



**ANNA UNIVERSITY  
CHENNAI - 600 025**

# **UNIVERSITY DEPARTMENT**

**REGULATIONS 2012  
CURRICULA & SYLLABI FOR  
I TO VIII SEMESTERS**

**B. TECH. INFORMATION TECHNOLOGY**

**[ Full Time ]**

**ANNA UNIVERSITY, CHENNAI – 600 025**

**UNIVERSITY DEPARTMENTS**

**R- 2012**

**B.TECH (INFORMATION TECHNOLOGY)**

**I-VIII SEMESTERS CURRICULA AND SYLLABUS**

**SEMESTER I**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>					
HS8151	Technical English - I	3	1	0	4
MA8151	Mathematics I	3	1	0	4
PH8151	Engineering Physics	3	0	0	3
CY8151	Engineering Chemistry	3	0	0	3
GE8151	Computing Techniques	3	0	0	3
GE8152	Engineering Graphics	2	0	3	4
<b>PRACTICAL</b>					
PH8161	Physics Laboratory	0	0	2	1
CY8161	Chemistry Laboratory	0	0	2	1
GE8161	Computer Practices Laboratory	0	0	3	2
GE8162	Engineering Practices Laboratory	0	0	3	2
<b>TOTAL</b>		<b>17</b>	<b>2</b>	<b>13</b>	<b>27</b>

**SEMESTER II**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>					
HS8251	Technical English - II	3	1	0	4
MA8251	Mathematics - II	3	1	0	4
PH8253	Physics for Information Science	3	0	0	3
CH8202	Chemistry for Information Science	3	0	0	3
IT8201	Information Technology Essentials	3	0	0	3
IT8202	Programming and Data Structures I	3	0	0	3
<b>PRACTICALS</b>					
IT8211	Information Technology Essentials Laboratory	0	0	3	2
IT8212	Programming and Data Structures I Laboratory	0	0	3	2
<b>TOTAL</b>		<b>18</b>	<b>2</b>	<b>6</b>	<b>24</b>

### SEMESTER III

COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>					
MA8354	Probability and Queueing Theory	3	1	0	4
GE8351	Environmental Science & Engineering **	3	0	0	3
IT8301	Computer Organisation	3	1	0	4
IT8302	Database Systems Concepts	3	0	0	3
IT8303	Programming and Data Structures II	3	0	0	3
<b>PRACTICALS</b>					
IT8311	Database Systems Laboratory	0	0	3	2
IT8312	Digital and Computer Organisation Laboratory	0	0	3	2
IT8313	Programming and Data Structures II Laboratory	0	0	3	2
<b>TOTAL</b>		<b>15</b>	<b>2</b>	<b>9</b>	<b>23</b>

### SEMESTER IV

Course Code	Course Title	L	T	P	C
<b>THEORY</b>					
MA8451	Discrete Mathematics	3	1	0	4
CS8451	Operating Systems	3	0	0	3
CS8452	Software Engineering	3	0	0	3
IT8401	Algorithmics	3	0	2	4
IT8402	Formal Languages and Automata	3	0	0	3
IT8451	Web Technology	3	0	0	3
<b>PRACTICALS</b>					
CS8461	Operating Systems Laboratory	0	0	3	2
IT8411	Web Technology Laboratory	0	0	3	2
<b>TOTAL</b>		<b>18</b>	<b>1</b>	<b>8</b>	<b>24</b>

**SEMESTER V**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>					
CS8551	Object Oriented Analysis and Design	3	0	0	3
IT8501	Computer Networks	4	0	0	4
IT8502	Distributed Systems	3	0	0	3
IT8503	Graphics and Multimedia	3	0	0	3
IT8504	Integrated Programming	1	0	2	2
E1	Elective I	3	0	0	3
<b>PRACTICALS</b>					
IT8511	Computer Networks Laboratory	0	0	3	2
IT8512	Graphics and Multimedia Laboratory	0	0	3	2
IT8513	Socially Relevant Project	0	0	0	2
<b>TOTAL</b>		<b>17</b>	<b>0</b>	<b>8</b>	<b>24</b>

**SEMESTER VI**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>					
IT8601	Embedded Systems	3	0	0	3
IT8602	Information Management	3	0	0	3
IT8603	Mobile Computing	3	0	0	3
E2	Elective II	3	0	0	3
E3	Elective III	3	0	0	3
<b>PRACTICALS</b>					
HS8561	Employability Skills	0	0	2	1
IT8611	Creative and Innovation Project	0	0	3	2
IT8612	Embedded System Laboratory	0	0	3	2
IT8613	Mobile Computing Laboratory	0	0	3	2
<b>TOTAL</b>		<b>12</b>	<b>0</b>	<b>11</b>	<b>22</b>

**SEMESTER VII**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>					
IT8701	Data Analytics	3	0	0	3
IT8702	Information Security	3	0	0	3
IT8703	Principles of Human Computer Interaction	3	0	0	3
E4	Elective IV	3	0	0	3
E5	Elective V	3	0	0	3
E6	Elective VI	3	0	0	3
<b>PRACTICALS</b>					
IT8711	Human Computer Interaction Laboratory	0	0	3	2
IT8712	Industrial Training	0	0	3	2
<b>TOTAL</b>		<b>18</b>	<b>0</b>	<b>6</b>	<b>22</b>

**SEMESTER VIII**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>					
E7	Elective VII	3	0	0	3
E8	Elective VIII	3	0	0	3
<b>PRACTICALS</b>					
IT8811	Project Work	0	0	12	6
<b>TOTAL</b>		<b>6</b>	<b>0</b>	<b>12</b>	<b>12</b>

**TOTAL NO OF CREDITS: 178**

## ELECTIVES

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
MA8351	Algebra Number Theory	3	1	0	4
CS8651	Digital Signal Processing – Algorithms and Applications	3	0	0	3
IT8001	Advanced Database Technology	3	0	0	3
IT8002	Advanced Networks	3	0	0	3
IT8003	Agent Based Intelligent Systems	3	0	0	3
IT8004	C# And .Net Programming	3	0	0	3
IT8005	Cloud Computing	3	0	0	3
IT8006	Computational Linguistics	3	0	0	3
IT8007	Graph Theory	3	0	0	3
IT8008	Heterogeneous Computing	3	0	0	3
IT8009	Intellectual Property Rights	3	0	0	3
IT8010	Knowledge Engineering	3	0	0	3
IT8011	Mobile Application Development	3	0	0	3
IT8012	Network Programming & Management	3	0	0	3
IT8013	Principles of Compiler Design	3	0	0	3
IT8014	Service Oriented Architecture	3	0	0	3
IT8015	Social Network Analysis	3	0	0	3
IT8016	Soft Computing	3	0	0	3
IT8017	Software Project Management	3	0	0	3
IT8018	Software Testing	3	0	0	3
IT8019	Wireless Sensor and Mesh Networks	3	0	0	3
IT8071	Digital Image Processing	3	0	0	3
IT8072	Free and Open Source Software	3	0	0	3
IT8073	TCP/IP Design and Implementation	3	0	0	3
MA8353	Numerical Methods	3	1	0	4
MG8654	Total Quality Management	3	0	0	3
CS8071	Cyber Forensics	3	0	0	3
CS8072	Game Programming	3	0	0	3
CS8073	Semantic Web	3	0	0	3
CS8074	Unix Internals	3	0	0	3

**OBJECTIVES:**

- To enable all students of engineering and technology develop their basic communication skills in English.
- To give special emphasis to the development of speaking skills amongst the students of engineering and technology.
- To ensure that students use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading for pleasure.

**UNIT I**

**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**

**Listening** - Listening and responding to video lectures / talks; **Speaking** - Describing a simple process (filling a form, etc.) - Asking & 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) - Lab descriptions (general/specific description of laboratory experiments) - Definitions - Recommendations; **Grammar** - Use of imperatives - Subject-verb agreement; **Vocabulary** - Compound words - Word Association; **E-materials** - Interactive exercises for Grammar and Vocabulary - Listening exercises with sample telephone conversations / lectures – Picture-based activities.

**UNIT III**

**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 & effect / compare & 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

**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 & acronyms; **E-materials** - Interactive exercises for Grammar and Vocabulary - Sample interviews - film scenes - dialogue writing.

#### UNIT V

**Listening** - Listening to different accents, Listening to Speeches / Presentations, Listening to broadcast & telecast from Radio & 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 & Vocabulary - Sending emails with attachment – Audio / video excerpts of different accents, - Interpreting posters

**TOTAL : 60 PERIODS**

#### TEXT BOOKS:

1. Mindscapes: English for Technologists and Engineers, Department Orient Black Swan, 2012 .
2. S.P. Dhanavel, English and Communication Skills for students of Science and Engineering. Oriented Black Swan, Chennai, 2011

#### REFERENCE BOOKS:

1. Pickett, Nell Ann, Ann A.Laster and Katherine E.Staples. **Technical English: Writing, Reading and Speaking**. New York: Longman, 2001.
2. Bailey, Stephen. **Academic Writing: A practical guide for students**. New York: Rutledge, 2011.
3. Morgan, David and Nicholas Regan. **Take-Off: Technical English for Engineering**. Reading: Garnet Publishing Limited, 2008.
4. Thorn, Michael and Alan Badrick. **An Introduction to Technical English**. Harlow: Prentice Hall Europe, 1993.
5. Rizvi, M.Ashraf. **Effective Technical Communication**. New Delhi: Tata McGraw-Hill Publishing Company, 2007.

#### EXTENSIVE READERS:

1. Murthy, Sudha. **Wise & Otherwise**. New Delhi: Penguin Books India, 2006.
2. Gates, Bill and Collins Hemingway. **Business @ the Speed of Thought: Succeeding in the Digital Economy**. New York: Warner Business Books, 2000.

#### WEBSITE RESOURCES:

1. [www.uefap.com](http://www.uefap.com)
2. [www.eslcafe.com](http://www.eslcafe.com)
3. [www.listen-to-english.com](http://www.listen-to-english.com)
4. [www.owl.english.purdue.edu](http://www.owl.english.purdue.edu)
5. [www.chompchomp.com](http://www.chompchomp.com)



**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 limitations of using infinite series approximations for solutions arising in mathematical modeling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, 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**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of eigenvalues and eigenvectors – Cayley-Hamilton Theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

**UNIT II        INFINITE SERIES****9+3**

Sequences – Convergence of series – General properties – Series of positive terms – Tests of convergence (Comparison test, Integral test, Comparison of ratios and D'Alembert's ratio test) – Alternating series – Series of positive and negative terms – Absolute and conditional convergence – Power Series – Convergence of exponential, logarithmic and Binomial Series.

**UNIT III        FUNCTIONS OF SEVERAL VARIABLES****9+3**

Limits and Continuity – Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Errors and approximations – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

**UNIT IV        IMPROPER INTEGRALS****9+3**

Improper integrals of the first and second kind and their convergence – Evaluation of integrals involving a parameter by Leibnitz rule – Beta and Gamma functions – Properties – Evaluation of integrals using Beta and Gamma functions – Error functions.

**UNIT V        MULTIPLE INTEGRALS****9+3**

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

**TOTAL : 60 PERIODS**

**TEXT BOOKS:**

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40<sup>th</sup> Edition, 2007.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11<sup>th</sup> Reprint, 2010.

**REFERENCES:**

1. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3<sup>rd</sup> Edition, 2007.
2. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7<sup>th</sup> Edition, 2009.
3. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2<sup>nd</sup> Edition, 5<sup>th</sup> Reprint, 2009.
4. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.

**PH8151****ENGINEERING PHYSICS**

(Common to ALL Branches of B.E./B.Tech. Programmes)

**L T P C****3 0 0 3****OBJECTIVE:**

To introduce the basic physics concepts relevant to different branches of Engineering and Technology.

**UNIT I PROPERTIES OF MATTER****9**

Elasticity - Poisson's ratio and relationship between moduli (qualitative) - Stress-strain diagram - factors affecting elasticity - bending of beams - cantilever - bending moment - theory and experiment of Young's modulus determination - Uniform and non-uniform bending - I shaped girders - twisting couple - hollow cylinder - shaft - torsion pendulum - determination of rigidity modulus- moment of inertia of a body (regular and irregular).

**UNIT II ACOUSTICS AND ULTRASONICS****9**

Classification of sound - loudness and intensity - Weber-Fechner Law - standard intensity and intensity level - decibel - reverberation - reverberation time - rate of growth and decay of sound intensity - derivation of Sabine's formula - absorption coefficient and its determination - factors affecting acoustics of buildings : focussing, interference, echo, Echelon effect, resonance - noise and their remedies. Ultrasonics - production - magnetostriction and piezoelectric methods - detection of ultrasound - acoustic grating - industrial applications - NDT - Ultrasonic method: scan modes and practice.

**UNIT III THERMAL PHYSICS****9**

Thermal expansion - thermal stress - expansion joints - bimetallic strips - thermal conductivity - conduction in solids - Forbes' and Lees' disc methods - Rectilinear flow of heat through a rod - flow of heat through a compound materials - radial flow of heat through a spherical shell - thermal insulation of buildings – Laws of blackbody radiation: Kirchhoff's law, Stephens law, Wiens law, Raleigh-Jean law and Planks law (derivation). Laws of thermodynamics - Otto and diesel engines and their efficiency - entropy - entropy of Carnot's cycle - reverse Carnot's cycle - refrigerator.

**UNIT IV                      APPLIED OPTICS                      9**

Interference - Michelson interferometer: construction, working, determination of wave length and thickness - anti-reflection coating - air wedge and its application - Lasers - Einstein's coefficients - CO<sub>2</sub>, Nd:YAG and semiconductor lasers - homo junction and hetro junction - construction and working - applications - Optical fibres - classification (index & mode based) - principle and propagation of light in optical fibres - acceptance angle and numerical aperture - fibre optic communication system - active and passive sensors.

**UNIT V                      SOLID STATE PHYSICS                      9**

Nature of bonding - growth of single crystals (qualitative) - crystal systems - crystal planes and directions - expressions for interplanar distance - coordination number and packing factor for simple structures: SC, BCC, FCC and HCP - structure and significance of NaCl, ZnS, diamond and graphite - crystal imperfections: point defects, dislocations and stacking faults - unit cell, Bravais space lattices - miller indices.

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. Gaur R.K., and Gupta, S.L., Engineering Physics, Dhanpat Raj Publications, 2003
2. Palanisamy, P.K., Engineering Physics, Scitech Publications (P) Ltd, 2006.
3. Arumugam, M., Engineering Physics, Anuradha Publications, 2000.

**REFERENCES:**

1. Sankar, B.N., Pillai.S.O., Engineering Physics, New Age International (P) Ltd., 2007.
2. Rajendran.V Engineering Physics, Tata McGraw-Hill, 2009.

<b>CY8151</b>	<b>ENGINEERING CHEMISTRY</b>	<b>L T P C</b>
	<b>(Common to all branches of Engineering and Technology)</b>	<b>3 0 0 3</b>

**UNIT I                      CHEMICAL THERMODYNAMICS                      9**

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; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius-Clapeyron equation; Maxwell relations – Van't Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation – variation of chemical potential with temperature and pressure.

**UNIT II                      POLYMER CHEMISTRY                      9**

Introduction: Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerisation. Types and mechanism of polymerisation: Addition (Free Radical, cationic, anionic and living); condensation and copolymerisation. Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerisation: Bulk, emulsion, solution and suspension.

**UNIT III KINETICS AND CATALYSIS 9**

Introduction – reaction velocity, factors affecting reaction velocity, rate constant, order of reaction, molecularity, pseudo molecular reactions, zero, first, second and third order reactions, reactions of fractional orders, determination of order of reactions. Catalysis: Auto catalysis - Enzyme Catalysis: Michaelis-Menton equation; factors affecting enzyme catalysis. Heterogeneous Catalysis: Types of adsorption isotherms: Langmuir–Hinselwood and Rideal–Eley Mechanism.

**UNIT IV PHOTOCHEMISTRY AND SPECTROSCOPY 9**

Photochemistry: Laws of photochemistry - Grotthuss–Draper law, Stark–Einstein law and Lambert–Beer Law. Photoprocesses - Internal Conversion, Inter-system crossing, Fluorescence, Phosphorescence, Chemiluminescence and Photo-sensitisation. Spectroscopy: Electromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and rotational transitions. Width and intensities of spectral lines. Spectrophotometric estimation of iron. UV-visible and IR spectroscopy – principles, instrumentation (Block diagram) and applications.

**UNIT V NANO CHEMISTRY 9**

Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Nanoparticles: Nanocluster, nanorod, nanotube and nanowire. Synthesis: Precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition, laser ablation; Properties and Applications. Risk discussion and Future perspectives.

**TOTAL :45 PERIODS**

**TEXT BOOKS:**

1. P. Kannan and A. Ravikrishnan, "Engineering Chemistry", Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2009.
2. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India, 2011

**REFERENCES:**

1. P.W. Atkins and de Paula Julio, "Physical Chemistry", Oxford University Press, 8<sup>th</sup> Ed., (Indian Student Edition) (2009).
2. K. K. Rohatgi-Mukherjee, "Fundamental of Photochemistry" New Age International (P) Ltd., New Delhi, 1986.
3. G.A. Ozin and A.C. Arsenault, "Nanotechnology: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.
4. V.R.Gowariker, N.V.Viswanathan and Jayadev Sreedhar, "Polymer Science", New Age International P (Ltd.), Chennai, 2006

**GE8151**

**COMPUTING TECHNIQUES**

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

**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**

**TEXTBOOKS:**

1. Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition, Oxford University Press, 2009
2. Ashok N. Kamthane, “Computer programming”, Pearson Education, 2007.
3. Yashavant P. Kanetkar. “ Let Us C”, BPB Publications, 2011.

**REFERENCES:**

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

**GE8152**

**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 and 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.

<b>UNIT I</b>	<b>PLANE CURVES AND FREE HAND SKETCHING</b>	<b>14</b>
<b>Basic Geometrical constructions, Curves used in engineering practices</b> 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, <b>Scales:</b> Construction of Diagonal and Vernier scales.		
<b>Visualization concepts and Free Hand sketching:</b> Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects		
<b>UNIT II</b>	<b>PROJECTION OF POINTS, LINES AND PLANE SURFACES</b>	<b>14</b>
Orthographic projection- principles-Principal planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.		
<b>UNIT III</b>	<b>PROJECTION OF SOLIDS</b>	<b>14</b>
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.		
<b>UNIT IV</b>	<b>PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES</b>	<b>14</b>
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		
<b>UNIT V</b>	<b>ISOMETRIC AND PERSPECTIVE PROJECTIONS</b>	<b>15</b>
Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method and vanishing point method.		
<b>COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY)</b>		<b>3</b>
Introduction to drafting packages and demonstration of their use.		
		<b>TOTAL: 75 PERIODS</b>

**TEXT BOOK:**

1. N.D.Bhatt and V.M.Panchal, "Engineering Drawing", Charotar Publishing House, 50<sup>th</sup> Edition, 2010

## REFERENCES:

1. K.R.Gopalakrishna., "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. M.B.Shah and B.C.Rana, "Engineering Drawing", Pearson, 2<sup>nd</sup> Edition, 2009
4. K.Venugopal and V.Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 2008.
5. K. V.Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
6. Basant Agarwal 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.
4. The examination will be conducted in appropriate sessions on the same day

**PH8161**

## PHYSICS LABORATORY

(common to all branches of B.E./B.Tech. Programmes)

**L T P C**  
**0 0 2 1**

- |                                |   |
|--------------------------------|---|
| 1. Torsional pendulum          | – Determination of rigidity modulus of wire and moment of inertia of disc |
| 2. Non – uniform bending       | – Determination of young's modulus  |
| 3. Lee's disc                  | – Determination of thermal conductivity of a bad conductor                |
| 4. Potentiometer               | – Determination of thermo e.m.f. of thermocouple                          |
| 5. Air wedge                   | – Determination of thickness of a thin sheet of paper                     |
| 6. i. Optical fibre acceptance | – Determination of Numerical Aperture and angle                           |
| ii. Compact disc               | – Determination of width of the groove using laser                        |

- |                             |   |
|-----------------------------|---|
| 7. Acoustic grating liquids | – Determination of velocity of ultrasonic waves in liquids                    |
| 8. Post office box          | – Determination of Band gap of a semiconductor                                |
| 9. Spectrometer             | – Determination of wavelength using grating                                   |
| 10. Viscosity of liquids    | – Determination of co-efficient of viscosity of a liquid by Poiseuille's flow |

**TOTAL : 30 PERIODS**

**CY8161**

**CHEMISTRY LABORATORY**  
**(Common to all branches of Engineering and Technology)**

**L T P C**  
**0 0 2 1**

1. Estimation of HCl using  $\text{Na}_2\text{CO}_3$  as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1,10- phenanthroline / thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
11. Determination of molecular weight of poly vinyl alcohol using Ostwald viscometer.
12. Pseudo first order kinetics – ester hydrolysis.
13. Corrosion experiment – weight loss method.
14. Determination of CMC.
15. Phase change in a solid.

**TOTAL : 30 PERIODS**

**REFERENCE BOOKS:**

1. A text of quantitative inorganic analysis, A. L. Vogel , ELBS London. 1995.
2. Experiments in physical chemistry, D.P. Shoemaker and C.W. Gardad, McGraw Hill, London, 2001.
3. American Public Health Association.



**LIST OF EXPERIMENTS:**

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

**TOTAL : 45 PERIODS****OBJECTIVE:**

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 & ELECTRICAL)****1. CIVIL ENGINEERING PRACTICE****12****PLUMBING**

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

Laying pipe connection to the suction side of a pump – inlet.

Laying pipe connection to the delivery side of a pump – out let.

Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.

**WOOD WORK**

Sawing, planning and making common joints: T-Joint, Mortise and Tennon joint, Dovetail joint.

**STUDY**

Study of joints in door panels, wooden furniture

Study of common industrial trusses using models

**2. ELECTRICAL ENGINEERING PRACTICE****9**

Basic household wiring using switches, fuse, indicator – lamp etc.,

Preparation of wiring diagrams

Stair case light wiring

Tube – light wiring

Study of iron-box, fan with regulator, emergency lamp

**GROUP – B (MECHANICAL AND ELECTRONICS)****15****3. MECHANICAL ENGINEERING PRACTICE****WELDING**

Arc welding of butt joints, lap joints, tee joints

Gas welding Practice.

Basic Machining

Simple turning, drilling and tapping operations.

Machine assembly Practice.

Study and assembling the following:

Centrifugal pump, mixies and air conditioners.

Demonstration on

(a) Smithy operations like the production of hexagonal bolt.

(b) Foundry operation like mould preparation for grooved pulley.

**4. ELECTRONIC ENGINEERING PRACTICE****9**

Soldering simple electronic circuits and checking continuity.

Assembling electronic components on a small PCB and testing.

Study of Telephone, FM radio, low-voltage power supplies.

**TOTAL: 45 PERIODS**

**OBJECTIVES**

- To make the students acquire listening and speaking skills meant for both formal and informal contexts
- To help them develop their reading skills by exposing them to different types of reading strategies
- To equip them with writing skills needed for academic as well as workplace situations
- To make them acquire language skills at their own pace by using e-materials and language lab component

**UNIT I**

**Listening** - Listening to informal conversations and participating; **Speaking** - Opening a conversation (greetings, comments on something, 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 & irregular verbs - Active and passive voice; **Vocabulary** - Homonyms (e.g. 'can') - Homophones (e.g. 'some', 'sum'); **E-materials** - Interactive exercise on Grammar and vocabulary – blogging; **Language Lab** - Listening to different types of conversation and answering questions.

**UNIT II**

**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 success, thanking one's friend / relatives); **Grammar** - modal verbs, Purpose expressions; **Vocabulary** - Phrasal verbs and their meanings, Using phrasal verbs in sentences; **E-materials** - Interactive exercise on Grammar and vocabulary, Extensive reading activity (reading stories / novels from links), Posting reviews in blogs - **Language Lab** - Dialogues (Fill up exercises), Recording students' dialogues.

**UNIT III**

**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 the time limit - Skimming; **Writing** - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading the articles from the journals - Format for the 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 & vocabulary - Speed Reading practice exercises; **Language Lab** - Intonation practice using EFLU materials – Attending a meeting and writing minutes.

#### UNIT IV

**Listening** - Listening to a telephone conversation, Viewing a model interview (face-to-face, telephonic and video conferencing) and observing the practices; **Speaking** - Role play practice in telephone skills - listening and responding, -asking questions, -note taking – passing on messages, Role play and mock interview for grasping the interview skills; **Reading** - Reading the job advertisements and the profile of the company concerned – scanning; **Writing** - Applying for a job – cover letter - résumé 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 & Vocabulary - Different forms of résumés- Filling up a résumé / cover letter; **Language Lab** - Telephonic interview – recording the responses - e-résumé writing.

#### UNIT V

**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** - Types of reports – Feasibility / Project report – report format – recommendations / suggestions – interpretation of data (using charts for effective presentation); **Grammar** - Use of clauses; **Vocabulary** – Collocation; **E-materials** - Interactive grammar and vocabulary exercises - Sample GD - Pictures for discussion, Interactive grammar and vocabulary exercises - Pictures for discussion; **Language Lab** - Different models of group discussion

**TOTAL: 60 PERIODS**

#### TEXT BOOKS:

1. Mindscapes: English for Technologists and Engineers, Orient Black Swan, 2012 .
2. S.P. Dhanavel, English and Communication Skills for students of Science and Engineering. Oriented Black Swan, Chennai, 2011

#### REFERENCE BOOKS:

1. Laws, Anne. **Presentations**. Hyderabad: Orient BlackSwan, 2000.
2. Lewis, Hedwig. **Body Language: A Guide for Professionals**. New Delhi: Sage Publications, 1998.
3. Naterop, Jean B. and Rod Revell. **Telephoning in English**. Cambridge: Cambridge University Press, 1987.
4. Rutherford, Andrea J. **Basic Communication Skills for Technology**. New Delhi: Pearson Education, 2001.
5. Ur, Penny. **Teaching Listening Comprehension**. Cambridge: Cambridge University Press, 1984.

#### EXTENSIVE READERS:

1. Abdul Kalam, A P J. **Ignited Minds: Unleashing the Power within India**. New Delhi: Penguin Books India, 2002.
2. Parameswaran, Uma. **C.V.Raman: A Biography**. New Delhi: Penguin Books India, 2011.

#### Web Resources

1. [www.esl-lab.com](http://www.esl-lab.com)
2. [www.englishgrammar.org](http://www.englishgrammar.org)
3. [www.englishclub.com](http://www.englishclub.com)
4. [www.mindtools.com](http://www.mindtools.com)
5. [www.esl.about.com](http://www.esl.about.com)

**MA8251**

**MATHEMATICS II**

**L T P C**

**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 the 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 DIFFERENTIAL EQUATIONS**

**9+3**

Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

**UNIT II VECTOR CALCULUS**

**9+3**

Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral and volume integral -Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

**UNIT III ANALYTIC FUNCTION**

**9+3**

Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions  $w = z + c$ ,  $az$ ,  $1/Z$ ,  $Z^2$ . - Bilinear transformation.

**UNIT IV COMPLEX INTEGRATION**

**9+3**

Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.

**UNIT V LAPLACE TRANSFORMS**

**9+3**

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems – Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem — Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients.

**TOTAL : 60 PERIODS**

**TEXT BOOKS:**

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition, 2007.
2. Ramana, B.V. "Higher Engineering Mathematics", Tata McGraw Hill, New Delhi, 2010.

**REFERENCES:**

1. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, New Delhi, 2007.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, Delhi, 3rd Edition, 2007.
3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2009.
4. Peter V.O'Neil, Advanced Engineering Mathematics, Cengage Learning India Pvt., Ltd, New Delhi, 2007.

**PH8253****PHYSICS FOR INFORMATION SCIENCE****L T P C****(Common to Computer Science and Information Technology Branches) 3 0 0 3****OBJECTIVE:**

To understand the essential principles of Physics of semiconductor device and Electron transport properties. Become proficient in magnetic and optical properties of materials and Nano electronic devices.

**UNIT I ELECTRICAL PROPERTIES OF MATERIALS****9**

Electrical conduction – Classification of conducting materials – Free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Ohm's law – Classical free electron theory (advantages and drawbacks) - Quantum free electron theory – Schrodinger wave equation – Applications of Schrodinger wave equation (Particle in infinite potential well, Particle in a box, Reflection and transmission of electron waves) – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – Electron effective mass.

**UNIT II SEMICONDUCTORS AND TRANSPORT PHYSICS****9**

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

**UNIT III MAGNETIC PROPERTIES OF MATERIALS****9**

Classification of magnetic materials – Quantum numbers – Magnetic moment – Classical theory of diamagnetism (Langevin theory) – Theory of paramagnetism – Ferromagnetism (Weiss theory) – Antiferromagnetic materials – Ferrites – Hard soft magnetic materials – Magnetic recording materials – Bubble memory – Magnetic principle in computer data storage – Magnetic tape – Floppy disc – Magnetic hard disc.

**UNIT IV OPTICAL PROPERTIES OF MATERIALS****9**

Classification of optical materials – Absorption in metals, insulators & Semiconductors - LED's – Organic LED's – Polymer light emitting materials – Plasma light emitting devices – LCD's – Laser diodes – Optical data storage techniques (including DVD, Blue -ray disc, Holographic data storage).

**UNIT V          NANO DEVICES****9**

The density of state for solids – Electron density in a conductor – Significance between Fermi energy and Volume of the material – Quantum confinement – Quantum structures – Metal-to-insulator transition – Confining excitons – Band gap of nanomaterials – Tunneling – Resonant Tunneling Diodes (RTD's) – Single electron phenomena – Single electron Transistor – Quantum cellular automata (QCA) – Carbon nanotubes – Molecular electronic structures – Spintronics.

**TOTAL: 45 PERIODS****TEXT BOOKS:**

1. P.K. Palanisamy, "Materials Science", Scitech, (2003).
2. S.O. Kasap, "Principles of Electronic Materials and Devices", Tata McGraw-Hill, (2007).
3. R.F. Pierret, "Semiconductor Device Fundamentals", Pearson, (1996).

**REFERENCES:**

1. N. Garcia and A. Damask, "Physics for Computer Science Students", Springer-Verlag, (1991).
2. S. Datta, "Quantum Transport: Atom to Transistor", Cambridge University Press, (2005).

**CH8202          CHEMISTRY FOR INFORMATION SCIENCE  
(Common to Computer Science and Information Technology Branches)****L T P C  
3 0 0 3****AIM:**

To impart knowledge in the Applied Chemistry topics relevant to computer science and engineering.

**OBJECTIVE:**

- To know about the conductivity in solids and insulating materials.
- To understand the importance of specialty polymers.
- Basic concepts of electrochemical energy systems.
- Familiarization of battery technology and alternate energy sources.
- Importance of metal finishing.

**UNIT I          CONDUCTIVITY IN SOLIDS****9**

Electrical properties of solids- band theory of solids- types of energy bands- application of band theory to solids; semiconductors: elemental and non-elemental semiconductors- non-stoichiometric p and n-type semiconductors- chalcogen semiconductors- preparation of pure germanium semiconductors by fractional distillation method- preparation of pure germanium semiconductors crystal growth. Super conductors, insulator: classification of insulating materials (based functions)- classification of insulating materials(based on physical state)- thermal insulators-optical iber- organic electronic materials- fullerenes.

**UNIT II          SPECIALTY POLYMERS****9**

Distinction between thermoplastics and thermosetting plastics- phenolic and epoxy resins, silicone polymers, rubbers; specialty polymers: ionornrsrs, polyelectrolytes, thermally stable polymers, fire retardant polymers, electrically conducting polymers, polymers with piezoelectric, pyroelectric ferroelectric properties, photoconducting polymers, photoresists. Basics of LCD and LED.

**UNIT III ELECTROCHEMICAL ENERGY SYSTEMS 9**

Electrochemical cell- differences between a galvanic cell and an electrolytic cell- a Daniel cell- electro chemical conventions- the origin of electrode potential- measurement of electrode potential and IUPAC sign- derivation of Nernst equation- EMF of cell- types of electrodes or half cells- ion selective electrodes- principle, types and applications- reference electrode- primary and secondary electrodes- determination of pH of a solution using glass and calomel electrodes- concentration cells.

**UNIT IV BATTERY TECHNOLOGY AND ENERGY SOURCES 9**

Battery technology: Principle, characteristics- classification - applications- Nickel-cadmium and Lithium batteries. Fuel cells- merits-types - alkaline fuel cells, PEMFC, MCFC, SOFC. Alternate energy sources - nuclear energy, hydro energy, wind energy, bio energy and solar cells.

**UNIT V METAL FINISHING 9**

Importance and methods of metal finishing- manufacturing of electronic components- electro chemical techniques of forming, mining and etching- electrolytic cell- polarization, decomposition potential, over voltage and electro deposition- polarization of electroplating- factors influencing electro deposition - electro plating process- surface preparation for electroplating- electroplating of copper and chromium- electro less plating of copper and nickel & nickel and aluminium- preparation of printed circuit board (PCB).

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Dara S.S, Umare S.S. "Engineering Chemistry", S. Chand & Company Ltd., New Delhi, 2010.
2. Kannan P., Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2009.

**REFERENCES :**

1. Pahari A., Chauhan B., "Engineering Chemistry", Firewall Media., New Delhi., 2010.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd., New Delhi 2008.
3. Ashima Srivastava., Janhavi N N., Concepts of Engineering Chemistry", ACME Learning Private Limited., New Delhi., 2010.
4. Vairam S., Kalyani P., Suba Ramesh., "Engineering Chemistry", Wiley India Pvt Ltd., New Delhi 2011.

**IT8201**

**INFORMATION TECHNOLOGY ESSENTIALS**

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

**OBJECTIVE:**

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



Creating a Website - Working principle of a Website - Parts of a Web address - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server - Social networks

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

Fundamental computer network concepts - Types of computer networks - Network equipments - Ethernet - Wireless Local Area Network - Internet Service - TCP/IP and other Internet protocols - Network Routing - Switching and Bridging

Cell phone working fundamentals - Cell phone frequencies - Cell phone channels - Cell phone codes - Digital cell phone components - Cell phone network technologies - Cell phone towers - Problems with cell phones and maintenance

Creation of simple interactive applications - Simple database applications - Multimedia applications - Design and development of information systems – Personal Information System – Information retrieval system – Social networking applications

**TEXT BOOKS:**

1. Luke Welling, Laura Thomson, "PHP and MySQL Web Development (4th Edition)", Pearson Education, 2009.
2. Preston Gralla, "How the Internet Works (8th Edition)", Que, 2006.
3. Preston Gralla, Eric Lindley, "How Wireless Works (2<sup>nd</sup> Edition)". Que, 2005.

1. Robin Nixon "Learning PHP, MySQL & JavaScript", O'Reilly, 2009.

**AIM:**

The aim is to review the basics of C programming and to introduce the concepts of Data Structures.

- To introduce the basics of C programming language
- To introduce the concepts of ADTs
- To introduce the concepts of Hashing and Sorting

Data types – Variables – Operations - Expression and Statements – Conditional statements – Control statements – Functions – Arrays - Preprocessor

Pointers - Variation in pointer declarations – Function Pointers – Function with Variable number of arguments - Structures and Unions - File handling concepts

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – cursor-based linked lists – doubly-linked lists – applications of lists – Polynomial Manipulation – Stack ADT – Evaluating arithmetic expressions- Queue ADT – circular queue implementation – Double ended Queues

Trees: Preliminaries – Binary Trees – Types of Binary Trees – Linked and non-linked implementation of Binary trees – Tree traversals – Application of Trees - Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing

Sorting algorithms: Insertion sort - Selection sort - Shell sort - Bubble sort - Quick sort - Heap sort - Merge sort - Radix sort – Searching: Linear search - Binary search - Search Tree ADT - Binary Search Trees - Indexed search techniques

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", 2<sup>nd</sup> edition, Pearson Education, 1988.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2<sup>nd</sup> 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.,

- To write simple scripts for the creation of web sites.
- To create various Information Technology enabled applications

1. Creation of interactive Web sites – Design using HTML and authoring tools
2. Creation of simple PHP scripts – Dynamism in Web sites
3. Handling Multimedia contents in the Web documents
4. Database applications using PHP and MySQL
5. Study of computer networking components
6. Study of technologies associated with mobile devices
7. Creation of Personal Information System
8. Creation of Information retrieval system using Web, PHP and MySQL

26

**AIM:**

The aim is to introduce the concepts of structured Programming and the implementation of primitive Data Structures using structured Programming Language.

### OBJECTIVES:

- To introduce the concepts of structured Programming language.
  - To introduce the concepts of pointers and files
  - To introduce the concepts of primitive Data Structures.
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. Creation of Binary Trees – Expression Trees – Tree Traversals – Linked Representation of Binary Trees
  7. Implementation of Sorting algorithms
  8. Implementation of Linear search – Binary Search – Indexed Search

**TOTAL: 45 PERIODS**

### OBJECTIVES:

- To provide the required fundamental concepts in probability and queueing models and apply these techniques in networks, image processing etc.
- Acquire skills in analyzing queueing models.

<b>UNIT I</b>	<b>RANDOM VARIABLES</b>	<b>9+3</b>
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Discrete and Continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions - Functions of a random variable.

## UNIT II TWO-DIMENSIONAL RANDOM VARIABLES 9+3

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

<b>UNIT III</b>	<b>RANDOM PROCESSES</b>	<b>9+3</b>
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Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions.

**UNIT IV            QUEUEING THEORY****9+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            NON-MARKOVIAN QUEUES AND QUEUEING NETWORKS****9+3**

M/G/1 queue – Pollaczek Khinchin formula - M/D/1 and M/E<sub>k</sub>/1 as special cases – Series queues – Open and closed Jackson networks.

**TOTAL : 60 PERIODS****TEXT BOOKS:**

1. Ibe, O.C. "Fundamentals of Applied Probability and Random Processes", Elsevier, U.P., 1<sup>st</sup> Indian Reprint, 2007.
2. Gross, D. and Harris, C.M., "Fundamentals of Queueing Theory", Wiley Student, 3<sup>rd</sup> Edition, New Jersey, 2004.

**REFERENCES:**

1. Allen, A.O., "Probability, Statistics and Queueing Theory with Computer Applications", Elsevier, California, 2<sup>nd</sup> Edition, 2005.
2. Taha, H.A., "Operations Research", Pearson Education, Asia, 8<sup>th</sup> Edition, 2007.
3. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", PHI, New Delhi, 2<sup>nd</sup> Edition, 2009.
4. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill, New Delhi, 9<sup>th</sup> Reprint, 2010.

**GE8351****ENVIRONMENTAL SCIENCE AND ENGINEERING****L T P C  
3 0 0 3****UNIT I            ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY****14**

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – 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**

**8**

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

## **UNIT III NATURAL RESOURCES**

**10**

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

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

**7**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

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

**6**

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

**TOTAL : 45 PERIODS**

### **TEXT BOOKS:**

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2<sup>nd</sup> edition, Pearson Education (2004).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2006).

**REFERENCES:**

- 1 R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
- 2 Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico 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)

**IT8301****COMPUTER ORGANIZATION****LT PC  
3 1 0 4****OBJECTIVES :**

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

- Perform arithmetic operations in any number system
- Use boolean simplification techniques to design a combinational hardware circuit
- Analyze a given digital circuit – combinational and sequential
- Identify different functional units in a digital computer system
- Trace execution of instruction sequence in a processor
- Explain the implementation of each functional unit

**UNIT I DIGITAL FUNDAMENTALS****9 + 3**

Number systems and conversions – Boolean algebra and simplification – Minimization Of Boolean functions – Karnaugh map – Logic gates – NAND-NOR implementation

**UNIT II COMBINATIONAL AND SEQUENTIAL CIRCUITS****9 + 3**

Design of combinational circuits – Adder / Subtractor – Encoder – Decoder – Mux / Demux – Comparators – Flip Flops – Designing sequential circuits - State diagrams and minimization – Counters – Registers - PLDs

**UNIT III BASIC STRUCTURE OF COMPUTERS****9 + 3**

Functional units – Basic operational concepts – Instruction set architecture – Hardware/Software Interface – Addressing modes – RISC – CISC - Performance metrics - ALU design – multiplier and divider circuits

**UNIT IV PROCESSOR DESIGN****9 + 3**

Fundamental concepts – Execution of a complete instruction – Hardwired control – Micro programmed control -- Pipelining – Basic concepts – Data hazards – Instruction hazards – Control hazards

**UNIT V MEMORY AND I/O SYSTEMS****9 + 3**

Memory Technology – Memory hierarchy – Cache Memory – Design Methods – Virtual Memory – Input/output System – Programmed I/O – DMA and Interrupts – Functions of I/O devices and interfaces

**Tutorial – 45 Practical – 15 TOTAL : 60 PERIODS**

**TEXT BOOKS:**

1. M. Morris Mano and Michael D. Ciletti, "Digital Design", Fourth Edition, Pearson Education, 2008.
2. David A. Patterson And John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Fourth Edition, Elsevier, 2010.

**REFERENCES:**

1. Carl Hamacher, Zvonko Vranesic And Safwat Zaky, "Computer Organization", Sixth Edition, Tata McGraw Hill, 2010.
2. Behrooz Parhami, "Computer Architecture: From Microprocessors to Supercomputers", Oxford University Press, 2007.
3. William Stallings, "Computer Organization and Architecture: Designing for Performance", Sixth Edition, Pearson Education, 2003.

**IT8302****DATABASE SYSTEM CONCEPTS****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 understand 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 –Entity-Relationship model – E-R Diagrams -- Introduction to relational databases - Relational Model: Keys -- Relational Algebra – Relational Calculus

**UNIT II                      APPLICATION DEVELOPMENT WITH SQL                      9**

SQL fundamentals - Advanced SQL features – High level language extension- Iteration selection - Procedures - Functions – Parameter passing -- Triggers- Embedded SQL– Dynamic SQL -- Database connectivity

**UNIT III                      DATABASE DESIGN                      9**

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 IV                      TRANSACTIONS                      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 – Distributed databases- Data warehouse and mining.

**UNIT V IMPLEMENTATION TECHNIQUES****9**

Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary storage – 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

**TOTAL : 45 PERIODS****TEXT BOOKS:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2011
2. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

**REFERENCE S:**

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education, 2008.
2. Raghu Ramakrishnan, Johannes Gehrke "Database Management Systems", Fourth Edition, Tata McGraw 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

**IT8303****PROGRAMMING AND DATA STRUCTURES II****L T P C  
3 0 0 3****AIM:**

The aim is to introduce the concepts Object Oriented Programming and the implementation of Advanced Data Structures using Object Oriented Programming Language.

**OBJECTIVES:**

- To introduce the concepts of Object Oriented Programming language.
- To introduce the concepts of Templates and Error Handling.
- To introduce the concepts of Advanced Data 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

**UNIT II OBJECT ORIENTED PROGRAMMING CONCEPTS****9**

String Handling – Copy Constructor - Polymorphism – compile time and run time polymorphisms – function overloading – operators overloading – dynamic memory allocation - Nested classes - Inheritance – virtual functions

**UNIT III C++ PROGRAMMING ADVANCED FEATURES****9**

Abstract class – Exception handling - Standard libraries - Generic Programming - templates – class template - function template – STL – containers – iterators – function adaptors – allocators - Parameterizing the class - File handling concepts



**UNIT IV          ADVANCED NON-LINEAR DATA STRUCTURES****9**

AVL trees – B-Trees – Red-Black trees – Splay trees – Binomial Heaps – Fibonacci Heaps – Disjoint Sets – Amortized Analysis – accounting method – potential method – aggregate analysis

**UNIT V          GRAPHS****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

**TOTAL: 45 PERIODS****TEXT BOOKS:**

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, McGraw Hill, 2002.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 2nd edition, Pearson Education, 2005.
3. Bjarne Stroustrup, "The C++ Programming Language", 3rd edition, Pearson Education, 2007.

**REFERENCES:**

1. Ira Pohl, "Object Oriented Programming using C++", 2nd edition, Pearson Education, 1997.
2. Michael T Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7th edition, Wiley Publishers, 2004.

**IT8311****DATABASE SYSTEMS LABORATORY****L T P C  
0 0 3 2****AIM:**

The aim of this laboratory is to inculcate the abilities of applying the principles of the database management systems. The course aims to prepare the students for projects where a proper implementation of databases will be required.

**OBJECTIVES:**

The students will be able to create a database file

The students will be able to query a database file

The students will be able to append and update a database file

- Data Definition, Manipulation of Tables and Views
- Database Querying – Simple queries, Nested queries, Sub queries and Joins
- Triggers
- Transaction Control
- Embedded SQL
- Database Connectivity with Front End Tools
- Front End Tools / Programming Languages
- High level language extensions - PL/SQL Basics
- Procedures and Functions
- Database Design and Implementation (Case Study)

**TOTAL: 45 PERIODS**

**OBJECTIVES:**

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

1. Identify the pin details, and internal logic of standards ICs and test ICs.
2. Construct digital circuits using standards ICs and testing boards
3. Design and implement combinational circuits.
4. Design and implement sequential circuits like shift registers and counters using Programmable Logic Devices.
5. Write and simulate HDL code for a given design.
6. Study the architectural variations of a processor using a simulator
3. Verification of Boolean Theorems using basic gates.
4. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters.
5. Design and implementation of combinational circuits using MSI devices:
  6. 4 – bit binary adder / subtractor
  7. Parity generator / checker
  8. Magnitude Comparator
  9. Application using multiplexers
10. Coding combinational / sequential circuits using HDL.
11. Design and implementation of sequential circuits using PLDs:
  12. Shift –registers
  13. Synchronous and asynchronous counters
6. Design and implementation of floating point arithmetic circuits
7. Use an architectural simulator and study execution of instruction sequence in various modes – pipelined, non-pipelined etc.

**TOTAL: 45 PERIODS**

**AIM:**

To implement different data structures and their algorithms for storing, accessing and manipulating data using an object oriented programming language.

**OBJECTIVES:**

- To implement the concepts of object oriented programming
- To implement different data structures using object oriented programming language
- To use standard template library in the implementation of standard data structures

1. Creating C++ programs for String Handling – Applications with Function overloading and Operator overloading – Inheritance
2. C++ implementation of Linked List, Stack, Queues and Binary Trees
3. Creation of Standard Template Libraries – containers – iterators – templates
4. Implementation of AVL tree – B-Tree – Splay Tree – Fibonacci Heap
5. Implementation of Graph Algorithms – Breadth-First Search – Depth-First Search - Dijkstra's algorithm – Bellman-Ford algorithm – Floyd-Warshall algorithm

**TOTAL : 45 PERIODS**

**MA8451**

**DISCRETE MATHEMATICS  
(BRANCH SPECIFIC COURSE)**

**L T P C  
3 1 0 4**

### **OBJECTIVES:**

At the end of the course, students would

- 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 output functions in computer science.
- Be aware of the counting principles.
- Be exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups.

### **UNIT I LOGIC AND PROOFS**

**9+3**

Propositional Logic – Propositional equivalences - Predicates and Quantifiers – Nested Quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy.

### **UNIT II COMBINATORICS**

**9+3**

Mathematical induction – Strong induction and well ordering – The basics of counting - The pigeonhole principle – Permutations and Combinations – Recurrence relations - Solving linear recurrence relations using generating functions – Inclusion - Exclusion Principle and its applications.

### **UNIT III GRAPHS**

**9+3**

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

### **UNIT IV ALGEBRAIC STRUCTURES**

**9+3**

Algebraic systems – Semi groups and monoids – Groups - Subgroups - Homomorphisms – Normal subgroup and coset - 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 : 60 PERIODS****TEXT BOOKS:**

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

**REFERENCES:**

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

**CS8451****OPERATING SYSTEMS****L T P C****3 0 0 3****OBJECTIVES:**

Gives an idea about process synchronization, inter-process communication, scheduling, deadlock handling, and memory management.

**UNIT I            OPERATING SYSTEMS OVERVIEW****9**

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

**UNIT II            PROCESS MANAGEMENT****9**

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

<b>UNIT III</b>	<b>STORAGE MANAGEMENT</b>	<b>9</b>
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Memory Management – Swapping – Contiguous memory allocation – Paging – Segmentation – Example: The Intel Pentium - Virtual Memory: Background – Demand paging – Copy on write – Page replacement – Allocation of frames – Thrashing.

## UNIT IV I/O SYSTEMS 9

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

<b>UNIT V</b>	<b>CASE STUDY</b>	<b>9</b>
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The Linux System – History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – File systems – Input and Output – Inter-process Communication – Network Structure – Security – Windows 7 – History – Design Principles – System Components – Terminal Services and Fast User – File system – Networking.

**TOTAL: 45 PERIODS**

**TEXT BOOK:**

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

**REFERENCES:**

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

CS8452

## SOFTWARE ENGINEERING

**L T P C**

**3 0 0 3**

## OBJECTIVE

This course is intended to provide the students with an overall view over Software Engineering discipline and with insight into the processes of software development.

<b>UNIT I</b>	<b>SOFTWARE PROCESS MODELS</b>	<b>9</b>
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The Evolving role of Software – Software – The changing Nature of Software – Legacy software — A generic view of process– A layered Technology – A Process Framework – The Capability Maturity Model Integration (CMMI) – Process Assessment – Personal and Team Process Models – Product and Process – Process Models – The Waterfall Model – Incremental Process Models – Incremental Model – The RAD Model – Evolutionary Process Models – Prototyping – The Spiral Model – The Concurrent Development Model – Specialized Process Models – the Unified Process.

Software Engineering Practice – communication Practice – Planning practice Modeling practice– Construction Practice –Deployment. Requirements Engineering - Requirements Engineering tasks – Initiating the requirements Engineering Process- Eliciting Requirements – Developing Use cases – Building the Analysis Models – Elements of the Analysis Model – Analysis pattern – Negotiating Requirements – Validating Requirements.

Requirements Analysis – Analysis Modeling approaches – data modeling concepts – Object oriented Analysis – Scenario based modeling – Flow oriented Modeling – Class based modeling – creating a behaviour model.

Design Engineering – Design process -Design Quality-Design model-User interface  
Design – Testing strategies- Testing Tactics - strategies Issues for conventional and  
object oriented software-validation testing –system testing –Art of debugging – Project  
management

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

**TEXT BOOKS:**

1. Roger S.Pressman, Software Engineering: A Practitioner's Approach, McGraw Hill International edition, Seventh edition, 2009.
2. Ian Sommerville. Software Engineering, 8th Edition, Pearson Education, 2008.

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

LTPC  
3024

- To understand the problem solving process and writing algorithms
- To use algorithm design paradigms for algorithm design
- To analyse the algorithms for time/space complexity

The Role of Algorithms in Computing – Analyzing algorithms – Worst-case and Average-case Analysis - Designing algorithms – Divide-and-Conquer approach - Performance analysis of sorting algorithms - Sorting in linear time - Lower bounds for sorting - Medians and order statistics

**UNIT II MATHEMATICAL FOUNDATIONS 9**

Growth of Functions - Big Oh, Small Oh, Omega and Theta notations - Summations - Solving Recurrence equations - The Substitution Method - The Master Method - Generating function techniques - Constructive induction

**UNIT III DESIGN AND ANALYSIS TECHNIQUES 9**

Dynamic Programming - Matrix chain multiplication - Elements of Dynamic programming - Longest common subsequence - Greedy Algorithms - Activity selection problem - Elements of the Greedy Strategy - Huffman code – Theoretical foundations for greedy methods – Task scheduling problem

**UNIT IV APPLICATIONS 9**

Matrix Operations – Solving systems of Linear equations - Simplex algorithm - Standard and Slack forms – Duality - Initial basic feasible solution - String Matching - Naive string-matching algorithm - Knuth-Morris-Pratt algorithm

**UNIT V NP PROBLEMS 9**

Probabilistic Analysis - Randomized Algorithms -The Hiring Problem - NP-completeness – reducibility - NP-completeness proofs - Approximation Algorithms - vertex-cover problem – Travelling-salesman problem

**TOTAL: 45 PERIODS**

**TEXT BOOK:**

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.

<b>IT8402</b>	<b>FORMAL LANGUAGES AND AUTOMATA</b>	<b>L T P C</b>
		<b>3 0 0 3</b>

**AIM:**

To get fundamental idea on Automata and Languages

**OBJECTIVES:**

A study of the formal relationships between machines, languages and grammar.

**UNIT I REGULAR EXPRESSIONS AND LANGUAGES 9**

Introduction to Formal Proof – Additional Forms of proof – Inductive proofs – Regular Expressions – Regular and Non Regular Languages - Closure Properties of Regular Languages - Proving Languages Not to Be Regular - Decision Properties of Regular Languages

**UNIT II AUTOMATA 9**

Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – Finite Automata with Epsilon Transitions - Kleene's Theorem –Equivalence and Minimization of Automata - Finite Automata and Regular Expressions

<b>UNIT III</b>	<b>CONTEXT-FREE GRAMMARS AND LANGUAGES</b>	<b>9</b>
Context-Free Grammars – Parse Trees – Ambiguity in Grammars and Languages – Phases of a compiler - Lexical Analysis – Parsing – Compiler Design using Lexical Analysis and Parsing – Grammars for Natural Language Processing		
<b>UNIT IV</b>	<b>PUSHDOWN AUTOMATA AND TURING MACHINES</b>	<b>9</b>
Definition– Languages of a Pushdown Automata – Equivalence of Pushdown Automata and Context-Free Grammars - Deterministic Pushdown Automata, Normal forms for Context-Free Grammars – Pumping Lemma for Context-Free Languages - Closure and Decision Properties of Context-Free Languages - Turing Machines – Programming Techniques for Turing Machines - Basic Turing Machine Extensionss		
<b>UNIT V</b>	<b>UNDECIDABILITY</b>	<b>9</b>
Not Recursively Enumerable Language – Recursively Enumerable Undecidable problem– Undecidable Problems about Turing Machines – Post’s Correspondence Problem - The classes P and NP - NP-complete problems		
<b>TOTAL: 45 PERIODS</b>		

#### TEXT BOOKS

- 1 J.E.Hopcroft, R.Motwani and J.D Ullman, “Introduction to Automata Theory, Languages and Computations”, Second Edition, Pearson Education, 2003.
- 2 J.Martin, “Introduction to Languages and the Theory of Computation”, Third dition, TMH, 2003.

#### REFERENCE BOOKS

1. H.R.Lewis and C.H.Papadimitriou, “Elements of The theory of Computation”, Second Edition, Pearson Education/PHI, 2003.
2. Micheal Sipser, “Introduction of the Theory and Computation”, Thomson Brokecole, 1997.
3. Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman, “Compilers: Principles, Techniques, & Tools”, Second Edition Boston: Addison-Wesley, 2007

<b>IT8451</b>	<b>WEB TECHNOLOGY</b>	<b>L T P C</b>
		<b>3 0 0 3</b>

#### AIM:

To provide an introduction to Java and basic Web concepts and enable the student to create simple Web based applications.

#### OBJECTIVES:

- To introduce the features of object oriented programming languages using Java
- To design and create user interfaces using Java frames and applets
- To have a basic idea about network programming using Java
- To create simple Web pages and provide client side validation
- To create dynamic web pages using server side scripting

<b>UNIT I</b>	<b>JAVA FUNDAMENTALS</b>	<b>9</b>
Java Data types – Class – Object – I / O Streams – File Handling concepts – Threads – Applets – Swing Framework – Reflection		



## **UNIT II                    JAVA NETWORKING FUNDAMENTALS                    9**

Overview of Java Networking - TCP - UDP - InetAddress and Ports - Socket Programming - Working with URLs - Internet Protocols simulation - HTTP - SMTP - POP - FTP - Remote Method Invocation - Multithreading Concepts

## **UNIT III                    CLIENT SIDE TECHNOLOGIES                    9**

XML - Document Type Definition - XML Schema - Document Object Model - Presenting XML - Using XML Parsers: DOM and SAX – JavaScript Fundamentals - Evolution of AJAX - AJAX Framework - Web applications with AJAX - AJAX with PHP - AJAX with Databases

## **UNIT IV                    SERVER SIDE TECHNOLOGIES                    9**

Servlet Overview - Life cycle of a Servlet - Handling HTTP request and response - Using Cookies - Session tracking - Java Server Pages - Anatomy of JSP - Implicit JSP Objects – JDBC - Java Beans - Advantages - Enterprise Java Beans - EJB Architecture - Types of Beans - EJB Transactions

## **UNIT V                    APPLICATION DEVELOPMENT ENVIRONMENT                    9**

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

**TOTAL: 45 PERIODS**

### **TEXT BOOK:**

1. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.

### **REFERENCES:**

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

**CS8461**

**OPERATING SYSTEMS LABORATORY**

**L T P C**

**0 0 3 2**

### **LIST OF EXPERIMENTS:**

1. Learn the use of basic UNIX commands.
2. Shell Programming.
3. Grep, sed, awk.
4. File system related system calls. (Learn to create, open, read, write, seek into, close files; open, read, write, search, close directories)
4. Process management – Fork, Exec (Learn to create a new process and to overlay an executable binary image on an existing process)

6. Inter-process communication between related processes using pipes.
7. Process synchronization using semaphores (Solutions to synchronization problems like producer consumer problem, dining philosophers' problem etc...)
8. Inter-process communication unrelated processes using Shared memory
9. Inter-process communication unrelated processes using Message Queues

**TOTAL: 45 PERIODS**

#### **LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS**

1. Linux server
2. Terminals for 30 students

**IT8411**

**WEB TECHNOLOGY LABORATORY**

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

#### **AIM:**

To enable the students to program in Java and to create simple Web based applications.

#### **OBJECTIVES:**

- To write simple programs using Java
  - To design and create user interfaces using Java frames and applets
  - To write I/O and network related programs using Java
  - To create simple Web pages and provide client side validation
  - To create dynamic web pages using server side scripting
1. Creating applications using Applets – Swing Framework - Method invocation programs using Reflection – File handling applications – Random access - Serialization - Simple Thread applications
  2. Client – Server model implementation – HTTP server simulation – Sending E-mails with SMTP and POP implementation – FTP simulation – Remote Method Invocation – Singleton and Single Call models – Activation model
  3. Simple JavaScript programs – Cascading Style Sheets – XML Generation and Parser – Applications using AJAX – AJAX with PHP scripting – AJAX with database applications
  4. Implementation of Servlets and JSPs – JDBC applications with JSPs - Session management – EJB implementation
  5. Creation of Web Enabled applications using Struts Framework – Simple Hibernate applications – Persistence classes - Representation of Servlets and RMI using Spring framework

**TOTAL: 45 PERIODS**

## OBJECTIVE

Gives an understanding of OOAD basics, UML diagrams, system modeling, design based on requirements, converting design to code, and design patterns.

<b>UNIT I</b>	<b>OOAD BASICS</b>	<b>10</b>
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Introduction – Overview of object oriented system development – Object basics-The Unified Process – Modeling concepts – Modeling as a design technique – Analysis and modeling – UML diagrams – Use case Modeling – Class modeling – State modeling – Interaction Modeling

## UNIT II REQUIREMENTS &amp; MORE MODELING 7

Object Constraint Language - Inception – Evolutionary Requirements– Domain Models – System Sequence Diagrams – Operation Contracts

<b>UNIT III</b>	<b>DESIGN AND PRINCIPLES OF DESIGN</b>	<b>10</b>
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Requirements to Design – Design Patterns – Logical Architecture – Package diagram – Design patterns – Model, View, Control pattern – Detailed design – Object design with GRASP pattern – Detailed class diagram with Visibility.

<b>UNIT IV</b>	<b>MAPPING TO CODE</b>	<b>8</b>
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## Mapping designs to code – Test Driven development and refactoring – UML Tools and UML as blueprint

## UNIT V MORE PATTERNS 10

More Patterns – Analysis update – Objects with responsibilities – Applying design patterns – Architectural Analysis – Logical Architecture Refinement – Package Design – Persistence framework with patterns.

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. Michael Blaha and James Rumbaugh, "Object-oriented modeling and design with UML", Prentice-Hall of India, 2005.
2. Craig Larman. "Applying UML and Patterns – An introduction to Object-Oriented Analysis and Design and Iterative Development", 3rd ed, Pearson Education, 2005.

**REFERENCES:**

1. Ali Bahrami, "Object Oriented Systems Development", McGraw-Hill, 1999.
2. Booch, Grady. Object Oriented Analysis and Design. 2nd ed. Pearson Education 2000.
3. Fowler, Martin. UML Distilled. 3rd ed. Pearson Education. 2004.
4. Lunn, Ken. Software development with UML. Palgrave Macmillan. 2003.
5. O'Docherty, Mike. Object-Oriented Analysis & Design. Wiley. 2005.

**OBJECTIVES:**

- At the end of this course the student will be able to
- Trace the flow of information from one node to another node in the network
- Identify the component required to build different types of networks
- Understand the division of network functionalities into layers.
- Identify solution for each functionality at each layer
- Choose the required functionality at each layer for given application

**UNIT I FUNDAMENTALS****12**

Building a network - Network edge and core - Layering and protocols - Internet Architecture - Networking devices: Modems, Routers, Switches, Gateways - Needs/Principles of Application Layer Protocols - Web and HTTP - FTP - Electronic Mail (SMTP, POP3, IMAP, MIME) - DNS - SNMP

**UNIT II TRANSPORT LAYER****12**

Overview of Transport layer - UDP - TCP - Reliable byte stream - Connection management - Flow control - Retransmission - Congestion control - Congestion avoidance

**UNIT III NETWORK AND ROUTING****12**

Circuit switching - Packet switching - Virtual circuit switching - Routing - IP - Global Address - Datagram Forwarding - Subnetting - CIDR - ARP - DHCP - RIP - OSPF - BGP - ICMP - IPv6 - Multicasting - PIM

**UNIT IV DATA LINK LAYER AND LAN****12**

Link layer services - Framing - Error control - Flow control - Media access control - Ethernet - CSMA/CD - Token Ring - FDDI - Wireless LANs - CSMA/CA

**UNIT V DATA COMMUNICATION****12**

Signal characteristics - Data transmission - Physical links and transmission media - Signal encoding techniques - Channel access techniques - TDM - FDM

**TOTAL: 60 PERIODS****TEXT BOOKS:**

1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A systems approach", Fifth Edition, Morgan Kaufmann Publishers, 2010.
2. James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, "Computer and Communication Networks", Pearson Prentice Hall Publishers, 2010.

**REFERENCES:**

1. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill Publisher, 2011.

**AIM:**

- To provide knowledge on principles and practice underlying the design of distributed systems and to explain the importance of the theory of distributed systems. It is intended to provide an understanding of the *concepts* of distributed systems, through several existing examples.
- The student will appreciate that the design and implementation of effective distributed systems is complex: issues related to "imperfect" computation and communication makes it substantially more difficult than designing centralized algorithms. These will be highlighted in specific distributed environments such as grid and cloud.
- The subject deals with IPC and Remote invocation in distributed environment, distributed objects, distributed file system, and Distributed operating system issues, distributed transactions and security in distributed environment.

**OBJECTIVES:**

- To lay the foundations of Distributed Systems.
- To introduce the idea of distributed architecture and related issues.
- To introduce the idea of distributed operating system and related issues.
- To understand in detail the system level and support required.
- To study and learn how the principles are applied in grid and cloud environment.

**UNIT I COMMUNICATION IN DISTRIBUTED ENVIRONMENT 8**

Fundamental – Various Paradigms in Distributed Applications – Remote Procedure Call – Remote Object Invocation – Group Communication – Threads in Distributed Systems – Virtual Machines

**UNIT II DISTRIBUTED OPERATING SYSTEMS 10**

Issues in Distributed Operating System – Clock Synchronization – Causal Ordering – Global States – Election Algorithms – Distributed Mutual Exclusion – Distributed Deadlock

**UNIT III DISTRIBUTED RESOURCE MANAGEMENT 10**

Distributed Shared Memory – Data-Centric Consistency Models – Distributed Scheduling – VM Scheduling – XEN – Meta scheduling Local Resource Manager – Distributed Load Balancing – Process Migration – Distributed File Systems – Sun NFS – Map Reduce – Hadoop

**UNIT IV FAULT TOLERANCE AND CONSENSUS 8**

Introduction to Fault Tolerance – Byzantine Fault Tolerance – Impossibilities in Fault Tolerance – Agreement Protocols – Distributed Transactions – Distributed Commit Protocols

**UNIT V CASE STUDIES 9**

Distributed Object Based System – CORBA – Distributed Virtualization System – VMWare

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

- 1 George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design", Third Edition, Pearson Education Asia, 2002.
- 2 Mukesh Singhal, "Advanced Concepts In Operating Systems", McGraw Hill Series in Computer Science, 1994.
- 3 Cloud Computing, A Practical Approach by Toby Velte, Anthony Velte, Robert Elsenpeter, TMH, 2009.

1. A.S.Tanenbaum, M.Van Steen, "Distributed Systems", Pearson Education, 2004.
2. M.L.Liu, "Distributed Computing Principles and Applications", Pearson Addison Wesley, 2004.
3. Tom White, "Hadoop: The Definitive Guide", O'REILLY Media, 2009.

L T P C  
3 0 0 3

- To develop, design and implement two and three dimensional graphical structures
- To enable students to acquire knowledge in the production of multimedia movies and animations
- To learn Creation, Management and Transmission of Multimedia objects.

Elements of pictures created in computer graphics – Graphics input primitives and devices – OpenGL basic Graphics primitives – Output primitives – Line, Circle and Ellipse drawing algorithms – Attributes of output primitives – Line drawings in OpenGL

2D Viewing – Window-Viewport Transformation - Two dimensional Geometric transformations – Line, Polygon, Curve and Text clipping algorithms – 2D Geometric Transformations using OpenGL

Parallel and Perspective projections - Three dimensional object representation – Polygons, Curved lines, Splines, Quadric Surfaces - Visualization of data sets - 3D affine transformations – Viewing – Visible surface identification – Color Models

Introduction and definitions – applications – elements – Animations – Compression – Types of Compressions: Lossless – Lossy – Video compression – Image Compression – Audio compression – Data and file format – Multimedia data structures: KD Trees – R trees.

Creating interactive multimedia – Multimedia Authoring Systems – Applications – Video  
On demand – Virtual Reality – Augmented Reality – Content based retrieval in digital  
libraries.

1. Donald D. Hearn, M. Pauline Baker and Warren Carithers, "Computer Graphics with OpenGL", Fourth Edition, Pearson Education, 2010.
2. Ze-Nian Li and Mark S.Drew, "Fundamentals of Multimedia", First Edition, Pearson Education, 2007.

1. F.S.Hill, "Computer Graphics using OPENGL", Second edition, Pearson Education, 2003.
2. Prabhat K Andleigh, Kiran Thakrar, "Multimedia systems design", First Edition, PHI, 2007.

**OBJECTIVE:**

- To know the essentials of XML Programming
- To understand programming concepts of distributed and wireless environments
- To understand the programming practices behind coordinating Distributed Architecture

**UNIT I INTRODUCTION 9**

Overview of Middleware Components - Distributed programming - XML in Web Programming - JINI fundamentals

**UNIT II WORKING WITH XML 9**

XML annotations - Custom annotations - Functions to Control XML - XML parsers - XML data sources - XML Validation - XSLT transformation and programming -XML processing using PHP

**UNIT III DISTRIBUTED PROGRAMMING 9**

Multithreaded Programming - Synchronization techniques - Java Threading model - Multiple process programming: Sockets - Messaging - Client-Server model - RPC - CORBA and DCOM models of RPC - Reusable Programming Techniques

**UNIT IV PROGRAMMING THE WIRELESS DEVICES 9**

J2ME - Connected Limited Device Configuration - Mobile Information Device Profile - UI controls - Event Handling - Persistent Storage - Network Midlets - Wireless Messaging

**UNIT V JINI PROGRAMMING 9**

Plug-and-Work model - Lookup Services - Discovery Protocol - Proxy Objects - Leases - Attributes - Groups - JINI with RMI - JINI with J2ME

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Keith Edwards .W, 2000, Core Jini, Second Edition, Prentice Hall PTR, ISBN 0130894087.
2. Sing Li, Mile Burmeijer, Jerome Scheuring, 2000, Professional Jini, Wrox Press, ISBN 1861003552.
3. Jan Newmarch, 2006, Foundations of Jini 2 Programming, First Edition, Apress, ISBN 1590597168.

**REFERENCES:**

1. Dale Rogerson, 1997, Inside Com (Microsoft Programming Series), Microsoft Press, ISBN 1572313498.
2. Don Box, Essential COM, 1998, First Edition, Addison-Wesley Professional, ISBN 0201634465.
3. Randy Abernethy, Randy Morin, Jesus Chahin, Randy Charles Morin, 1999, COM/DCOM Unleashed, SAMS Publishing, ISBN 0672313529.

**AIM:**

To understand the low-level network programming concepts using APIs and Simulation tools.

**OBJECTIVES:**

- Write a network application program
- Exercise all options of TCP/UDP sockets
- Use tools to visualize packet flow
- To analyze the performance of protocols in different layers using simulation tools
- Configure Router/Switch to set up network (network administration)
- Simple Chat Program using TCP Sockets
- Simulation of HTTP Protocol using TCP Sockets
- Simulation of Sliding Window Protocol using TCP Sockets
- Simulation of DNS using UDP Sockets
- Simulation of Ping using Raw Sockets
- Learn to use commands like TCP Dump, Netstat, TraceRoute
- Develop applications and understand the behaviour of TCP Options.
- Study of TCP/UDP performance using simulation tool
- Performance comparison of MAC protocols using simulation tool
- Performance comparison of Routing protocols using simulation tool
- Study and configure functionalities of a router and switches (or by simulation)

**TOTAL: 45 PERIODS****OBJECTIVE:**

- To make the students understand graphics programming
- To create 3D graphical scenes using open graphics library suits
- To perform image manipulation enhancement
- To create animations
- To create a multimedia presentation/Game/Project

**Implement the exercises from 1 to 4 using C / OpenGL / Java**

1. Implementation of Algorithms for drawing 2D Primitives –
  - Line (DDA, Bresenham) – all slopes
  - Circle (Midpoint)
2. 2D Geometric transformations –
  - Translation
  - Rotation
  - Scaling
  - Reflection
  - Shear
  - Window-Viewport
3. Composite 2D Transformations
4. Liang - Barsky Line Clipping



**Implement the exercises from 5 to 7 using OpenGL**

5. 3D Transformations - Translation, Rotation, Scaling
6. 3D Projections – Parallel, Perspective
7. Creating 3D Scenes
8. Compression Algorithms - To implement text and image compression algorithms.
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****IT8513****SOCIALLY RELEVANT PROJECT****L T P C  
0 0 0 2**

Students are expected to take up problems that would directly benefit the society, and design and implement an IT based solution for the problem, based on the courses undertaken up to that semester. The evaluation of the project would be based on the formulation of the problem, and the technical merit of the solution.

**IT8601****EMBEDDED SYSTEMS****L T P C  
3 0 0 3****OBJECTIVES :**

- To learn the internal architecture of an embedded processor including timers and interrupts
- To quantize the core specifications of an embedded processor
- To introduce interfacing I/O devices to the processor
- To learn programming on a processor
- To run and debug programs in an IDE
- To design an embedded processor based system for a real-time application

**UNIT I 8-BIT EMBEDDED PROCESSOR****9**

8051 Microcontroller – Architecture, Instruction set and programming. Programming parallel ports, Timers and serial port – Memory system mechanisms – Memory and I/O devices and interfacing – Interrupt handling.

**UNIT II LOW-POWER EMBEDDED PROCESSORS****9**

ARM7 TDMI processing core - instruction sets and programming – Intel ATOM Processor – Architecture – Programming

**UNIT III RTOS****9**

Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Performance issues - Need for RTOS - Introduction to µC/OS II

**UNIT IV      EMBEDDED C PROGRAMMING      9**

Programming embedded systems in C – programming using  $\mu$ C/OS II functions - inline functions and inline assembly – portability issues - Meeting real time constraints - Multi-state systems and function sequences

**UNIT V      EMBEDDED SYSTEM DEVELOPMENT      9**

Embedded software development tools – Emulators and debuggers. Challenges of Embedded Systems – Embedded system design process - Design issues – Design methodologies – Case studies – Complete design of example embedded systems.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearson Education, Second edition, 2007
2. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.
4. Andrew N Sloss, D. Symes, C. Wright, "Arm system developers guide", Morgan Kaufman/ Elsevier, 2006.

**REFERENCES:**

1. Michael J. Pont, "Embedded C", Pearson Education, 2007.
2. Steve Heath, "Embedded System Design", Elsevier, 2005

**IT8602****INFORMATION MANAGEMENT****L T P C  
3 0 0 3****AIM:**

To provide an insight in the management of information in the corporate.

**OBJECTIVE**

- To aware the significant of information in the business scenario
- To familiarize method of restoring, retrieving and presenting the information.

**UNIT I      INTRODUCTION      9**

Data, information, knowledge and wisdom; characteristics of information, quality of information, value of information in decision making in various levels of the organization  
Role of information in Business scenario- functional and process approach in the organization; Source and supply of information and content to employees, shareholders and customers

**UNIT II      INFORMATION CAPTURING AND MIGRATION MECHANISMS      9**

Data management and system integration ;Content management – text, imaging , records, workflow, web content management; Distributed databases, Object oriented databases-object life cycle modeling visual databases and knowledge based databases and business impacts, ETL on data ware house, Meta data and indexing

**UNIT III      BUSINESS PROCESS MANAGEMENT      9**

Practices of BPM, role of Information in BPM, Business Analysis-relationship between information and organization, Critical success factors, Enterprise analysis –framework and tools, Process design and modeling-process improvements, process modeling, business process reengineering, SOA, Six Sigma and continuous improvement, ERP.

**UNIT IV INFORMATION PRESENTATION****9**

Enterprise wide search-DSS, EIS, ES, Fact and entity extraction -OLAP, Data mining algorithm- classification and clustering of information, information governance, BI

**UNIT V INFORMATION IN BUSINESS SCENARIO AND BUSINESS TRENDS****9**

Information in management application: Functional areas of management, roles and responsibilities of Information resource manager, E business models, Value of information in E-CRM - Social marketing – social and ethical issues in handling information management.

**TOTAL: 45 PERIODS****REFERENCES**

1. Robert Schultheis and Mary Summer, Management Information Systems – The Managers View, Tata McGraw Hill, 2008.
2. Peter Rob, Carlos Coronel, Database System and Design, Implementation and Management, 7 th edition, Cengage Learning,
3. Jeffrey A Hoffer et al, Modern Database Management, 8<sup>th</sup> Edition, Pearson Education, 2008,
4. Gordon Davis, Management Information System : Conceptual Foundations, Structure and Development, Tata McGraw Hill, 2000.
5. Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008
6. Efraim Turban and Jay E. Aronson, Decision Support System and Intelligent Systems, Prentice Hall International, 2002
7. Michel Berry and Gordon Linoff, Data mining techniques for Marketing, Sales and Customer support, John Wiley, 2004.
8. Kimiz Dalkir, Knowledge Management in Theory and Practice, Butterworth – Heinemann 2008.
9. Efraim Turban, Ramesh Sharda, Jay E. Aronson and David King, Business Intelligence, Prentice Hall, 2008.

**IT8603****MOBILE COMPUTING****L T P C****3 0 0 3****AIM:**

- To give a comprehensive exposure to the developments taking place in the areas of wireless networks and mobile computing

**OBJECTIVES:**

- To understand the challenges of wireless communication and the solutions that are in use
- To study about various types of wireless data networks and wireless voice networks
- To realize the role of wireless protocols in shaping the future Internet
- To design and implement mobile applications
- To give an introduction to the enabling technologies of pervasive computing

**UNIT I                      WIRELESS COMMUNICATION                      9**

Challenges of Wireless Transmission - Multi-carrier modulation - Spread Spectrum - Satellite Communication - Broadcast systems - Multiplexing - FDMA, TDMA and CDMA - Cellular organization of mobile telephone networks - Operation of cellular networks - Frequency Reuse - Tessellation - Handoff - Capacity Improvement

**UNIT II                      WIRELESS NETWORKS                      9**

IEEE 802.11 Wireless LAN - Architecture - Modes of Operation - CSMA/CA and its variants - Wireless LAN security - Bluetooth networks - Generation of cellular networks - Overview of GSM - GPRS Network Architecture and Operations - UMTS and IMT 2000 - Packet Switching Domain - Core Network - Radio Access Network - LTE - Control Plane - User Plane

**UNIT III                      L3 AND L4 WIRELESS PROTOCOLS                      9**

Mobile IP - Mobility features in IPv6 - Proactive and reactive ad hoc routing protocols - DSDV, DSR and AODV - Limitations of Traditional TCP in wireless networks - TCP improvements for Wireless Networks – Indirect TCP, Snoop TCP, Mobile TCP - Security issues in network layer and transport layer

**UNIT IV                      MOBILE COMPUTING PLATFORM                      9**

PDA - Device characteristics and Software components - Smart Phone - Convergence of Mobile devices - J2ME - Modes, Data store, GUI support - HTTP Connection Interface Push Registry - Application development using Android APIs - Palm OS Architecture and Program Development - Overview of other mobile Operating Systems

**UNIT V                      MOBILE INTERNET                      9**

WAP - WAP Gateways - WML - VoiceXML - Mobile Messaging - Multimedia Messaging Service - Synchronized Multimedia Integration Language - Application Servers - Internet portals - Device management - Synchronization Models - Communication to Servlets and Web Services - Location aware Mobile computing - IP Multimedia Subsystem

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Asoke Talukder, Hasan Ahmed, Rupa Yavagal, "Mobile Computing: Technology, Applications and Services Creation", Second Edition, TMH, 2010.
2. William Stallings, "Wireless Communication and Networks", Pearson, 2009.

**REFERENCE BOOKS:**

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson, 2009.
2. Uwe Hansmann et al, "Principles of Mobile Computing", Springer, 2003.
3. Ivan Stojmenovic, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002.

**OBJECTIVES:**

- To enhance the employability skills of students with a special focus on Presentation skills, Group discussion skills and Interview skills
  - To help them improve their soft skills, including report writing, necessary for the workplace situations
1. Making presentations – introducing oneself – introducing a topic – answering questions – individual presentation practice
  2. Creating effective PPTs – presenting the visuals effectively
  3. Using appropriate body language in professional contexts – gestures, facial expressions, etc.
  4. Preparing job applications - writing covering letter and résumé
  5. Applying for jobs online - email etiquette
  6. Participating in group discussions – understanding group dynamics - brainstorming the topic
  7. Training in soft skills - persuasive skills – People skills - questioning and clarifying skills – mock GD
  8. Writing Project proposals – collecting, analyzing and interpreting data / drafting the final report
  9. Attending job interviews – answering questions confidently
  10. Interview etiquette – dress code – body language – mock interview

**TOTAL: 30 PERIODS****REQUIREMENTS FOR A CLASS OF 30 STUDENTS**

1. A PC or a lap top with one or two speakers
2. A Collar mike and a speaker
3. An LCD projector and a screen
4. CD's and DVD's on relevant topics

**REFERENCES:**

1. Dhanavel, S.P. 2010. *English and Soft Skills*. Hyderabad: Orient BlackSwan Ltd.
2. Corneilssen, Joep. *How to Prepare for Group Discussion and Interview*. New Delhi: Tata-McGraw-Hill, 2009.
3. D'Abreo, Desmond A. *Group Discussion and Team Building*. Mumbai: Better Yourself Books, 2004.
4. Ramesh, Gopalswamy, and Mahadevan Ramesh. *The ACE of Soft Skills*. New Delhi: Pearson, 2010.
5. Gulati, Sarvesh. *Corporate Soft Skills*. New Delhi: Rupa and Co. 2006.
6. Van Emden, Joan, and Lucinda Becker. *Presentation Skills for Students*. New York: Palgrave Macmillan, 2004.

**EXTENSIVE READERS**

1. Covey, Stephen R. *The 7 Habits of Highly Effective People*. New York: Free Press, 1989.
2. Bagchi, Subroto. *The Professional*. New Delhi: Penguin Books India, 2009.

**WEB RESOURCES**

1. [www.humanresources.about.com](http://www.humanresources.about.com)
2. [www.careerride.com](http://www.careerride.com)

**IT8611****CREATIVE AND INNOVATIVE PROJECT**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

The goal of this course is to encourage the students to identify innovative projects that help in exploring variables that promote creativity and innovation. Each student is expected to choose a real life or socially relevant problem. At the end of the project, students should be familiar with the state of art in their respective fields. They would be able to apply the concepts learnt to relevant research problems or practical applications.

The goal of this course is to motivate them to learn concepts, models, frameworks, and tools that engineering graduates' need in a world where creativity and innovation is fast becoming a pre-condition for competitive advantage.

**TOTAL: 45 PERIODS****IT8612****EMBEDDED SYSTEMS LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**OBJECTIVES:**

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

- Develop Applications based on Embedded Systems
- Write an Embedded C Program, Debug and interpret the Results
- Write and implement simple assembly programs that use various features of the processor.
- Able to do an experiment that senses an analog signal, process and control [e.g., Keypad, Display].

**1. 8051 Assembly Language Experiments based on:**

- Data transfer programs
  - Arithmetic and logical programs
  - Conversions and sorting
  - Timers and Interrupts
  - Serial Communication
  - I/O interfacing: Traffic Generator, DAC, ADC, Stepper Motor
2. Basic and Interfacing Programs Using Embedded C
  3. Real time system programs (Embedded C)
  4. KEIL software example programs

**2. ARM/Atom based Application Development:**

1. Programs to practice data processing instructions.
2. Interfacing programs
3. Program that uses combination of C and ARM/Atom assembly code.

**TOTAL: 45 PERIODS**

**OBJECTIVE:**

- To understand and use the fundamentals of programming for mobile devices.
  - To apply event-driven programming and graphical user interfaces for mobile devices.
1. GSM modem study (Nokia 30) and SMS client-server application
  2. Implementation of Mobile Network using Network Simulator (NS2)
  3. GUI APIs for high-level and low level programming
  4. To store and access information stored in a mobile device (persistence and record management)
  5. Usage of HTTP and sockets for communication between mobile devices and remote servers.
  6. Mobile Internet and WML
  7. J2ME Program for Mobile Node Discovery
  8. Mobile protocol study using simulator
  9. To design sample programs for Mobile Phones.( Antroid , iPhone etc)
  10. Bluetooth Integration

**TOTAL: 45 PERIODS****OBJECTIVE:**

This course deals with evolving multidimensional massive data sets and the various analysis which may be performed on it.

**UNIT I INTRODUCTION TO BIG DATA 8**

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 12**

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 8**

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****8**

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****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 analytics, 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.

**IT8702****INFORMATION SECURITY****L T P C  
3 0 0 3****AIM:**

- To give an overview about the basics of security and cryptography.
- To give an exposure to the security standards and security practices followed in IT industries

**OBJECTIVES:**

- To introduce the concepts and models of security in computing
- To design and implement symmetric and asymmetric cryptosystems
- To explain the security standards followed at the network level and at the application level
- To estimate the level of security risk faced by an organization and the counter measures to handle the risk
- To learn secured software development

**UNIT I SECURITY - AN OVERVIEW****6**

Basics of Security - CIA Triad - Threats, Attacks and Controls - Aspects of Security - Legal, Ethical and Professional - Security Models - Depth of Security - Need for Security at Multiple levels - Security Policies - Role of Trust, Bell-LaPadula model - Biba Integrity model - Chinese Wall model - Malicious Logic - Viruses, Worms, Logic Bombs - Notion of Trust



**UNIT II CRYPTOGRAPHY 9**  
 Classical Cryptosystems - Substitution and Transposition - Blowfish and AES - Public Key Cryptography - RSA and ElGamal algorithms - Authentication and Key Exchange - Biometric authentication - Diffie Hellman and Needham Schroeder algorithms - Digital Signatures - Message Digest - Certificates - Directories and Revocation of keys and certificates

**UNIT III SECURITY STANDARDS 12**  
 Public Key Infrastructure - Kerberos - X.509 - IPSec - Virtual Private Networks - E-Mail Security - PGP and PEM - Web Security - Secured DNS - SSL, TLS and SET - CoBIT Framework - Compliances - Credit Card Applications - GLBA - Standards - ISO 27000

**UNIT IV SECURITY PRACTICES 9**  
 Vulnerability Analysis - Flaw Hypothesis Methodology, NRL taxonomy and Aslam's model - Auditing - Anatomy of an Auditing System - Design of Auditing Systems - Posteriori Design - Auditing mechanisms - Risk Analysis and Management - Disaster Recovery Planning/Incident Response Planning - Intrusion Detection System

**UNIT V SECURED DEVELOPMENT 9**  
 Secured Coding - OWASP/SANS Top Vulnerabilities - Buffer Overflows - Incomplete mediation - XSS - Anti Cross Site Scripting Libraries - Canonical Data Format - Command Injection - Redirection - Inference - Application Controls - Secured Software Development Life Cycle - Testing, Maintenance and Operation - Evaluation of Security Systems

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Wade Trappe, Lawrence C Washington, "Introduction to Cryptography with Coding and Theory", Second Edition, Pearson, 2007.
2. Matt Bishop, "Computer Security: Art and Science", Pearson, 2003.

**REFERENCES:**

1. Charles Pfleeger, Shari Lawrence Pfleeger, Devin N Paul, "Security in Coding", Pearson, 2007.
2. Wenbo Mao, "Modern Cryptography Theory and Practice", Pearson, 2004.

**IT8703 PRINCIPLES OF HUMAN COMPUTER INTERACTION L T P C**  
**3 0 0 3**

**OBJECTIVES:**

- To study about the design, implementation and evaluation of effective and usable graphical computer interfaces.
- To describe and apply core theories, models and methodologies from the field of HCI.
- To learn various case studies in HCI

**UNIT I FOUNDATIONS FOR INTERACTION DESIGN 9**  
The psychopathology of Everyday things – Psychology of everyday actions - Human memory – Thinking – Emotion - Psychology and design of interactive system - Text entry devices - display devices - devices for virtual reality and 3D interaction - Models of interaction - Frame work and HCI-Ergonomics - Interaction styles - Elements of WIMP interface – Interactivity - paradigms for interaction - Affective aspects of HCI

**UNIT II MODELS AND THEORIES 9**  
Cognitive models: Linguistic models-Physical and device models - Cognitive architecture, Communication and collaboration models: Face to face communication - conversation - Text based communication - Group working, Models of the system: Standard formalisms - Interaction models - Continuous behavior, Modeling rich interaction: Status event analysis - Rich contexts - Low interaction and sensor based interaction.

**UNIT III DESIGN PROCESS 9**  
Interaction design basics: The process of design - user focus - navigation design - Screen design and layout - iteration and prototyping, HCI in software Process: Usability Engineering - iterative design and prototyping, Design rules: Principles to support usability - Standards - Guidelines - Golden rules and heuristics - HCI patterns, Designing for collaboration and communication.

**UNIT IV IMPLEMENTATION AND EVALUATION TECHNIQUES 9**  
Implementation support: Elements of windowing systems - Programming the application-Using toolkits-User interface management systems, Evaluation techniques: Goals of evaluation-Evaluation through user participation-Choosing and evaluation method, Universal design: Universal design principles-Multi model interaction-Designing for diversity, User support: Requirements of user support-Approaches to user support-Adaptive help systems-Designing user support systems.

**UNIT V CASE STUDIES 9**  
Goals of HCI case studies: Exploration - Explanation - Description - Demonstration, Types of case study: Intrinsic or instrumental - Single case multiple cases - Embedded or holistic, Groupware: Groupware systems - Computer mediated communication - Meeting and decision support system - Shared applications and artifacts - Frameworks for groupware - Implementing synchronous groupware, Ubiquitous computing and augmented realities: Ubiquitous computing applications research - Virtual and augmented reality - Information and data visualization - HCI for smart environment – Virtual reality – HCI for scientific applications, medical applications – HCI for assistive technology

**TOTAL: 45 PERIODS**

**TEXT BOOK:**

1. Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale, Human – Computer Interaction, Third Edition, Pearson, 2004.

**REFERENCES:**

1. Helen Sharp, Yvonne Rogers, Interaction Design beyond human - computer interaction, Second Edition, 2009.
2. Jonathan Lazar, Jinjuan Feng and Harry Hochheiser, Research Methods in Human - Computer Interaction, John Wiley & Sons Ltd, 2010.

**IT8711****HUMAN COMPUTER INTERACTION LABORATORY****L T P C**  
**0 0 3 2****OBJECTIVE:**

- To design and create effective user interfaces for various applications.
  - To create interactive animated displays using various interactive devices.
1. Design of simple user interfaces using Generalized Interface Toolkit (GTK).
  2. Modifying the user interfaces of text processor, Excel, Power point builder.
  3. Designing interfaces for health care, telephone directory and collaborative applications using tools like Cog tool, Flash builder.
  4. Creating user interfaces for disabled people using speech engines, translators and sign language.
  5. Working on Multi touch devices and multi sensor devices
  6. Design of interactive devices like cell phones and video controllers, household appliances and smart cars.
  7. Drag and Drop an application instance from server to client and then automate the execution of the application on the client side (JAVA / VC++)
  8. Simulate the Smart Car display to view the availability of petrol in the tank, distance travelled and a graphic display (continuous monitoring) with different colors about the level of petrol in the tank
  9. To drag the magnifying lens on the world map just to zoom the region of interest and to collect the retrieve the relevant information about that region
  10. Gaming applications – masking – Hide and Seek the Text and Image.

**TOTAL:45 PERIODS****MA 8351****ALGEBRA AND NUMBER THEORY**  
**(Branch specific course)****L T P C**  
**3 1 0 4****OBJECTIVES:**

- To introduce the basic notions of groups, rings, fields which will then be used to solve related problems.
- To examine the key questions in the Theory of Numbers.
- To give an integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

**UNIT I          FIELDS****9+3**

Group Theory - Rings and Polynomials – Fields.

**UNIT II          FINITE FIELDS AND POLYNOMIALS****9+3**

Finite Fields – Irreducible Polynomials over Finite fields – Factorization of Polynomials over Finite Fields.

**UNIT III          DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS****9+3**

Division algorithm- Base-b representations – number patterns – Prime and composite numbers –Fibonacci and Lucas numbers – Fermat numbers – GCD – Euclidean Algorithm – Fundamental theorem of Arithmetic – LCM.

**UNIT IV          DIOPHANTINE EQUATIONS AND CONGRUENCES          7+3**  
 Linear Diophantine equations – Congruence's – Linear Congruence's - Applications:  
 Divisibility tests – Modular Designs – Chinese remainder theorem – 2x2 linear systems.

**UNIT V          CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS          10+4**  
 Wilson's theorem – Fermat's Little theorem – Euler's theorem – Euler's Phi functions –  
 Tau and Sigma functions – Perfect numbers – Mersenne Primes – Mobius Function.

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. Lidl.R., and Pilz. G., "Applied Abstract Algebra", Springer-Verlag, New Delhi, 2<sup>nd</sup> Edition, 2006.
2. Thomas Koshy, "Elementary Number Theory with Applications", Elsevier Publications, New Delhi, 2002.

**REFERENCES:**

1. San Ling and Chaoping Xing, "Coding Theory – A first Course", Cambridge Publications, Cambridge, 2004.
2. Niven.I, Zuckerman.H.S., and Montgomery, H.L., "An Introduction to Theory of Numbers", John Wiley and Sons, Singapore, 2004.

**CS8651          DIGITAL SIGNAL PROCESSING – ALGORITHMS AND          L T P C**  
**APPLICATIONS          3 0 0 3**

**OBJECTIVE**

This course provides the idea on design of analog and digital filters, and their classifications. Also, it provides a good knowledge of error correction in signal processing systems, which is then enriched with the applications to the image and speech processing.

**UNIT I          SIGNALS AND SYSTEMS          9**  
 Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution – Correlation.

**UNIT II          FREQUENCY TRANSFORMATIONS          9**  
 Introduction to DFT – Properties of DFT – Circular Convolution - Filtering methods based on DFT – FFT Algorithms - Decimation – in – time 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, BRFF) filter design using frequency translation

**UNIT IV      FIR FILTER DESIGN****9**

Structures of FIR – Linear phase FIR filter – Fourier Series - Filter design using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques – Finite word length effects in digital Filters: Errors, Limit Cycle, Noise Power Spectrum.

**UNIT V      APPLICATIONS****9**

Multirate signal processing: Decimation, Interpolation, Sampling rate conversion by a rational factor – Adaptive Filters: Introduction, Applications of adaptive filtering to equalization, echo cancellation, interference cancellation – Speech Recognition Systems, Speech Synthesis Systems – Image Enhancement.

**TOTAL: 45 PERIODS****TEXT BOOKS:**

1. John G. Proakis & Dimitris G. Manolakis, "Digital Signal Processing – Principles, Algorithms & Applications", Pearson education / Prentice Hall, Fourth edition, 2007.
2. Emmanuel C. Ifeakor, & Barrie W. Jervis, "Digital Signal Processing", Pearson Education / Prentice Hall, Second edition, 2002.

**REFERENCES:**

1. Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", Tata McGraw Hill, Third Edition, 2007.
2. Alan V. Oppenheim, Ronald W. Schaffer & John R. Buck, "Discrete Time Signal Processing", Pearson Education, Second Edition, 2001.
3. Andreas Antoniou, "Digital Signal Processing", Tata McGraw Hill, 2006.

**IT8001****ADVANCED DATABASE TECHNOLOGY****L T P C  
3 0 0 3****OBJECTIVE:**

- To know advanced concepts of database in large scale analytics
- To derive data maintenance, change schema, database update and Benchmark
- To understand Object Databases and to deal with uncertainties in advanced concepts of database, and open issues in database technologies.

**UNIT I      PARALLEL AND DISTRIBUTED DATABASES****9**

Database System Architectures: Centralized and Client-Server Architectures - Server system architectures - Parallel systems - Distributed systems - Parallel databases: I/O Parallelism - Inter and Intra query parallelism - Inter and Intra operation parallelism - Distributed database concepts - Distributed data storage - Distributed transactions - Commit protocols - Concurrency control - Distributed query processing - Three tier client server architecture - Case studies

**UNIT II      OBJECT AND OBJECT RELATIONAL DATABASES****9**

Concepts for Object Databases: Object Identity - Object structure - Type constructors - Encapsulation of operations - Methods – Persistence - Type and class hierarchies - Inheritance - Complex objects - Object database standards, languages and design: Object Data Management Group (ODMG) Model – Object Definition Language – Object Query Language – Object-relational and extended-Relational systems: Object Relational features in SQL/Oracle - Case studies

**UNIT III XML DATABASES 9**

XML Databases: XML data model - DTD - XML Schema - XML querying - Web databases - JDBC - Information retrieval - Data warehousing - Data mining

**UNIT IV MOBILE DATABASES 9**

Mobile Databases: Location and Handoff Management - Effect of mobility on data management - Location dependent data distribution - Mobile transaction models - Concurrency control - Transaction commit protocols - Mobile database recovery schemes

**UNIT V INTELLIGENT DATABASES 9**

Active databases - Deductive databases - Knowledge databases – Multimedia databases - Multidimensional data structures - Image databases - Multimedia database design - Text/Document databases - Audio databases - Video databases

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Sixth Edition, McGraw Hill, 2011.
2. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

**REFERENCES:**

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education, 2011.
2. Thomas M Connolly and Carolyn E Begg, "Database Systems: A Practical Approach to Design, Implementation and Management", Fourth Edition, Pearson Education, 2008.
3. Subramaniam, "Principles of Multimedia Database Systems", Morgan Kauffman Publishers, 2008.

**IT8002**

**ADVANCED NETWORKS**

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

**OBJECTIVES:**

- To explain QoS requirements and compare different approaches to QoS.
- To appreciate need for high speed networks
- To identify reliability issues and provide solutions

**UNIT I INTERNETWORKING 9**

IPv6 - Design issues - Scalability - Addressing - Headers - Routing - Auto configuration - Transition from IPv4 to IPv6 - Interoperability - QoS in IPv6 - Multicast support - ICMPv6 - Security in IPv6

**UNIT II MPLS AND VPN 9**

MPLS Architecture and related protocols - Traffic engineering with MPLS - QoS - Network recovery and restoration with MPLS – VPN L2 – VPN L3 & Hybrid

## 9

## UNIT IV OPTICAL NETWORKS

9

## UNIT V WDM NETWORKS

9

**TOTAL: 45 PERIODS**

1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Elsevier/Morgan Kaufmann Publishers, 2011.
2. Bruce S. Davie, Adrian Farrel, "MPLS: Next Steps", Morgan Kaufmann Publishers, 2011.

1. Krishna M. Sivalingam, Suresh Subramaniam, "Emerging Optical Network Technologies: Architectures, Protocols and Performance", Springer publishers, 2011.

## AGENT BASED INTELLIGENT SYSTEMS

L T P C  
3 0 0 3

- To know the intelligent agents and the associated searching algorithms
- To understand the various learning approaches and creation of neural network
- To understand the concepts of fuzzy logic

## 9

## UNIT II RESOLUTION AND REASONING

9

## UNIT III      NEURAL NETWORKS

9

Machine Learning using Neural Network - Adaptive networks - Feed forward networks - Supervised learning Neural Networks - Radial basis function networks - Reinforcement learning - Unsupervised learning Neural Networks - Adaptive resonance architectures - Advances in Neural Networks

**UNIT IV FUZZY LOGIC****9**

Fuzzy sets - Operations on Fuzzy sets - Fuzzy relations - Membership functions - Fuzzy rules and Fuzzy reasoning - Fuzzy inference systems - Fuzzy Expert Systems - Fuzzy decision making

**UNIT V DEFAULTS, UNCERTAINTY AND EXPRESSIVENESS****9**

Introduction to defaults - Closed world reasoning – Circumscription - Default logic limitations - Fuzzy logic - Non-monotonic logic - Theories and world - Semiotics – Autoepistemic logic - Vagueness – Uncertainty and degrees of belief – Non categorical reasoning – Objective and subjective probability

**TOTAL: 45 PERIODS****TEXT BOOKS**

1. Stuart Russell, Peter Norvig, “Artificial Intelligence: A Modern Approach”, Second Edition, Pearson Education, 2004.
2. Elaine Rich, Kevin Knight and B.Nair, “Artificial Intelligence”, Third Edition, Tata McGraw Hill, 2008.

**REFERENCES**

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2010.
2. Ronald Brachman, Hector Levesque “Knowledge Representation and Reasoning”, The Morgan Kaufmann Series in Artificial Intelligence 2004
3. John F. Sowa, “Knowledge Representation: Logical, Philosophical, and Computational Foundations”, 2000
4. Arthur B. Markman, “Knowledge Representation”, Lawrence Erlbaum Associates, 1998

**IT8004****C# AND .NET PROGRAMMING****LT P C  
3 0 0 3****OBJECTIVE:**

Understand the concept of .NET framework, study the different techniques of security, introduce web services with ASP.NET, and explore window based applications.

**UNIT I C# LANGUAGE BASICS****9**

C# and the .NET framework - C# basics - Objects and types - Inheritance - Arrays - Operators and casts - Indexes

**UNIT II C# ADVANCED FEATURES****9**

Delegates and events - Strings and regular expressions - Generics - Collections - Memory management and pointers - Errors and exceptions

**UNIT III BASE CLASS LIBRARIES AND DATA MANIPULATION****9**

Tracing and events - Threading and synchronization - .Net security - Localization - Manipulating XML - Managing the file system - Basic network programming

**UNIT IV DATABASE AND WEB SERVICES****9**

Window based applications - Data access with .NET - basics of ASP .NET - Introduction to web services



**UNIT V .NET FRAMEWORK****9**

Architecture - Assemblies - Shared assemblies - CLR hosting - Appdomains - Reflection

**TOTAL:45 PERIODS****TEXT BOOK:**

1. Christian Nagel et al. "Professional C# 2005 with .NET 3.0", Wiley India, 2007.

**REFERENCES:**

1. Ian Gariffiths, Mathew Adams, Jesse Liberty, "Programming C# 4.0", O'Reilly, Fourth Edition, 2010.
2. Andrew Troelson, "Pro C# with .NET 3.0", Apress, 2007.
3. Kevin Hoffman, "Microsoft Visual C# 2005", Pearson Education, 2006.
4. S.Thamarai Selvi, R. Murugesan, "A Text Book on C#", Pearson Education, 2003.

**IT8005****CLOUD COMPUTING****L T P C  
3 0 0 3****OBJECTIVE :**

- To understand the concept of cloud and utility computing
  - To understand the various issues in cloud computing
  - To familiarise themselves with the lead players in cloud
  - To appreciate the emergence of cloud as the next generation computing paradigm
  - To be able to set up a private cloud
- At the end of this course the student should be able to
- Appreciate the new computing model called cloud computing and why its creating such a hype in the 21<sup>st</sup> century;
  - Use the open source cloud services;
  - Understand that one of the major issues in uasge of public cloud is security;
  - Is expected to deploy a private cloud and understand the issues currently prevailing.

**UNIT I INTRODUCTION****9**

Evolution of cloud computing – Need for cloud computing - Benefits - Limitations - Migration into Cloud - Basics of virtualization - Desktop virtualization - Server virtualization - Case study: VMware - Basics of web services - Key concepts

**UNIT II CLOUD ARCHITECTURE****9**

Three-layer cloud computing architecture - On-demand provisioning - Elasticity in cloud Cloud Computing Services – Infrastructure-as-a-Service – Software-as-a-Service – Platform-as-a-Service - Cloud providers - Cloud deployment models

**UNIT III ISSUES IN CLOUD****9**

Federation in cloud - Four levels of federation - Privacy in cloud - Security in cloud - Software-as-a-Service security - Case study: Aneka - Service level agreements

**UNIT IV CLOUD STORAGE****9**

Overview of cloud storage - Cloud storage providers - Case studies: Walrus - Amazon S3 - Cloud file system – Map Reduce - Case study: Hadoop

**UNIT V CLOUD DEPLOYMENT TOOLS****9**

Study of open source cloud platforms - Eucalyptus - Nimbus - Open Nebula

**TOTAL: 45 PERIODS****TEXT BOOKS :**

1. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", Tata McGrawHill, 2009.
2. John W. Rittinghouse, James F. Ransome, "Cloud Computing: Implementation, Management and Security", CRC Press, 2010

**REFERENCES :**

1. Danielle Ruest and Nelson Ruest, "Virtualization: A Beginner's Guide", McGraw Hill, 2009.
2. Leonard Richardson, Sam Ruby, "RESTful Web Services Web services for the real world", O'REILLY, 2007.
3. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, "Grid and Cloud Computing - A Business Perspective on Technology and Applications", Springer, 2009.
4. Tom White, "Hadoop: The Definitive Guide", O'REILLY Media, 2009.
5. Rajkumar Buyya, James Broberg, Andrzej Goscinski, "Cloud Computing - Principles and Paradigms", John Wiley and Sons, 2011.
6. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
7. [www.open.eucalyptus.com/](http://www.open.eucalyptus.com/)
8. <http://opennebula.org>
9. [www.nimbusproject.org](http://www.nimbusproject.org)
10. [http://www.nimbusproject.org/files/riteau\\_CCA11.pdf](http://www.nimbusproject.org/files/riteau_CCA11.pdf)

**IT8006****COMPUTATIONAL LINGUISTICS****L T P C  
3 0 0 3****AIM:**

- The aim of this course is to provide an introduction to some basic Language Technologies. The course also provides an overview of Text mining and applications of language processing.

**OBJECTIVES:**

1. To understand the statistical modeling and classification for NLP.
2. To understand the basic techniques of Information Retrieval.
3. To understand the basic of Text mining and techniques of text mining.
4. To know about the generic issues in speech processing and application relevant to Natural Language Generation.

## **UNIT I                    NATURAL LANGUAGE PROCESSING                    9**

Linguistic background - Spoken language input and output technologies - Written language input - Mathematical methods - Statistical modeling and classification - Finite state methods: Grammar for natural language processing - Parsing - Semantic interpretation: Semantics and logical form - Ambiguity resolution – Other strategies for semantic interpretation

## **UNIT II                    INFORMATION RETRIEVAL                    9**

Information Retrieval architecture - Indexing - Storage - Compression techniques - Retrieval approaches - Evaluation - Search engines - commercial search engine features – comparison - performance measures - Document processing - NLP based Information Retrieval - Information extraction

## **UNIT III                    TEXT MINING                    9**

Categorization: Extraction based Categorization - Clustering - Hierarchical clustering - Document classification and routing - Finding and organizing answers from Text search - Categories and clusters for organizing retrieval results - Text Categorization - Efficient summarization using lexical chains - Pattern extraction

## **UNIT IV                    GENERIC ISSUES                    9**

Multilinguality - Multilingual Information Retrieval and Speech processing - Multimodality - Text and Images - Modality integration - Transmission and storage - Speech coding - Evaluation of systems - Human factors and user acceptability

## **UNIT V                    APPLICATIONS                    9**

Machine translation - Transfer metaphor - Interlingua and statistical approaches - Discourse processing - Dialog and conversational agents - Natural language generation - Surface realization and discourse planning

**TOTAL: 45 PERIODS**

### **TEXT BOOKS:**

1. Daniel Jurafsky, James H. Martin, "Speech and Language Processing", Pearson Education, 2009.
2. Ronald Cole, J.Mariani, et.al, "Survey of the State of the Art in Human Language Technology", Cambridge University Press, 1997.
3. Michael W. Berry, "Survey of Text Mining: Clustering, Classification and Retrieval", Springer Verlag, 2004.
4. Christopher D.Manning, Hinrich Schutze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.

### **REFERENCES:**

1. James Allen, "Natural Language Understanding", Second Edition, Pearson Education, 2008
2. Gerald J.Kowalski, Mark.T. Maybury, "Information Storage and Retrieval systems", Kluwer Academic Publishers, 2000.
3. Tomek Strzalkowski, "Natural Language Information Retrieval", Kluwer Academic Publishers, 1999.

**OBJECTIVE**

This course comprehends the graphs as a modeling and analysis tool in computer science & Engineering. It introduces the structures such as graphs & trees and techniques of counting and combinations, which are needed in number theory based computing and network security studies in Computer Science.

**UNIT I INTRODUCTION****9**

Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits – Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.

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

Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and geometric graphs – Planer graphs – Different representation of a planer graph.

**UNIT III MATRICES, COLOURING AND DIRECTED GRAPH****8**

Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.

**UNIT IV PERMUTATIONS & COMBINATIONS****9**

Fundamental principles of counting - Permutations and combinations - Binomial theorem - combinations with repetition - Combinatorial numbers - Principle of inclusion and exclusion - Derangements - Arrangements with forbidden positions.

**UNIT V GENERATING FUNCTIONS****10**

Generating functions - Partitions of integers - Exponential generating function - Summation operator - Recurrence relations - First order and second order – Non-homogeneous recurrence relations - Method of generating functions.

**TOTAL: 45 PERIODS****TEXT BOOKS:**

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

**REFERENCES:**

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

**OBJECTIVE:**

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

- Identify parallelism in an application
- Choose the right parallel processing paradigm and solution for a heterogeneous multi-core platform
- Program using OpenMP and OpenCL

**UNIT I                      MULTI-CORE PROCESSOR FUNDAMENTALS                      9**

Multi-core Processors and Need for Parallel Computing – ILP, TLP and Data Parallelism - Chip Multiprocessing, SMP, Homogeneous Vs Heterogeneous Processors – GPUs - GPGPUs - Shared memory architectures - Cache Memory - Cache Coherency Protocols.

**UNIT II                      MULTICORE PROGRAMMING                      9**

Parallel Programming Overview – Processes, Tasks and Threads – Parallel Programming Models – Techniques for Parallelizing Programs – Shared Memory Programming – Message Passing Paradigm - Memory Consistency Models – Synchronization Issues.

**UNIT III                      OPENMP PROGRAMMING                      9**

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

**UNIT IV                      OPENCL FUNDAMENTALS                      9**

Open CL Architecture – Platform model – Kernels – Execution Model - Memory model - Programming model - Task and data decomposition - CPU-GPU communication

**UNIT V                      OPENCL ADVANCED FEATURES                      9**

GPU Memory - Coalescing - Conflicts - Event timing and profiling - Threading and Scheduling - Programming multi devices - Applications

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Hennessey & Patterson, "Computer Architecture A Quantitative Approach", Morgan Kaufmann – Elsevier, 5<sup>th</sup> edition, 2012.
2. Benedict R. Gaster, Lee Howes, D.R. Kalei, Mistry, Schaa, "Heterogeneous Computing with OpenCL" Morgan Kaufmann, 2012.
3. Michael J Quinn, "Parallel programming in C with MPI and OpenMP", Tata McGraw Hill, 2003.

**REFERENCES:**

1. Darryl Gove, "Multicore Application Programming for Windows, Linux, and Oracle Solaris", Pearson, 2011.
2. Shameem Akhter and Jason Roberts, "Multi-core Programming", Intel Press, 2006.
3. David B. Kirk, Wen-mei W Hwu, "Programming massively parallel processors", 2010.

## OBJECTIVE

To understand patents, copyrights and IPR related issues.

## UNITI      INTRODUCTORY ASPECTS

9

Invention and Creativity - Need for protecting Intellectual Property - Concept of Property vis-a- vis Intellectual Property - Forms of Industrial Properties: Patents, Trademarks, Copyrights, Industrial Designs, Plant varieties, Geographical Indicators ..

## UNIT II INTERNATIONAL INSTITUTIONS, CONVENTIONS AND TREATIES ON INTELLECTUAL PROPERTY RIGHTS

9

Establishment of WIPO - functions, membership, agreement between WIPO and WTO-dispute settlement - new treaties - Paris convention, Patent Co-operation treaty - Madrid convention - Berne convention - TRIPS Agreement - WTO and Intellectual Property Rights - Commercialization of IPR by licensing.

## UNIT III PATENTS

9

Introduction to Patents - History - Patents Act 1970 - Definition of Patents, objects, scope and salient features -- Patentable subject matter, patentability criteria - Procedure for filing Patent Application - Register of Patents and Patent Office - Patent granting procedure - Rights and obligations of patentee, transfer of Patent rights - evocation, Patent infringement and remedies - Case studies.

## UNIT IV COPYRIGHTS, TRADEMARKS AND OTHER IPR

10

Copyrights - salient features of Copyright Act - rights conferred by copyright - infringement and remedies - Trademark - rights arising from registration - offences and penalties - Definitions - Industrial designs and Integrated circuits - Protection of Geographical indications - Plant varieties and farmer's rights - Application Procedures, Trade secret - Case studies.

## UNITV IPR IN THE CYBER WORLD:

8

Introduction and overview - emergence of cyber crime - software piracy - software copyright and patent - Trademark issues. related to Internet - data protection in cyberspace IPR provisions in Information Technology Act.

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. P Narayanan, Intellectual Property Law, Eastern Law House, Fourth Edition.
2. Cornish William. Intellectual Property. Oxford University Press. USA.

## REFERENCES:

1. Ganguli -IPR: Unleashed the knowledge economy, Tata McGraw Hill .
2. V.K. Unru, Trademark, Design and Cyber Property Rights, Eastern Law House, 2002.
3. Rodney Ryder, Intellectual Property and the Internet, Lexis Nexis Butterworths Wadhwa, Nagpur.
4. Rahul Matthan, The Law relating to Computers and the Internet, Eastern Book Company.
5. Elizabeth Verkey, Law of Plant Varieties Protection, Eastern Book Company,
6. Pavan Duggal, Cyber Law: The Indian Perspective, Saakshar Law Publications, New Delhi.
7. D.P. Mittal, Law of Information Technology, Taxmann Publications.
8. Prof.A. Chandrasekaran, Intellectual Property Law, C. Sitaraman Co. Pvt. Ltd, Chennai.

**OBJECTIVE**

- To understand knowledge representation and reasoning techniques
- To understand logics and planning

**UNIT I INTRODUCTION****9**

Key concepts - Knowledge representation and reasoning - Language of first order logic - Syntax, Semantics, Pragmatics - Expressing Knowledge - Levels of representation - Knowledge acquisition and sharing - Sharing Ontologies - Language Ontologies - Language patterns - Tools for knowledge acquisition

**UNIT II RESOLUTION AND REASONING****9**

Proportional case - Handling variables and qualifiers - Dealing with intractability - Reasoning with horn clauses - Procedural control of reasoning - Rules in production - Description logic

**UNIT III REPRESENTATION****9**

Semantic networks - Object Oriented representations - Frame formalism - Structured descriptions - Meaning and Entailment - Taxonomies and Classification - Inheritance - Networks - Strategies for defensible inheritance - Formal account of Inheritance networks - Conceptual dependency - Scripts

**UNIT IV DEFAULTS, UNCERTAINTY AND EXPRESSIVENESS****9**

Defaults - Introduction - Closed world reasoning - Circumscription - Default logic - Limitations of logic - Fuzzy logic - Nonmonotonic logic - Theories and World - Semiotics - Auto epistemic logic - Vagueness uncertainty and Degrees of belief - Noncategorical reasoning - Objective and Subjective probability

**UNIT V ACTIONS AND PLANNING****9**

Rules - Expert Systems - Explanation and Diagnosis - Natural language processing - Actions - Situational calculus - Frame problem - Complex actions - Planning - Strips - Planning as reasoning - Hierarchical and Conditional Planning

**TOTAL: 45 PERIODS****TEXT BOOK:**

1. Ronald Brachman, Hector Levesque "Knowledge Representation and Reasoning ", The Morgan Kaufmann Series in Artificial Intelligence, 2004.

**REFERENCES:**

1. Elaine Rich, Kevin Knight, "Artificial Intelligence", McGraw-Hill, Second edition, 2003.
2. John F. Sowa, "Knowledge Representation: Logical, Philosophical and Computational Foundations", 2000.
3. Arthur B. Markman, "Knowledge Representation", Lawrence Erlbaum Associates, 1998.

**OBJECTIVE**

- To know the mobile architecture and its standards
- To develop various applications using mobile devices

**UNIT I INTRODUCTION****9**

Mobile application fundamentals - Characteristics - Benefits - History of mobiles - Mobile framework - Devices – Platform - Operating systems - Application framework - Overview of types of mobile applications

**UNIT II APPLICATION DESIGN****9**

Mobile Information Architecture: Click streams - Wireframes - Prototyping – Mobile design - Design elements - Design tools - Design principles - Mobile Web Vs Native applications - Device testing - Desktop testing - Usability testing

**UNIT III WEB STANDARDS****9**

Overview of Mobile 2.0 - Web Standards - Designing for multiple mobile browsers - Markup languages - Cascading Style Sheets - JavaScript for mobile application development

**UNIT IV APPLICATION DEVELOPMENT IN MOBILE DEVICES****9**

Native Android and iPhone applications - Android Vs iPhone SDK features - Open handset alliance - Development framework - Android Vs iPhone development tools - Creating applications and activities - Creating user interfaces

**UNIT V ADVANCED APPLICATION DEVELOPMENT IN MOBILE DEVICES****9**

Internets - Broadcast Receivers - Adapters - Internet - Data Storage - Retrieval and Sharing - Working in the background - Peer to Peer communication - Accessing Android hardware

**TOTAL : 45 PERIODS****TEXT BOOKS:**

1. Brian Fling, "Mobile Design and Development", First Edition, O'Reilly Media, 2009.
2. Reto Meier, "Professional Android Application Development", Wrox Publications, 2010.
3. Lauren Darcey, Shane Conder, "Teach Yourself Android Application Development in 24 Hours", Second Edition, Sams Publishing, 2010.
4. Jonathan Zdziarski, "iPhone SDK Application Development", First Edition, O'Reilly, 2009.
5. Neal Goldstein, "iPhone Application Development for Dummies", Third Edition, Wiley Publishing house, 2010.
6. John Ray, "Teach Yourself iPhone Application Development in 24 days", Pearson Education, Limited, 2010.



**OBJECTIVE**

- To learn the basics of socket programming using TCP Sockets.
- To learn about Socket Options
- To learn to develop Macros for including Objects In MIB Structure
- To understand SNMPv1, v2 and v3 protocols & practical issues.

**UNIT I                      SOCKETS AND APPLICATION DEVELOPMENT                      9**

Introduction to Socket Programming - System Calls - Address conversion functions - POSIX Signal Handling - Server with multiple clients - Boundary conditions - Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown - I/O Multiplexing - I/O Models -TCP echo client/server with I/O Multiplexing

**UNIT II                      SOCKET OPTIONS                      9**

Socket options - getsockopt and setsockopt functions - Generic socket options - IP socket options - ICMP socket options - TCP socket options - Multiplexing TCP and UDP sockets - SCTP Sockets - SCTP Client/server - Streaming Example - Domain name system - gethostbyname, gethostbyaddr, getservbyname and getservbyport functions - Protocol Independent functions in TCP Client/Server Scenario

**UNIT III                      ADVANCED SOCKETS                      9**

IPv4 and IPv6 interoperability - Threaded servers - Thread creation and termination - TCP echo server using threads - Mutex - Condition variables - Raw sockets - Raw socket creation - Raw socket output - Raw socket input - ping program - traceroute program

**UNIT IV                      SIMPLE NETWORK MANAGEMENT                      9**

SNMP network management concepts - SNMPv1 - Management information - MIB Structure - Object syntax - Standard MIB's - MIB-II Groups - SNMPv1 protocol and Practical issues

**UNIT V                      SNMP V2, V3 AND RMO                      9**

Introduction to SNMPv2 - SMI for SNMPV2 - Protocol - SNMPv3 - Architecture and applications - Security and access control model - Overview of RMON

**TOTAL : 45 PERIODS**

**TEXT BOOKS**

1. W. Richard Stevens, "UNIX Network Programming Vol-I", Third Edition, PHI Pearson Education, 2003.
2. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", Third Edition, Pearson Edition, 2009.

**REFERENCE BOOK**

1. D.E. Comer, "Internetworking with TCP/IP Vol- III: Client-Server Programming and Application BSD Sockets Version", Second Edition, Pearson Edition, 2003.

### OBJECTIVE:

To design the front end of the compiler, scanner, parser, intermediate code generator, object code generator, and the parallel compilation strategies

<b>UNIT I</b>	<b>LEXICAL ANALYSIS</b>	<b>9</b>
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Introduction to Compiler: Compilers - Analysis of the Source Program -The phases of compiler - Compiler construction tools - Lexical analyzer - Input buffering - Specification of tokens - Recognition of tokens - A language for specifying lexical analyzer

## UNIT II SYNTAX ANALYSIS AND RUN-TIME ENVIRONMENTS 9

Syntax Analysis: The role of the parser - Context-free grammars - Writing a grammar - Top down parsing - Bottom-up parsing - LR parsers - Constructing SLR parsing table - Type checking - Type systems - Specification of a simple type checker – Run-time Environments - Source language issues - Storage organization - Storage-allocation strategies.

## UNIT III INTERMEDIATE CODE GENERATION 9

Intermediate languages – Declarations - Assignment statements - Boolean expressions  
– Flow of Control statements - Back patching - Procedure calls

<b>UNIT IV</b>	<b>CODE GENERATION</b>	<b>9</b>
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Issues in the design of a code generator - Target machine - Run-time storage management - Basic blocks and flow graphs - Next-use information - Simple code generator - Register allocation and assignment -The DAG representation of basic blocks - Generating code from DAGs

## UNIT V CODE OPTIMIZATION 9

Principle sources of optimization - Peephole optimization - Optimization of basic blocks - Loops in flow graphs - Introduction to global data-flow analysis - Code improving transformations

**TOTAL: 45 PERIODS**

**TEXT BOOK:**

1. Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education, 2011.

**REFERENCES:**

1. David Galles, "Modern Compiler Design", Pearson Education, 2008
2. Steven S. Muchnick, "Advanced Compiler Design & Implementation", Morgan Kaufmann Publishers, 2000.
3. Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2008.

**AIM**

To provide an overview of Service Oriented Architecture and enable the student to create applications in a collaborative environment.

**OBJECTIVE**

- To study the importance of Service Oriented Architecture
- Implementation of SOA in the Java and .Net frameworks
- To study the advanced features of SOA

**UNIT I SOA FUNDAMENTALS****9**

Principles of Service Orientation - Client-Server Architecture - Distributed Internet Architecture - SOA Characteristics - Anatomy of SOA - Components - Interaction - Technical and Business Benefits - Multi-channel access - Business Process Management

**UNIT II SOA AND WEB SERVICES****9**

Web Service Platform - Web Service Description - Service Contracts - Service Level Data Model - Service Discovery - Service Level Security - Service Level Interaction Patterns: SOAP basics - Messaging with SOAP - Message Exchange Patterns - Atomic Services and Composite Services – Service Layer Abstraction - Proxies and Skeletons – SOAP communication based web services

**UNIT III SERVICE ORIENTED ANALYSIS AND DESIGN****9**

Design principles - Business Centric SOA - Deriving Business services - Service Modeling - Coordination - Atomic Transaction - Business activities - Web Service Orchestration - Choreography - Entity centric business service design - Application Service design - Task centric business service design

**UNIT IV WEB SERVICES DEVELOPMENT AND DEPLOYMENT****9**

XML and Web Services - WSDL basics - SOA support in J2EE - Java API for XML-based Web Services (JAX-WS) - Java Architecture for XML Binding (JAXB) - Java API for XML Registries (JAXR) - Web Services Interoperability Technologies - SOA support in .NET - Common Language Runtime - ASP.NET - Web forms - ASP.NET Web Services - Web Services Enhancements

**UNIT V SOA APPLICATIONS AND SECURITY****9**

Business Process Execution Language (BPEL) – Metadata Management – XML Security – XML Signature – XML Encryption – Advanced Messaging – WS Security – Security in Web Service framework

**TOTAL : 45 PERIODS****REFERENCES:**

1. Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Pearson Education, 2009.
2. Thomas Erl, "Service Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2011.
3. Shankar Kambhampaly, "Service Oriented Architecture for Enterprise Applications", First Edition, Wiley India Pvt Ltd, 2008.

4. Mark O' Neill, et al., "Web Services Security", First Edition, Tata McGraw-Hill Edition, 2003.
5. Frank Cohen, "Fast SOA", First Edition, Elsevier, 2007.
6. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services", Pearson Education, 2004.

**IT8015**

**SOCIAL NETWORK ANALYSIS**

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

**OBJECTIVE**

- To introduce the concept of semantic web and related applications
- To represent knowledge using ontology
- To understand human behaviour in social web and related communities
- To visualize 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**

### **TEXT BOOKS:**

1. Peter Mika, "Social networks and the Semantic Web", Springer, First edition 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 1<sup>st</sup> edition, 2010.

### **REFERENCES:**

1. Guandong Xu , Yanchun Zhang and Lin Li, "Web Mining and Social
2. Networking – Techniques and applications", Springer, First edition, 2011.
3. Dion Goh and Schubert Foo, "Social information retrieval systems: emerging technologies and applications for searching the Web effectively", IGI Global snippet, 2008.
4. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and social information retrieval and access: techniques for improved user modelling", IGI Global snippet, 2009.
5. John G. Breslin, Alexandre Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

**IT8016**

**SOFT COMPUTING**

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

### **OBJECTIVE**

- To give students a detailed understanding of soft computing and understanding the need for soft computing .
- To develop skills in neural networks, genetic algorithms and Fuzzy logic.
- To develop skills to apply soft computing paradigms in real time software projects.

## **UNIT I      INTRODUCTION TO SOFT COMPUTING      9**

Evolution of Computing - Soft Computing Constituents - Conventional Artificial Intelligence to Computational Intelligence - Basics of Machine Learning - Machine Learning approach to Knowledge acquisition

## **UNIT II      GENETIC ALGORITHMS      9**

Fundamentals - Genetic Operators - Sample genetic algorithms - Applications of Genetic Algorithms

## **UNIT III      NEURAL NETWORKS      9**

Machine Learning using Neural Networks and Adaptive Networks - Feed forward networks - Supervised learning neural networks - Radial basis function networks - Reinforcement learning - Unsupervised learning neural networks - Adaptive resonance architectures – Advancements in neural networks

**UNIT IV FUZZY LOGIC 9**  
 Fuzzy sets - Operations on Fuzzy sets - Fuzzy relations - Membership functions - Fuzzy rules and reasoning - Fuzzy Inference systems - Fuzzy Expert systems - Fuzzy decision making

**UNIT V NEURO-FUZZY MODELING 9**  
 Adaptive Neuro-Fuzzy Inference Systems - Coactive Neuro-Fuzzy Modeling - Classification and Regression trees - Data Clustering algorithms - Rule based Structure identification - Neuro-Fuzzy control - Case study

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", First Edition, Prentice-Hall of India, 2003.
2. S. N. Sivanandam, and S. N. Deepa, "Principles of Soft Computing", Second Edition, Wiley-India, 2007.

**REFERENCES:**

1. David Poole, Alan Mackworth and Randy Goebel, "Computational Intelligence: A Logical approach", First Edition, Oxford University Press, 2009.
2. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", First Edition, Pearson Education, 2003.
3. Mitchell Melanie, "An Introduction to Genetic Algorithm", First Edition, Prentice Hall, 1998.
4. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", First Edition, Addison Wesley, 1997.
5. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", First Edition, Prentice Hall, 1995.

**IT8017 SOFTWARE PROJECT MANAGEMENT L T P C**  
**3 0 0 3**

**OBJECTIVES:**

- To develop an awareness of the need for project planning and management
- To apply professional attitudes and techniques to managing a project
- Explain the stages in the system development lifecycle and the activities that are carried out to implement an IT application;
- Demonstrate an understanding of steps needed to build and maintain effective development teams;
- Explain the procedures needed to monitor, control and report upon an IT development project;
- Discuss and where appropriate apply the principles of project risk management.
- Explain the ways in which appropriate quality attributes of the products of an IT development project can be assessed and assured.

<b>UNIT I</b>	<b>FUNDAMENTALS</b>	<b>9</b>
Conventional software management - Evolution of software economics - Improving software economics - Conventional Vs Modern software project management.		
<b>UNIT II</b>	<b>SOFTWARE MANAGEMENT PROCESS FRAMEWORK</b>	<b>9</b>
Lifecycle phases - Artifacts of the process - Model based software architectures - Workflows of the process - Checkpoints of the process.		
<b>UNIT III</b>	<b>SOFTWARE MANAGEMENT DISCIPLINES</b>	<b>9</b>
Iterative process planning - Organization and Responsibilities - Process automation - Process control and process instrumentation - Tailoring the process. Project planning - Scheduling - Tracking and Control - Time and Cost overruns - Project organization - Staffing - Group working - Team dynamics.		
<b>UNIT IV</b>	<b>MANAGED AND OPTIMIZED PROCESSES</b>	<b>9</b>
Quality management and ISO 9000 quality assurance method - Configuration management - Quality reviews - Software standards - Tracking of defects - Process improvements - SCI/CMM models - Other process models - Data gathering and analysis Principles of data gathering - Data gathering process - Software measures - Data analysis - Managing software quality - Defect prevention.		
<b>UNIT V</b>	<b>CASE STUDIES</b>	<b>9</b>
COCOMO Cost estimation model - Change metrics -Case studies		

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Bob Hughes, Mike Cotterell, "Software Project Management", Fifth edition, Tata McGraw Hill, 2009.
2. Walker Royce "Software Project Management A Unified Framework", Pearson Education, 2004.

**REFERENCES:**

1. Ramesh Gopalswamy, "Managing Global Software Projects", Tata McGraw Hill, 2001.
2. Humphrey Watts, "Managing the software process", Addison Wesley, 1989.

<b>IT8018</b>	<b>SOFTWARE TESTING</b>	<b>L T P C</b>
		<b>3 0 0 3</b>

**OBJECTIVES**

- This objective of the course is to make students aware about the importance of the software testing during software development.
- Understand the theoretical aspects of software testing
- To study traditional static and dynamic analyses, such as data-flow, slicing, and profiling, along with promising techniques such as model checking and abstract interpretation
- To study traditional applications of these analyses, such as validation, program understanding, and debugging as well as new applications, such as security and component-based systems
- To extend understanding of software testing – its application and management – its key disciplines – and to enhance awareness of issues and constraints around testing

## **UNIT I                      BASICS OF SOFTWARE TESTING                      9**

Human errors and testing - Software quality- Requirements - Behavior and Correctness - Correctness Vs Reliability- Testing and Debugging - Test metrics - Software and Hardware testing - Testing and Verification - Defect management - Execution history - Test-generation strategies - Static testing - Model based testing and Model checking - Control flow Graph - Types of testing - Saturation effect - Testing axioms - Origins of defects - Cost of defects - Defect classes - Defect repository and Test design - Defect examples - Developer / Tester support - Defect prevention strategies

## **UNIT II                      TEST CASE DESIGN                      9**

Design strategies - Black box approach - Random testing - Requirements based testing - Boundary value analysis - Decision tables - Equivalence class partitioning – State based testing - Cause-effect graphing - Error guessing - Compatibility testing - User documentation testing - Domain testing - White box approach - Test adequacy criteria - Static testing Vs Structural testing - Code functional testing - Coverage and control flow graphs - Covering code logic - Paths - Role in White box based test design - Code complexity testing

## **UNIT III                      TEST CASE SELECTION AND ADEQUACY TEST EXECUTION                      9**

Overview - Test specification and cases - Adequacy criteria- Comparing criteria- Overview of test execution - Test case specification to test cases - Scaffolding - Generic Vs specific scaffolding - Test Oracles - Self-checks as Oracles - Capture and replay - Process: Test and analysis activities - Quality process - Planning and Monitoring - Quality goals - Dependability properties - Analysis -Testing - Improving the process - Organizational factors - Integration testing strategies - Testing components and assemblies - System testing - Acceptance testing - Usability - Regression testing - Regression test selection techniques - Test case prioritization and selective execution

## **UNIT IV                      TEST MANAGEMENT                      9**

People and organizational issues in testing - Organization structures for testing teams - Testing services - Test planning - Test plan components - Test plan attachments - Locating test items - Test management - Test process - Reporting test results - Role of three groups in test planning and policy development - Test specialist - Skills - Building a testing group.

## **UNIT V                      TEST AUTOMATION                      9**

Software test automation - Skills - Scope - Design and architecture for automation - Requirements for a test tool - Challenges in automation - Test metrics and measurements - Project progress and productivity metrics

**TOTAL : 45 PERIODS**

### **TEXT BOOKS**

1. Srinivasan Desikan and Gopalaswamy Ramesh, “ Software Testing – Principles and Practices”, Pearson education, 2007.
2. Ilene Burnstein, “Practical Software Testing”, Springer International Edition, 2003.

### **REFERENCES:**

1. Software Testing and Analysis Process Principles and Techniques – Mauro Pezze, Michal Young, Wiley India, 2008.
2. Ron Patton, “ Software Testing”, Second Edition, Sams Publishing, Pearson education, 2007
3. Renu Rajani, Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2004.
4. Aditya P. Mathur, “Foundations of Software Testing – Fundamental algorithms and techniques”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008



**OBJECTIVES:**

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

- Explore the state-of-art in sensor and mesh networks
- Understand the specific design challenges for sensors and mesh.
- Identify solution for each applications such as environmental monitoring, home automation
- List protocols suitable for a given task satisfying the performance metric

**UNIT I INTRODUCTION AND NETWORKING SENSORS 9**

Challenges for WSN - Single node architecture - Energy consumption - Energy scavenging techniques - Operating systems - TinyOS network architecture - Network scenarios - Adaptation of MAC protocols - SMAC - Low duty Cycle Protocols and Wakeup Concepts - SMAC 802.15.4 MAC - Zigbee

**UNIT II SYNCHRONIZATION AND LOCALIZATION 9**

Time synchronization - calibration - classes - Techniques of Synchronization, Localization Issues - Centralized and Distributive algorithm - Multilateration Positioning tracking Topology Construction - MST- RNG - GG - Delaunay Triangulation Connectivity Metric

**UNIT III ROUTING AND QUERYING 9**

Routing Protocols - Energy-Efficient Routing - Geographic Routing - Data Centric Routing - In-Network Aggregation - Storage and Retrieval - Range Query - KD Tree - Range Tree - Location Service

**UNIT IV MESH NETWORKING 9**

Necessity for Mesh Networks - Adaptive Coding and Radio Technologies, MAC enhancements - IEEE 802.11s, IEEE 802.16 MAC in Mesh mode Single Radio and Multi Radio MAC protocol - Mobility and Power Management - Topology Control

**UNIT V MESH ROUTING AND CASE STUDY 9**

Routing Metrics – Categories - Opportunistic Routing - Self Configuration and Auto Configuration - Cross layer routing - Capacity Models - Heterogeneous Mesh Networks - Vehicular Mesh Networks - Case Study

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. Holger Karl, Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.
2. Feng Zhao, Leonidas J. Guibas, "Wireless Sensor Networks - An Information Processing Approach", Elsevier, 2007.
3. Thomas Krag, Sebastin Buettrich, "Wireless Mesh Networking", O'Reilly, 2007.
4. Ian Fuat Akyildiz, Xudong Wang, "Wireless Mesh Networks", John Wiley, 2009.

**REFERENCES:**

1. Kazem Sohraby, Daniel Minoli, Taieb Znati, "Wireless Sensor Networks - Technology, Protocols and Applications", John Wiley, 2007.
2. Robert Faludi, "Building Wireless Sensor Networks", O'Reilly Publishers, 2010.
3. Nobuo Funabiki, "Wireless Mesh Networks", InTech Publisher, January 2011.
4. Sudip Misra, Subhas Chandra Misra, Isaac Woungang, "Guide to Wireless Mesh Networks", Springer, 2009.

**OBJECTIVE:**

This course gives the knowledge of effectively storing images, extracting interesting patterns from an image, discriminate between different classes of images, and mathematical fundamentals for image processing. This may lead to the confidence in developing image-processing applications.

**UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9**

Introduction - Steps in image processing systems - Image acquisition - Sampling and Quantization - Pixel relationships - Color fundamentals and models - File Formats, Image operations: Arithmetic, Geometric and Morphological.

**UNIT II IMAGE ENHANCEMENT 9**

Spatial Domain - Gray level transformations - Histogram processing - Spatial filtering - Smoothing and sharpening - Frequency domain: Filtering in frequency domain - DFT, FFT, DCT - Smoothing and sharpening filters - Homomorphic filtering

**UNIT III IMAGE SEGMENTATION AND FEATURE ANALYSIS 9**

Detection of discontinuities - Edge operators - Edge linking and boundary Detection - Thresholding - Region based segmentation - Morphological Watersheds - Motion segmentation, Feature analysis and extraction

**UNIT IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS 9**

Multi Resolution analysis : Image pyramids - Multi resolution expansion - Wavelet transforms - Image compression : Fundamentals - Models - Elements of information theory - Error free compression - Lossy compression - Compression standards

**UNIT V APPLICATIONS OF IMAGE PROCESSING 9**

Image classification - Image recognition - Image understanding - Video motion analysis - Image fusion - Steganography - Digital compositing - Mosaics - Color image processing

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing", Third Edition, Pearson Education, 2009.
2. S.Sridhar, "Digital Image Processing", Oxford University Press, 2011.

**REFERENCES:**

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", Second Edition, Thompson Learning, 2007.
2. Anil K.Jain, "Fundamentals of Digital Image Processing", PHI, 2011.
3. Sanjit K. Mitra, & Giovanni L. Sicuranza, "Non Linear Image Processing", Elsevier, 2007.

**OBJECTIVE:**

To provide exposure in FOSS and to develop open source software for society.

**UNIT I PHILOSOPHY 6**

Linux, GNU and Freedom, Brief history of GNU, Licensing free software – GPL and copy Left, trends and potential – global and Indian, overview and usage of various Linux Distributions – userfrendliness perspective – scientific perspective

**UNIT II SYSTEM ADMINISTRATION 10**

GNU and linux installation – Boot process, Commands Using bash features, The man pages, files and file systems, File security, Partitions, Processes, Managing processes, I/O redirection, Graphical environment, Installing software, Backup techniques

**UNIT III FOSS PROGRAMMING PRACTICES 10**

GNU debugging tools, Using source code versioning and managing tools, Review of common programming practices and guidelines for GNU/Linux and FOSS, Documentation

**UNIT IV PROGRAMMING TECHNIQUES 10**

Application programming – Basics of X Windows server architecture – QT programming – GTK + Programming- Python programming – Open source equivalent of existing Commercial software

**UNIT V PROJECTS AND CASE STUDIES 9**

Linux for portable Devices, Creation of Bootable CD and USB from command line, Case Studies – Samba, Libreoffice, Assistive technology

**TE XT BOOK:**

- 1) Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, Linux in a nutshell, Sixth edition, OReilly media, September 2009.

**REFERENCES:**

1. Philosophy of GNU URL: <http://www.gnu.org/philosophy/>
2. Overview of Linux Distributions URL: <http://distrowatch.com/dwres.php?resource=major>
3. Introduction to Linux – A Hands on Guide, URL: <http://tldp.org/guides.html>
4. Linux: Rute's User tutorial and exposition, URL: <http://rute.2038bug.com/index.html.gz>
5. Version control system, URL: <http://git-scm.com/>
6. SVN version control, URL: <http://svnbook.red-bean.com/>
7. GTK+/GNOME  
Application  
Development,  
Havoc  
Pennington.  
URL:  
<http://developer.gnome.org/doc/GGAD>  
Python Tutorial, Guido van Rossum, Fred L. Drake, Jr., Editor. URL:  
<http://www.python.org/doc/current/tut/tut.html>
8. Doug Abbot, Linux for Embedded and Embedded and Real time applications, Newnes
9. Case study SAMBA: URL : <http://www.samba.org/>
10. Case study., Libre office: <http://www.libreoffice.org/>
11. Case study, ORCA: <http://live.gnome.org/Orca>



**OBJECTIVES:**

- To provide the mathematical foundations of numerical techniques for solving linear system, Eigenvalue problems, interpolation, numerical differentiation and integration and the errors associated with them;
- To demonstrate the utility of numerical techniques of ordinary and partial differential equations in solving engineering problems where analytical solutions are not readily available.

**UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3**

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton-Raphson method- Solution of linear system of equations - Gauss Elimination method – Pivoting - Gauss-Jordan methods – Iterative methods of Gauss-Jacobi and Gauss-Seidel - Matrix Inversion by Gauss-Jordan method – Eigen values of a matrix by Power method and by Jacobi's method.

**UNIT II INTERPOLATION AND APPROXIMATION 9+3**

Interpolation with unequal intervals - Lagrange interpolation – Newton's divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton's forward and backward difference formulae – Least square method - Linear curve fitting.

**UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+3**

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 and Simpson's 3/8 rules – Romberg's method - Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's rules.

**UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9+3**

Single step-methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first and second order equations - Multi-step methods - Milne's and Adams-Bashforth predictor-corrector methods for solving first order equations.

**UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9+3**

Finite difference methods for solving two-point linear boundary value problems. Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit (Crank-Nicholson) methods - One dimensional wave equation by explicit method.

**TOTAL: 60 PERIODS****TEXT BOOKS:**

1. Grewal, B.S. and Grewal, J.S., "Numerical methods in Engineering and Science", Khanna Publishers, New Delhi, 9<sup>th</sup> Edition, 2007.
2. Sankara Rao, K. "Numerical methods for Scientists and Engineers", Prentice Hall of India Private Ltd., New Delhi, 3<sup>rd</sup> Edition, 2007.

**REFERENCES:**

1. Brian Bradie, "A Friendly Introduction to Numerical Analysis", Pearson Education Asia, New Delhi, 1st Edition, 2007.
2. Gerald, C.F. and Wheatley, P.O., "Applied Numerical Analysis", Pearson Education Asia, New Delhi, 6<sup>th</sup> Edition, 2006.
3. Laurene V. Fausett, "Applied Numerical Analysis using MATLAB", Pearson Education, New Delhi, 1<sup>st</sup> print, 2<sup>nd</sup> Edition, 2009.

**AIM**

To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

**OBJECTIVES**

- To understand the various principles, practices of TQM to achieve quality.
- To learn the various statistical approaches for Quality control.
- To understand the TQM tools for continuous process improvement.
- To learn the importance of ISO and Quality systems

**UNIT I INTRODUCTION****9**

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality - Basic concepts of TQM – TQM Framework - Contributions of Quality Gurus – Barriers to TQM – Cost of Quality.

**UNIT II TQM PRINCIPLES****9**

Quality statements - Customer focus –Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Continuous process improvement – PDCA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

**UNIT III TQM TOOLS & 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, Types.

**UNIT IV TQM TOOLS & TECHNIQUES II****9**

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Performance measures - BPR.

**UNIT V QUALITY SYSTEMS****9**

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits –Quality Council – Leadership, Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward.

**TOTAL : 45 PERIODS****TEXT BOOK:**

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

**REFERENCES:**

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", (6th Edition), South-Western (Thomson Learning), 2005.
2. Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, Third Edition , 2003.
3. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006 .
4. Janakiraman,B and Gopal, R.K, "Total Quality Management – Text and Cases",Prentice Hall (India) Pvt. Ltd., 2006.

**OBJECTIVE:**

To understand Computer Forensics, Computing Investigations, Enforcement Agency Investigations, Corporate Investigations, forensically sound principles and practices related to digital evidence collection, management, and handling.

**UNIT I TYPES OF COMPUTER FORENSICS****9**

Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services.

**UNIT II DATA RECOVERY****9**

Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication.

**UNIT III ELECTRONIC EVIDENCE****9**

Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events – Networks.

**UNIT IV THREATS****9**

Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies.

**UNIT V SURVEILLANCE****9**

The Future – Arsenal – Surveillance Tools – Victims and Refugees – Advanced Computer Forensics.

**TOTAL: 45 PERIODS****TEXT BOOK:**

1. John R. Vacca, "Computer Forensics", Firewall Media, 2004.

**REFERENCES:**

1. Chad Steel, "Windows Forensics", Wiley India, 2006.
2. Majid Yar, "Cybercrime and Society", Sage Publications, 2006.
3. Robert M Slade, "Software Forensics", Tata McGrawHill, 2004

**OBJECTIVE**

To get subsequent understanding of game design and development, which includes the processes, mechanics, issues in game design, game engine development, modeling, techniques, handling situations, and logic. At the end, the student will be in a position to create interactive games. To learn this course an exposure to 3D graphics principles and animation techniques are the prerequisite.

<b>UNIT I</b>	<b>3D GRAPHICS FOR GAME PROGRAMMING</b>	<b>9</b>
Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation		
<b>UNIT II</b>	<b>GAME DESIGN PRINCIPLES</b>	<b>9</b>
Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI, Path Finding		
<b>UNIT III</b>	<b>GAMING ENGINE DESIGN</b>	<b>9</b>
Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics		
<b>UNIT IV</b>	<b>GAMING PLATFORMS AND FRAMEWORKS</b>	<b>9</b>
Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DXStudio, Unity		
<b>UNIT V</b>	<b>GAME DEVELOPMENT</b>	<b>9</b>
Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.		

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" Morgan Kaufmann, 2 Edition, 2006.
2. JungHyun Han, "3D Graphics for Game Programming", Chapman and Hall/CRC, 1<sup>st</sup> edition, 2011.
3. Mike McShaffrff, "Game Coding Complete", Third Edition, Charles River Media, 2009.
4. Jonathan S. Harbour, "Beginning Game Programming", Course Technology PTR, 3 edition, 2009.

**REFERENCES:**

1. Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", Prentice Hall 1<sup>st</sup> edition, 2006.
2. Roger E. Pedersen, "Game Design Foundations", Edition 2, Jones & Bartlett Learning, 2009.
3. Scott Rogers, "Level Up!: The Guide to Great Video Game Design", Wiley, 1<sup>st</sup> edition, 2010.
4. Jason Gregory, "Game Engine Architecture", A K Peters, 2009.
5. Jeannie Novak, "Game Development Essentials", 3rd Edition, Delmar Cengage Learning, 2011.
6. Andy Harris, "Beginning Flash Game Programming For Dummies", For Dummies; Updated edition, 2005.
7. John Hattan, "Beginning Game Programming: A GameDev.net Collection", Course Technology PTR, 1 edition, 2009.
8. Eric Lengyel, "Mathematics for 3D Game Programming and Computer Graphics", Third Edition, Course Technology PTR, 3<sup>rd</sup> edition, 2011.
9. Dino Dini, "Essential 3D Game Programming", Morgan Kaufmann, 1<sup>st</sup> edition 2012.
10. Jim Thompson, Barnaby Berbank-Green, and Nic Cusworth, "Game Design: Principles, Practice, and Techniques - The Ultimate Guide for the Aspiring Game Designer", 1<sup>st</sup> edition, Wiley, 2007.



**OBJECTIVE:**

To build and implement a small ontology that is semantically descriptive of your chosen problem domain, implement applications that can access, use and manipulate the ontology, represent data from a chosen problem in XML with appropriate semantic tags obtained or derived from the ontology, depict the semantic relationships among these data elements using Resource Description Framework (RDF), design and implement a web services application that “discovers” the data and/or other web services via the semantic web (which includes the RDF, data elements in properly tagged XML, and the ontology), discover the capabilities and limitations of semantic web technology for different applications

**UNIT I INTRODUCTION 9**

Introduction to the Syntactic web and Semantic Web – Evolution of the Web – The visual and syntactic web – Levels of Semantics – Metadata for web information - The semantic web architecture and technologies –Contrasting Semantic with Conventional Technologies –Semantic Modeling -Potential of semantic web solutions and challenges of adoption

**UNIT II ONTOLOGICAL ENGINEERING 9**

Ontologies – Taxonomies –Topic Maps – Classifying Ontologies - Terminological aspects: concepts, terms, relations between them – Complex Objects -Subclasses and Sub-properties definitions –Upper Ontologies – Quality – Uses - Types of terminological resources for ontology building – Methods and methodologies for building ontologies – Multilingual Ontologies -Ontology Development process and Life cycle – Methods for Ontology Learning – Ontology Evolution – Versioning

**UNIT III STRUCTURING AND DESCRIBING WEB RESOURCES 9**

Structured Web Documents - XML – Structuring – Namespaces – Addressing – Querying – Processing - RDF – RDF Data Model – Serialization Formats- RDF Vocabulary –Inferencing -RDFS – basic Idea – Classes – Properties- Utility Properties – RDFS Modelling for Combinations and Patterns- Transitivity

**UNIT IV WEB ONTOLOGY LANGUAGE 9**

OWL – Sub-Languages – Basic Notions -Classes- Defining and Using Properties – Domain and Range – Describing Properties - Data Types – Counting and Sets- Negative Property Assertions – Advanced Class Description – Equivalence – Owl Logic.

**UNIT V SEMANTIC WEB TOOLS AND APPLICATIONS 9**

Development Tools for Semantic Web – Jena Framework – SPARL –Querying semantic web - Semantic Desktop – Semantic Wikis -Semantic Web Services – Application in Science – Business

**TOTAL: 45 PERIODS**

## TEXT BOOKS:

1. Liyang Yu, A Developer's Guide to the Semantic Web, Springer; 1st Edition. Edition, 2011.
2. John Hebel, Matthew Fisher, Ryan Blace and Andrew Perez-Lopez, Semantic Web Programming, Wiley; 1 edition, 2009.
3. Grigoris Antoniou, Frank van Harmelen, A Semantic Web Primer, Second Edition (Cooperative Information Systems) (Hardcover), MIT Press, 2008
4. Robert M. Colomb, Ontology and the Semantic Web: Volume 156 Frontiers in Artificial Intelligence and Applications (Frontier in Artificial Intelligence and Applications), IOS Press, 2007.
5. Dean Allemang and James Hendler, Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL, Morgan Kaufmann; 2 edition, 2011.

## REFERENCES:

1. Michael C. Daconta, Leo J. Obrst and Kevin T. Smith, The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management, Wiley; 1 edition 2003
2. Karin Breitman, Marco Antonio Casanova and Walt Truszkowski, Semantic Web: Concepts, Technologies and Applications (NASA Monographs in Systems and Software Engineering), Springer; Softcover, 2010.
3. Vipul Kashyap, Christoph Bussler and Matthew Moran, The Semantic Web: Semantics for Data and Services on the Web (Data-Centric Systems and Applications), Springer, 2008.

**CS8074**

**UNIX INTERNALS**

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3 0 0 3**

## OBJECTIVE

To provide knowledge about Unix operating system working principles, its file system and programming for interprocess communication. It also gives an understanding for using various system calls.

## UNIT I OVERVIEW

**9**

General Overview of the System : History – System structure – User perspective – Operating system services – Assumptions about hardware. Introduction to the Kernel : Architecture of the UNIX operating system – Introduction to system concepts. The Buffer Cache: Buffer headers – Structure of the buffer pool – Scenarios for retrieval of a buffer – Reading and writing disk blocks – Advantages and disadvantages of the buffer cache.

## UNIT II FILE SUBSYSTEM

**9**

Internal representation of files: Inodes – Structure of a regular file – Directories – Conversion of a path name to an Inode – Super block – Inode assignment to a new file – Allocation of disk blocks

## UNIT III SYSTEM CALLS FOR THE FILE SYSTEM

**9**

Open – Read – Write – File and record locking – Adjusting the position of file I/O – Lseek – Close – File creation – Creation of special files – Changing directory, root, owner, mode – stat and fstat – Pipes – Dup – Mounting and unmounting file systems – link – unlink

**UNIT IV PROCESSES****9**

Process states and transitions – Layout of system memory – The context of a process – Saving the context of a process – Manipulation of the process address space - Sleep. Process Control : Process creation – Signals – Process termination – Awaiting process termination – Invoking other programs – user id of a process – Changing the size of a process - Shell – System boot and the INIT process– Process Scheduling

**UNIT V MEMORY MANAGEMENT AND I/O****9**

Memory Management Policies : Swapping – Demand paging. The I/O Subsystem: Driver Interface – Disk Drivers – Terminal Drivers– Streams – Inter process communication.

**TOTAL : 45 PERIODS****TEXT BOOK:**

1. Maurice J. Bach, "The Design of the Unix Operating System", First Edition, Pearson Education, 1999.

**REFERENCES:**

1. B. Goodheart, J. Cox, "The Magic Garden Explained", Prentice Hall of India, 1986.
2. S. J. Leffler, M. K. McKusick, M. J. Karels and J. S. Quarterman., "The Design And Implementation of the 4.3 BSD Unix Operating System", Addison Wesley, 1998.
3. Uresh Vahalia, "Unix Internals: The New Frontiers", Pearson Education, 1996.
4. Steve D Pate, "UNIX Filesystems: Evolution, Design and Implementation", Wiley Publishing Inc., 2003.