTUALIZATION 9

Web Services - Service Oriented Architecture – Cluster Computing – Grid Computing - Cloud Computing - Essential Characteristics and Benefits - Cloud Service Models – Deployment Models - Cloud Vendors – Standards. Implementation Levels of Virtualization - Virtualization Structures - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

UNIT IV CLOUD PROGRAMMING AND SOFTWARE ENVIRONMENTS 9

Parallel and Distributed Programming Paradigms - Google - Google App Engine-GFS- BigTable - Microsoft Azure - Open Source Eucalyptus and Nimbus - OpenNebula – OpenStack- Manjrasoft Aneka cloud and Appliances.

UNIT V SECURITY 9

Security management in Peer-to-Peer networks – Peer trust and Reputation Systems – Trust overlay and DHT implementation – Power Trust – Securing Overlays. Cloud Security and Trust Management – Defense Strategies – Distributed Intrusion Detection – Data and Software Protection Techniques - Reputation Guided Protection of Data Centers

TOTAL: 45 PERIODS

OUTCOMES:

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

- Establish the concepts of distributed systems and shared memory.
- Learn the various distributed file systems.
- Identify the levels of virtualization and its advantages.
- Setup the cloud infrastructure and make cloud environment.
- Learn how to provide security for distributed and cloud computing information.

TEXT BOOKS:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair, "Distributed Systems – Concepts and Design", Fifth Edition, Pearson, 2016.

REFERENCES:

1. Andrew S. Tanenbaum, marten van steen "Distributed Systems – Principles and Paradigms",pearson prentice hall,2007.
2. James E. Smith, Ravi Nair, Virtual Machines: Versatile Platforms for Systems and Processes, Elsevier/Morgan Kaufmann, 2005.
3. William von Hagen, Professional Xen Virtualization, Wrox Publications, January, 2008.
4. Chris Wolf, Eric M. Halter, Virtualization: From the Desktop to the Enterprise, APress 2005.
5. Alex Amies, Harm Sluiman, Qiang Guo Tong, Guo Ning Liu, Developing andHosting Applications on the Cloud, IBMPress, 2012.
6. John W. Rittinghouse, James F. Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2010.

CS16704	RESOURCE MANAGEMENT TECHNIQUES (COMMON TO CS & IT)	L	T	P	C
		3	0	0	3

OBJECTIVES

- The student should be familiar with the basic resource management techniques
- The student should learn to solve problems in linear programming and Integer programming and be exposed to CPM and PERT
- The student should be familiar to use the queuing model

UNIT I LINEAR PROGRAMMING MODELS 9

Mathematical Formulation - Graphical Solution of linear programming models – Simplex method – Artificial variable Techniques- Variants of Simplex method.

UNIT II INTEGER PROGRAMMING MODELS 9

Formulation – Gomory's IPP method – Gomory's mixed integer method – Branch and bound technique.

UNIT III TRANSPORTATION AND ASSIGNMENT MODELS 9

Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution – optimum solution - degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm – Variants of the Assignment problem

UNIT IV SCHEDULING BY PERT AND CPM 9

Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling

UNIT V QUEUING MODELS 9

Characteristics of Queuing Models – Poisson Queues - (M / M / 1) : (FIFO / 8 /8), (M / M / 1) : (FIFO / N / 8), (M / M / C) : (FIFO / 8 / 8), (M / M / C) : (FIFO / N / 8) models.

TOTAL (L:45): 45 PERIODS

OUTCOMES:

- Students will understand and will apply the resource management techniques in various engineering fields
- Students will automate and apply resource management techniques to facilitate relations among the working networks and projects
- Students can schedule real time applications using queuing theory

TEXT BOOKS:

1. Taha H.A., "Operations Research : An Introduction " 7th Edition, Pearson Education, 2004.

REFERENCES:

1. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2005.
2. Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand & Company Ltd, New Delhi, 3rd Edition , 2003.

CS16711	SECURITY LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVES:

The student should be made to:

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

LIST OF EXPERIMENTS:

1. Number theory
    a. Euclid's Algorithm
    b. Extended Euclidean Algorithm
    c. Miller Rabin Primality Test
    d. Euler's Totient Funtion
2. Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts: a) Caesar Cipher b) Playfair Cipher c) Hill Cipher d) Vigenere Cipher e) Rail fence – row & Column Transformation f) Vernam One time pad
3. Implement the following algorithms a)S DES b) RSA Algorithm c) Diffiee-Hellman
4. Implement the following algorithms a) MD5 b) SHA-1
5. Implement the SIGNATURE SCHEME - Digital Signature Standard
6. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
7. Setup a honey pot and monitor the honeypot on network (KF Sensor)
8. Installation of rootkits and study about the variety of options
9. Perform wireless audit on an access point or a router and decrypt WEP and WPA.(Net Stumbler)
10. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

TOTAL : 45 PERIODS

OUTCOMES:

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

- Implement the cipher techniques
- Develop the various security algorithms
- Use different open source tools for network security and analysis

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:

- C / C++ / Java or equivalent compiler GnuPG, KF Sensor or Equivalent, Snort, Net Stumbler or Equivalent

HARDWARE:

- Standalone desktops – 30 Nos.
  (or)
- Server supporting 30 terminals or more.

CS16712	CLOUD COMPUTING LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVES:

The student should be made to:

- Be exposed to simulation kits for grid and cloud environment.
- Be exposed to tool kits for grid and cloud environment.
- Be familiar with developing web services/Applications in grid framework.
- Learn to run virtual machines of different configuration.
- Learn to use Hadoop.

LIST OF EXPERIMENTS:

GRID COMPUTING LAB:

Use Globus Toolkit or equivalent and do the following:

- Develop a Grid environment using GridSim simulator
- Develop a new Web Service for Calculator.
- Using Apache Axis develop a Grid Service.
- Develop applications using Java or C/C++ Grid APIs
- Develop secured applications using basic security mechanisms available in Globus Toolkit.
- Develop a Grid portal, where user can submit a job and get the result. Implement it with and without GRAM concept.

CLOUD COMPUTING LAB:

1. Use Eucalyptus or Open Nebula or equivalent to set up the cloud and demonstrate:
2. Develop a Cloud environment using CloudSim simulator.
3. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
4. 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.
5. Install a C compiler in the virtual machine and execute a sample program.
6. Show the virtual machine migration based on the certain condition from one node to the other.
7. Find procedure to install storage controller and interact with it.
8. Find procedure to set up the one node Hadoop cluster.
9. Mount the one node Hadoop cluster using FUSE.
10. Write a program to use the API's of Hadoop to interact with it.
11. Write a wordcount program to demonstrate the use of Map and Reduce tasks

TOTAL: 45 PERIODS

OUTCOMES:

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

- Use the grid and cloud simulators.
- Use the grid and cloud tool kits.
- Design and implement applications on the Grid.
- Design and Implement applications on the Cloud.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:

- GridSim or CloudSim simulator, Globus Toolkit or equivalent Eucalyptus or Open Nebula or equivalent

HARDWARE:

- Standalone desktops 30 Nos

CS16801	MULTI-CORE ARCHITECTURES AND PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES

The student should be made to:

- Understand the challenges in parallel and multi-threaded programming.
- Learn about the various parallel programming paradigms, and solutions.

UNIT I PARALLEL ARCHITECTURES 9

Von Neumann architecture –Process – Threads – Instruction Level Parallelism (ILP) – Thread Level Parallelism (TLP) - Single core to Multi-core architectures – SIMD and MIMD systems – Symmetric and Distributed Shared Memory Architectures - Interconnection networks - Cache coherence - Performance Issues – Parallel program design.

UNIT II PARALLEL PROGRAM CHALLENGES 9

Performance – Amdahl's Law - Gustafson-Barsis's Law - Karp-Flatt Metric - Isoefficiency Metric – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – Deadlocks and Livelocks – Communication between threads and processes (condition variables, signals, message queues and pipes).

UNIT III SHARED MEMORY PROGRAMMING WITH OpenMP 9

OpenMP Execution Model – Memory Model – OpenMP Directives – Parallel Region Construct - Work-sharing Constructs – Synchronization Constructs – Data Environment Constructs - Handling Loops – Handling Data and Functional Parallelism – Library functions - Performance Considerations.

UNIT IV DISTRIBUTED MEMORY PROGRAMMING WITH MPI 9

MPI program execution – MPI constructs – MPI send and receive – Point-to-point and Collective communication – Library Functions - MPI derived datatypes – Performance evaluation.

UNIT V PARALLEL PROGRAM DEVELOPMENT 9

OpenMP and MPI implementations – Bubble Sort - Trapezoidal Rule - Tree Search - n-Body solvers.

TOTAL (L:45): 45 PERIODS

OUTCOMES:

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

- Analyze Serial and Parallel Architectures.
- Develop programs using OpenMP and MPI.
- Compare and contrast programming for serial processors and programming for parallel processors.

TEXT BOOKS:

1. Peter S. Pacheco, "An Introduction to Parallel Programming", Morgan-Kauffman/Elsevier, 2011.
2. Darryl Gove, "Multicore Application Programming for Windows, Linux, and Oracle Solaris",Pearson, 2011 (Unit II)

REFERENCES:

1. Michael J Quinn, "Parallel programming in C with MPI and OpenMP", Tata McGraw Hill, 2003.(Unit II)

CS16001	SCRIPTING LANGUAGES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the concepts and architecture of the WorldWideWeb.
- To understand and practice mark up languages
- 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 9

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 9

Markup Language (HTML): Introduction to HTML and HTML5 - Formatting and Fonts – Commenting Code – Anchors – Backgrounds – Images – Hyperlinks – Lists – Tables – Frames - HTML Forms. Cascading Style Sheet (CSS): The need for CSS, Introduction to CSS – Basic syntax and structure -Inline Styles – Embedding Style Sheets - Linking External Style Sheets – Backgrounds – Manipulating text - Margins and Padding - Positioning using CSS.

UNIT III INTRODUCTION TO JAVASCRIPT 9

Introduction - Core features - Data types and Variables - Operators, Expressions, and Statements - Functions - Objects - Array, Date and Math related Objects - Document Object Model - Event Handling- Controlling Windows & Frames and Documents - Form handling and validations.

UNIT IV ADVANCED JAVASCRIPT 9

Browser Management and Media Management – Classes – Constructors – Object-Oriented Techniques in JavaScript – Object constructor and Prototyping - Sub classes and Super classes – JSON - jQuery and AJAX.

UNIT V PHP 9

Introduction - How web works - Setting up the environment (LAMP server) - Programming basics -Print/echo - Variables and constants – Strings and Arrays – Operators, Control structures and looping structures – Functions – Reading Data in Web Pages - Embedding PHP within HTML – Establishing connectivity with MySQL database.

TOTAL: 45 PERIODS

OUTCOMES:

Upon Completion of the course, the 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 and connect to the back end databases.

TEXT BOOKS:

1. Harvey & Paul Deitel & Associates, 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. Steven Holzner, “The Complete Reference - PHP”, Tata McGraw Hill, 2008
4. Mike Mcgrath, “PHP & MySQL in easy Steps”, Tata McGraw Hill, 2012.
5. http://php.net/manual/

IT16603	SOFTWARE TESTING & QUALITY ASSURANCE (Common to CS & IT)	L	T	P	C
		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 the course, students will be able to

- 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 Gopalaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, 2006.
3. Ron Patton, “Software Testing”, Second Edition, Sams Publishing, Pearson Education, 2007.

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 UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, 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.

CS16002 INFORMATION RETRIEVAL TECHNIQUES

L	T	P	C
3	0	0	3

OBJECTIVES:

The Student should be made to:

- Learn the information retrieval models.
- Be familiar with Web Search Engine.
- Be exposed to Link Analysis.
- Understand Hadoop and Map Reduce.
- Learn document text mining techniques.

UNIT I INTRODUCTION 9

Introduction - History of IR- Components of IR - Issues – Open source Search engine Frameworks - The impact of the web on IR - IR Versus Web Search - Components of a Search engine - Crawls and Feeds – Crawling the Web - Crawling Documents and Email – Document Feeds

UNIT II INFORMATION RETRIEVAL 9

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

UNIT III WEB SEARCH ENGINE – CRAWLING AND NAVIGATION 9

Web search overview, web structure, Information seeking on the web, Link Analysis, Content Relevance – Link-based Metrics, Evaluating search engines – Different types of search engines – Search Engine Advertising – Metasearch - Personalization – Question Answering on the Web, Image search - Special Purpose Search Engines - Web Browsing and Navigation - Navigation Tools - Navigational Metrics - Web Data Mining and algorithms

UNIT IV SEARCH IN MOBILE WEB AND SOCIAL NETWORKS 9

The Mobile Web - The Paradigm of Mobile Computing - Mobile Web Services - Mobile Device Interfaces - The Navigation Problem in Mobile Portals - Mobile Search - Social Networks – Introduction - Social Network Analysis - Collaborative Filtering – Weblogs - Searching in Social Networks - Social Tagging and Bookmarking - Opinion Mining.

UNIT V DOCUMENT TEXT MINING 9

Text Mining -Text classification and clustering - Categorization algorithms: naive Bayes; decision trees; and nearest neighbor - Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Apply information retrieval models.
- Design Web Search Engine.
- Use Link Analysis.
- Use Hadoop and Map Reduce.
- Apply document text mining techniques.

TEXT BOOKS:

1. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009
2. C. Manning, P. Raghavan, and H. Schutze, Introduction to Information Retrieval, Cambridge University Press, 2008.
3. Mark Levene, An Introduction to Search Engines and Web Navigation, 2nd Edition Wiley, 20103.

REFERENCES:

1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
2. Ophir Frieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series ",2nd Edition, Springer, 2004.
3. Manu Konchady, "Building Search Applications: Lucene, Ling Pipe", and First Edition, Gate Mustru Publishing, 2008.

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

CS16003	BUSINESS INTELLIGENCE (COMMON TO CS & IT)	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:

- 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.

CS16004	DATA ANALYTICS (COMMON TO CS & EE)	L	T	P	C
		3	0	0	3

OBJECTIVES:

The Student should be made to:

- Be exposed to big data
- Learn the different ways of Data Analysis
- Be familiar with data streams
- Learn the mining and clustering
- Be familiar with the visualization

UNIT I INTRODUCTION TO BIG DATA 9

Introduction to Big Data Platform – Challenges of conventional systems - Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting - Modern data analytic tools, Stastical concepts: Sampling distributions, resampling, statistical inference, prediction error.

UNIT II DATA ANALYSIS 9

Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics - Rule induction - Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT III 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 - Realtime Analytics Platform(RTAP) applications - case studies - real time sentiment analysis, stock market predictions.

UNIT IV FREQUENT ITEMSETS AND CLUSTERING 9

Mining Frequent itemsets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in non-euclidean space – Clustering for streams and Parallelism.

UNIT V FRAMEWORKS AND VISUALIZATION 9

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications:

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course,

- Apply the statistical analysis methods.
- Compare and contrast various soft computing frameworks.
- Design distributed file systems.
- Apply Stream data model.
- Use Visualisation techniques

TEXT BOOKS:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.

REFERENCES:

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analystics, John Wiley & sons, 2012.
2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
3. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier,Reprinted 2008.

EC16017	AD HOC AND SENSOR NETWORKS (COMMON TO CS,EC & IT)	L	T	P	C
		3	0	0	3

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.

CS16005	GREEN COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.
- To develop the skills in energy saving practices for the use of hardware, examine technology tools that can reduce paper waste and carbon footprint by user.

UNIT I FUNDAMENTALS 9

Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

UNIT II GREEN ASSETS AND MODELING 9

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

UNIT III GRID FRAMEWORK 9

Virtualizing of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

UNIT IV GREEN COMPLIANCE 9

Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.

UNIT V CASE STUDIES 9

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

TOTAL: 45 PERIODS

OUTCOMES:

- Overall the effects of green computing with its benefits, practicality, and uses are all positives.
- By going "green" in technology it will help to promote an eco-friendly and cleaner environment, along with our own benefits by reducing costs, conserving energy, cutting down on waste and greenhouse gases.

TEXT BOOKS:

1. Bhuvan Unhelkar, “Green IT Strategies and Applications-Using Environmental Intelligence”, CRC Press, June 2011
2. Woody Leonhard, Katherrine Murray, “Green Home computing for dummies”, August 2009.

REFERENCES:

1. John Lamb, “The Greening of IT”, Pearson Education, 2009.
2. Jason Harris, “Green Computing and Green IT- Best Practices on regulations & industry”, Lulu.com, 2008.
3. Carl speshocky, “Empowering Green Initiatives with IT”, John Wiley & Sons, 2010.

CS16006	SOFTWARE DEFINED RADIO NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The Student should be made to:

- Know the basics of the software defined radios.
- Understand the concepts of wireless networks
- Understand the concepts of next generation networks

UNIT I INTRODUCTION TO SOFTWARE RADIO CONCEPTS 9

The need for software radios, what is a software radio, characteristics and benefits of a software radio, Design principles of a software radio.

UNIT II RADIO FREQUENCY IMPLEMENTATION ISSUES 9

The purpose of the RF front-end, Dynamic range: The principal Challenge of receiver design, RF receiver front-end topologies, Enhanced flexibility of the RF chain with software radios, importance of the components of overall performance, transmitter architectures and their issues, noise and distortion in the RF chain, ADC and DAC distortion.

UNIT III SOFTWARE DEFINED RADIO 9

Acquisition of software radios,Broader implication of software radios, software radio architecture evolution- technology demographics,commercial architecture needs,Military architecture needs,Open architecture and standard evolution, technology tradeoffs.

UNIT IV SDR ARCHITECTURE 9

System level architecture analysis-Radio resource analysis,Network architecture analysis,Analysing the protocol stack,System level architecture parameters,Node level architecture analysis-Architecture representation,Industry standard node architecture.

UNIT V NEXT GENERATION WIRELESS NETWORKS 9

The XG Network architecture, spectrum sensing, spectrum management, spectrum mobility, spectrum sharing, upper layer issues, cross – layer design.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course,

- Describe the basics of the software defined radios.
- Explain the concepts behind the wireless networks
- Explain the concepts behind the next generation networks

TEXT BOOKS:

1. Software Radio: A Modern Approach to Radio Engineering By Jeffrey H. Reed Pearson Education Low Price Edition
2. Joseph Mitola III,"Software Radio Architecture: Object-Oriented Approaches to Wireless System Engineering", John Wiley & Sons Ltd. 2000.
3. 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.

REFERENCES:

1. Thomas W.Rondeau, Charles W. Bostain, "Artificial Intelligence in Wireless communication", ARTECH HOUSE .2009.
2. Bruce A. Fette, "Cognitive Radio Technology", Elsevier, 2009.
3. Markus Dillinger, Kambiz Madani, Nancy Alonistioti, "Software Defined Radio", John Wiley, 2003.

IT16005	DIGITAL IMAGE PROCESSING (COMMON TO CS, EE, EC & IT)	L 3	T 0	P 0	C 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:

Upon completion of the course, students will be able to

- Analyze general terminology of digital image processing.
- Implement image processing 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.

CS16007	REAL TIME OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES

The student should be made to:

- To provide overview of OS concepts.
- To teach fundamental concepts of RTOS and how Synchronization and Communications happen in RTOS
- To give an insight on RTOS Models, Real Time Language and compare study on types and Functionalities of commercial OS
- To discuss the application development using RTOS

UNIT I REVIEW OF OPERATING SYSTEMS 9

Basic Principles - Operating System structures – System Calls – Files – Processes – Design and Implementation of processes – Communication between processes.

UNIT II RTOS STRUCTURE AND SYNCHRONIZATION 12

RTOS Characteristics and Types – RTOS Task and Task state – Task Management, Task Scheduling - Time Management, Event Control Blocks - Interrupt Handling – Resource Allocation - Process Synchronization-– Critical section – Semaphores – Classical Synchronisation problem – Deadlock.

UNIT III REAL TIME MODELS AND COMMUNICATIONS 6

Event Based – Process Based and Graph based Models – Real Time Languages – Message queues– Mail boxes –pipes –Memory Management.

UNIT IV REAL TIME KERNEL 9

Principles – Design Stratergies – Polled Loop Systems – RTOS Porting to a Target – Comparisonand Basic study of various RTOS like – VX works – Linux supportive RTOS – C Executive – Comparison of Uniprocessor RTOS and Multiprocessor RTOS.

UNIT V RTOS APPLICATION DOMAINS 9

Case studies-RTOS for Image Processing – Embedded RTOS for Network communication – RTOS for fault-Tolerant Applications – RTOS for Control Systems.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Apply OS Concepts.
- Handle Process Synchronization in RTOS.
- Design communication between processes.
- Implement real time kernel.
- Perform different application on RTOS.

TEXT BOOKS:

1. Silberschatz,Galvin,Gagne, ”Operating System Concepts”,6th ed, John Wiley, 2003
2. Raj Kamal, “Embedded Systems- Architecture, Programming and Design”, Tata McGraw Hill, 2006.

REFERENCES:

1. Wang, K.C.,”Embedded and Real-Time Operating Systems”, Springer, 2016.
2. Jean J. Labrosse, “MicroC/OS II The Real-Time Kernel”, Second Edition, 2002.
3. Filip Thoen, Francky Catthoor, “Modeling verification and exploration of task-level concurrency in real-time embedded systems”, First Edition, Springer-Science + Business Media,B.V, 2000

CS16008	SOCIAL NETWORK ANALYSIS	L	T	P	C
		3	0	0	3

OBJECTIVES

The student should be made to:

- Understand the concept of semantic web and related applications.
- Learn knowledge representation using ontology.
- Understand human behavior in social web and related communities
- Learn visualization of social networks.

UNIT I INTRODUCTION 9

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

UNIT II MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION 9

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

UNIT III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS 9

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

UNIT IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES 9

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

UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS 9

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

TOTAL: 45 PERIODS

OUTCOMES:

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

- Develop semantic web related applications.
- Represent knowledge using ontology.
- Predict human behaviour in social web and related communities.
- Visualize social networks

TEXT BOOKS:

1. Peter Mika, "Social Networks and the Semantic Web", , First Edition, Springer 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.

REFERENCES:

1. Guandong Xu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
2. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global
4. Snippet, 2009.
5. John G. Breslin, Alexandre Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

IT16701	INTERNET OF THINGS (COMMON TO CS, EC, EE & IT)	L 3	T 0	P 0	C 3

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:

Upon completion of the course, students will 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.

CS16009	BIO INFORMATICS (COMMON TO CS & IT)	L	T	P	C
		3	0	0	3

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 AND 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

CS16010	NATURAL LANGUAGE PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The Student should be made to:

- Learn the techniques in natural language processing.
- Be familiar with the natural language generation.
- Be exposed to machine translation.
- Understand the information retrieval techniques.

UNIT I OVERVIEW AND LANGUAGE MODELING 9

Overview: Origins and challenges of NLP-Language and Grammar-Processing Indian Languages-NLP Applications-Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model..

UNIT II WORD LEVEL AND SYNTACTIC ANALYSIS 9

Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Context-free Grammar-Constituency- Parsing-Probabilistic Parsing.

UNIT III SEMANTIC ANALYSIS AND DISCOURSE PROCESSING 9

Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. Discourse Processing: cohesion-Reference Resolution- Discourse Coherence and Structure.

UNIT IV NATURAL LANGUAGE GENERATION AND MACHINE TRANSLATION 9

Natural Language Generation: Architecture of NLG Systems- Generation Tasks and Representations-Application of NLG. Machine Translation: Problems in Machine Translation- Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.

UNIT V INFORMATION RETRIEVAL AND LEXICAL RESOURCES 9

Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame Net-Stemmers-POS Tagger- Research Corpora.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Analyze the natural language text
- Generate the natural language
- Do machine translation
- Apply information retrieval techniques

TEXT BOOKS:

1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

REFERENCES:

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", 2nd Edition, Prentice Hall, 2008.
2. James Allen, "Natural Language Understanding", 2nd edition, Benjamin /Cummings publishing company, 1995.

IT16015	ETHICAL HACKING (COMMON TO CS & IT)	L	T	P	C
		3	0	0	3

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 9

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 9

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 9

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 Webspy, 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 9

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 9

Wireless Hacking : Requirements , Aircrack-ng , 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.

IT16016	DIGITAL FORENSIC TOOLS AND TECHNIQUES (COMMON TO CS & IT)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand evidence-handling procedure.
- To comprehend the general rules of evidence
- To know the fundamental computer and mobile forensics concepts
- Locate forensic artifacts in various operating systems
- Analyze extracted evidence and properly report findings

UNIT I BASICS OF DIGITAL FORENSICS 9

The Role of Digital Forensics - the history and purpose, criminal investigations and cybercrime, civil investigations and the nature of e-discovery , The role and challenges of digital forensic practitioners , case studies, Digital Forensics Environment – Nature of digital information, Operating systems , Describing and locating evidence in file systems , password security, encryption, and hidden files , linking the evidence to the user.

UNIT II INTRODUCTION TO DIGITAL EVIDENCE 9

Digital evidence – Usage, Characteristics, technical complexities, determining the value and admissibility of digital evidence, Recovering and Preserving Digital Evidence - chain of custody, physical acquisition and safe keeping, Recovery - forensic imaging process, live recovery process.

UNIT III TOOLS 9

Forensic Tools - Standards, Need, forensic imaging tools, Enhanced forensic tools - The Event Analysis tool ,The Cloud Analysis tool ,The Lead Analysis tool, Analyzing e-mail datasets ,Detecting scanned images ,Volume Shadow Copy analysis tools ,Timelines and other analysis tools, Case study : Interrogating large datasets , Selecting and Analyzing Digital Evidence- Structured processes to locate and select digital evidence ,Locating digital evidence, Selecting digital evidence , Case study : recovery of deleted evidence held in volume shadows.

UNIT IV EVIDENCE SOURCE AND EXAMINATION 9

Sources of Evidence -The Windows Registry and system files and logs as resources of digital evidence , Apple and other operating system structures, Remote access and malware threats ,Case study – corroborating evidence using Windows Registry, Examining Evidence - Locating evidence from Internet browsing , Messaging systems , E-mail analysis and the processing of large e-mail databases , evidence recovery from mobile phones and handheld devices Case study – mobile phone evidence in a bomb hoax.

UNIT V VALIDATING THE EVIDENCE 9

The nature and problem of unsound digital evidence , Impartiality in selecting evidence ,The structured and balanced analysis ,Formalizing the validation of digital evidence , presentation , Ethical issues confronting digital forensics practitioners, Case study – presumed unauthorized use of intellectual property, Solutions to the challenges posed by new hardware and software ,Challenges posed by communication media and the cloud , Mobile phone evidence recovery ,The cloud - convenient for users but problematic for practitioners ,The need for effective evidence processing and validation ,Contingency planning .

TOTAL:45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Interpret and appropriately apply the laws and procedures associated with identifying, acquiring, examining and presenting digital evidence.
- Create a method for gathering, assessing and applying new and existing legislation and industry trends specific to the practice of digital forensics.
- 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.

CS16011	ADVANCED SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To provide the students with an in-depth introduction of the

- To enable the students to know about the basic concepts of software engineering, process life cycle models and various patterns.
- To understand the attributes of the model and to gain insight into the measurement and experimentation about the software product.
- To enable the students to know about agile and iterative development.
- To make the students sound with the concept of distributed, service oriented architecture and embedded systems.
- To enable the learners to understand web engineering process.

UNIT I **9**

Review of software development techniques: Life cycle models: water fall, prototyping, Rapid application development, spiral model, component based model. Development Approach: Object oriented Analysis and Design – Artifacts. Introduction to Patterns – Application of Patterns

UNIT II **9**

Measurement and Experimentation: Introduction- the basics of measurement-goal based framework for measurement-empirical investigation-software metrics data collection –Analyzing software measurement data.

UNIT III **9**

Agile and Iterative Development: Introduction-Iterative and Evolutionary-agile-motivation-Scrum-Extreme Programming-Unified Process.

UNIT IV **9**

Distributed Software Engineering: Distributed systems issues- Client-server computing-Architectural patterns for distributed systems-Software as a service.

Service-oriented Architecture: Services as reusable components-Service engineering- Software development with services.

Embedded Systems: Embedded systems design- Architectural patterns-Timing Analysis-Real time operating systems.

UNIT V **9**

Web engineering: An introduction to web engineering-Requirements engineering for web Application -Modeling web applications-web application architecture-technology is web application Design –Testing web application-web application development process performance of web applications

TOTAL: 45 PERIODS

OUTCOMES:

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

- Identify suitable life cycle model for a given project.
- Identify the metrics for the defined software product.
- Give continuous attention to technical excellence and provide good design.
- Use reusable components for the software development.
- Establish web based information systems.

TEXT BOOKS:

1. Ian Sommerville, "Software Engineering", 9th Edition, 2010, University of St Andrews, Scotland.

REFERENCES:

1. Dan Pilone and Neil Pitman, "UML 2. 0 In A Nutshell", Shroff/o'reilly publisher,2005.
2. Craig Larman, "Agile and Iterative Development: AManager;s Guide" Pearson Education 2009.
3. Gerti Kappel, Brigit Proll,Siegfried Reich and Werner Retschitzegger, "Web Engineering", Wiley India 2009.

GE16701	TOTAL QUALITY MANAGEMENT (COMMON TO ALL BRANCHES EXCEPT CE & BT)	L	T	P	C
		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. Besterfiled, et at., "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.

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. Harold Koontz & Heinz Weihrich "Essentials of management" Tata Mc Graw Hill, 1998.
4. Tripathy PC & Reddy PN, "Principles of Management", Tata McGraw Hill, 1999.

CS16012	ENTERPRISE RESOURCE PLANNING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The Student should be made to:

- To make the students understand the concepts of ERP systems
- To enable students to know about ERP software and modules
- To make students well-versed in Implementation of ERP
- To educate the students in the Emerging trends on ERP

UNIT I INTRODUCTION 9

Enterprises an overview – Introduction to ERP – Basic ERP concepts – Justifying ERP investments – Risks of ERP – Benefits of ERP

UNIT II ERP & TECHNOLOGY 9

ERP and Related Technologies – Business Intelligence – E-Commerce and E-Business – Business Process reengineering – Data ware housing – Data mining – On-line Analytical Processing.

UNIT III ADVANCED TECHNOLOGY & ERP IMPLEMENTATION 9

Product Lifecycle Management – Supply chain management – Customer relationship Management – Advanced Technolog& ERP Security – Implementation Challenges – ERP Implementation Strategies – ERP Implementation Lifecycle – Pre-Implementation Tasks – Requirements Definition – Implementation Methodologies.

UNIT IV THE BUSINESS MODELING 9

Business modules of an ERP package – Finance – Manufacturing – Human Resources - Plant Maintenance – Materials Management – Quality Management – Marketing – Sales, Distribution and Service.

UNIT V ERP MARKET, ERP – PRESENT AND FUTURE 9

ERP Marketplace and Marketplace Dynamics – SAP AG – Oracle Corporation – PeopleSoft – Turbo Charge the ERP System – Enterprise Application Integration – ERP and E-Business – ERP, Internet, and WWW – ERP II – ERP and Total Quality management – Future directions and Trends in ERP.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course,

- The students will be able to know about Enhanced Evaluation of ERP systems
- The students will have a knowledge on Business Analytics
- Students will be able to understand the Future trends in ERP systems.

TEXT BOOKS:

1. "ERP Demystified", Alexis Leon, Second Edition Tata McGraw Hill 2011.

REFERENCES:

1. Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008
2. Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill, 2008.
3. Mahadeo Jaiswal and Ganesh Vanapalli, ERP Macmillan India, 2009.
4. Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice, Prentice Hall of India,2 nd edition, 2006.
5. Summer, ERP, Pearson Education, 2008.

GE16001	PROFESSIONAL ETHICS	L	T	P	C
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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, "Fundametals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001
5. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" 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