

# ANNA UNIVERSITY, CHENNAI 600 025

## UNIVERSITY DEPARTMENTS

### R 2013

#### B.E. (PART TIME) COMPUTER SCIENCE AND ENGINEERING I TO VII SEMESTERS CURRICULUM AND SYLLABUS

##### SEMESTER I

COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>					
PTMA8151	Applied Mathematics	3	0	0	3
PTPH8153	<u>Physics for Information Science</u>	3	0	0	3
PTCS8101	Digital Principles and System Design	3	0	0	3
PTGE8151	Computing Techniques	3	0	0	3
PTCS8102	<u>Principles of Computer Engineering</u>	3	0	0	3
<b>TOTAL CREDITS</b>		<b>15</b>	<b>0</b>	<b>0</b>	<b>15</b>

##### SEMESTER II

COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>					
PTCS8201	Computer Architecture	3	0	0	3
PTCS8202	Data Structures	3	0	0	3
PTCS8203	Programming using C++	3	0	0	3
PTCS8204	Database Management Systems	3	0	0	3
<b>PRACTICAL</b>					
PTCS8211	Programming Laboratory	0	0	3	2
<b>TOTAL CREDITS</b>		<b>12</b>	<b>0</b>	<b>3</b>	<b>14</b>

**SEMESTER III**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>					
PTCS8301	Java and Internet Programming	3	0	0	3
PTCS8351	Operating Systems	3	0	0	3
PTCS8352	Software Engineering	3	0	0	3
PTGE8251	<u>Environmental Science and Engineering</u>	3	0	0	3
<b>PRACTICAL</b>					
PTCS8311	Java and Internet Programming Laboratory	0	0	3	2
<b>TOTAL CREDITS</b>		<b>12</b>	<b>0</b>	<b>3</b>	<b>14</b>

**SEMESTER IV**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>					
PTCS8401	Artificial Intelligence	3	0	0	3
PTCS8402	Computer Graphics and Multimedia	3	0	0	3
PTCS8403	<u>Data Communication and Computer Networks</u>	3	0	0	3
PTCS8451	<u>Object Oriented Analysis and Design</u>	3	0	0	3
<b>PRACTICAL</b>					
PTCS8411	Case Tools Laboratory	0	0	3	2
<b>TOTAL CREDITS</b>		<b>12</b>	<b>0</b>	<b>3</b>	<b>14</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>					
PTCS8501	Mobile and Pervasive Computing	3	0	0	3
PTCS8502	Security in Computing	3	0	0	3
E1	Elective I	3	0	0	3
E2	Elective II	3	0	0	3
<b>PRACTICAL</b>					
PTCS8511	Mobile Application Development Laboratory	0	0	3	2
<b>TOTAL CREDITS</b>		<b>12</b>	<b>0</b>	<b>3</b>	<b>14</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>					
PTCS8601	Data Warehousing and Data Mining	3	0	0	3
PTCS8602	<u>Service Oriented Architecture</u>	3	0	0	3
E3	Elective-III	3	0	0	3
E4	Elective-IV	3	0	0	3
<b>PRACTICAL</b>					
PTCS8611	<u>Software Development Laboratory</u>	0	0	3	2
<b>TOTAL CREDITS</b>		<b>12</b>	<b>0</b>	<b>3</b>	<b>14</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>					
PTCS8701	<u>Cloud Computing and Services</u>	3	0	0	3
PTMG8551	<u>Principles of Management</u>	3	0	0	3
	Elective V	3	0	0	3
<b>PRACTICAL</b>					
PTCS8711	Project Work	0	0	9	6
<b>TOTAL CREDITS</b>		<b>9</b>	<b>0</b>	<b>9</b>	<b>15</b>

**TOTAL NO OF CREDITS: 100**

## ELECTIVES

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
PTCS8001	<u>.Net &amp; C# Programming</u>	3	0	0	3
PTCS8002	<u>Adhoc &amp; Sensor Networks</u>	3	0	0	3
PTCS8003	<u>Advanced Topics on Databases</u>	3	0	0	3
PTCS8004	<u>Bio Informatics Technologies</u>	3	0	0	3
PTCS8005	<u>Computational Intelligence</u>	3	0	0	3
PTCS8006	<u>Database Tuning</u>	3	0	0	3
PTCS8007	<u>E-Learning Techniques</u>	3	0	0	3
PTCS8008	<u>Graph Theory &amp; Combinatorics</u>	3	0	0	3
PTCS8009	<u>Green Computing</u>	3	0	0	3
PTCS8010	<u>Human Computer Interaction</u>	3	0	0	3
PTCS8011	<u>Information Retrieval &amp; Management</u>	3	0	0	3
PTCS8012	<u>Middleware Technologies</u>	3	0	0	3
PTCS8013	<u>Nano Computing</u>	3	0	0	3
PTCS8014	<u>Natural Language Processing</u>	3	0	0	3
PTCS8015	<u>Network Analysis &amp; Management</u>	3	0	0	3
PTCS8016	<u>Principles of Cryptography &amp; Network Security</u>	3	0	0	3
PTCS8017	<u>Principles of Distributed Systems</u>	3	0	0	3
PTCS8018	<u>Principles of Embedded &amp; Real Time Systems</u>	3	0	0	3
PTCS8019	<u>Software Quality &amp; Testing</u>	3	0	0	3
PTCS8020	<u>System Modeling &amp; Simulation</u>	3	0	0	3
PTCS8071	<u>Cyber Forensics</u>	3	0	0	3
PTCS8072	<u>Game Programming</u>	3	0	0	3
PTCS8073	<u>Semantic Web</u>	3	0	0	3
PTCS8074	<u>Software Agents</u>	3	0	0	3
PTCS8075	<u>UNIX Internals</u>	3	0	0	3
PTGE8551	<u>Engineering Ethics and Human Values</u>	3	0	0	3
PTIT8071	<u>Digital Image Processing</u>	3	0	0	3
PTIT8072	<u>Free &amp; Open Source Software</u>	3	0	0	3
PTIT8073	<u>TCP/IP Design &amp; Implementation</u>	3	0	0	3
PTMG8651	<u>Total Quality Management</u>	3	0	0	3

**OBJECTIVE:**

- To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

**OUTCOMES:**

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- 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 MATRICES 9**  
Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley - Hamilton Theorem – Diagonalization of matrices - Reduction of a quadratic form to canonical form by orthogonal transformation.

**UNIT II FUNCTIONS OF SEVERAL VARIABLES 9**  
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 - Maxima and minima of functions of two variables.

**UNIT III ANALYTIC FUNCTION 9**  
Analytic functions – Necessary and sufficient conditions for analyticity – Properties – Harmonic conjugates – Construction of analytic function – Conformal Mapping – Mapping by functions  $w = a + z, az, 1/z, -$  Bilinear transformation.

**UNIT IV COMPLEX INTEGRATION 9**  
Line Integral – Cauchy's theorem and 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**  
Existence conditions – Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients.

**TOTAL: 45 PERIODS**

**BOOKS FOR STUDY:**

1. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, Forty Second Edition, Delhi, 2012.
2. Ramana, B.V. Higher Engineering Mathematics" Tata McGraw Hill Publishing Company, 2008.

**REFERENCES:**

1. Glyn James, Advanced Modern Engineering Mathematics, Prentice Hall of India, Fourth Edition, 2011.
2. Veerarajan, T., Engineering Mathematics (For First Year), Tata McGraw-Hill Pub. Pvt. Ltd., New Delhi, 2007.

**PTPH8153****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

**PTCS8101****DIGITAL PRINCIPLES AND SYSTEM DESIGN****L T P C  
3 0 0 3****OBJECTIVE**

Learn how to design digital circuits, both Combinational and Sequential. Also, to learn to design using PLDs, and writing codes for designing larger digital systems using HDLS.

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

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

**UNIT II                    COMBINATIONAL LOGIC                    9**

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

**UNIT III                    SYNCHRONOUS SEQUENTIAL LOGIC                    9**

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

**UNIT IV                    ASYNCHRONOUS SEQUENTIAL LOGIC                    9**

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

**UNIT V                    MEMORY AND PROGRAMMABLE LOGIC                    9**

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

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

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

**REFERENCES:**

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

**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

**OBJECTIVE**

To provide a fundamental knowledge of Computer Engineering , which includes evolution of computers and its various components and applications.

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

Characteristics of computers – Evolution of Computers – Evaluation of computers – Computer generations – Units of Data storage – Coding data in storage – Program planning – Algorithms – Evaluation of Algorithms - Flow charts – Pseudocodes.



**UNIT II SOFTWARE & HARDWARE 9**

Basic computer operations – Classification of computers – Hardware components – Bus Architecture and instruction sets – Computer Ethics - Generation of Languages – Compiler & Interpreters – Virtual Machines – Procedural programming – Object oriented programming – Scripting languages – Functional languages – Language design – Language syntax and semantics.

**UNIT III OPERATING SYSTEMS 9**

Role of OS – Types of OS – Functions of OS – Process Management – Memory Management – File Management – Device Management – Security – MS-DOS – UNIX – Windows – Current trends of OS.

**UNIT IV DATABASE MANAGEMENT 9**

File based approach and Database approach – Evolutions of data models – Three levels architecture for DBMS – Data independence – Data dictionary – Database administrator – Database languages.

**UNIT V NETWORKS 9**

Definition and purpose of computer Networks – Open systems interconnections – Types of networks – Topologies in Network Design – Switching Technologies – TCP/IP Network model – Networking Devices – Internet – www and network security.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Pradeep K. Sinha and Priti Sinha, Computer Fundamentals, Third Edition, BPB Publications, New Delhi, 2003.
2. Carl Reynolds and Paul Tymann, Principles of Computer Science, Schaum's Outline Series, McGraw Hill, New Delhi, 2008.
3. Sanjay Silakari and Rajesh K. Shukla, Basic Computer Engineering, Wiley- India, 2011.

**REFERENCE:**

1. Bhanu Pratap,, Computer Fundamentals, Cyber Tech Publications, New Delhi, 2011.

**PTCS8201**

**COMPUTER ARCHITECTURE**

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

**OBJECTIVE**

Identify the functional units in a digital computer system, distinguish between the various ISA styles, trace the execution sequence of an instruction through the processor, compare different approaches used for implementing a functional unit and evaluate different computer systems based on performance metrics.

**UNIT I FUNDAMENTALS OF A COMPUTER SYSTEM 9**

Functional Units of a Digital Computer – Hardware – Software Interface – Translation from a High Level Language to the Hardware Language – Instruction Set Architecture – Styles and features – RISC and CISC Architectures – Performance Metrics – Amdahl's Law – Case Studies of ISA.

**UNIT II BASIC PROCESSING UNIT 9**

Components of the Processor – Datapath and Control – Execution of a Complete Instruction – Hardwired and Micro programmed Control – Instruction Level Parallelism – Basic Concepts of Pipelining – Pipelined Implementation of Datapath and Control – Hazards – Structural, Data and Control Hazards – Exception handling.



<b>UNIT III</b>	<b>SEARCH STRUCTURES AND PRIORITY QUEUES</b>	<b>9</b>
AVL Trees – Red-Black Trees – Splay Trees – Binary Heap – Leftist Heap		
<b>UNIT IV</b>	<b>SORTING</b>	<b>8</b>
Insertion sort – Merge sort – Quick sort – Heap sort – Sorting with disks – k-way merging – Sorting with tapes – Polyphase merge.		
<b>UNIT V</b>	<b>SEARCHING AND INDEXING</b>	<b>8</b>
Linear Search – Binary Search - Hash tables – Overflow handling – Cylinder Surface Indexing – Hash Index – B-Tree Indexing.		

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures, Galgotia Book Sorce, Gurgon, 1976.
2. Gregory L. Heilman, Data Structures, Algorithms and Object Oriented Programming, Tata Mcgraw-Hill, New Delhi, 2002.

**REFERENCES:**

1. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Second Edition, Tata McGraw-Hill, New Delhi, 1991.
2. Alfred V. Aho, John E. Hopcroft and Jeffry D. Ullman, Data Structures & Algorithms, Pearson Education, New Delhi, 2006.

<b>PTCS8203</b>	<b>PROGRAMMING USING C++</b>	<b>L T P C</b>
		<b>3 0 0 3</b>

**OBJECTIVE**

To develop the programming skill and to solve engineering related problems using Object Oriented Programming Concepts.

<b>UNIT I</b>	<b>POINTERS AND FILE HANDLING IN C</b>	<b>9</b>
Introduction to Pointers – Pointers and arrays – Pointers and structures –Pointers to functions – Applications of pointers – File Handling – Case study		
<b>UNIT II</b>	<b>INTRODUCTION TO OBJECT-ORIENTED PROGRAMMING</b>	<b>9</b>
Introduction – Procedure vs. object oriented programming – Data types – control structures – Arrays and Strings – User defined types – Functions and Pointers – Case study		
<b>UNIT III</b>	<b>OBJECT ORIENTED PROGRAMMING CONCEPTS</b>	<b>9</b>
Classes and Objects – Operator Overloading – Inheritance – Polymorphism and Virtual Functions – Case study		
<b>UNIT IV</b>	<b>TEMPLATES AND EXCEPTION HANDLING</b>	<b>9</b>
Function templates and class templates – Namespaces – Casting – Exception Handling – Case study.		
<b>UNIT V</b>	<b>FILES AND ADVANCED FEATURES</b>	<b>9</b>
C++ Stream classes – Formatted IO – File classes and File operations – Dynamic memory allocation – Standard Template Library – Case Study.		

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Yashavant Kanetkar, "Understanding Pointers in C", 4<sup>th</sup> Revised & Updated Edition, 2008, BPB Publications.
2. HM Deitel and PJ Deitel "C++ How to Program", Seventh Edition, 2010, Prentice Hall.

**REFERENCES:**

1. Brian W. Kernighan and Dennis M. Ritchie, "The C programming Language", 2006, Prentice-Hall.
2. E Balagurusamy, "Object oriented Programming with C++", Third edition, 2006, Tata McGraw Hill.
3. Bjarne Stroustrup, "The C++ Programming language", Third edition, Pearson Education.
4. Horstmann "Computing Concepts with C++ Essentials", Third Edition, 2003, John Wiley.
5. Herbert Schildt, "The Complete Reference in C++", Fourth Edition, 2003, Tata McGraw Hill.
6. Robert Lafore, "Object Oriented Programming in C++", 2002, Pearson education.

**PTCS8204**

**DATABASE MANAGEMENT SYSTEMS**  
(Common to CSE & IT programmes)

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

**OBJECTIVE**

Classify modern and futuristic database applications based on size and complexity; design a database from understanding an Universe of Discourse, using ER diagrams; map ER model into Relations and to normalize the relations; create a physical database from a design using DDL statements with appropriate key, domain and referential integrity constraints; analyze different ways of writing a query and justify which is the effective and efficient way; and compare and contrast various indexing strategies in different database systems and list key challenges in advanced database systems and to critique how they differ from traditional database systems.

**UNIT I INTRODUCTION TO DATABASE SYSTEMS 9**

Data - Database Applications - Evolution of DB & DBMS - Need for data management – Data models & Database Architecture - Professions in DBMS - Key issues and challenges in Database Systems

**UNIT II ER & RELATIONAL MODELS 9**

ER Diagrams - Relational Model - ER to Relational Mapping - Constraints - Keys - Dependencies - Relational Algebra - Normalisation - First, Second, Third BCNF - Fourth Normal Form – Fifth Normal Form.

**UNIT III DATA DEFINITION & QUERYING 8**

Basic DDL - Introduction to SQL - Data Constraints - Triggers - Database Security – Advanced SQL - Embedded & Dynamic SQL - Views

**UNIT IV TRANSACTIONS & CONCURRENCY 10**

Introduction to Transactions - Transaction Systems - ACID Properties - System & Media Recovery - Two Phase Commit Protocol - Recovery with SQL - Need for Concurrency - Locking Protocols - Deadlocks & Managing Deadlocks - SQL Support for Concurrency

**UNIT V ADVANCED TOPICS IN DATABASES 9**

Indexing & Hashing Techniques - Query Processing & Optimization - Sorting & Joins – Database tuning - Introduction to Special Topics - Spatial & Temporal Databases - Data Mining & Warehousing - Data Visualisation - Mobile Databases - OODB & XML Databases - Multimedia & Web Databases.

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2010
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson / Addison Wesley, 2010
3. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGrawHill, 2002.

**PTCS8211****PROGRAMMING LABORATORY****L T P C  
0 0 3 2****LIST OF EXPERIMENTS:**

1. Programs using Functions and Pointers in C
2. Programs using Files in C
3. Programs using Classes and Objects
4. Programs using Operator Overloading
5. Programs using Inheritance, Polymorphism and its types
6. Programs using Arrays and Pointers
7. Programs using Dynamic memory allocation
8. Programs using Templates and Exceptions
9. Programs using Sequential and Random access files

**TOTAL: 45 PERIODS****LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS**

30 Terminals with C and C++ Compiler

**PTCS8301****JAVA AND INTERNET PROGRAMMING****L T P C  
3 0 0 3****OBJECTIVE**

This course comprehends the concepts of core java and working principles of Internet, and the knowledge will be enhanced to the client and server side programming and web development.

**UNIT I JAVA FUNDAMENTALS 9**

Overview of Java, Fundamental Programming Structures, Strings – Objects, Classes and Methods - Inheritance - Packages and Interfaces - Exception Handling, Collections - Multithreading – Java I/O Streams, File Handling.

**UNIT II INTERNET BASICS AND JAVA NETWORK PROGRAMMING 9**

Internet Addressing, Browsers, Servers, Protocols – Web Application Architectures, Development – Scripting Languages – Databases – Search Engines – Web Services – Collective Intelligence – Mobile Web – Features of Web 3.0

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

**UNIT III CLIENT-SIDE PROGRAMMING 9**

Scripting for content structuring, form design, client side validation, dynamic page generation, adding interactivity, styles, using HTML, DHTML, XHTML, CSS, Java Script – XML - Document Type Definition - XML Schema - Document Object Model - Presenting XML - Using XML Parsers: DOM and SAX - Web applications with AJAX - AJAX Framework - Java Applets – AWT-Swing

**UNIT IV SERVER-SIDE PROGRAMMING 9**

Types of servers - Configuring and Using Web servers, Setting up Databases, Java Database Connectivity -Handling form data, validation, querying databases, information retrieval, response generation, Session management - using PHP, Servlets, JSP, ASP. NET.

**UNIT V WEB APPLICATION DEVELOPMENT 9**

Creating Interactive Websites - Search engines – cookies - Blogs - Social web applications - developing WIKI pages – Programming for the Mobile web.

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. Herbert Schildt, “Java The Complete Reference”, 8th Edition, McGraw-Hill Osborne Media, 2011.
2. Paul Deitel, “Internet & World Wide Web: How to Program”, Prentice Hall, 4th Edition, 2007.

**REFERENCES:**

1. Cay S. Horstmann and Gary Cornell, “Core Java™, Volume I – Fundamentals” 8th Edition, Prentice Hall, 2007.
2. Cay S. Horstmann and Gary Cornell, “Core Java, Vol. 2: Advanced Features”, 8th Edition, Prentice Hall, 2008.
3. Robert W. Sebesta, “Programming the World Wide Web”, Addison-Wesley, Sixth Edition, 2010.
4. Elliotte Rusty Harold, “Java Network Programming”, Third Edition, O’Reilly, 2004.
5. Uttam K. Roy, “Web Technologies”, Oxford University Press, 1<sup>st</sup> Edition, 2010.  
Leon Shklar and Rich Rosen, “Web Application Architecture: Principles, Protocols and Practices”, Wiley, 2<sup>nd</sup> Edition, 2009.  
<http://www.w3schools.com/>

**PTCS8351 OPERATING SYSTEMS L T P C**  
**(Common to ECE, CSE, IT & EEE branches) 3 0 0 3**

**OBJECTIVE**

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

**UNIT III STORAGE MANAGEMENT 9**

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

**UNIT V CASE STUDY 9**

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.

**PTCS8352**

**SOFTWARE ENGINEERING**

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

**(Common to CSE & IT branches)**

**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.

**UNIT I SOFTWARE PROCESS MODELS 9**

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.

**UNIT II REQUIREMENT ENGINEERING 9**

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.

**UNIT III ANALYSIS MODELLING 9**

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

**UNIT IV DESIGN & TESTING 9**

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

**UNIT V QUALITY & MAINTENANCE 9**

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.

**TOTAL: 45 PERIODS**

**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.

**REFERENCES:**

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



**OBJECTIVE:**

To understand the structure and function of an ecosystem. To probe into various kinds of environmental pollution along with measures to control and prevent such pollution. To study the exploitation of various natural resources like Forest, Water, Land and Energy with substantial case studies. The course also enlightens on the steps taken by the Government and NGOs through the implementation of various Legislative protection acts and their impact on the environment. To study the population explosion and its impact on the environment. To focus on explaining the available Family welfare programs through the cognizance of the role of Information Technology in environment protection and human health with apt case studies.

**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).

**REFERENCE BOOKS:**

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)

**PTCS8311 JAVA AND INTERNET PROGRAMMING LABORATORY L T P C  
0 0 3 2**

**LIST OF EXPERIMENTS:**

1. Java classes and objects
2. Inheritance, Polymorphism
3. Interfaces and Exception Handling, Packages
4. Using InetAddress class
5. Socket Programming in Java
6. RMI
7. Client side scripting using  
XHTML,  
Javascript/DOM  
CSS
8. XML DTD, Parsers, XSLT
9. Programming with AJAX
10. Java Applets, AWT, Swings
11. Server Side programming (implement these modules using any of the server

side scripting languages like PHP, Servlets, JSP, ASP.NET

- Gathering form data
- Querying the database
- Response generation
- Session management

12. MySQL/JDBC/Oracle

13. Application development

14. Develop applications using Dreamweaver/Flex/SilverLight etc.,

**TOTAL: 45 PERIODS**

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

Software:

1. Browser
2. JDK version 6 update 27
3. TOMCAT 7.0
4. MySQL 5.5,
5. Oracle 11i
6. Dreamweaver CS5.5
7. NetBeans IDE 7
8. XAMPP / WAMP

**PTCS8401**

**ARTIFICIAL INTELLIGENCE**

**L T P C**

**3 0 0 3**

**OBJECTIVE**

To search and discover intelligent characteristics of existing AI projects, map a new problem – as search and create an animation – showing different search strategies for a problem, program a new game/ problem in Prolog, evaluate different Knowledge Representation schemes for typical AI problems, design and implement a typical AI problem to be solved Using Machine Learning Techniques, design and implement a futuristic AI application

**UNIT I INTRODUCTION**

**9**

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

**UNIT II PROBLEM SOLVING METHODS**

**9**

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

**UNIT III KNOWLEDGE REPRESENTATION**

**9**

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

**UNIT IV MACHINE LEARNING 9**

Probability basics - Bayes Rule and its Applications - Bayesian Networks – Exact and Approximate Inference in Bayesian Networks - Hidden Markov Models - Forms of Learning - Supervised Learning - Learning Decision Trees - Regression and Classification with Linear Models - Artificial Neural Networks - Nonparametric Models - Support Vector Machines - Statistical Learning - Learning with Complete Data - Learning with Hidden Variables- The EM Algorithm – Reinforcement Learning

**UNIT V APPLICATIONS 9**

AI applications – Language Models - Information Retrieval - Information Extraction – Natural Language Processing - Machine Translation – Speech recognition – Robot – Hardware – Perception – Planning – Moving

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, 3<sup>rd</sup> Edition, 2009
2. Bratko, I., Prolog Programming for Artificial Intelligence (International Computer Science Series), Addison-Wesley Educational Publishers Inc; 4th edition, 2011.
3. David L. Poole, Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

**REFERENCES:**

1. M. Tim Jones, Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc; 1 edition, 2008
2. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning series), The MIT Press; second edition, 2009
3. Nils J. Nilsson, the Quest for Artificial Intelligence, Cambridge University Press, 2009.
4. William F. Clocksin, and Christopher S. Mellish, "Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003.

**PTCS8402 COMPUTER GRAPHICS AND MULTIMEDIA L T P C  
3 0 0 3**

**OBJECTIVES:**

- 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.

**UNIT I 2D PRIMITIVES 9**

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.

**UNIT II 2D GEOMETRIC TRANSFORMATIONS 9**

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



**UNIT III NETWORK LAYER 9**

Circuit Switching - Packet Switching Virtual Circuit Switching – IP – ARP – DHCP – ICMP – Routing – RIP – OSPF – Subnetting – CIDR – Interdomain Routing – BGP – IPV6 Basic Features – Inter Domain Multicast – Congestion Avoidance in Network Layer.

**UNIT IV DATA LINK LAYER 9**

Channel access on links – SDMA – TDMA – FDMA – CDMA – Hybrid Multiple Access Techniques – Issues in the Data Link Layer – Framing - Error correction and detection – Link Level Flow Control – Medium Access – Ethernet – Token Ring – FDDI – Wireless LAN – Bridges and Switches.

**UNIT V DATA COMMUNICATIONS 9**

Data Transmission – Transmission Media – Signal Encoding Techniques – Multiplexing – Spread Spectrum

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. James F. Kurose, Keith W. Ross, “Computer Networking, A Top-Down Approach Featuring the Internet”, Third Edition, Pearson Education, 2006.
2. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers Inc., 2011.
3. William Stallings, “Data and Computer Communications”, Eighth Edition, Pearson Education, 2011.

**REFERENCES:**

1. Nader F. Mir, “Computer and Communication Networks”, First Edition, Pearson Education, 2007.
2. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach “, McGraw Hill Publisher, 2011.
3. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw-Hill, 2004.

**PTCS8451 OBJECT ORIENTED ANALYSIS AND DESIGN L T P C**  
**(Common to CSE & IT branches) 3 0 0 3**

**OBJECTIVE:**

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

**UNIT I OOAD BASICS 10**

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 & 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>
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>
Mapping designs to code – Test Driven development and refactoring – UML Tools and UML as blueprint.		
<b>UNIT V</b>	<b>MORE PATTERNS</b>	<b>10</b>
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.

**PTCS8411**

**CASE TOOLS LABORATORY**

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

**LIST OF EXPERIMENTS:**

1. Study of case tools such as rational rose or equivalent tools
2. Requirements
  - Implementation of requirements engineering activities such as elicitation, validation, management using case tools
3. Analysis and design
  - Implementation of analysis and design using case tools.
4. Study and usage of software project management tools such cost estimates and scheduling
5. Documentation generators - Study and practice of Documentation generators.
6. Data modeling using automated tools.
7. Practice reverse engineering and re engineering using tools.
8. Exposure towards test plan generators, test case generators, test coverage and software metrics.
9. Meta modeling and software life cycle management.

**TOTAL : 45 PERIODS**

**LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS**

1. Case tools such as rational rose or equivalent tools. (30 user license).
2. Any Project management tools such as JxProject (freeware).
3. 1 server + 32 PCs (P4 or higher version with atleast 2 GB RAM).

**OBJECTIVE:**

To study the details of lower layers of mobile architectures in the context of pervasive computing and mobile applications.

**UNIT I PERVASIVE COMPUTING 9**

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

**UNIT II MOBILE APPLICATIONS 9**

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

**UNIT III MEDIUM ACCESS AND TELECOMMUNICATIONS 9**

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

**UNIT IV WIRELESS NETWORKS 9**

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

**UNIT V MOBILE NETWORK AND TRANSPORT LAYERS 9**

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

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

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

**REFERENCES:**

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



**OBJECTIVE**

To understand the basics of cryptography, learn to find the vulnerabilities in programs and to overcome them, know the different kinds of security threats in networks, databases and the different solutions available, and learn about the models and standards for security.

**UNIT I      ELEMENTARY CRYPTOGRAPHY      9**

Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption – Cryptographic Hash Functions – Key Exchange – Digital Signatures – Certificates

**UNIT II      PROGRAM SECURITY      9**

Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – Controls Against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Top 10 Flaws – Common Weakness Enumeration Top 25 Most Dangerous Software Errors

**UNIT III      SECURITY IN NETWORKS      9**

Threats in networks – Encryption – Virtual Private Networks – PKI – SSH – SSL – IPsec – Content Integrity – Access Controls – Wireless Security – Honeypots – Traffic Flow Security – Firewalls – Intrusion Detection Systems – Secure e-mail.

**UNIT IV      SECURITY IN DATABASES      9**

Security requirements of database systems – Reliability and Integrity in databases – Two Phase Update – Redundancy/Internal Consistency – Recovery – Concurrency/Consistency – Monitors – Sensitive Data – Types of disclosures – Inference.

**UNIT V      SECURITY MODELS AND STANDARDS      9**

Secure SDLC – Secure Application Testing – Security architecture models – Trusted Computing Base – Bell-LaPadula Confidentiality Model – Biba Integrity Model – Graham-Denning Access Control Model – Harrison-Ruzzo-Ulman Model – Secure Frameworks – COSO – CobiT – Compliances – PCI DSS – Security Standards - ISO 27000 family of standards – NIST.

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

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson Education, 2007.
2. Matt Bishop, "Introduction to Computer Security", Addison-Wesley, 2004.
3. Michael Whitman, Herbert J. Mattord, "Management of Information Security", Third Edition, Course Technology, 2010.

**REFERENCES:**

1. William Stallings, "Cryptography and Network Security : Principles and Practices", Fifth Edition, Prentice Hall, 2010.
2. Michael Howard, David LeBlanc, John Viega, "24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them", First Edition, Mc Graw Hill Osborne Media, 2009.
3. Matt Bishop, "Computer Security: Art and Science", First Edition, Addison-Wesley, 2002.
4. [https://www.owasp.org/index.php/Top\\_10\\_2010](https://www.owasp.org/index.php/Top_10_2010)
5. [https://www.pcisecuritystandards.org/security\\_standards/pci\\_dss.shtml](https://www.pcisecuritystandards.org/security_standards/pci_dss.shtml)
6. <http://cwe.mitre.org/top25/index.html>

**LIST OF EXPERIMENTS:**

1. General Form Design
2. Mobile browser based interactive applications
3. Applications using controls
4. Mobile networking applications (SMS/Email)
5. Applications involving data retrieval
6. Launching services in a mobile phone
7. Web portal development
8. Applications using Android SDK framework (like interactive applications, applications that make use of accelerometer sensor, video applications)
9. Applications that use the iPhone SDK framework
10. Testing the applications using emulators

**TOTAL: 45 PERIODS****LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS**

1. JDK environment
2. J2ME
3. Sun Java Wireless Toolkit
4. Android SDK
5. iPhone SDK

**OBJECTIVE**

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

**UNIT I INTRODUCTION TO DATA WAREHOUSING****8**

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

**UNIT II DATA WAREHOUSE PROCESS AND ARCHITECTURE****9**

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

**UNIT III INTRODUCTION TO DATA MINING 9**

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

**UNIT IV CLASSIFICATION AND CLUSTERING 10**

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

**UNIT V APPLICATIONS 9**

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

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, third edition 2011, ISBN: 1558604898.
2. Alex Berson and Stephen J. Smith, “ Data Warehousing, Data Mining & OLAP”, Tata Mc Graw Hill Edition, Tenth Reprint 2007.
3. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Eastern Economy Edition, Prentice Hall of India, 2006.

**REFERENCES:**

1. Mehmed Kantardzic, “Datamining concepts, models, methods, and algorithms”, Wiley Interscience, 2003.
2. Ian Witten, Eibe Frank, Data Mining; Practical Machine Learning Tools and Techniques, third edition, Morgan Kaufmann, 2011.
3. George M Marakas, Modern Data Warehousing, Mining and Visualization, Prentice Hall, 2003.

**PTCS8602**

**SERVICE ORIENTED ARCHITECTURE**

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

**OBJECTIVE**

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

**UNIT I FUNDAMENTALS OF SOA 9**

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

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

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

**UNIT III MULTI CHANNEL ACCESS AND WEB SERVICES COMPOSITION 9**

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

**UNIT IV JAVA WEB SERVICES 9**

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

**UNIT V WEB SERVICES SECURITY AND TRANSACTION 9**

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

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Eric Newcomer, Lomow, “Understanding SOA with Web Services”, Pearson Education, 2005.
2. JamesMcGovern,Sameer Tyagi,Michael E Stevens,Sunil Mathew,”Java Web Services Architecture”,Elsevier,2003.

**REFERENCES:**

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

**PTCS8611 SOFTWARE DEVELOPMENT LABORATORY L T P C**

**0 0 3 2**

Develop a software package in any application relevant to any area of study of your curriculum by applying the Software Engineering Practices generally done by software industries, which are

1. Identification of Use cases for each application system and SRS preparation.
2. Identification of reusable Components/Frameworks from open source and customizing them for each application.
3. Coding/Customizing/Wrapping for components/subsystems.
4. Testing – Scenario testing and test case preparation for each components/subsystems
5. Integration of subsystems and Testing
6. Simulation of datasets and load testing to analyze performance of the system.

**TOTAL : 45 PERIODS**

**OBJECTIVE**

This course gives the idea of evolution of cloud computing and its services available today, which may led to the design and development of simple cloud service. It also focused on some key challenges and issues around cloud computing.

**UNIT I INTRODUCTION 9**

Cloud-definition, benefits, usage scenarios, History of Cloud Computing - Cloud Architecture - Types of Clouds - Business models around Clouds – Major Players in Cloud Computing - issues in Clouds - Eucalyptus - Nimbus - Open Nebula, Cloud Sim.

**UNIT II CLOUD SERVICES 9**

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service –Communication as services. Service providers- Google, Amazon, Microsoft Azure, IBM, Sales force.

**UNIT III COLLABORATING USING CLOUD SERVICES 9**

Email Communication over the Cloud - CRM Management - Project Management-Event Management - Task Management – Calendar - Schedules - Word Processing – Presentation – Spreadsheet - Databases – Desktop - Social Networks and Groupware.

**UNIT IV VIRTUALIZATION FOR CLOUD 9**

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization –System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

**UNIT V SECURITY, STANDARDS AND APPLICATIONS 9**

Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. John Rittinghouse & James Ransome, Cloud Computing, Implementation, Management and Strategy, CRC Press, 2010.
2. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Que Publishing, August 2008.
3. James E Smith, Ravi Nair, Virtual Machines, Morgan Kaufmann Publishers, 2006.

**REFERENCES:**

1. David E.Y. Sarna Implementing and Developing Cloud Application, CRC press 2011.
2. Lee Badger, Tim Grance, Robert Patt-Corner, Jeff Voas, NIST, Draft cloud computing synopsis and recommendation, May 2011.
3. Anthony T Velte, Toby J Velte, Robert Elsenpeter, Cloud Computing : A Practical Approach, Tata McGraw-Hill 2010.
4. Haley Beard, Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.
5. G.J.Popek, R.P. Goldberg, Formal requirements for virtualizable third generation Architectures, Communications of the ACM, No.7 Vol.17, July 1974.

**OBJECTIVES:**

To learn the different principles and techniques of management in planning, organizing, directing and controlling.

- To study the Evolution of Management
- To study the functions and principles of management
- To learn the application of the principles in an organization

**UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9**

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

**UNIT II PLANNING 9**

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

**UNIT III ORGANISING 9**

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

**UNIT IV DIRECTING 9**

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

**UNIT V CONTROLLING 9**

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

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

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

**REFERENCES:**

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

**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.

**REFERENCE BOOKS:**

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.

**OBJECTIVE**

To study the protocols and the functionalities of ad hoc networks, understanding the various applications developed based on ad hoc networking, addressing issues and challenges created. To know about the sensor networks and addressing the challenges in establishing infrastructure for sensor networks and managing database.

**UNIT I INTRODUCTION AND MAC PROTOCOLS 9**

Cellular and Ad hoc Networks - Issues in Ad hoc Networks - Design Issues and Design Goals of MAC protocol for Ad hoc Networks - Classification of MAC protocols - Contention Based Protocols - Reservation and Scheduling Mechanisms - Other Protocols.

- UNIT II ROUTING PROTOCOLS 9**  
 Design Issues and Classifications of unicast and multicast Routing Protocols - Proactive, Reactive and Hybrid routing protocol – Tree based and Mesh based multicast protocols, Energy Efficient and QoS guaranteed multicast protocols.
- UNIT III TRANSPORT LAYER AND SECURITY ISSUES 9**  
 Design Issues, Design Goals and Classifications of Transport layer protocols - TCP over Ad Hoc – Security in Ad hoc Networks - Network Security Requirements - Network Security Attacks - Key Management - Secure Routing in Ad hoc Networks.
- UNIT IV SENSOR NETWORKS AND NETWORKING SENSORS 9**  
 Unique Constraints and Challenges – Advantages and Applications – Collaborative Processing – Key Definitions – Localization and Tracking – Networking Sensors – MAC – Geographic, Energy Aware and Attribute based Routing.
- UNIT V INFRASTRUCTURE ESTABLISHMENT AND NETWORK DATABASE 9**  
 Topology Control – Clustering – Time Synchronization – Localization and Localization Services – Task Driven Sensing – Roles of Sensor Nodes and Utilities – Network Database

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. C. Siva Ram Murthy and B.S. Manoj, “Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2<sup>nd</sup> Edition, 2005.
2. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks – An Information Processing Approach”, Elsevier Publications, 2004.

**REFERENCES:**

1. C.K.Toh, “Ad hoc Mobile Wireless Networks – Protocols and Systems”, Pearson Education, 1<sup>st</sup> Edition, 2007.
2. George Aggelou, “Mobile Ad hoc Networks – From Wireless LANs to 4G Networks, Tata McGraw Hill, 2009.
3. Holger Karl and Andreas Willing, “Protocols and Architectures for Wireless Sensor Networks” Wiley Publications, 2005.

**PTCS8003 ADVANCED TOPICS ON DATABASES L T P C**  
**3 0 0 3**

**OBJECTIVE**

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

- UNIT I PARALLEL AND DISTRIBUTED DATABASES 9**  
 Inter and Intra Query Parallelism – Architecture – Query evaluation – Optimization – Distributed Architecture – Storage – Catalog Management – Query Processing - Transactions – Recovery - Large-scale Data Analytics in the Internet Context - MapReduce Paradigm - run-time system for supporting scalable and fault-tolerant execution - paradigms: Pig Latin and Hive and parallel databases versus Map Reduce



**UNIT II ACTIVE DATABASES 9**

Syntax and Semantics (Starburst, Oracle, DB2) – Taxonomy – Applications – Integrity Management – Workflow Management – Business Rules – Design Principles – Properties – Rule Modularization – Rule Debugging – IDEA methodology – Open Problems.

**UNIT III TEMPORAL AND OBJECT DATABASES 9**

Overview – Data types – Associating Facts – Temporal Query Language – TSQL2 – Time Ontology – Language Constructs – Architecture – Temporal Support – Object Database and Change Management – Change of Schema – Implementing Database Updates in O<sub>2</sub> – Benchmark Database Updates – Performance Evaluation.

**UNIT IV COMPLEX QUERIES AND REASONING 9**

Logic of Query Languages – Relational Calculi – Recursive rules – Syntax and semantics of Datalog – Fixpoint semantics – Implementation Rules and Recursion – Rule rewriting methods – Compilation and Optimization – Recursive Queries in SQL – Open issues.

**UNIT V SPATIAL, TEXT AND MULTIMEDIA DATABASES 9**

Traditional Indexing Methods (Secondary Keys, Spatial Access Methods) – Text Retrieval – Multimedia Indexing – 1D Time Series – 2d Color images – Subpattern Matching – Open Issues – Uncertainties

**TOTAL: 45 PERIODS**

**REFERENCES:**

1. Ramakrishnan, Gehrke, "Database Management System", Tata Mc Graw Hill Publications, Third Edition.
2. Carlo Zaniolo, Stefano Ceri "Advanced Database Systems", Morgan Kauffmann Publishers.
3. VLDB Journal.

**FURTHER READING:**

- <http://video.google.com>
- <http://www.blinkvid.com/video>
- <http://www.learnerstv.com/course.php?cat=Computers>
- <http://www.crazyengineers.com/forum>

**PTCS8004**

**BIO INFORMATICS TECHNOLOGIES**

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

**OBJECTIVE:**

To understand basic concepts of molecular biology and genetics, the concepts of computer science that relate to problems in biological sciences, computer as a tool for biomedical research, and important functional relationships from gene data.

**UNIT I INTRODUCTION 9**

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

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

Bioinformatics data – Data warehousing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics

**UNIT III MODELING FOR BIOINFORMATICS 9**

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

**UNIT IV PATTERN MATCHING AND VISUALIZATION 9**

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

**UNIT V MICROARRAY ANALYSIS 9**

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

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Yi-Ping Phoebe Chen (Ed), “BioInformatics Technologies”, First Indian Reprint, Springer Verlag, 2007.
2. Zoe Iacox and Terence Critchlow, “BioInformatics – Managing Scientific data”, First Indian Reprint, Elsevier, 2004

**REFERENCES:**

1. Zoe Lacroix and Terence Critchlow, “Bioinformatics – Managing Scientific Data”, First Edition, Elsevier, 2004
2. Bryan Bergeron, “Bio Informatics Computing”, Second Edition, Pearson Education, 2003.
3. Arthur M Lesk, “Introduction to Bioinformatics”, Second Edition, Oxford University Press, 2005

**PTCS8005 COMPUTATIONAL INTELLIGENCE L T P C  
3 0 0 3**

**OBJECTIVE**

To examine work at the frontiers of research in computing where ideas from biology are inspirations to build truly intelligent computer systems; analyse the dependencies among biology, complexity, computer science, informatics, cognitive science, robotics, and cybernetics.; introduce concepts, models, algorithms, and tools for development of intelligent systems; create an understanding of the fundamental Computational Intelligence models; explore the theory and applications of two classes of system inspired by biology: neural networks and evolutionary computation; and apply Computational Intelligence techniques to classification, pattern recognition, prediction, rule extraction, and optimization problems.

**UNIT I THEORETICAL FOUNDATIONS 9**

Data mining: fundamentals – data reduction - Decision tree algorithms - Association rules, Clustering: K-means, fuzzy c-means, hierarchical, probabilistic clustering methods - Rough set theory: definition – rule induction – feature selection - rough sets in data mining

**UNIT II LEARNING 9**  
 Bayes Optimal Classifiers – Gibbs Algorithms – Supervised Learning – Unsupervised Learning – Reinforcement Learning – Adaptive Learning EM Algorithm – Probability Learning - K- Nearest Neighbour Learning – Regression – Case Based Learning – collaborative learning - cognitive approach to learning and prediction

**UNIT III EVOLUTIONARY COMPUTING 9**  
 Neural Networks – Back propagation Networks – Hopfield Neural Networks – Radial Basis Function Networks – Learning Vector Quantisation - Artificial Neural Networks  
 Fuzzy Classifiers – Fuzzy Cognitive Maps – Collective Intelligence - Swarm Intelligence – Ant routing – Adaptivity and self-organisation – quantitative emergence and control - Self-Organising Feature Maps

**UNIT IV ARTIFICIAL IMMUNE SYSTEMS 9**  
 Scope – Framework – Algorithms – Network Models – Cognition and Immune Systems – Survey of Immune Systems, AI Hybrid systems: Case based reasoning – Classifier systems – Fuzzy systems – DNA computing – Case studies: Autonomous Navigation – Network Security – Job-shop scheduling

**UNIT V ADVANCED TOPICS 9**  
 Ant Colony Optimization – Particle Swarm optimization – Artificial Life Systems - Swarms in business intelligence - Human-swarm interaction - Behavioral Intelligence – flock based collaboration – fusion, Robotic Swarms – population diversity - Self-organising robots – self-reconfigurable robots – Robot Coordination - Quantum computing – quantum algorithms – firefly, glow worm - applications

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. S. Sumathi, Surekha Paneerselvam, Computational Intelligence Paradigms: Theory & Applications Using MATLAB, CRC Press, 2009.
2. Russell C. Eberhart and Yuhui Shi, Computational intelligence: concepts to implementations, Morgan Kaufman, 2007.
3. John Fulcher, L. C. Jain, Computational intelligence: a compendium, Studies in computational intelligence, Vol. 115, Springer, 2008.
4. Leandro N. De Castro, Jonathan Timmis, Artificial immune systems: a new computational intelligence approach, Illustrated edition, Springer, 2002.

**REFERENCES:**

1. Andries P. Engelbrecht, Computational intelligence: an introduction, editon 2, John Wiley and Sons, 2007.
2. Christine L. Mumford, Lakhmi C. Jain, Computational Intelligence: Collaboration, Fusion and Emergence, Intelligence Systems reference library series, Volume 1, Springer, 2009.
3. Cordon, O.; Herrera, F.; Gomide, F.; Hoffmann, F.; Magdalena, L.; , "Ten years of genetic fuzzy systems: current framework and new trends," 9<sup>th</sup> Joint IFSA World Congress and 20th NAFIPS International Conference , vol.3, pp.1241-1246, 25-28 July 2001

**PTCS8006**

**DATABASE TUNING**

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

**OBJECTIVE**

To use Tuning tools for different operations; optimization to different mechanism of Database; and change Schema, Database update and Benchmark Databases.

<b>UNIT I</b>	<b>SQL TUNING</b>	<b>9</b>
SQL tuning – Execution Plan – Inspection – Optimization – Locking – Joining – Locks – Tuning Recovery subsystem – Operating system consideration – Hardware Tuning.		
<b>UNIT II</b>	<b>DESIGN OPTIMIZATION</b>	<b>9</b>
Techniques – Tuning Relational Systems – Normalization – Tuning Denormalization – Clustering two tables – Aggregate Maintenance – Record Layout – Query Tuning – Triggers – Client server mechanism – Bulk Loading data – Accessing Multiple Databases.		
<b>UNIT III</b>	<b>PERFORMANCE TUNING</b>	<b>9</b>
Approach – Performance Tuning Vs Relational database Applications – Performance Monitoring – Reasons – Types – Strategy – Performance monitoring Tools and strategies.		
<b>UNIT IV</b>	<b>TROUBLESHOOTING</b>	<b>9</b>
Query plan explainers – Performance Monitors – Event Monitors – Finding Suspicious Queries – Analyzing Query Access Plan – Profiling a Query Execution – DBMS Subsystems.		
<b>UNIT V</b>	<b>CASE STUDIES</b>	<b>9</b>
Monitoring and Tuning Activities – Benchmarking results of Oracle SQL* Forms – Oracle 11g – Informix.		

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Dennis Shasha and Philippe Bonnet “Database Tuning, Principles, Experiments, and Troubleshooting Techniques”, Elsevier Reprint 2005.
2. Peter Gulutzan & Trudy Pelzer, “SQL Performance Tuning”, Addison-Wesley, 1st edition, 2002.

**PTCS8007**

**E-LEARNING TECHNIQUES**

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

**OBJECTIVE**

To analyze and compare different on-line E-Learning tools, design course content for a specific subject from different perspective, plan and design the instruction and support needs of learners of various backgrounds, levels and situations based on different learning methodologies, outline the various tasks of a typical online course facilitator, and Design and Implement an E-Learning Course Content for a complete online course

<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>9</b>
E-Learning - E-Learning cycle - E-Learning types - challenges and opportunities – cognitive presence –Approaches to design E-Learning - E-Learning framework - 6C framework - E-Learning Tools		
<b>UNIT II</b>	<b>E-LEARNING STRATEGY</b>	<b>9</b>
Role of tutor - E-Learning strategy - Blended E-Learning – M-Learning- problem based learning- Enterprise learning- Corporate Learning- Web based Learning - Pod casting -Learning Management systems – Content development process – E-Learning standards- SCORM standard- managing e-learning quality - case studies		

**UNIT III PRINCIPLES OF E-LEARNING 9**  
Philosophy of E-Learning – theory of learning – Applying principles of multimedia - Applying principles of contiguity - Applying principles of modality - Applying principles of redundancy - Applying principles of coherency - Applying principles of personalization- web-based learning communities - knowledge sharing and Knowledge management in e-learning- social networks and social media in e-learning

**UNIT IV DESIGN 9**  
On line E-Learning technologies – visual communication techniques- Computer-based technologies - Computer-mediated communication (CMC) - Assessment and evaluation- Organizing and designing learning sequences, Characteristics of Interactive Online Learning Media

**UNIT V IMPLEMENTATION 9**  
Leverages example in E-Learning – collaborative E-Learning- Learner control in E-Learning- guidelines to solve issues in E-Learning – Implementation of an E-Learning Course Content for a complete online course, Research in content retrieval and generation for E-Learning, Role of cloud and semantic Grid in E-Learning

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. D.Randy Garrison “E-Learning in the 21<sup>st</sup> century a framework for research and practice”, 2<sup>nd</sup> edition, Taylor and Francis, 2011.
2. Robin Mason, “E-Learning : the key concepts”, Routledge, 2007.
3. William Horton, “E-Learning by Design”, Pfeiffer Wiley, 2006.
4. John Gardner, Bryn Holes, “E-Learning : Concepts and practice” SAGE Publications, 2006.

**REFERENCES:**

1. R.C.Clark and R.E.Mayer, “E-Learning and the science of instruction”, Pfeiffer Wiley, 2011.
2. Mark J Rosenberg, “E-Learning: strategies for delivering knowledge in the Digital Age”, McGraw- Hill, 2001.
3. Kjell E. (Erik) Rudestam , Judith Schoenholtz-Read, “Handbook of Online Learning”, Sage Publications Inc., Second Edition, 2009.
4. Topics (Wiley Series on Parallel and Distributed Computing)

**PTCS8008 GRAPH THEORY AND COMBINATORICS L T P C  
3 0 0 3**

**OBJECTIVES:**

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.

**PTCS8009**

**GREEN COMPUTING**

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

**OBJECTIVE**

To acquire knowledge to adopt green computing practices to minimize negative impacts on the environment, skill in energy saving practices in their use of hardware, examine technology tools that can reduce paper waste and carbon footprint by user, and to understand how to minimize equipment disposal requirements



**UNIT I DESIGN PROCESS 9**  
Humans – Information process – Computer – Information Process – Differences and Similarities between them – Need for Interaction – Models – Ergonomics – Style – Context – Paradigms – Designing of Interactive systems – Usability – Paradigm shift – Interaction design basics – Design Process – Scenarios – Users need – Complexity of design

**UNIT II DESIGN AND EVALUATION OF INTERACTIVE SYSTEMS 9**  
Software Process – Usability engineering – Issue based Information systems – Iterative design practices – Design rules – maximum usability – Principles – Standards and guidelines – design patterns – Programming Tools – Windowing systems – Interaction tool kit – User Interface management system – Evaluation techniques – evaluation design – Evaluating implementations – Observational Methods

**UNIT III MODELS 9**  
Universal design principles – Multimodal systems – User Support – Presentation and Implementation Issues – types – requirements – approaches – Cognitive model – Hierarchical model – Linguistic model – physical and device models – Socio-technical models – Communication and Collaboration models – Task models – Task analysis and design

**UNIT IV EXPERIMENTAL DESIGN AND STATISTICAL ANALYSIS OF HCI 9**  
Basic Design structure – Single independent variable – multiple independent variable – factorial design – split-plot design – random errors – experimental procedure – Statistical analysis – T tests – Analysis of Variance test – Regression – Chi-Square test – Survey – Probabilistic sampling – Non-probabilistic sampling – developing survey questions

**UNIT V THEORIES 9**  
Dialogue notations and design – Dialogue need – dialogue design notations – Graphical – Textual - representing dialogue – formal descriptions – Dialogue analysis – System models – Interaction models – relationship with dialogue – Formalisms – Formal notations – Interstitial behavior – Virtual reality – Modeling rich interaction – Status Event analysis – Properties – Rich contexts – Sensor-based systems – Groupware – Applications – Ubiquitous computing – Virtual reality

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale Human Computer Interaction, 3<sup>rd</sup> Edition Prentice Hall, 2004.
2. Jonathan Lazar, Jinjuan Heidi Feng, Harry Hochheiser, Research Methods in Human-Computer Interaction Wiley, 2010.

**REFERENCE:**

1. Ben Shneiderman and Catherine Plaisant Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition, pp. 672, ISBN 0-321-53735-1, March 2009), Reading, MA: Addison-Wesley Publishing Co.



**OBJECTIVE**

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

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

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

**UNIT II INFORMATION RETRIEVAL****9**

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

**UNIT III WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING****9**

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

**UNIT IV WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH****9**

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

**UNIT V DOCUMENT TEXT MINING****9**

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

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

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

## REFERENCES:

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

**PTCS8012**

**MIDDLEWARE TECHNOLOGIES**

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

### OBJECTIVE

This course provides a sound knowledge in various middleware technologies for distributed applications. Also, it gives familiarization web service architectures and their standards.

#### UNIT I INTRODUCTION

**9**

General Middleware, Service Specific Middleware, Client/Server Building blocks – RPC - Messaging – Peer – to – Peer, Java RMI - Computing standards – OMG - Overview of CORBA - Overview of COM/DCOM - Overview of EJB - Middleware types - Middleware in distributed Applications.

#### UNIT II EJB and CORBA

**9**

EJB architecture - Overview of EJB software architecture, EJB Conversation, Building and Deploying EJBs, Roles, applications - EJB Session Beans, EJB entity beans - Lifecycle of Beans - EJB clients - developing an application - Deployment. CORBA – components - architectural features - method invocations - static and dynamic: IDL - CORBA's self-describing data - interface repository - Building an application using CORBA - Overview of CORBA Services - Object location Services, Messaging Services - CORBA Component Model.

#### UNIT III COM and .NET

**9**

Evolution of DCOM - Introduction to COM - COM clients and servers - COM IDL - COM Interfaces COM Threading Models – Marshalling - Custom and standard marshalling - Comparison COM and CORBA - Introduction to .NET - Overview of .NET architecture - Remoting.

#### UNIT IV SOA and WEB SERVICES

**9**

Defining SOA - Business value of SOA - SOA characteristics - Concept of a service, Basic SOA - Enterprise Service Bus (ESB) - SOA enterprise Software Models -Services and SOA – WSDL - SOAP, UDDI, WS Standards -Web Services and Service Oriented Enterprise (SOE) - Coordination and Transaction - Business Process Execution Language for Web Services.

#### UNIT V OTHER TYPES OF MIDDLEWARE

**9**

Other types of Middleware, Real-Time Middleware, Embedded Systems Middleware, Mobile Middleware, Oracle Fusion Middleware

**TOTAL: 45 PERIODS**

### TEXT BOOKS:

1. G. Sudha Sadasivam, Radha Shankarmani, “Middleware and Enterprise Integration Technologies”, Wiley, 2009.
2. Gustavo Alonso, Fabio Casati, Harumi Kuno, Vijay Machiraju, “Web Services: Concepts, Architectures and Applications”, Springer, 2010.
3. Ian Gorton, “Essential Software Architecture”, Springer, 2nd Edition, 2011.

## REFERENCES:

1. Judith M. Myerson, "The Complete Book of Middleware" Auerbach Publications, 1 edition, 2002.
2. Sasu Tarkoma, "Mobile Middleware: Supporting Applications and Services" Wiley 1st edition, 2009.
3. Distributed Systems Architecture: A Middleware Approach", Morgan Kaufmann, 2005.
4. Reza Shafii, Stephen Lee, and Gangadhar Konduri, "Oracle Fusion Middleware 11g Architecture and Management", McGraw-Hill Osborne Media, 1 edition, 2011.

**PTCS8013**

**NANO COMPUTING**

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

## OBJECTIVE

This course is intended to provide the students with the prospects, challenges, imperfections, reliability and with insight into Nanoscale Quantum Computing and QCA implementation.

### **UNIT I NANOCOMPUTING-PROSPECTS AND CHALLENGES 9**

Introduction - History of Computing - Nanocomputing - Quantum Computers - Nanocomputing Technologies - Nano Information Processing - Prospects and Challenges - Physics of Nanocomputing : Digital Signals and Gates - Silicon Nanoelectronics - Carbon Nanotube Electronics - Carbon Nanotube Field-effect Transistors - Nanolithography

### **UNIT II NANOCOMPUTING WITH IMPERFECTIONS 9**

Introduction - Nanocomputing in the Presence of Defects and Faults - Defect Tolerance - Towards Quadrillion Transistor Logic Systems

### **UNIT III RELIABILITY OF NANOCOMPUTING 9**

Markov Random Fields - Reliability Evaluation Strategies - NANOLAB - NANOPRISM - Reliable Manufacturing and Behavior from Law of Large Numbers

### **UNIT IV NANOSCALE QUANTUM COMPUTING 9**

Quantum Computers - Hardware Challenges to Large Quantum Computers - Fabrication, Test, and Architectural Challenges - Quantum-dot Cellular Automata (QCA) - Computing with QCA - QCA Clocking - QCA Design Rules

### **UNIT V QCADESIGNER SOFTWARE AND QCA IMPLEMENTATION 9**

Basic QCA Circuits using QCADesigner - QCA Implementation - Molecular and Optical Computing: Molecular Computing - Optimal Computing - Ultrafast Pulse Shaping and Tb/sec Data Speeds

**TOTAL: 45 PERIODS**

## TEXT BOOK:

1. Sahni V. and Goswami D., Nano Computing, McGraw Hill Education Asia Ltd. (2008), ISBN (13): 978007024892.

## REFERENCES:

1. Sandeep K. Shukla and R. Iris Bahar., Nano, Quantum and Molecular Computing, Kluwer Academic Publishers (2004), ISBN: 1402080670.
2. Sahni V, Quantum Computing, McGraw Hill Education Asia Ltd. (2007).
3. Jean-Baptiste Waldner, Nanocomputers and Swarm Intelligence, John Wiley & Sons, Inc. (2008), ISBN (13): 978-1848210097.

**OBJECTIVE**

To tag a given text with basic Language processing features, design an innovative application using NLP components, implement a rule based system to tackle morphology/syntax of a Language, design a tag set to be used for statistical processing keeping an application in mind, design a Statistical technique for a new application, Compare and contrast use of different statistical approaches for different types of applications.

**UNIT I INTRODUCTION 9**

Natural Language Processing tasks in syntax, semantics, and pragmatics – Issues - Applications - The role of machine learning - Probability Basics –Information theory – Collocations -N-gram Language Models - Estimating parameters and smoothing - Evaluating language models.

**UNIT II MORPHOLOGY AND PART OF SPEECH TAGGING 9**

Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models – Transformation based Models - Maximum Entropy Models. Conditional Random Fields

**UNIT III SYNTAX PARSING 9**

Syntax Parsing - Grammar formalisms and treebanks - Parsing with Context Free Grammars - Features and Unification -Statistical parsing and probabilistic CFGs (PCFGs)-Lexicalized PCFGs.

**UNIT IV SEMANTIC ANALYSIS 9**

Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation - Supervised – Dictionary based and Unsupervised Approaches - Compositional semantics- Semantic Role Labeling and Semantic Parsing – Discourse Analysis.

**UNIT V APPLICATIONS 9**

Named entity recognition and relation extraction- IE using sequence labeling-Machine Translation (MT) - Basic issues in MT-Statistical translation-word alignment- phrase-based translation – Question Answering

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

1. Daniel Jurafsky and James H. Martin Speech and Language Processing (2nd Edition), Prentice Hall; 2 edition, 2008
2. Foundations of Statistical Natural Language Processing by Christopher D. Manning and Hinrich Schuetze, MIT Press, 1999
3. Steven Bird, Ewan Klein and Edward Loper Natural Language Processing with Python, O'Reilly Media; 1 edition, 2009
4. Roland R. Hausser, Foundations of Computational Linguistics: Human- Computer Communication in Natural Language, Paperback, MIT Press, 2011

**REFERENCES:**

1. Pierre M. Nugues, An Introduction to Language Processing with Perl and Prolog: An Outline of Theories, Implementation, and Application with Special Consideration of English, French, and German (Cognitive Technologies) Softcover reprint, 2010
2. James Allen, Natural Language Understanding, Addison Wesley; 2 edition 1994
3. NLTK – Natural Language Tool Kit - <http://www.nltk.org/>

**OBJECTIVE**

To learn the network analysis and flow analysis with a network tool and to evaluate the performance of the design issues and architecture to meet the network communication requirements, and to understand how network management technology works to manage today's system

**UNIT I INTRODUCTION 9**

Introduction – Requirement Analysis Concepts – Requirement Analysis Process – Flow Analysis

**UNIT II ARCHITECTURE 9**

Network Architecture – Addressing and Routing Architecture – Performance architecture – Security and Privacy Architecture – Network Analysis Tool

**UNIT III NETWORK MANAGEMENT 9**

Network Management Overview - Management Perspective: Dimensions of the Management: Management Interoperability, Management Life cycle, Management Layers – Management functions and reference models

**UNIT IV NETWORK MANAGEMENT ORGANIZATION 9**

Management Information – Management Communication Patterns: Rules of conversation. Common Management Protocols – Management organization

**UNIT V MANAGEMENT INTEGRATION 9**

Applied Network Management: Management Integration – Service Level Management – Management Metrics: Assessing Management Impact and Effectiveness – Case Study: NMS, Organization Network

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. James D.McCabe, Network Analysis, Architecture and Design, 3rd Edition, Elsevier, 2007.
2. Alexander Clemm, Network Management Fundamentals, 1<sup>st</sup> Edition, Cisco Press, 2006.

**REFERENCES:**

1. Larry Walsh, SNMP MIB Handbook, 2008.
2. Laura Chappell and Gerald Combs, Wireshark Network Analysis, 1<sup>st</sup> Edition, 2010.
3. William Stallings, SNMP, SNMPV2, SNMPV3, AND RMON 1&2, 3<sup>rd</sup> Edition, 1999.

**OBJECTIVE**

To learn about wired and wireless network security with various cryptographic techniques, which include private and public keys algorithms along with attacks types.

**UNIT I CLASSICAL CRYPTOSYSTEM 9**

Security trends – Security Attacks and services – Symmetric cipher model- Classical Encryption Techniques — LFSR sequences – Basic Number theory – Congruences – Chinese Remainder theorem – Modular exponentiation – Fermat and Euler's theorem – Legendre and Jacobi symbols – Finite Field – Galois Field.

**UNIT II BLOCK CIPHER 9**

Simple DES – DES – Modes of operation – Triple DES – AES – RC4 – RSA – Attacks – Primality test – factoring.

**UNIT III MESSAGE AUTHENTICATION 9**

Discrete Logarithms – Computing discrete logs – Diffie-Hellman key exchange – ElGamal Public key cryptosystems – Hash functions – Secure Hash – Birthday attacks - MD5 – Digital signatures – RSA – ElGamal – DSA.

**UNIT IV NETWORK SECURITY 9**

Kerberos, X.509, PKI – Electronic Mail security – PGP – IP security – Web Security – SSL, TLS, SET.

**UNIT V WIRELESS NETWORK SECURITY 9**

Wireless Network Security- IEEE 802.11 Wireless LANs - Protocol Overview and Security - Wireless Application Protocol (WAP) - Protocol Overview - Wireless Transport Layer Security (WTLS).

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. William Stallings, "Cryptography and Network security Principles and Practices", Pearson/PHI, 5th ed, 2006. [Unit II, Unit III, Unit IV, Unit V]
2. Wade Trappe, Lawrence C Washington, "Introduction to Cryptography with coding theory", 2nd ed, Pearson, 2007. [Unit I]

**REFERENCES:**

1. W. Mao, "Modern Cryptography – Theory and Practice", Pearson Education, Second Edition, 2007.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in computing", Third Edition – Prentice Hall of India, 2006.
3. Douglas R. Stinson. "Cryptography, theory and practice", Third edition, CRS Press, 2006.

**PTCS8017 PRINCIPLES OF DISTRIBUTED SYSTEMS L T P C  
3 0 0 3**

**OBJECTIVE:**

- Explain the goals and types of distributed systems, describe and implement distributed systems in the areas of system processes, communication applications, naming and synchronization, design distributed systems that take into account consistency, replication and/or fault tolerance, and to evaluate the security of distributed systems.

**UNIT I INTRODUCTION 9**

Introduction to Distributed systems - challenges - architectural models - fundamental models - P2P systems - Introduction to interprocess communications - external data representation and marshalling- client server communication - group communication-multicast/pubsub - Energy Efficient Computing - Cloud computing

**UNIT II DISTRIBUTED OBJECTS AND FILE SYSTEM 9**

Introduction - Communication between distributed objects - Remote procedure call - Events and notifications - Java RMI case Study - Introduction to DFS - File service architecture – Google file system - Introduction to Name Services- Name services and DNS - Directory and directory services-ClusterComputing-mapreduce/bigtable.

**UNIT III DISTRIBUTED OPERATING SYSTEM SUPPORT 9**

The operating system layer – Protection - Process and threads - Communication and invocation - Operating system architecture - Introduction to time and global states - Clocks, Events and Process states - Synchronizing physical clocks - Logical time and logical clocks - Global states - Distributed mutual exclusion - Overlay Networks – DHT

**UNIT IV TRANSACTION AND CONCURRENCY CONTROL-DISTRIBUTED TRANSACTIONS 9**

Transactions – Nested transaction – Locks - Optimistic concurrency control - Timestamp ordering - Comparison of methods for concurrency control - Introduction to distributed transactions - Flat and nested distributed transactions - Atomic commit protocols - Concurrency control in distributed transactions - Distributed deadlocks - Transaction recovery - Data-Intensive Computing and Map Reduce

**UNIT V FAULT TOLERANCE, SECURITY AND REPLICATION 9**

Overview of security techniques - Cryptographic algorithms – Digital signatures - Cryptography pragmatics – Distributed Replication - CDNs and replication – Fault tolerant services - Byzantine Fault Tolerance - Detecting and Correcting Local Faults - Logging and Crash Recovery – Highly available services – Transactions with replicated data.

Case study: Multiplayer online games, Social networking services, Large object CDN's (video/audio streaming systems)

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Tanenbaum, A. and van Steen, M., Distributed Systems: Principles and Paradigms, 2nd ed, Prentice Hall, 2007. ISBN: 0132392275.
2. Coulouris, G, Dollimore, J., and Kindberg, Distributed Systems: Concepts and Design, 4rd ed T., Addison-Wesley, 2006. ISBN: 0321263545

**REFERENCES:**

1. Mukesh Singhal, Ohio State University, Columbus ,“Advanced Concepts In Operating Systems”, McGraw-Hill Series in Computer Science, 1994.
2. Kenneth P. Birman, “Reliable Distributed Systems: Technologies, Web Services, and Applications”, Springer
3. Haggit Attiya, “Distributed Computing: Fundamentals, Simulations, and Advanced E-

**OBJECTIVE:**

To obtain a broad understanding of the technologies and applications of embedded and real-time systems; understand the architecture of embedded systems and real-time systems; have a basic knowledge on the various issues involved in real-time databases; know how these systems can be made more fault tolerant; and learn about embedded/real-time operating systems and the various issues associated with them.

**UNIT I INTRODUCTION TO EMBEDDED SYSTEM ARCHITECTURE 9**

Embedded System - Introduction – Application Areas – Overview of Embedded System Architecture – Specialties – Recent Trends – Hardware Architecture – Software Architecture – Application Software – Communication Software – Process of Generating Executable Image – Programming for Embedded Systems – Memory Management – Device Drivers – Productivity Tools – Embedded System - Development Process - Embedded System Fiascos

**UNIT II REAL-TIME SYSTEM AND TASKS 9**

Issues in Real Time Computing, Structure of a Real Time System - Task Classes, Performance Measures for Real Time Systems, Estimating Program Run times. Task Assignment and Scheduling - Classical Uniprocessor scheduling algorithms, Uni-Processor scheduling of IRIS Tasks, Task Assignment, Mode Changes, and Fault Tolerant Scheduling.

**UNIT III REAL-TIME DATABASES AND COMMUNICATION 9**

Introduction – Main Memory Databases – Transaction Priorities – Concurrency Control Issues – Disk Scheduling Algorithms – Databases for Hard Real-Time Systems – Fault-Tolerant Routing

**UNIT IV FAULT-TOLERANCE TECHNIQUES 9**

Fault Types – Temporal Behavior Classification, Output Behavior Classification, Independence and Correlation - Fault Detection – Fault and Error Containment – Redundancy – Hardware, Software, Time, Information - Data Diversity – Reversal Checks – Integrated Failure Handling

**UNIT V EMBEDDED/REAL-TIME OPERATING SYSTEMS 9**

RS232/UART – RS422/RS485 – US – Infrared – IEEE 1394 Firewire – Ethernet – Bluetooth – Architecture of Kernel – ISR – Semaphores – Mutex – Mailboxes – Message Queues – Event Registers – Pipes – Signals – Timers – Memory Management – Priority Inversion Problem – Off-the-shelf Operating Systems – Embedded OS – Real-Time OS – Handheld OS – Target Image Creation – Representative Embedded Systems.

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

1. C.M. Krishna, Kang G. Shin, "Real-Time Systems", McGraw Hill International Editions, 1997. (Unit 2,3,4)
2. Dr. K.V.K.K. Prasad, "Embedded/Real-Time Systems: Concepts, Design and Programming", Dreamtech Press, 2008. (Unit 1,5)



## REFERENCES:

1. Andrew N Sloss, D. Symes, C. Wright, " Arm system developers guide", Morgan Kauffman/ Elsevier, 2006.
2. Michael J. Pont, "Embedded C", Pearson Education, 2007.
3. Stuart Bennett, "Real Time Computer Control-An Introduction", Second edition, Prentice Hall PTR, 1994.
4. Peter D. Lawrence, "Real time Micro Computer System Design – An Introduction", McGraw Hill, 1988.
5. S.T. Allworth and R.N. Zobel, "Introduction to real time software design", Macmillan, II Edition, 1987.

**PTCS8019**

**SOFTWARE QUALITY AND TESTING**

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

## OBJECTIVE

Gives an understanding of basics of Software Quality. Functional testing, Control Flow based testing, Data Flow based and Mutation testing, Software Reliability, and formal verification of programs.

### **UNIT I INTRODUCTION TO SOFTWARE QUALITY 8**

Ethical Basis for Software Quality – Total Quality Management Principles – Software Processes and Methodologies – Quality Standards, Practices & Conventions – Improving Quality with Methodologies – Structured/Information Engineering – Measuring Customer Satisfaction– Software Quality Engineering – Defining Quality Requirements – Management Issues for Software Quality – Data Quality Control – Benchmarking and Certification.

### **UNIT II SOFTWARE QUALITY METRICS AND RELIABILITY 9**

Writing Software Requirements and Design Specifications – Analyzing Software Documents using Inspections and Walkthroughs – Software Metrics – Lines of code, Cyclomatic Complexity, Function Points, Feature Points – Software Cost Estimation– Reliability Models – Reliability Growth Models – OO Metrics.

### **UNIT III TEST CASE DESIGN 11**

Testing as an Engineering Activity – Testing Fundamentals – Defects – Strategies and Methods for Black Box Test Case Design – Strategies and Methods for White-Box Test Case design – Test Adequacy Criteria – Evaluating Test Adequacy Criteria – Levels of Testing and different types of testing – OO Testing.

### **UNIT IV TEST MANAGEMENT 9**

Testing and Debugging Goals and Policies – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – Reporting Test Results – The role of three groups in Test Planning and Policy Development – Process and the Engineering Disciplines – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

### **UNIT V CONTROLLING AND MONITORING 8**

Measurement and Milestones for Controlling and Monitoring – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of reviews – Developing a review program – Components of Review Plans – Reporting review results.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Ilene Burnstein, "Practical Software Testing", Springer International Edition, Chennai, 2003.
2. Stephen Kan, "Metrics and Models in Software Quality", Addison-Wesley, Second Edition, 2004.

**REFERENCES:**

1. Milind Limaye, "Software Quality Assurance", McGraw Hill, 2011.
2. M G Limaye, "Software Testing – Principles, Techniques and Tools", McGraw Hill, 2011.
3. Edward Kit, "Software Testing in the Real World – Improving the Process", Pearson Education, New Delhi, 1995.
4. Elfriede Dustin, "Effective Software Testing", Pearson Education, New Delhi, 2003.
5. Renu Rajani and Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, New Delhi, 2003.
6. Yogesh Singh, "Software Testing" Cambridge University Press India, 2012.

**PTCS8020****SYSTEM MODELING AND SIMULATION****L T P C  
3 0 0 3****OBJECTIVE**

To understand the system, specify systems using natural models of computation, modeling techniques, prediction of behavior, and decision support.

**UNIT I INTRODUCTION TO SIMULATION 9**

Introduction – Simulation Terminologies- Application areas – Model Classification Types of Simulation- Steps in a Simulation study- Concepts in Discrete Event Simulation Example.

**UNIT II MATHEMATICAL MODELS 9**

Statistical Models - Concepts – Discrete Distribution- Continuous Distribution – Poisson Process- Empirical Distributions- Queueing Models – Characteristics- Notation Queueing Systems – Markovian Models- Properties of random numbers- Generation of Pseudo Random numbers- Techniques for generating random numbers-Testing random number generators- Generating Random-Variates- Inverse Transform technique Acceptance- Rejection technique – Composition & Convolution Method.

**UNIT III ANALYSIS OF SIMULATION DATA 9**

Input Modeling - Data collection - Assessing sample independence – Hypothesizing distribution family with data - Parameter Estimation - Goodness-of-fit tests – Selecting input models in absence of data- Output analysis for a Single system – Terminating Simulations – Steady state simulations.

**UNIT IV VERIFICATION AND VALIDATION 9**

Building – Verification of Simulation Models – Calibration and Validation of Models – Validation of Model Assumptions – Validating Input – Output Transformations.

**UNIT V SIMULATION OF COMPUTER SYSTEMS AND CASE STUDIES**

**9**

Simulation Tools – Model Input – High level computer system simulation – CPU – Memory Simulation – Comparison of systems via simulation – Simulation Programming techniques - Development of Simulation models.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Jerry Banks and John Carson, “Discrete Event System Simulation”, Fourth Edition, PHI, 2005.
2. Geoffrey Gordon, “System Simulation”, Second Edition, PHI, 2006.

**REFERENCES:**

1. Frank L. Severance, “ System Modeling and Simulation”, Wiley, 2001.
2. Averill M. Law and W.David Kelton, “Simulation Modeling and Analysis, Third Edition, McGraw Hill, 2006.
3. Jerry Banks, “Handbook of Simulation: Principles, Methodology, Advances, Applications and Practice”, Wiley-Interscience, 1 edition, 1998.

**PTCS8071**

**CYBER FORENSICS  
(Common to CSE & IT branches)**

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

**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 McGraw Hill, 2004

**PTCS8072****GAME PROGRAMMING**  
**(Common to CSE & IT branches)****L T P C**  
**3 0 0 3****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.

**UNIT I            3D GRAPHICS FOR GAME PROGRAMMING            9**

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

**UNIT II            GAME DESIGN PRINCIPLES            9**

Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI, Path Finding

**UNIT III            GAMING ENGINE DESIGN            9**

Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics

**UNIT IV            GAMING PLATFORMS AND FRAMEWORKS            9**

Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DXStudio, Unity

**UNIT V            GAME DEVELOPMENT            9**

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 McShaffrfy, "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.

**PTCS8073**

**SEMANTIC WEB**  
**(Common to CSE & IT branches)**

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

### 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 Truskowski, 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.

**PTCS8074 SOFTWARE AGENTS L T P C**  
**3 0 0 3**

**OBJECTIVE**

Understand the how software agents reduce information overhead, gain knowledge in use of software agents for cooperative learning and personal assistance, to know how agent can communicate and share knowledge using agent communication language, gain knowledge in design of an agent interpreter and intelligent agent, and understand the concept of mobile technology and mobile agents and its security.

**UNIT I AGENT AND USER EXPERIENCE 9**  
Agent characteristics- object Vs agent. Agent types- Interacting with Agents - Agent From Direct Manipulation to Delegation - Interface Agent, Metaphor with Character – Designing Agents –problem solving agent, rational agent. Direct Manipulation versus Agent Path to Predictable

**UNIT II AGENTS FOR LEARNING AND ASSISTANCE 9**

Agents for Information Sharing and Coordination - Agents that Reduce Work Information Overhead - Agents without Programming Language - Life like Computer character - S/W Agents for cooperative Learning – Multiple Reasoning agents –M system. Learning agents: computational architectures for learning agents; evolution, adaptation; multi-agent learning.

**UNIT III AGENT COMMUNICATION AND COLLABORATION 9**

Overview of Agent Oriented Programming - Agent Communication Language – KQML-Performatives. Agent Based Framework of Interoperability. Virtual agents: agents in games and virtual environments; companion and coaching agents; modeling personality, emotions; multimodal interaction; verbal and non-verbal expressiveness.

**UNIT IV AGENT ARCHITECTURE 9**

Strategies for agent design. Agent interpreter- BDI architecture. Architecture of Intelligent Agents. Agents for Information Gathering - Open Agent Architecture - Communicative Action for Artificial Agent. Agent societies and societal issues.

**UNIT V MOBILE AGENTS 9**

Mobile agent paradigm - Mobile agent concepts - -Mobile agent technology – programming mobile agents –application of mobile agents- Teleshopping. Mobile agent security- trust, reliability and reputation.

**TOTAL: 45 PERIODS**

**TEXT BOOK:**

1. Jeffrey M. Bradshaw, " Software Agents ", MIT Press 2000, Pearson Indian Reprint 2010.

**REFERENCES:**

1. Lin, Fuhua Oscar (Ed.), "Designing Distributed Learning Environments with Intelligent Software Agents", Information Science Publishing, 2004
2. Russel & Norvig, " Artificial Intelligence: A Modern Approach ", Pearson Education', 2nd Edition, 2003.
3. Murch Richard, Johnson Tony 'Intelligent Software Agents, 'Prentice Hall, 2000.
4. Joseph P. Bigus & Jennifer Bigus, "Constructing Intelligent agents with Java: A Programmer's Guide to Smarter Applications ", Wiley, 1997.
5. Knapik, Michael and Jay Johnson 'Developing Intelligent Agents for Distributed Systems: Exploring Architecture, Technologies, and Applications', McGraw-Hill. 1998
6. William R. Cockayne, Michael Zyda, "Mobile Agents", Prentice Hall, 1998

**PTCS8075**

**UNIX INTERNALS  
(Common to CSE & IT branches)**

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

**OBJECTIVE**

To provide knowledge about the Unix operating system, its working principles, its file system and programming for interprocess communication. It also gives an understanding about 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 File systems: Evolution, Design and Implementation", Wiley Publishing Inc., 2003.

**PTGE8551 ENGINEERING ETHICS AND HUMAN VALUES L T P C**  
**(Common to CSE, ECE, EEE, Industrial, Textile, Printing, Auto, 3 0 0 3**  
**Mechanical & Civil branches)**

**OBJECTIVE:**

The course explains various moral issues through predominant theories. It educates the code of ethics as well as the industry standards and how they can be used for ensuring safety and reducing the risk. The course enunciated the Rights and Responsibilities of individuals. Various other ethical global issues also have been explained along with case studies.



<b>UNIT I</b>	<b>HUMAN VALUES</b>	<b>10</b>
Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality.		
<b>UNIT II</b>	<b>ENGINEERING ETHICS</b>	<b>9</b>
Senses of ‘Engineering Ethics’ – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories		
<b>UNIT III</b>	<b>ENGINEERING AS SOCIAL EXPERIMENTATION</b>	<b>9</b>
Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study		
<b>UNIT IV</b>	<b>SAFETY, RESPONSIBILITIES AND RIGHTS</b>	<b>9</b>
Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – The Three Mile Island and Chernobyl Case Studies Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination		
<b>UNIT V</b>	<b>GLOBAL ISSUES</b>	<b>8</b>
Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample Code of Conduct		

**TEXTBOOK:**

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.

**REFERENCES:**

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Wadsworth, A Division of Thomson Learning Inc., United States, 2000
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001

**WEB SOURCES:**

1. [www.onlineethics.org](http://www.onlineethics.org)
2. [www.nspe.org](http://www.nspe.org)
3. [www.globalethics.org](http://www.globalethics.org)
4. [www.ethics.org](http://www.ethics.org)

**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.

**REFERENCE BOOKS:**

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 – userfreeness 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

**TEXT BOOK:**

1. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, Linux in a nutshell, Sixth edition, O'Reilly media, September 2009.

**REFERENCE BOOKS:**

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
8. Application
9. Development,
10. Havoc
11. Pennington.
12. URL:
13. <http://developer.gnome.org/doc/GGAD>
14. Python Tutorial, Guido van Rossum, Fred L. Drake, Jr., Editor. URL:
15. <http://www.python.org/doc/current/tut/tut.html>
16. Doug Abbot, Linux for Embedded and Embedded and Real time applications , Newnes
17. Case study SAMBA: URL : <http://www.samba.org/>
18. Case study., Libre office: <http://www.libreoffice.org/>
19. Case study, ORCA: <http://live.gnome.org/Orca>

**OBJECTIVES:**

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

- Understand the internals of the TCP/IP protocols
- Understand how TCP/IP is actually implemented
- Understand the interaction among the protocols in a protocol stack
- 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 FUNDAMENTALS 9**

Internetworking concepts - IP and datagram forwarding - TCP services - Interactive data flow - Timeout and retransmission - Bulk data flow - Persist timer – Keep-alive timer

**UNIT II ARP AND IP 9**

Structure of TCP/IP in OS - Data structures for ARP - Cache design and management - IP software design and organization - Sending a datagram to IP

**UNIT III IP ROUTING IMPLEMENTATION 9**

Routing table - Routing algorithms - Fragmentation and reassembly - Error processing (ICMP) - Multicast Processing (IGMP)

**UNIT IV TCP I/O PROCESSING AND FSM 9**

Data structure and input processing - Transmission control blocks - Segment format - Comparison - Finite state machine implementation - Output processing - Mutual exclusion - Computing TCP data length

**UNIT V TCP TIMER AND FLOW CONTROL 9**

Timers - Events and messages - Timer process - Deleting and inserting timer event - Flow control and adaptive retransmission - Congestion avoidance and control - Urgent data processing and push function

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. Douglas E. Comer, "Internetworking with TCP/IP Principles, Protocols and Architecture", Vol. 1 Fifth edition, Pearson Education Asia, 2006.
2. Douglas E. Comer, "Internetworking with TCP/IP - Design, Implementation and Internals", Vol. 2 Third edition, Pearson Education Asia, 1999.

**REFERENCE:**

1. W.Richard Stevens, "TCP/IP illustrated-The Protocols", Volume 1, Pearson Education, 2003.

**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.