ANNA UNIVERSITY, CHENNAI 600 025

UNIVERSITY DEPARTMENTS

REGULATIONS - 2013

MASTER OF COMPUTER APPLICATIONS (M.C.A.)

SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	CA8101	Computer Organization and Design	3	0	0	3
2.	CA8102	Database Management Systems	3	0	0	3
3.	CA8103	Problem Solving and C Programming	3	0	0	3
4.	CA8104	Software Engineering	3	0	0	3
5.	MA8151	Mathematical Foundations of Computer Science	3	1	0	4
PRACTICAL						
6.	CA8111	Database Management Systems Laboratory	0	0	3	2
7.	CA8112	Programming Laboratory (Unix Platform)	0	0	3	2
		TOTAL	**15**	**1**	**6**	**20**

SEMESTER II

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	CA8201	Computer Communication and Networks	3	1	0	4
2.	CA8202	Data Structures and Algorithms	3	0	0	3
3.	CA8203	Embedded Systems	3	0	0	3
4.	CA8204	Object Oriented Paradigm and Programming	3	0	0	3
5.	CA8205	Operating System Concepts	3	0	0	3
PRACTICAL						
6	CA8211	Data Structures and Algorithms Laboratory	0	0	3	2
7	CA8212	OS and Network Laboratory	0	0	3	2
		TOTAL	**15**	**1**	**6**	**20**

SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	CA8301	Data Mining and Analytics	3	0	0	3
2.	CA8302	Object Oriented System Design	3	0	0	3
3.	CA8303	Open Technologies	3	1	0	4
4.	CA8304	Web Programming	3	0	0	3
5.		Elective I	3	0	0	3
PRACTICAL						
6.	CA8311	Case Tools Laboratory	0	0	3	2
7.	CA8312	Web Programming Laboratory	0	0	3	2
		TOTAL	**15**	**1**	**6**	**20**

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CA8401	Advanced Java Programming	3	1	0	4
3	CA8402	Mobile Application Development	3	0	0	3
2	CA8403	Security Practices	3	0	0	3
4		Elective II	3	0	0	3
5		Elective III	3	0	0	3
PRACTICAL						
6	CA8411	Advanced Java Programming Laboratory	0	0	3	2
7	CA8412	Mobile Application Development Laboratory	0	0	3	2
		TOTAL	**15**	**1**	**6**	**20**

SEMESTER V

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	CA8501	Cloud Computing	3	0	0	3
2.	CA8502	Service Oriented Architecture	3	1	0	4
3.	CA8503	Software Testing	3	0	0	3
4.		Elective – IV	3	0	0	3
5.		Elective – V	3	0	0	3
PRACTICAL						
6.	CA8511	Cloud Laboratory	0	0	3	2
7.	CA8512	Software Testing Laboratory	0	0	3	2
		TOTAL	**15**	**1**	**6**	**20**

SEMESTER VI (0+1)

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICALS						
1	CA8611	Project Work	0	0	24	12
		TOTAL	**0**	**0**	**24**	**12**

TOTAL NO.OF CREDITS: 112

LIST OF ELECTIVES

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
1.	CA8001	Bio Metrices	3	0	0	3
2.	CA8002	Cryptography and Network Security	3	0	0	3
3.	CA8003	Customer Relationship Management	3	0	0	3
4.	CA8004	Data Warehousing and Data Mining	3	0	0	3
5.	CA8005	Database Tuning	3	0	0	3
6.	CA8006	Digital Image Processing	3	0	0	3
7.	CA8007	Distributed Systems	3	0	0	3
8.	CA8008	E – Learning Techniques	3	0	0	3
9.	CA8009	Enterprise Resource Planning	3	0	0	3
10.	CA8010	Financial Management	3	0	0	3
11.	CA8011	Game Programming	3	0	0	3
12.	CA8012	Geographical Information Systems	3	0	0	3
13.	CA8013	Grid Computing	3	0	0	3
14.	CA8014	Healthcare Information Systems	3	0	0	3
15.	CA8015	High Speed Networks	3	0	0	3
16.	CA8016	Human Resources Management	3	0	0	3
17.	CA8017	M-Commerce	3	0	0	3
18.	CA8018	Operation Research	3	0	0	3
19.	CA8019	Professional Practices	3	0	0	3
20.	CA8020	Real Time Systems	3	0	0	3
21.	CA8021	Software Quality Management	3	0	0	3
22.	CA8022	Software Reliability and Metrics	3	0	0	3
23.	CA8023	TCP/IP Design and Implementation	3	0	0	3
24.	CA8024	UNIX Internals	3	0	0	3
25.	CA8025	User Interface Design	3	0	0	3
26.	CA8026	Virtualization Techniques	3	0	0	3
27.	CA8027	Visualisation Techniques	3	0	0	3
28.	CA8028	XML and Web Services	3	0	0	3

CA8101 COMPUTER ORGANIZATION AND DESIGN L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the fundamentals of Boolean logic and functions.
- To have a thorough understanding of the basic structure and operation of a digital computer.
- To design and realize digital systems with basic gates and other components using combinational and sequential circuits.
- To discuss in detail about the operation of the arithmetic and logic unit.
- To study the instruction sets and operation of a processor.
- To study the different ways of communication with I/O devices and standard I/O Interfaces.
- To study the hierarchical memory system including cache memories and virtual memory.

UNIT I DIGITAL FUNDAMENTALS 9

Digital systems - Binary numbers – Octal - Hexadecimal conversions - Signed binary numbers – Complements - Logic gates - Boolean algebra- K-maps-Standard forms - NAND-NOR implementation.

UNIT II COMBINATIONAL AND SEQUENTIAL CIRCUITS 9

Combinational circuits - Adder- Subtractor - ALU design – Decoder - Encoder – Multiplexers - Sequential circuits – Latches - Flip-flops – Registers – Memories – Up-down Counters.

UNIT III PROCESSOR FUNDAMENTALS 9

Von-Neumann architecture- Processor – Definition – Structure – Category – Technology - ALU concept - Stored programs - Fetch execute cycle - Instruction formats - Clock rate instruction rate – Pipeline - Current processors - Multi core processors.

UNIT IV MEMORY 9

Physical memory – Addressing - Virtual memory - Address translation – Paging – Cache - L1-L2-L3 cache memories - Cache mapping - LRU replacement.

UNIT V I/O DATA TRANSFER 9

Data transfer - Serial and Parallel data transfer - Full duplex - Half duplex interaction - Bus interface - Programmed I/O – Polling - Interrupt driven I/O - Hardware interrupt mechanism - Interrupt vectors - Multi level of interrupts – DMA - Buffer chaining - Operation chaining.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Master the binary and hexadecimal number systems including computer arithmetic.
- Design and implement digital systems with basic gates and other components using combinational and sequential circuits.
- Familiarize the Von Neumann architecture.
- Familiarize the functional units of the processor and addressing modes, instruction sets.
- Familiarize the memories and cache subsystem.
- Familiarize the different ways of communication with I/O devices and standard I/O interfaces.

REFERENCES:

1. Marris Mano, “Digital design”, Fourth edition, PHI/Pearson, 2006.
2. Douglas E.Comer, “Essentials of Computer Architecture”, Sixth Edition, Pearson Education, 2012.

3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, “Computer Organization”, Fifth Edition, Tata McGraw Hill , 2002.
4. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Seventh Edition, Pearson Education, 2006.
5. David A Patterson and John L. Hennessy, “Computer Organization and Design, The Hardware/Software Interface”, Third Edition, Morgan Kaufmann / Elsevier, 2005.

CA8102 DATABASE MANAGEMENT SYSTEMS L T P C
3 0 0 3

COURSE OBJECTIVES

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

UNIT I RELATIONAL DATABASES 9

Purpose of Database System – Views of data – Data Models – Database System Architecture – Entity Relationship model – E-R Diagrams - Introduction to relational databases - The relational Model – Keys - Relational Algebra – Relational Calculus – SQL fundamentals - Advanced SQL features – Embedded SQL – Dynamic SQL.

UNIT II DATABASE DESIGN 9

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First – Second - Third Normal Forms - Dependency Preservation – Boyce/Codd Normal Form - Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT III TRANSACTIONS 9

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

UNIT IV IMPLEMENTATION TECHNIQUES 9

Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary storage – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Catalog Information for Cost Estimation.

UNIT V ADVANCED TOPICS 9

Distributed Databases – Architecture - Transaction Processing - Data Warehousing and Mining – Classification - Association rules – Clustering - Information Retrieval - Relevance ranking - Crawling and Indexing the Web - Object Oriented Databases - XML Databases.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Design and create tables in database and query them.

- Know how transaction processing is done.
- Compare different types of databases.

REFERENCES:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2011
2. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
3. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson, 2008.
4. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, Tata McGraw Hill, 2010.
5. G.K.Gupta,”Database Management Systems”, Tata McGraw Hill, 2011.

CA8103 PROBLEM SOLVING AND C PROGRAMMING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the various problem solving techniques.
- To be aware of the top down design technique.
- To learn the syntax of C.
- To get exposed to the file processing techniques of C.
- To get familiarized with the preprocessor directives.

UNIT I PROBLEM SOLVING 9

Introduction – The Problem–Solving Aspect – Top-Down Design – Implementation of Algorithms – Program Verification – The Efficiency of Algorithms – The Analysis of Algorithms.

UNIT II BASICS OF C PROGRAMMING 9

Introduction to C Programming Environment – History of C – C Standard Library – Basics of C Program Development Environment - Introduction to C Programming - A simple C Program – Memory Concepts – Arithmetic – Decision Making – Relational Operators – Assignment – Increment and Decrement Operators - Structured Program Development – Algorithms – Pseudocode- Control Structures – if and if/else Selection Structure.

UNIT III REPETITION CONTROL STRUCTURES, FUNCTIONS AND ARRAYS 9

Essentials of Repetition – The while and do/while Repetition Structure - Counter -Controlled Repetition – for – Multiple Selection - switch – break – continue – Logical Operators - Functions-Definitions - Prototypes – Header Files – Storage Classes – Scope Rules - Recursion- Comparing Iteration and Recursion - Arrays – Declaration – Usage – Passing Arrays to Functions.

UNIT IV POINTERS, STRINGS AND AGGREGATE DATA TYPES 9

Pointer Variable Declarations and Initialization – Operators – Uses - Pointer Expressions and Pointer Arithmetic – Relationship between Pointers and Arrays – Arrays of Pointers – Pointers to Functions - Fundamentals of Strings and Characters – Character Handling Library - String Handling Library. Structures- Definition – Initialization – Unions – Bitwise Operators – Enumeration Constants.

UNIT V STREAMS, FILES AND PREPROCESSOR 9

Streams – Formatting Output with printf –- Formatting Input with scanf - Files – Sequential-Access Files - Creation – Reading – Random-Access Files – Creation – Reading - C Preprocessor – Introduction - #include - #define – Symbolic Constants – Macros - Conditional Compilation - #error - #pragma – Operators # and ## - Line Numbers – Predefined Symbolic Constants.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Design and implement C programs for any given problem.
- Work with existing programs and modify it as per the requirements.
- Identify the errors in a C program.
- Identify the output of a C program without actually executing it.

REFERENCES:

1. R.G.Dromey, “How to Solve it by Computer”, Pearson Education, 2007.
2. H. M. Deitel and P. J. Deitel, ”C How to Program”, 7th Edition, Pearson Education, 2013.
3. Pradip Dey, Manas Ghosh, “Programming in C”, Oxford University Press, 2007.
4. Cormen,Leiserson, Rivest, Stein, “ Introduction to Algorithms”, McGraw Hill Publishers, 2002.
5. Kernigan Brian W., and Dennis M. Ritchie, “ The C Programming Language”, Second Edition, Prentice Hall, 1988.

CA8104 SOFTWARE ENGINEERING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To provide information about wider engineering issues that form the background to develop complex, evolving (software-intensive) systems.
- To plan a software engineering process to account for quality issues and non-functional requirements.
- To employ a selection of concepts and techniques to complete a small-scale analysis and design in mini projects.
- To impart knowledge to translate requirement specifications into a design, and then realize that design practically, all using an appropriate software engineering methodology.
- To provide basic knowledge about software project management.

UNIT I INTRODUCTION 9

Software Engineering – Product and process – process models - Waterfall Life cycle model – Spiral Model – Prototype Model – fourth Generation Techniques – Agile methods.

UNIT II REQUIREMENT ANALYSIS 9

Software Requirements Analysis and Specification – Software Requirements – Problem Analysis – Requirements Specification – Validation – Metrics – Summary.

UNIT III SOFTWARE DESIGN 9

Abstraction – Modularity – Software Architecture – Cohesion – Coupling – Various Design Concepts and notations – Real time and Distributed System Design – Documentation – Dataflow Oriented design – Designing for reuse – Programming standards.

UNIT IV SOFTWARE TESTING 9

Coding – Programming Practice – Top-down and Bottom-up - structured programming – Information Hiding – Programming style – Internal Documentation Verification – Code Reading – Static Analysis – Symbolic Execution – Code Inspection or Reviews – Unit Testing – Fundamentals – Functional Testing versus structural Testing Coding.

UNIT V SOFTWARE MAINTENANCE AND SOFTWARE METRICS 9

Need for Software maintenance – Maintenance models - SCM – Version Control – SCM process – Software Configuration Items – Taxonomy – Basics of Case tools - Scope of Software Metrics – Classification of metrics – Measuring Process and Product attributes – Direct and Indirect measures – Reliability – Software Quality Assurance – Standards.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

- Familiarize the basic concepts of Software design and implementation.
- Perform software testing on various applications.
- Apply various software metrics on software quality products.

REFERENCES:

1. Pankaj Jalote, "An Integrated Approach to Software Engineering", Third Edition, Narosa publications, 2011.
2. Ian Sommerville, "Software engineering", Ninth Edition, Pearson Education Asia, 2010.
3. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Seventh Edition, Tata McGraw-Hill International Edition, 2009.

MA8151 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE L T P C
3 1 0 4

COURSE OBJECTIVES:

To introduce mathematical logic, combinatorial and counting techniques, Algebraic structures, Finite state system and grammar as Mathematical Foundation of computer Science so as to understand algorithms, computability and other theoretical aspects of Computer science.

UNIT I LOGIC 9+3

Statements - Connectives - Truth Tables - Normal Forms - Predicate Calculus – Inference -Theory for Statement Calculus**.**

UNIT II COMBINATORICS 9+3

Permutations and Combinations - Mathematical Induction - Pigeonhole principle - Principle of Inclusion and Exclusion - Recurrence relations - Solution by generating functions and characteristics equations.

UNIT III ALGEBRAIC STRUCTURES 9+3

Groups - Cyclic group - Permutation group (Sn and Dn) - Substructures - Homomorphism - Cosets and Lagrange's Theorem - Normal Subgroups - Rings and Fields (definition and examples).

UNIT IV LATTICES 9+3

Partial order relation – Posets - Hasse diagram - Lattices - Special Lattices - Boolean Algebra.

UNIT V FINITE STATE AUTOMATA AND GRAMMARS 9+3

Finite state automata - Deterministic and non-deterministic model - languages accepted by Finite State Automata - Regular expressions - Context-free grammars - Derivation trees.

L: 45 +T: 15 TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- Understand mathematical logic and develop analytical solutions for logical problems and they will be equipped with counting techniques to solve combinatorial problems.
- Comprehend the algebraic structure and formal languages with their applications to handle abstract generalizations and computability.

REFERENCES:

1. Trembley.J.P. and Manohar R., "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw – Hill Publishing Company Limited, New Delhi. Reprinted in 2007.
2. Grimaldi R.P. and Ramana B.V., "Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education, Reprinted in 2006.
3. Hopcroft J.E. and Ullman J.D., "Introduction to Automata, Languages and Computation**",** Narosa Publishing House, 1987.

CA8111	**DATABASE MANAGEMENT SYSTEMS LABORATORY**	**L T P C**
		0 0 3 2

COURSE OBJECTIVES:

- To understand the concepts of DBMS.
- To familiarize with SQL queries.
- To write stored procedures in DBMS.
- To learn front end tools to integrate with databases.

EXPERIMENTS IN THE FOLLOWING TOPICS:

1. Data Definition - Manipulation of Tables and Views.
2. Database Querying – Simple queries - Nested queries - Sub queries and Joins.
3. Triggers.
4. Transaction Control.
5. Embedded SQL.
6. Database Connectivity with Front End Tools.
7. Front End Tools / Programming Languages.
8. High level language extensions - PL/SQL Basics.
9. Procedures and Functions.
10. Database Design and Implementation (Case Study).

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Design and Implement databases.
- Formulate complex queries using SQL.
- Design and Implement applications that have GUI and access databases for backend connectivity.

CA8112 PROGRAMMING LABORATORY (Unix Platform) **L T P C**
0 0 3 2

COURSE OBJECTIVES:

- To learn the syntax of C.
- To be exposed to the file processing techniques of C.
- To be familiarized with the preprocessor directives.

The following experiments should be practiced

1. Non-iterative control structures.
2. Iterative control structures and arrays.
3. Functions with parameters.
4. Functions with arrays - structures as arguments.
5. Character and String Handling Libraries.
6. Files – Sequential access and random access.
7. Preprocessor directives for other features like macros - conditional compilation.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Design and implement C programs for any given problem.
- Work with existing programs and modify it as per the requirements.
- Identify the errors in a C program.
- Identify the output of a C program without actually executing it.

CA8201 COMPUTER COMMUNICATIONS AND NETWORKS **L T P C**
3 1 0 4

COURSE OBJECTIVES:

- To understand data communication techniques.
- To know Network Fundamentals.
- To understand Network layers and its functionalities.

UNIT I INTRODUCTION **12**

Communication model – Data communications and Networking – Data transmission concepts and terminology – Transmission media – Data Encoding Techniques – Digital Data communication Techniques - Data link Control Protocols.

UNIT II NETWORK FUNDAMENTALS **12**

Protocol architecture – OSI – TCP/IP – LAN Architecture – Topologies – MAC – Ethernet - Fast Ethernet - Token ring – FDDI - Wireless LANS - 802.11- Wi-Fi – Bluetooth -WiMAX.

UNIT III NETWORK LAYER **12**

Network layer functions – Switching concepts – Circuit switching networks – Packet Switching – Routing – Internetworking concepts – IP – Unreliable connectionless delivery – Datagrams – Routing IP datagrams – ICMP.

UNIT IV TRANSPORT LAYER **12**

Transport layer functions – User Datagram Protocol – Transmission Control Protocol – Reliable Delivery Service – Connection Establishment – Flow Control – Congestion Control – Queuing disciplines – Congestion Avoidance.

UNIT V APPLICATIONS 12

Domain Name System(DNS) – Telnet – rlogin – FTP – SMTP – MIME – IMAP – HTTP – SNMP – Security.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- Trace the flow of information from one node to another node in the network.
- Identify the components required to build different types of networks.
- Work with the division of network functionalities into layers.
- Identify solution for each functionality at each layer.
- Choose the required functionality at each layer for given application.

REFERENCES:

1. Larry L. Peterson and Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2012.
2. William Stallings, “Data and Computer Communications”, Ninth Edition, PHI, 2004.
3. James F. Kurose, Keith W. Ross, “Computer Networking: A Top-Down Approach”, Sixth Edition, Addison-Wesley, 2008.

CA8202 DATA STRUCTURES AND ALGORITHMS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To gain comprehensive introduction of common data structures, and algorithm design and analysis.
- To master the design of tree, sets and graph structures and its applications.
- To learn about sorting techniques and understand how common computational problems can be solved efficiently on a computer.

UNIT I BASIC DATA STRUCTURES 9

From Problems to programs - Abstract Data Types - Data Types - Data Structures - and Abstract Data Types - The Running Time of a program - Calculating the Running Time of a program - Good Programming Practice- Basic Data Types - List - Implementation of Lists – Stacks – Queues – Mappings - Stacks and Recursive Procedures.

UNIT II TREES & SETS 9

Trees - Basic Terminology - The ADT Tree - Implementation of Trees - Binary Trees - Basic operations on sets - Introduction to Sets - An ADT with Union – Intersection - and Difference - A Bit-Vector Implementation of Sets - Advanced Set Representation Methods - Binary Search Trees - Time Analysis of Binary Search Tree operations – Tries - Balanced Tree Implementations.

UNIT III GRAPHS 9

Directed Graphs - Basic Definitions - Representations of Directed Graphs - The Single-Source Shortest Paths Problem - The All-Pairs Shortest Path Problem - Traversals of Directed Graphs - Directed Acyclic Graphs - Strong Components- Undirected Graphs - Definitions - Minimum-Cost Spanning Trees – Traversals - Articulation Points and Biconnected Components - Graph Matching.

UNIT IV SORTING AND ALGORITHM ANALYSIS 9

Sorting - The Internal Sorting Model - Some Simple Sorting Schemes - Quick Sort - Heap Sort - Bin Sorting - A Lower Bound for Sorting by Comparisons - Order Statistics - Algorithm Analysis Techniques - Efficiency of Algorithms - Analysis of Recursive programs - Solving Recurrence Equations - A General Solution for a Large Class of recurrences.

UNIT V ALGORITHM DESIGN TECHNIQUES 9

Algorithm Design Techniques - Divide-and-Conquer Algorithms - Dynamic Programming - Greedy Algorithms – Backtracking - Local Search Algorithms.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Describe, explain, and use abstract data types including stacks, queues and lists.
- Design and Implement Tree data structures and Sets.
- Design algorithms using graph structure to solve real-life problems.
- Implement a variety of algorithms for sorting, including insertion sort, selection sort, merge sort, quick sort, and heap sort.
- Describe the asymptotic performance and algorithm design techniques studied in this course and understand the practical implications of that information.

REFERENCES:

1. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, Reprint 2006.
2. Robert Sedgewick and Kevin Wayne, “Algorithms”, Fourth Edition, Pearson Education.

CA8203 EMBEDDED SYSTEMS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the architecture of embedded processor, microcontroller and peripheral devices.
- To appreciate the nuance of programming micro controllers in assembly language for embedded systems.
- To understand challenges in Real time operating systems.
- To learn programming the embedded systems in high level languages such as C.

UNIT I INTRODUCTION TO EMBEDDED SYSTEM 9

Introduction to Embedded system - Microprocessor V/s Micro-controller - 8051 Microcontroller - General architecture - Instruction set and Assembly programs- Embedded C programs.

UNIT II MEMORY AND INTERFACE 9

Memory organization and interfacing - I/O devices and interfacing Counters and Timers - Serial data communication - Interrupts.

UNIT III INTERFACING PERIPHERALS 9

Interfacing LCD Display – Keypad Interfacing – Generation of Gate signals for Converters and Inverters – Motor Control – Controlling AC appliances –Measurement of frequency – Stand alone Data Acquisition System.

UNIT IV ADVANCED CONTROLLER AND PROCESSORS 9

Advanced Microcontrollers - PIC - ARM - ATOM processor - Architecture-Instruction set.

UNIT V DESIGNING AND DEVELOPMENT OF APPLICATIONS 9

Design methodologies and tools - designing hardware and software components - system analysis and architecture design - system integration – debugging - case studies

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Have the ability to understand architecture of embedded processors and microcontroller.
- Have the ability to use Assembly language to develop embedded software.
- Have the ability to use ANSI C to develop embedded software.
- Interface to peripherals, and have the knowledge of typical interfacing standards.
- Design and Develop the prototype of Embedded system (including interfacing to microcontroller, and control from software).

REFERENCES:

1 Muhammad Ali Mazidi, Janice Gillispie Mazidi., "The 8051 Microcontroller and Embedded systems", Second Edition, Pearson Education, 2008.
2 Lyla B.Das “Embedded systems an integrated approach”, Pearson Education, 2013.
3 Wayne wolf “Computers as components”, Second edition, Elsevier, 2011.
4 Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey, “PIC Microcontroller an Embedded Systems using Assembly and C for PIC18”, Pearson Education, 2008.
5 Andrew N Sloss, D. Symes, C. Wright, ” Arm system developers guide”, Morgann Kauffman / Elsevier, 2006.
6 Peter Bary Patrick Crowley “Modern Embedded computing”, Elsevier, 2012.

CA8204 OBJECT ORIENTED PARADIGM AND PROGRAMMING L T P C

3 0 0 3

COURSE OBJECTIVES:

- To understand the OO paradigm.
- To be aware of the OO design technique.
- To learn the syntax of C++.
- To be exposed to the file processing and exception handling techniques of C++.
- To be familiarized with the Standard Template Library.

UNIT I INTRODUCTION 9

Introduction - History and Use – Programming Paradigms – Standard Library – Types and Declaration – Pointers – Arrays - Structures – Expressions and Statements – Functions – Namespaces and Exceptions – Source Files and Programs.

UNIT II ABSTRACT DATA TYPES 9

Classes – Constructors – Destructors – Function Overloading - Operator Overloading – Conversions.

UNIT III GENERIC PROGRAMMING 9

Templates – Function Templates – Class Templates – Standard Template Library – Containers – Iterators – Function Objects – Allocators.

UNIT IV INHERITANCE 9

Derived Class – Virtual Functions –Polymorphism - Abstract Base Class – Multiple Inheritance.

UNIT V I/O AND EXCEPTION HANDLING 9

Streams - Ostream – Istream –Files –Throwing Exceptions – Try Blocks – Handlers- OOP using C++.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Design and implement C++ programs for any given problem.
- Understand an existing program and modify it as per the requirements.
- Identify the errors in a C++ program.
- Identify the output of a C++ program without actually executing it.
- Write generic programs using STL.

REFERENCES:

1. Ira Pohl, “Object-Oriented Programming using C++”, Second Edition, Pearson Education, 2003.
2. Bjarne Stroustrup, “The C++ Programming Language”, Third Edition, Addison Wesley, 1997.
3. Herbert Schildt, “C++: The Complete Reference”, Fourth Edition, McGraw Hill, 2002.

CA8205 OPERATING SYSTEM CONCEPTS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To Learn the Operating System basics.
- To Study the process management of Operating system.
- To Gain knowledge in storage management and I/O systems of Operating system.
- To Explore the case studies with various operating systems.

UNIT I OPERATING SYSTEMS OVERVIEW 9

Operating system – Types of Computer Systems - Computer-system operation – I/O structure – Hardware Protection - System components – System calls – System programs – System structure - Process concept – Process scheduling – Operations on processes – Cooperating processes – Interprocess communication – Communication in client-server systems - Multithreading models – Threading issues.

UNIT II PROCESS MANAGEMENT 10

Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation – Process Scheduling Models - The critical-section problem – Synchronization hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors - System model – Deadlock characterization – Methods for handling deadlocks – Recovery from deadlock.

UNIT III STORAGE MANAGEMENT 9

Memory Management – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging- Virtual Memory - Background – Demand paging – Process creation – 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.

UNIT V CASE STUDY 8

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 – Environmental subsystems – File system – Networking.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Discuss on the basics of OS.
- Familiarize the In depth knowledge in process management, memory management and I/O management of various operating systems.

REFERENCES:

1. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, “Operating System Concepts”, Ninth Edition, John Wiley and Sons Inc, 2012.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Addison Wesley, 2001.
3. Gary Nutt, “Operating Systems”, Second Edition, Addison Wesley, 2001.
4. H M Deital, P J Deital and D R Choffnes, “Operating Systems”, Pearson Education, 2004.

CA8211 DATA STRUCTURES AND ALGORITHMS LABORATORY L T P C
0 0 3 2

COURSE OBJECTIVES:

- To develop skills in design and implementation of data structures and their applications.
- To learn and implement linear, non linear and tree data structures.
- To learn Set ADT and Graph data structures and its applications.
- To study, implement and analyze the different sorting techniques.

The following experiments should be practiced

1. Abstract Data type Implementation of List - Stack and Queues.
2. Tree ADT.
3. Tries Implementation.
4. Set ADT- Bit Vector Implementation.
5. Graph Representations.
6. Graph Traversals.
7. Shortest Path Implementation.
8. Spanning Tree Implementation.
9. Sorting Algorithms.
10. Implementation of Algorithms using Dynamic Programming - Backtracking.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Work with basic data structures that are suitable for the problems to be solved efficiently.
- Design and implement linear, tree, and graph structures and its applications.
- Design various sorting techniques, its algorithm design and analysis.

CA8212 OS AND NETWORKING LABORATORY L T P C
0 0 3 2

OBJECTIVES:

- To know about various Process scheduling algorithms
- To realize the differences between OS and Distributed OS
- To learn Socket programming
- To study about Networking Tools

EXPERIMENTS:

1. Implementation of Process scheduling algorithms.
2. Simulation of Deadlock detection, prevention and recovery process.
3. Implementation of Memory management Algorithms.
4. Implementation of Disk management algorithms.
5. Implementation of Distributed OS Resource Scheduling algorithms
6. Two-Phase Commit Protocol in Distributed OS.
7. Client-server programming
8. Socket programming (TCP/UDP)
9. Network analyser
10. Traffic Analysis
11. Protocol Analysis
12. Study of Software Defined Networking tools

TOTAL:45 PERIODS

OUTCOMES:

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

- Implement process scheduling and deadlock detection, prevention algorithms
- Write programs for distributed process management.
- Write Socket programs with TCP/UDP
- Develop networking applications

CA8301 DATA MINING AND ANALYTICS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand data mining principles and techniques.
- To expose the students to the concepts of Big Data.
- To understand various data analysis tasks.

UNIT I DATA PREPROCESSING & ASSOCIATION RULE MINING 9

Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-Based Association Mining.

UNIT II CLASSIFICATION & PREDICTION 10

Classification vs Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT III CLUSTERING 10

Cluster Analysis - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

UNIT I V INTRODUCTION TO BIG DATA 8

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

UNIT V DATA ANALYSIS 12

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Perform Classification and Clustering of data.
- Mine Big data by applying various mining techniques.
- Analyze data using various Modeling techniques.

REFERENCES:

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier, Reprinted 2008**.**
3. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
4. Pete Warden, “Big Data Glossary”, O’Reilly, 2011.

CA8302 OBJECT ORIENTED SYSTEM DESIGN L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the basics of Object Oriented SDLC.
- To learn UML models and tools.
- To apply Design patterns on various applications.

UNIT I INTRODUCTION 10

Introduction to System Concepts - Managing Complex Software – Properties – Object Oriented Systems Development – Object Basics – Systems Development Life Cycle Rumbaugh Methodology - Booch Methodology - Jacobson Methodology – Unified Process.

UNIT II UML 8

Unified Approach – Unified Modeling Language – Static Behavior diagrams – Dynamic Behavior diagrams – Object Constraint Language.

UNIT III SYSTEM DESIGN 9

Inception– Evolutionary Requirements – Domain Models – Operation Contracts -Requirements to Design – Design Axioms – Logical Architecture - Designing Objects with Responsibilities – Object Design – Designing for Visibility.

UNIT IV DESIGN PATTERNS 9

Patterns – Analysis and Design patterns – GoF Patterns - Mapping designs to code – Test Driven development and refactoring – UML Tools and UML as blueprint.

UNIT V APPLICATION OF DESIGN PATTERNS 9

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

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Familiarize with the topics of object oriented System designs.
- Design Patterns using UML.
- Apply design patterns to various applications.

REFERENCES:

1. Craig Larman, “Applying UML and Patterns – An introduction to Object-Oriented Analysis and Design and Iterative Development”, 3rd edition, Pearson Education, 2005.
2. Fowler, Martin. “UML Distilled”, 3rd edition, Pearson Education, 2004.
3. Michael Blaha and James Rumbaugh, “Object-oriented modeling and design with UML”, Prentice-Hall of India, 2005.
4. Grady Booch, “Object Oriented Analysis and Design”, 2nd edition, Pearson Education, 2000.
5. Ali Bahrami, “Object Oriented Systems Development”, Tata McGraw Hill, 1999.

CA8303 OPEN TECHNOLOGIES L T P C

3 0 0 3

OBJECTIVE:

- To introduce open technologies
- To develop web applications using python and ruby
- To understand the use of content management system

UNIT I INTRODUCTION 9

Need for free and open source software – Overview of linux – Distributions -– Desktop environment – KDE – GNOME - Development environment tools and systems - using version control system - FOSS practices - programming guidelines

UNIT II PYTHON 9

Introduction to Django - templates - models - forms - deploying django - caching - Integrating with legacy databases and applications – security

UNIT III RUBY 9

Ruby on rails - introduction - ruby, ruby gems, rails and git - deploying - building a demo app - static and dynamic pages - rails flavored ruby – users

UNIT IV CONTENT MANAGEMENT SYSTEMS 9

Drupal / Joomla – Creating a basic page – Modules – User Interface – Media Management – Event Management – Multilingual capabilities

UNIT V APPLICATIONS 9

Case study – Web applications using django - web sites using ruby on rails

TOTAL : 45 PERIODS

OUTCOMES:

- Analyze the various open web frameworks
- Write web applications using python and ruby
- Design for extendibility and code reuse
- Understand deployment options

REFERENCES:

1. Jesús M. González-Barahona, Joaquín Seoane Pascual, Gregorio Robles, Introduction to Free Software, Free Technology Academy, Europe, 2009 (http://ftacademy.org/materials/fsm/1#1).
2. Adrian Holovaty, Jacob Kaplan–Moss, The Definitive Guide to Django: Web Development Done Right, Apress, 2009
3. Michael Hartl, Ruby on Rails tutorial: Learn Web development with Rails, Addison-Wesley Professional Ruby Series, 2012
4. Angela Byron, Addison Berry, Bruno De Bondt, Using Drupal 2nd edition, O' Reilly, 2012
5. http://sixrevisions.com/resources/git-tutorials-beginners/

CA8304 WEB PROGRAMMING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the basics of web forms and validation.
- To learn the concepts of XML related technologies.
- To learn the fundamentals of java.
- To understand the importance of server side programming and web development.

UNIT I HTML AND JAVA SCRIPT 9

World Wide Web – XHTML - Cascading Style Sheet - JavaScript – Java script objects - Date – Array – pattern matching using regular expressions – Dynamic documents with Java script – HTML 5 – New features.

UNIT II XML TECHNOLOGIES 9

XML – Validating XML - DTD – XML schema – XPath – XLink – parsing XML using DOM – parsing XML using SAX – Transforming XML with XSL – Integrating XML with database – AJAX – RSS – JSON.

UNIT III JAVA BASICS 9

Overview of Java – Java Fundamentals – Classes - Objects and Methods – Arrays and Array Lists – String – String Builder – Regular expressions – class pattern – class matcher - Packages and Interfaces – Exception Handling.

UNIT IV JAVA GUI AND DATABASE CONNECTIVITY 9

Generic classes – Generic methods – Applets – Applet life cycle methods – Applets based GUI – GUI components – Basic of Swings – Accessing database with JDBC – basics.

UNIT V SERVER SIDE SCRIPT 9

Overview of servlets – Servlet API – Servlet life cycle – Servlet configuration – Running Servlet with database connectivity - Servlet support for cookies – Session tracking – Basics of PHP - JSP/PHP-Case study/ Applications – Developing Dynamic - Data driven web sites.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Design and implement web forms and client side validation.
- Work with XML authoring, Parsing, and related technologies.
- Develop object oriented programming using Java.
- Design and develop GUI based applications using Swing components.
- Design and develop servlet and JSP application with database connectivity.

REFERENCES:

1. Robert W. Sebesta, “Programming with World Wide Web”, Pearson Education, 2008.
2. Paul Deitel and Harvey Daitel, “Java – How to program”, Ninth Edition, PHI, 2012.
3. Kogent Solutions, “Java 6 Programming Black book”, Dreamtech Press, 2007 .

CA8311 CASE TOOLS LABORATORY L T P C

0 0 3 2

COURSE OBJECTIVES:

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

SOFTWARE REQUIRED:

Open source Tools: StarUML / UMLGraph / Topcased

Prepare the following documents for each experiment and develop the software using software engineering methodology.

Problem Analysis and Project Planning -Thorough study of the problem –
Identify Project scope - Objectives and Infrastructure.

1. **Software Requirement Analysis -** Describe the individual Phases/modules of the project and Identify deliverables.
2. **Data Modelling -** Use work products – data dictionary - use case diagrams and activity diagrams - build and test class diagrams - sequence diagrams and add interface to class diagrams.
3. **Software Development and Debugging** – implement the design by coding
5. **Software Testing** - Prepare test plan - perform validation testing - coverage analysis - memory leaks - develop test case hierarchy - Site check and site monitor.

Sample Experiments:

Academic domain

1. Course Registration System
2. Student marks analysing system

Railway domain

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

Medicine domain

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

Finance domain

7. ATM system
8. Stock maintenance

Human Resource management

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

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

- Use open source CASE tools to develop software.
- Analyze and design software requirements in an efficient manner.

CA8312	WEB PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	2

COURSE OBJECTIVES:

- To learn web page creation.
- To understand the real time requirements of web page such as validation, use of DOM, role of XML.
- To understand OOP concepts and basics of Java language.
- To learn and use client server architecture based applications.
- To explore server side functionalities of an application.

The following experiments should be practiced using open source technologies :

1. Creation of web pages having dynamic contents and validation using Java script.
2. Creation of XML file and validation using XML schema and generation of XML using tools.
3. Simple xml based applications using DOM, SAX and XSL.
4. Basic Java programming covering objects, inheritance, polymorphism, interfaces, packages and exception handling.
5. String handling programs and regular expression programs.
6. Creation of applet based GUI's.
7. Application involving applet based GUI, JDBC, Servlet, JSP/PHP, cookies and session tracking.

COURSE OUTCOMES:

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

- Make Web site creation and validation.
- Work with XML based technologies.
- Develop simple console application using Java.
- Develop GUI application using Swing and Applet.
- Build web based applications using JDBC, Servlet / JSP.

TOTAL : 45 PERIODS

CA8401 ADVANCED JAVA PROGRAMMING L T P C
3 1 0 4

COURSE OBJECTIVES:

- To understand the advanced concepts of java.
- To learn the concepts of MVC architecture and security issues.
- To learn the concept of distributed objects including web services.
- To understand the importance of other advanced frameworks.

UNIT I JAVA BASICS 12

Review of java basics - Java String Handling - Files – streams – Working with Streams - File and I/O Handling Threads – multithreading - object serialization – Swing components – Graphics and Java 2D – Recursion.

UNIT II JAVA NETWORK PROGRAMMING 12

Generic collections – Classes – Methods – Networking – Manipulating URLs – Reading web pages – Using stream sockets – Datagrams – Manipulating databases with JDBC- Broadcasting – Multicasting – Chat application.

UNIT III WEB APPLICATION DEVELOPMENT 12

Java Server Faces – Multitier application Architecture – MVC architecture of JSF Apps – common JSF components – Session tracking – Cookies – Accessing databases in Web Apps – Java Beans component – Security – Class loaders – Security manager and permission – Authentication using JAAS – JAR file signing – Encryption.

UNIT IV SOFTWARE COMPONENTS 12

Distributed objects – RMI programming model – Parameters and return values in remote methods – Remote object activation - Web services and JAX-WS - Publishing and consuming SOAP based web services – REST-based web services – REST-based JSON web services - Session tracking.

UNIT V ADVANCED FRAMEWORK 12

Advanced Frameworks – Understanding Struts – MVC framework – Struts control flow – Building model view controller component - Hibernate – Architecture – Understanding O/R mapping – Query language - Spring framework – Architecture - Case studies – Current trends.

TOTAL:60 PERIODS

COURSE OUTCOMES:

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

- Work with Java I/O streams, networking and GUI based application development.
- Work with Web application development using Java Server Faces.
- Work with Security features supported in Java.
- Develop web services using REST/SOAP/JSON.
- Design and develop applications using other frameworks.

REFERENCES:

1. Kogent Solution Inc, “Java 6 Programming Black Book”, Dreamtech Press, 2007.
2. Paul Deitel and Harvey Deitel, “Java How to Program”, 9th Edition, Prentice Hal, 2012.
3. Cay S.Horstmann and Gary Cornell, “Core Java Volume II – Advanced Features”, Eighth edition, PHI, 2008.
4. Herbert Schildt , “Java The Complete Reference”, 8th Edition, Tata McGraw Hill, 2011.

CA8402 MOBILE APPLICATION DEVELOPMENT L T P C
3 0 0 3

COURSE OBJECTIVES:

- To learn the characteristics of mobile applications.
- To understand the intricacies of UI required by mobile applications.
- To study about the design aspects of mobile application.
- To learn development of mobile applications.

UNIT I INTRODUCTION 9

Mobile Applications – Characteristics and Benefits – Application Model – Infrastructure and Managing Resources – Mobile Software Engineering – Frameworks and Tools – Mobile devices Profiles.

UNIT II USER INTERFACE 9

Generic UI Development – VUIs and Mobile Applications – Text to Speech techniques – Designing the right UI – Multimodal and Multichannel UI – Gesture based UIs – Screen Elements and Layouts – Voice XML – Java API.

UNIT III APPLICATION DESIGN 9

Memory Management – Design patterns for limited memory – Work flow for Application Development – Techniques for composing Applications – Dynamic Linking – Plug ins and rules of thumb for using DLLs – Concurrency and Resource Management – Look and feel.

UNIT IV APPLICATION DEVELOPMENT 9

Intents and Services – Storing and Retrieving data – Communication via the Web – Notification and Alarms – Graphics and Multimedia – Telephony – Location based services – Packaging and Deployment – Security and Hacking.

UNIT V TOOLS 9

Google Android Platform – Eclipse Simulator – Android Application Architecture – Event based programming – Apple iPhone Platform – UI tool kit interfaces – Event handling and Graphics services – Layer Animation.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- To design and implement the user interfaces for mobile applications.
- To design the mobile applications that is aware of the resource constraints of mobile devices.
- To develop advanced mobile applications that accesses the databases and the web.
- To develop useful mobile applications in the current scenario using Google Android and Eclipse simulator.

REFERENCES:

1. Zigurd Mednieks, Laird Dornin, G, Blake Meike and Masumi Nakamura, “Programming Android”, O’Reilly, 2011.
2. Reto Meier, Wrox Wiley, “Professional Android 2 Application Development”, 2010.
3. Alasdair Allan, “iPhone Programming”, O’Reilly, 2010.
4. Wei-Meng Lee, “Beginning iPhone SDK Programming with Objective-C”, Wrox Wiley, 2010.
5. Stefan Poslad, “Ubiquitous Computing: Smart Devices, Environments and interactions”, Wiley, 2009.

CA8403 **SECURITY PRACTICES** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To understand the concepts and models of security in computing.
- To understand the cryptographic techniques used.
- To explain the security standards followed at the network level and at the application level.
- To estimate the level of security risk faced by an organization and the counter measures to handle the risk.
- To learn secure software development.

UNIT I SECURITY – OVERVIEW **9**

The Threat Environment – Attackers and attacks – Security Planning and Policy – Risk analysis – Governance frameworks.

UNIT II CRYPTOGRAPHY **9**

Elements of cryptography – Ciphers – Encryption systems – Symmetric / Asymmetric – DES – AES - RSA – Key management – Authentication – Cryptographic systems - Standards – Secure networks VPNs - SSL/TLS – IPSec - LAN security.

UNIT III ACCESS CONTROL **9**

Physical access control – Access cards – Authentication mechanisms – Directory servers – Firewalls – Packet filtering – Stateful packet inspection – NAT – IDS – Firewall architectures.

UNIT IV HOST AND DATA SECURITY **9**

Host Hardening – OS hardening – Managing vulnerabilities - Permissions - Data protection – Application security – Issues – E-commerce security – E-mail security - Incident and Disaster Response.

UNIT V SECURE CODING **9**

OWASP/SANS Top Vulnerabilities - Buffer Overflows - Incomplete mediation - XSS - Anti Cross Site Scripting Libraries - Canonical Data Format - Command Injection - Redirection - Inference – Application Controls – Secure Software Development Life Cycle – Testing - Maintenance and Operation - Evaluation of Security Systems.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

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

REFERENCES:

1. Raymond R. Panko, “Corporate computer and Network security”, Second edition, Pearson, 2012.
2. Wade Trappe, Lawrence C Washington, “Introduction to Cryptography with Coding and Theory”, Second Edition, Pearson, 2007.
3. Matt Bishop, “Computer Security: Art and Science”, Pearson, 2003.
4. Charles Pfleeger, Shari Lawrence Pfleeger, Devin N Paul, “Security in Coding”, Pearson, 2007.
5. Wenbo Mao, “Modern Cryptography Theory and Practice”, Pearson, 2004.

CA8411 ADVANCED JAVA PROGRAMMING LABORATORY L T P C
0 0 3 2

COURSE OBJECTIVES:

- To learn Java and Enterprise Java intensively.
- To understand many advanced technologies of Java such as Multithreading, Streaming, Networking, Generic collections, RMI.
- To learn and use MVC architecture for application development.
- To learn and use web services and advanced frameworks for web application development.

The following experiments should be practiced

1. Design and Implement java programs that deals with the following:
   a. Classes and Objects and Interfaces.
   b. Exception Handling with user defined Exceptions.
   c. String Handling (String Class objects - String Manipulation functions).
   d. Streaming (Image File Handling using Byte Streams - Text File Manipulation using Character Streams).
   e. Multiple Threads Creation
   f. Implementation of Thread Synchronization using any application.
   g. Reading and Writing Objects using Serialization.
   h. Creation of User Interfaces using SWING.
   i. Creation of Smileys – Drawings – Cartoons – Symbols - Simple animations using Java Graphics.
   j. Usage of Recursion.
   k. Creation and Manipulation of generic objects.
   l. Reading websites using URL class.
   m. File Transfer using UDP.
   n. Chat Application using TCP.
2. Implementation of any Information System using JDBC.
3. Simple JSF programs.
4. Session Management and Implementation of Cookies using JSF.
5. Development of a Web application using JSF.
6. Database Connectivity using Java Bean.
7. Development of security applications using JAAS.
8. Remote Method Access using RMI Implementation.
9. Creation of Web Services using JAX-WS.
10. Creation of REST based web services and its access using JSON.
11. Database access using Hibernate.
12. Web application development using Struts Framework & Spring Framework.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Become an intermediate or advanced developer of Java.
- Write programs on advanced technologies of Java such as Streaming, Networking, Multithreading and Generic collections.
- Develop chat and file transfer applications.
- Implement Server Side Programming and dynamic software components.
- Design and Develop GUI based components and Animations.
- Design and implement an interactive web sites.
- Work with online databases.
- Create distributed applications using RMI, JAX-WS, and REST based services.
- Create MVC applications using advanced frameworks.

CA8412 MOBILE APPLICATION DEVELOPMENT LABORATORY L T P C
0 0 3 2

COURSE OBJECTIVES:

- To know about various platforms and tools available for developing mobile applications.
- To realize the differences between the development of conventional applications and mobile applications.
- To learn programming skills in J2ME and Android SDK.
- To study about micro browser based applications to access the Internet using Sun Java Toolkit.

The following experiments to be practiced

1. Survey of Mobile Application Development Tools.
2. Form design for mobile applications.
3. Applications using controls.
4. Graphical and Multimedia applications.
5. Data retrieval applications.
6. Networking applications.
7. Gaming applications.
   (Perform the experiments from 2 to 7 in J2ME and Android SDK framework)
8. Micro browser based applications using WAP, WML and WML scripts.
   (Perform experiments in 8 using Sun Java Wireless toolkit)

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Develop useful mobile applications for the current scenario in mobile computing and pervasive computing.

CA8501 CLOUD COMPUTING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the concept of cloud and utility computing.
- To understand the various issues in cloud computing.
- To familiarize themselves with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.
- To be able to set up a private cloud.

UNIT I INTRODUCTION 8

Evolution of Cloud Computing – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture - IaaS – On-demand provisioning – Elasticity in cloud – Egs of IaaS providers - PaaS – Egs. of PaaS providers - SaaS – Egs. of SaaS providers – Public - Private and Hybrid clouds.

UNIT II VIRTUALIZATION 9

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU – Memory - I/O Devices - Desktop virtualization – Server Virtualization.

UNIT III CLOUD INFRASTRUCTURE 9

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNIT IV PROGRAMMING MODEL 10

Parallel and Distributed programming Paradigms – MapReduce - Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine - Amazon AWS - Cloud Software Environments –Eucalyptus – Open Nebula – Open Stack.

UNIT V SECURITY IN THE CLOUD 9

Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- Identify the architecture, infrastructure and delivery models of cloud computing.
- Explain the core issues of cloud computing such as security, privacy and interoperability.
- Choose the appropriate technologies, algorithms and approaches for the related issues.

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, "Management, and Security", CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical ApproachTMH, 2009.
4. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.
5. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
6. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer.

CA8502 SERVICE ORIENTED ARCHITECTURE L T P C
3 1 0 4

COURSE OBJECTIVES:

- To understand various architecture for application development.
- To learn the importance of SOA in Application Integration.
- To learn web service and SOA related tools.

UNIT I INTRODUCTION TO SOA 9

Software Architecture – Types of IT Architecture – SOA – Evolution – Key Components – Perspective of SOA – Enterprise-Wide SOA – Architecture – Enterprise Applications – Solution Architecture for Enterprise Application – Software Platforms for Enterprise Applications – Patterns for SOA – SOA Programming Models.

UNIT II ANALYSIS AND DESIGN OF SOA BASED SYSTEMS 9

Service-Oriented Analysis And Design – Design of Activity – Data - Client And Business Process Services – Technologies of SOA – SOAP – WSDL – JAX – WS – XML WS for .NET – Service Integration With ESB – Scenario – Business Case for SOA – Stakeholder Objectives – Benefits of SPA – Cost Savings.

UNIT III SOA GOVERNANCE 9

SOA Implementation and Governance – Strategy – SOA Development – SOA Governance – Trends in SOA – Event-Driven Architecture – Software as a Service – SOA Technologies – Proof-of-Concept – Process Orchestration – SOA Best Practices.

UNIT IV SOA IMPELEMENTATION 9

SOA using REST – Restful Services – Restful Services with and without JWS – Role of WSDL - SOAP And Java/XML Mapping in SOA – JAXB Data Binding.

UNIT V SOA ARCHESTRATION 9

JAX – WS 2.0 Client Side/Server Side Development – Packaging and Deployment of SOA Component – SOA Shopper Case Study –WSDL Centric Java WS with SOA-J – Related Software – Orchestration – BPEL - Current Trends.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Compare different IT architecture.
- Analyze and design SOA based applications.
- Implement web service and obtain the realization of SOA.
- Implement RESTful Services.
- Design and implement SOA based Application Integration using BPEL.

REFERENCES:

1. Shankar Kambhampaly, "Service –Oriented Architecture for Enterprise Applications", Wiley India Pvt Ltd, 2008.
2. Mark D. Hansen, "SOA using Java Web Services", Practice Hall, 2007.
3. Waseem Roshen, "SOA-Based Enterprise Integration", Tata McGraw-HILL, 2009.

CA8503 SOFTWARE TESTING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To introduce the basics and necessity of Software testing.
- To introduce various testing techniques along with software production.
- To introduce the concepts of Software bugs and its impact.

UNIT I INTRODUCTION 9

Software Testing Background – Software Bugs- Cost of Bugs-Software Testing Realities - Testing Axioms – Precision and Accuracy - Verification and Validation - Quality and Reliability -Testing and Quality Assurance.

UNIT II SOFTWARE TESTING METHODOLOGY 9

Functional Testing - Structural Testing – Static and Dynamic Testing – Low Level Specification Test Techniques – Equivalence Partitioning – Data Testing – State Testing – Formal Reviews – Coding Standards and Guidelines – Code Review Checklist – Data Coverage - Code Coverage.

UNIT III SOFTWARE TESTING TECHNIQUES 9

Configuration Testing – Compatibility Testing – Foreign Language Testing – Usability Testing – Testing the Documentation - Testing for Software Security – Website Testing.

UNIT IV AUTOMATED TESTING AND TEST TOOLS 9

Benefits of Automation and Tools – Viewers and Monitors – Drivers – Stubs – Stress and Load Tools – Analysis Tools - Software Test Automation – Random Testing – Beta Testing.

UNIT V TEST DOCUMENTATION 9

Goal of Test Planning – Test Phases – Test Strategy – Resource Requirements – Test Schedule – Writing and Tracking Test Cases - Bug Tracking Systems – Metrics and Statistics - Risks and Issues.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Perform automated testing using test tools.
- Document the testing procedures.

REFERENCES:

1. Glenford J.Myers, Tom Badgett, Corey Sandler, “The Art of Software Testing”,3rd edition, John Wiley & Sons publication, 2012.
2. Ron Patton, “Software testing”, second edition, Pearson education, 2009.
3. Boris Beizer, “Software testing techniques”, DreamTech Press, 2009.
4. Srinivasan Desikan, Gopalaswamy Ramesh, “Software testing- Principles and Practices”, Pearson education, 2009.

CA8511 CLOUD LABORATORY L T P C
0 0 3 2

1. Create and destroy a Virtual machine using Xen hypervisor
2. Use single Virtual Machine n-number of times
3. Create a VM image which has a C compiler along with an operating system and do the following experiments
    a. Fibonnaci Series
    b. File Operations
4. Write a program to communicate between two Virtual Machines
5. Store a video image in Walrus and playback the same using a VM
6. Implement a cryptographic algorithm to secure data in the VM
7. Data storing in remote database
8. Data storing in multiple data centers
9. Access control for databases
10. Simulate a cloud scenario using Cloud Sim (Mini Project)

TOTAL: 45 PERIODS

CA8512 SOFTWARE TESTING LABORATORY L T P C
0 0 3 2

COURSE OBJECTIVES:

- To study various testing tools.
- To implement various testing techniques.

The following experiments should be practiced:

1. Study of software testing tools such as WinRunner, LoadRunner, Rational Rose Test Suite etc.,
2. Implementation of testing techniques using tools:
    (1) Function testing
    (2) System testing
    (3) Acceptance testing
    (4) Usability testing
    (5) Agile testing
    (6) Configuration testing
    (7) Compatibility testing
    (8) Foreign language testing
    (9) Security testing
3. Mini-project: developing automated test case generation tool for following domains:
    a) Website development
    b) Passport management system
    c) Health care
    d) Finance management
    e) Travel reservation system
    f) Mobile application

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Perform automated testing on applications using test tools.
- Design and develop automated test case generation tools.

CA8001 BIO METRICS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the basic ideas and principles in biometrics.
- To understand the basic concepts of statistical data analysis for validating the biometrics projects.
- To familiarize the student with the image processing facilities in MATLAB and its equivalent open source tools like OpenCV.
- To appreciate the use of biometrics Industrial applications and to understand the role of biometrics in modern security environment.
- To understand and implement more advanced topics in current research literature.
- To understand the role of multi-biometrics.

UNIT I BIOMETRICS FUNDAMENTALS 9

Introduction – Benefits of biometric security – Verification and identification – Basic working of biometric matching – Accuracy – False match rate – False non-match rate – Failure to enroll rate – Derived metrics – Layered biometric solutions.

UNIT II FINGER AND FACIAL SCAN 9

Finger scan – Features – Components – Operation (Steps) – Competing finger Scan technologies – Strength and weakness - Types of algorithms used for interpretation - Facial Scan - Features – Components – Operation (Steps) – Competing facial Scan technologies – Strength and weakness.

UNIT III IRIS AND VOICE 9

Iris Scan - Features – Components – Operation (Steps) – Competing iris Scan technologies – Strength and weakness. Voice Scan - Features – Components – Operation (Steps) – Competing voice Scan (facial) technologies – Strength and weakness.

UNIT IV PHYSIOLOGICAL BIOMETRICS 9

Other physiological biometrics – Hand scan – Retina scan – AFIS (Automatic Finger Print Identification Systems) – Behavioral Biometrics – Signature scan - Keystroke scan - Multimodalities and combining biometrics for improving performance.

UNIT V BIOMETRICS APPLICATION DEVELOPMENT 9

Biometrics Application – Biometric Solution Matrix – Bio privacy – Comparison of privacy factor in different biometrics technologies – Designing privacy sympathetic biometric systems - Biometric standards (BioAPI , BAPI) – Biometric middleware - Biometrics for Network Security - Statistical measures of Biometrics.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Implement basic biometrics related algorithms.
- Familiar with the use of MATLAB and its equivalent open source environments.
- Design and implement industrial applications that incorporate different concepts of biometrics.
- Critically analyze different approaches to implement mini projects in industrial environment and in security related projects.

REFERENCES:

1. Samir Nanavati, Michael Thieme, Raj Nanavati, “Biometrics – Identity Verification in a
2. Networked World”, John Wiley, 2002.
3. James L. Wayman, Anil K. Jain, Davide Maltoni, and Dario Maio, “Biometric Systems:
4. Technology, Design and Performance Evaluation”, 2004.
5. Stan Z. Li and Anil K. Jain, “Handbook of Face Recognition”, 2005.
6. John R. Vacca, “Biometric Technologies and Verification Systems”, 2007.
7. Richard O. Duda, Peter E. Hart, and David G. Stork, “Pattern Classification”, 2000.

CA8002 CRYPTOGRAPHY AND NETWORK SECURITY L T P C

3 0 0 3

COURSE OBJECTIVES:

- To understand the mathematics behind Cryptography.
- To understand the standard algorithms used to provide confidentiality, integrity and authenticity.
- To get the knowledge of various security practices applied in the field of information technology.

UNIT I FUNDAMENTALS AND MATHEMATICS OF CRYPTOGRAPHY 9

Overview - Classical Crypto Systems – Substitution Ciphers –Transposition Ciphers - Stream and Block Ciphers – Introduction to Number Theory – Congruences – Chinese Remainder theorem – Modular Arithmetic - Modular Exponentiation – Fermats and Eulers Theorem - Finite Fields – GF(2^n) Fields.

UNIT II ENCRYPTION TECHNIQUES 9

Data Encryption Standard – Advanced Encryption Standard – Confidentiality using Symmetric Encryption - Public-Key Cryptography and RSA – Key Management - Diffie-Hellman Key Exchange – Elliptic Curve Cryptography – Symmetric Key Distribution – Kerberos - X.509 Authentication Service.

UNIT III HASH FUNCTIONS AND SIGNATURES 9

Message Authentication and Hash Functions – Description of MD Hash Family – Secure Hash Algorithms – SHA-512 - Digital Signatures and Authentication Protocols – Digital Signature Standard – Process - Services - Attacks on Digital Signature - Digital Signature Schemes.

UNIT IV NETWORK SECURITY 9

Security at the application layer - E-Mail - Pretty Good Privacy – S/MIME – Security at the transport layer - SSL Architecture – Protocols – Message Formats - TLS – Security at the Network Layer - IPSec – Two modes - Authentication Header (AH) – Encapsulating Security Payload (ESP) – Security Policy – Security Association – Internet Key Exchange.

UNIT V SYSTEM SECURITY 9

Intruders – Intrusion Detection – Password Management – Malwares and Related Threats – DOS Attacks - Distributed Denial of Service Attacks - Firewalls – Firewall Types-Configuration and Implementation - Demilitarized Zone - Firewall Forensics -Services and Limitations - Intrusion Prevention System.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Understand the basic security algorithms required by any computing system.
- Predict the vulnerabilities across any computing system.
- Design a security solution for any computing system.

REFERENCES:

1. William Stallings, “Cryptography And Network Security – Principles and Practices”, Fourth Edition, Pearson Education, 2006.
2. Behrouz A. Forouzan, Debdeep Mukhopadhyay, “Cryptography and Network Security”, Second Edition, Tata Mc Graw Hill, 2010.
3. Atul Kahate, “Cryptography and Network Security”, Tata McGraw Hill, 2003.
4. Joseph Migga Kizza, “A Guide to Computer Network Security”, Springer International Edition, 2010.
5. Charles B. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Fourth Edition, Pearson Education, 2007.

CA8003 CUSTOMER RELATIONSHIP MANAGEMENT L T P C

3 0 0 3

COURSE OBJECTIVES:

- To understand the importance of CRM in strategic management.
- To gain knowledge about CRM structures, planning and implementation.
- To get acquainted with the recent trends in CRM.

UNIT I INTRODUCTION 9

Definitions - Concepts and Context of relationship Management – Evolution - Transactional vs Relationship Approach – CRM as a strategic marketing tool – CRM significance to the stakeholders.

UNIT II UNDERSTANDING CUSTOMERS 9

Customer information Database – Customer Profile Analysis - Customer perception - Expectations analysis – Customer behavior in relationship perspectives - individual and group customer's - Customer life time value – Selection of Profitable customer segments.

UNIT III CRM STRUCTURES 9

Elements of CRM – CRM Process – Strategies for Customer acquisition – Retention and Prevention of defection – Models of CRM – CRM road map for business applications.

UNIT IV CRM PLANNING AND IMPLEMENTATION 9

Strategic CRM planning process – Implementation issues – CRM Tools - Analytical CRM – Operational CRM – Call center management – Role of CRM Managers.

UNIT V TRENDS IN CRM 9

e- CRM Solutions – Data Warehousing – Data mining for CRM – An introduction to CRM software packages.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Implement CRM in strategic management.
- Describe about CRM structures, planning and implementation.
- Design CRM solutions.

REFERENCES:

1. G.Shainesh, Jagdish, N.Sheth, "Customer Relationships Management Strategic Prespective", Macmillan, 2005.
2. H.Peeru Mohamed and A.Sahadevan, "Customer Relation Management", Vikas Publishing, 2005.
3. Jim Catheart, "The Eight Competencies of Relationship selling", Macmillan India, 2005.
4. Kumar, "Customer Relationship Management - A Database Approach", Wiley India, 2007.
5. Francis Buttle, "Customer Relationship Management: Concepts & Tool", Elsevier, 2004.

CA8004 DATA WAREHOUSING AND DATA MINING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To Understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence.
- To expose the students to the concepts of Data warehousing Architecture and Implementation.
- To study the overview of developing areas – Web mining, Text mining and ethical aspects of Data mining.
- To identify Business applications and Trends of Data mining.

UNIT I DATA WAREHOUSE 8

Data Warehousing - Operational Database Systems vs Data Warehouses - Multidimensional Data Model - Schemas for Multidimensional Databases – OLAP operations – Data Warehouse Architecture – Indexing – OLAP queries & Tools.

UNIT II DATA MINING & DATA PREPROCESSING 9

Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT III ASSOCIATION RULE MINING 8

Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint - Based Association Mining.

UNIT IV CLASSIFICATION & PREDICTION 10

Classification vs Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT V CLUSTERING 10

Cluster Analysis - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Evolve Multidimensional Intelligent model from typical system.
- Discover the knowledge imbibed in the high dimensional system.
- Evaluate various mining techniques on complex data objects.

REFERENCES:

1 Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”,Second Edition, Elsevier, Reprinted 2011.

2 K.P. Soman, Shyam Diwakar and V. Ajay, “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.

3 G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.

4 Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Pearson Education, 2007.

CA8005 DATABASE TUNING L T P C

3 0 0 3

COURSE OBJECTIVES:

- To understand the basic principles of tuning.
- To learn about the performance criteria of choosing a DBMS.
- To understand and use suitable troubleshooting mechanisms for tuning databases.

UNIT I FUNDAMENTALS OF TUNING 8

Review of Relational Databases – Relational Algebra - Locking and Concurrency Control – Correctness Consideration – Lock Tuning – Logging and the Recovery Subsystem – Principles of Recovery – Tuning the Recovery Subsystem – Operating Systems Considerations – Hardware Tuning.

UNIT II INDEX TUNING 8

Types of Queries – Data Structures – B tree – B^+ Tree - Hash Structures – Bit Map Indexes – Clustering Indexes – Non Clustering Indexes – Composite Indexes – Hot Tables – Comparison of Indexing and Hashing Techniques.

UNIT III QUERY OPTIMIZATION 10

Techniques - Tuning Relational Systems – Normalization – Tuning Denormalization – Clustering Two Tables – Aggregate Maintenance – Record Layout – Query Tuning – Triggers – Client Server Mechanisms – Objects - Application Tools and Performance – Tuning the Application Interface – Bulk Loading Data – Accessing Multiple Databases.

UNIT IV TROUBLESHOOTING 10

Query Plan Explainers – Performance Monitors – Event Monitors – Finding Suspicious Queries – Analyzing a Query's Access Plan – Profiling a Query Execution – DBMS Subsystems – Data Warehousing Tuning.

UNIT V CASE STUDIES 9

Tuning E-Commerce Applications – E-Commerce Architecture – Tuning E-Commerce Architecture - Transaction Chopping – Time Series Databases – Understanding Access Plans – Configuration Parameters – Oracle - SQL Server - DB2UDB – Distributed Database - Implementation.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Gain knowledge on the significance of database tuning.
- Optimize queries for tuning databases.
- Develop tuning based E-Commerce applications.

REFERENCES:

1. Dennis Shasha and Philippe Bonnet, "Database Tuning, Principles, Experiments, and Troubleshooting Techniques", Morgan Kaufmann, An Imprint of Elsevier, 2003.
2. Thomas Connoly and Carlolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2003.
3. M.Tamer Ozsu, Patrick Valduriez and S.Sridhar, "Principles of Distributed Database Systems", Pearson Education, 2007.

CA8006 DIGITAL IMAGE PROCESSING L T P C

3 0 0 3

COURSE OBJECTIVES:

- To understand the basic concepts and algorithms of digital image processing.
- To familiarize the students with the image processing environments like MATLAB and its equivalent open source Image processing environments.
- To expose the students to a broad range of image processing techniques and issues and their applications, and to provide the students with practical experience using them.
- To appreciate the use of image processing in current technologies and to expose the students to real-world applications of image processing.

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9

Introduction – Elements of Visual Perception Steps in Image Processing Systems – Digital Imaging System – Light - Cameras - Image Acquisition – Sampling and Quantization – Pixel Relationships – File Formats – colour images and colour models – RGB - CMY - CMYK – Introduction to Spatial and Frequency domain - Image Operations – Arithmetic - Logical - Statistical and Spatial Operations – Convolution and Correlation - Geometrical Operations – Image translation - Scaling - Zooming and Rotations.

UNIT II IMAGE ENHANCEMENT AND RESTORATION 9

Spatial Domain Gray Level Transformations - Histogram Processing - Spatial Filtering – Smoothing And Sharpening - Frequency Domain Operations- Filtering in Frequency Domain – Introduction to DFT - FFT - DCT Transformations - Smoothing And Sharpening Filters – Homomorphic Filtering - Noise Models - Constrained And Unconstrained Restoration Models.

UNIT III IMAGE SEGMENTATION AND IMAGE FEATURE ANALYSIS 9

Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Image Segmentation - Thresholding – Region Based Segmentation – Motion Segmentation - Image Features – Textures - Boundary representations and Descriptions - Component Labeling – Regional descriptors and Feature Selection Techniques.

UNIT IV MULTI RESOLUTION ANALYSIS AND MORPHOLOGICAL PROCESSING 9

Multi Resolution Analysis - Image Pyramids – Multi resolution expansion – Wavelet Transforms - Fast Wavelet transforms - Wavelet Packets - Image Morphology - Binary and Gray level morphology operations – Erosion - Dilation - Opening and closing operations – Distance transforms – Basic morphological operations.

UNIT V IMAGE PATTERN RECOGNITION AND CASE STUDIES 9

Statistical Classifiers – Clustering Algorithms – Hierarchical and Partitional clustering – Image classification and Recognition - Image Understanding – Caste Studies in Biometrics - Video - Image Fusion – Steganography

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Implement basic image processing algorithms using MATLAB tools.
- Design an application that incorporates different concepts of Image Processing.
- Apply and explore new techniques in the areas of image enhancement- restoration-segmentation- compression-wavelet processing and image morphology.
- Critically analyze different approaches to implement mini projects.
- Explore the possibility of applying Image processing concepts in various domains.

REFERENCES:

1. Rafael C.Gonzalez and Richard E.Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2008.
2. S.Sridhar, “Digital Image Processing”, Oxford University Press, 2011.

CA8007 DISTRIBUTED SYSTEMS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the concepts of distributed system.
- To learn about distributed system resource management.
- To understand various fault tolerant techniques.

UNIT I COMMUNICATION IN DISTRIBUTED ENVIRONMENT 8

Introduction – Various Paradigms in Distributed Applications – Remote Procedure Call –Remote Object Invocation – Message-Oriented Communication – Unicasting - Multicasting and Broadcasting – Group Communication.

UNIT II DISTRIBUTED OPERATING SYSTEMS 12

Issues in Distributed Operating System – Threads in Distributed Systems – Clock Synchronization – Causal Ordering – Global States – Election Algorithms – Distributed Mutual Exclusion – Distributed Transactions – Distributed Deadlock – Agreement Protocols.

UNIT III DISTRIBUTED RESOURCE MANAGEMENT 10

Distributed Shared Memory – Data-Centric Consistency Models – Client-Centric Consistency Models – Ivy – Munin – Distributed Scheduling – Distributed File Systems –Sun NFS.

UNIT IV FAULT TOLERANCE AND CONSENSUS 7

Introduction to Fault Tolerance – Distributed Commit Protocols – Byzantine Fault Tolerance – Impossibilities in Fault Tolerance.

UNIT V CASE STUDIES 8

Distributed Object-Based System – CORBA – COM+ – Distributed Coordination - Based System – JINI.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Develop fault tolerant distributed applications.
- Compare various distributed operating system characteristics.
- Apply efficient Resource allocation methodologies in distributed applications.

REFERENCES:

1. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design”, Third Edition, Pearson Education Asia, 2002.
2. Hagit Attiya and Jennifer Welch, “Distributed Computing: Fundamentals, Simulations and Advanced Topics”, Wiley, 2004.
3. Mukesh Singhal, “Advanced Concepts In Operating Systems”, McGraw Hill Series in Computer Science, 1994.
4. A.S.Tanenbaum, M.Van Steen, “Distributed Systems”, Pearson Education, 2004.
5. M.L.Liu, “Distributed Computing Principles and Applications”, Pearson Addison Wesley, 2004.

CA8008 E – LEARNING TECHNIQUES L T P C
3 0 0 3

COURSE OBJECTIVES:

- To gain knowledge about modern technology for learning.
- To acquaint with the e-Learning Tools.
- To learn technologies involved in e-learning application development.
- To become aware of the current business potential of e-learning based business.

UNIT I INTRODUCTION 9

Introduction – Training and Learning - Virtual Round Table - Understanding e-learning - components and models of e-learning - Advocacy of e-learning – benefits - learning styles - criteria for choosing.

UNIT II E-LEARNING STRATEGY AND TOOLS 9

E-Learning Strategy - The essential elements of e-learning strategy - Quality assuring e-learning - Suppliers and resources - Virtual learning environments - Authoring tools - e-assessment other concepts.

UNIT III DESIGN ASPECTS OF E-LEARNING 9

Learning Design Issues – purpose - general principles - designing live e-learning - designing self managed learning - designing electronic performance support.

UNIT IV BUSINESS CASES 9

Measurement and Results – Making business case - different approaches - Return on investment – expectation - Six Sigma - evaluation check list.

UNIT V OPENSOURCE E-LEARNING APPLICATION 9

Moodle 2.0 E-Learning Course Development – Features - Architecture - Installation and configuring site - Adding static course material - Evaluating student.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Work with technologies involved in e-Learning Applications.
- Design and Develop e-Learning Application and working with e-Learning tools.

REFERENCES:

1. Kenneth Fee, Kogan page, “Delivering E-Learning: A complete Strategy for Design, Application and Assessment”, 2009.
2. Michael Allen, “Designing Successful e-Learning”, Pfeiffer Publication, 2007.

CA8009 ENTERPRISE RESOURCE PLANNING L T P C
3 0 0 3

COURSE OBJECTIVE:

To make the students aware of the enterprise resource planning using information technology.

UNIT I INTRODUCTION TO ERP 9

ERP essentials – ERP evolution – ERP market – ERP tiers – information systems – Presentation tier – application tier – database tier.

UNIT II ENTERPRISE SYSTEMS 9

Enterprise systems – stand alone mainframe systems – client server architecture – service oriented architecture – types of enterprise systems – types of data – SAP overview.

UNIT III PROCESS IN ERP 9

Basic Procurement process – physical flow – document flow – information flow – financial impact - role of enterprise systems in the procurement process – fulfillment process – production process.

UNIT IV INTEGRATION 9

Integrated processes – Integrated processes execution – additional intracompany processes – extended (intracompany) processes.

UNIT V CASE STUDY 9

ERP for construction industry – ERP for a corrugated box manufacturing company – ERP for lens making company – ERP for furniture manufacturing company – ERP for toys manufacturing company - Mc Donald's story – Automobile enterprises.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of this course, the students should be able to:

- Understand the traditional ecosystem and the use of technology in enterprises.

REFERENCES:

1. Simha R Magal, Jeff Word, “Essentials of Business Processes and Information Systems”, Wiley Publications, 2009.
2. Marianne Bradford, “Modern ERP: Select, Implement and use Today's advanced business systems”, Second Edition, Lulu Publishers, 2010.
3. Jyotindra Zaveri, “Enterprise Resource Planning”, Second edition, Himalaya Publishing House, 2012.

CA8010 FINANCIAL MANAGEMENT LT P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the operational nuances of a Finance Manager.
- To comprehend the technique of making decisions related to finance function.

UNIT I FOUNDATIONS OF FINANCE 9

Financial management – An overview - Time value of money - Introduction to the concept of risk and return of a single asset and of a portfolio - Valuation of bonds and shares - Option valuation.

UNIT II INVESTMENT DECISIONS 9

Capital Budgeting - Principles and techniques - Nature of capital budgeting - Identifying relevant cash flows - Evaluation Techniques – Payback - Accounting rate of return - Net Present Value - Internal Rate of Return - Profitability Index - Comparison of DCF techniques - Project selection under capital rationing - Inflation and capital budgeting - Concept and measurement of cost of capital - Specific cost and overall cost of capital.

UNIT III FINANCING AND DIVIDEND DECISION 9

Financial and operating leverage - capital structure - Cost of capital and valuation - designing capital structure - Dividend policy - Aspects of dividend policy - practical consideration - forms of dividend policy - forms of dividends - share splits.

UNIT IV WORKING CAPITAL MANAGEMENT 9

Principles of working capital - Concepts - Needs - Determinants - issues and estimation of working capital - Accounts Receivables Management and factoring - Inventory management - Cash management - Working capital finance - Trade credit - Bank finance and Commercial paper.

UNIT V LONG TERM SOURCES OF FINANCE 9

Indian capital and stock market - New issues market Long term finance - Shares -Debentures and term loans - lease - Hire purchase - Venture capital financing - Private Equity.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Possess the techniques of managing finance in an organization.

REFERENCES:

1. M.Y. Khan and P.K.Jain, "Financial management, Text, Problems and cases", 6th edition, Tata McGraw Hill, 2011.
2. M. Pandey, "Financial Management", 10th edition, Vikas Publishing House Pvt. Ltd., 2012.
3. Aswat Damodaran, "Corporate Finance Theory and practice", John Wiley & Sons, 2011.
4. James C. Vanhorne, "Fundamentals of Financial Management", 11th Edition, PHI Learning, 2012.
5. Righam, Ehrhardt, "Financial Management Theory and Practice", 12th edition, Cengage Learning, 2010.
6. Prasanna Chandra, "Financial Management", 9th edition, Tata McGraw Hill, 2012.
7. Srivatsava, Mishra, "Financial Management", Oxford University Press, 2011.

CA8011 GAME PROGRAMMING L T P C
3 0 0 3

COURSE OBJECTIVE:

- To understand Game Designing and Development.
- To design the logic and develop Game Engine Model.
- To enable the students to create Interactive Games.

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 detai - 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

COURSE OUTCOMES:

Upon completion of this course, the students should be able to:

- Model and develop a new Gaming System.
- Develop interactive games with their knowledge gained out of various Gaming Platforms.

REFERENCES:

1. David H. Eberly, "3D Game Engine Design: A Practical Approach to Real-Time Computer Graphics", 2nd Edition, Morgan Kaufmann, 2006.
2. JungHyun Han, "3D Graphics for Game Programming", 1st edition, Chapman and Hall/CRC, 2011.
3. Mike McShaffrfy, "Game Coding Complete", Third Edition, Charles River Media, 2009.
4. Jonathan S. Harbour, "Beginning Game Programming", 3rd edition, Course Technology PTR, 2009.
5. Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", 1st edition,Prentice Hall 2006.
6. Roger E. Pedersen, "Game Design Foundations", Edition 2, Jones & Bartlett Learning, 2009.
7. Scott Rogers, "Level Up: The Guide to Great Video Game Design", 1st Edition, Wiley, 2010.

CA8012 GEOGRAPHICAL INFORMATION SYSTEM L T P C

3 0 0 3

COURSE OBJECTIVES:

- To give a brief overview of Geographic Information System.
- To acquire knowledge about Spatial and Non-Spatial Data.
- To understand about various File Formats.

UNIT I GIS COMPONENTS 7

GIS – Definition - History of GIS - Basic Components of GIS – Hardware - Software Data - Methods - People – List of GIS Software: Popular software - Open Source software

UNIT II CLASSIFICATION OF DATA 10

Data: Spatial and Non - Spatial Data – Spatial Data - Points - Lines - Polygons/Area and Surface - Non-Spatial Data - Levels of Measurement: Nominal - Ordinal - interval - ratio – Data Base – Functions - Data Base Structures – Hierarchical - Network.

UNIT III MODELS 10

Raster Data Model – Grid Cell/Pixel - Tessellations – Regular - Irregular – Geometry of Regular Tessellations - Shape - Adjacency - Connectivity - Orientation - Size of Grid Cell – Data Encoding - Rule of dominance - Rule of importance - Centre of Cell - Data Compression - Runlength – Chain - Block and Quad tree coding - Vector Data Model – Topology - Euler Equation - Rules for Topological Consistency – Arc-Node Data Structure – Raster vs Vector Comparison.

UNIT IV FILE FORMATS **9**

Vector Data Input – Digitizer - Principles - Co-ordinate transformation – Errors in digitizing – Scanner - Principles - On Screen Digitization - Georeferencing – Raster File Formats - Vector File formats – Import/Export Functionality – Linking Non-spatial data with Spatial data – Linking digital databases - ODBC – GPS data integration.

UNIT V DIGITAL ELEVATION MODELS **9**

Discrete and Continuous Surfaces – Interpolation Techniques - Digtial Elevation Models – Sources of DEM - Ground Survey – Photogrammetry - Stereo Satellite data - Airborne Laser Terrain Mapping - DEM representation – Gridded DEM - TIN structure – Extraction of Topographic Parameters - Slope - Aspect - Delineation of Watershed and Drainage Network – DEM Applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Apply the fundamental concepts and techniques related to the use of Geographic Information System.
- Apply this knowledge to a wide range of spatial/environmental problems.
- Describe GIS data models and spatial data collection.

REFERENCES:

1. Lo, C.P. and Yeung, Albert K.W., “Concepts and Techniques of Geographic Information Systems”, Prentice Hall, 2/E, 2006.
2. Peter A. Burrough, Rachael A. McDonnell, “Principles of GIS”, Oxford University Press, 2000
3. Robert Laurini and Derek Thompson, “Fundamentals of Spatial Information Systems”, Academic Press, 1996
4. Paul Longley, “Geographic Information Systems and Science”, John Wiley & Sons Inc, 2001.

CA8013 GRID COMPUTING **L T P C**

3 0 0 3

COURSE OBJECTIVES:

- To understand Grid Architecture.
- To understand different types of grids.
- To know about Grid standards.
- To apply grid computing in various areas.

UNIT I INTRODUCTION **9**

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

UNIT II FRAMEWORK **9**

Architecture – Implementation of Grid architecture – Grid Services - OGSI – OGSA - WSRF – Grid Resource and Service Management – Layers of Grid Computing – Grid monitoring – Grid Security.

UNIT III DATA AND KNOWLEDGE GRID **9**

Data Source – Collective Data Service - Data Management - Knowledge Oriented Grid.

UNIT IV GRID MIDDLEWARE 9

List of Globally available toolkits – GT3 – Architecture details – Security - System level Services – Load Balancing.

UNIT V APPLICATIONS 9

Scientific – Medical – Bioinformatics – Federated – ERM – Collaborative Science – Case Study.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Create a Grid Middleware architecture.
- Explain the services offered by grid.
- Utilize grid for various applications.

REFERENCES

1. Ian Foster, Carl Kesselman, "The Grid 2: Blueprint for a New Computing Infrastructure", Elsevier Series, 2004.
2. Vladimir Silva, "Grid Computing for Developers, Charles River Media," January 2006.
3. Parvin Asadzadeh, Rajkumar Buyya, Chun Ling Kei, Deepa Nayar, and Srikumar Venugopal, "Global Grids and Software Toolkits: A Study of Four Grid Middleware Technologies, High
4. Performance Computing: Paradigm and Infrastructure", Laurence Yang and Minyi Guo (editors), Wiley Press, New Jersey, USA, June 2005.

CA8014 HEALTHCARE INFORMATION SYSTEMS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To provide the students, the knowledge to address the current challenges in HIS.
- To focus on the storage, integration, querying and management of heterogeneous, voluminous, geographically dispersed biomedical data.
- To address the analysis of the experimental data and methods.

UNIT I INTRODUCTION 9

Computational Biology - Genomes – Networks - Evolution- Imaging Biophysiology and Clinical Apps - Biomedical Computing - Medical Decision Support - Biomedical Information Technology.

UNIT II NEURAL PROCESSING 9

Topics Neural Signal Processing – Sensory - Neural Systems – Genetics - Medical Artificial Intelligence - Designing and Sustaining Technology Innovation for Global Health Practice.

UNIT III ACOUSTICS INFORMATION SYSTEMS 9

Acoustics of Speech & Hearing-Automatic Speech Recognition - Bio-Computational Systems – Design Med Devices & Implants - Speech Communication systems.

UNIT IV FUNCTIONAL MAGNETIC RESONANCE IMAGING 9

FMRI - Data Acquisition and Analysis - Image Reconstruction in MRI – Disease Analysis tools – Disease Decision Support System.

UNIT V DATA ANALYTICS AND CASE STUDIES 9

Economics of the Health Care Industries - Strategic Decision Making in the Biomedical Business - Critical Reading and Technical Assessment of Biomedical Information - Dynamics of Biomedical Technologies - Case Studies and Strategies in Drug Discovery and Development.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Be enriched in analyzing medical data in biomedical information systems.
- Explore the different tools for analyzing the medical data for HIS.
- Present the medical examples of pathway analysis methods and generate the reports.

REFERENCES:

1. Shortliffe, Edward H., Cimino, James J. (Eds.), "Biomedical Informatics", Springer Publications, 2012.
2. Nitish Thakor, "Medical & Biological Engineering & Computing", Springer Publications, 2012**.**
3. Karen A Wager, Frances Wickham Lee, John P Glaser, "Managing Health Care Information Systems: A Practical Approach for Health Care Executives", Jossey- Bass/Wiley, 2005.
4. Rudi Van De Velde and Patrice Degoulet, "Clinical Information Systems: A Component based approach", Springer 2005http://compbio.mit.edu/teaching.html

CA8015 HIGH SPEED NETWORKS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To provide an overview of high-speed networking technologies.
- To learn the enhanced set of functionalities for high-speed networking.
- To understand the underlying concept involved for high performance.

UNIT I HIGH SPEED LANS 9

Ethernet – Fast Ethernet - Gigabit Ethernet - 10 Gigabit Ethernet – Token Ring - Fibre Channel – Wireless LAN's – IEEE802.11 architecture and services – IEEE802.11 MAC – IEEE802.11 a/b/g/n physical layers - security considerations.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 9

Queuing Analysis - Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III IPV6 9

Overview of IPv6- Functionalities - Addressing- Router/Network configuration – DNS for IPv6 – Multicasting-interoperability Issues - Scalability Issues - Performance of TCP over IPv6 – ICMPv6.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 9

Integrated Services Architecture – Approach - Components – Services - Queuing Discipline - FQ - PS - BRFQ - GPS - WFQ – Random Early Detection - Differentiated Services - RSVP – Goals and Characteristics - Data Flow - RSVP operations - Protocol Mechanisms.

UNIT V MPLS NETWORKS 9

Multiprotocol Label Switching – Operations - Label Stacking - Protocol Details – Congestion Control and Routing in MPLS networks – MPLS Virtual Private Networks - MPLS Traffic Engineering.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- A good appreciation of the building blocks and operation of high speed networking technology including the hardware and software components.

REFERENCES:

1. William Stallings, "Data and Computer Communications", Ninth Edition, Pearson Education, 2011.
2. William Stallings, "High Speed Networks and Internet", Second Edition, Pearson Education, 2002.
3. Warland, Pravin Varaiya, "High Performance Communication Networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., 2001.
4. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, "MPLS and VPN Architecture", Cisco Press, Volume 1 and 2, 2003.

CA8016 HUMAN RESOURCE MANAGEMENT L T P C
3 0 0 3

COURSE OBJECTIVES:

To provide knowledge about management issues related to staffing, training, performance, compensation, human factors consideration and compliance with human resource requirements.

UNIT I PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT 5

Evolution of human resource management – The importance of the human factor – Challenges – Inclusive growth and affirmative action - Role of human resource manager – Human resource policies – Computer applications in human resource management – Human resource accounting and audit.

UNIT II THE CONCEPT OF BEST FIT EMPLOYEE 8

Importance of Human Resource Planning – Forecasting human resource requirement –matching supply and demand - Internal and External sources - Recruitment - Selection – induction – Socialization benefits.

UNIT III TRAINING AND EXECUTIVE DEVELOPMENT 10

Types of training methods – purpose - benefits- resistance - Executive development programmes – Common practices - Benefits – Self development – Knowledge management.

UNIT IV SUSTAINING EMPLOYEE INTEREST 12

Compensation plan – Reward – Motivation – Application of theories of motivation – Career management – Development of mentor – Protégé relationships.

UNIT V PERFORMANCE EVALUATION AND CONTROL PROCESS 10

Method of performance evaluation – Feedback – Industry practices – Promotion – Demotion - Transfer and Separation – Implication of job change - The control process – Importance – Methods – Requirement of effective control systems grievances – Causes – Implications – Redressal methods.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Gain knowledge and skills needed for success as a human resources professional.

REFERENCES:
1. Dessler, “Human Resource Management”, Pearson Education Limited, 2007.
2. Decenzo and Robbins, "Human Resource Management", 8th Edition, Wiley, 2007.
3. Luis R.Gomez-Mejia, David B.Balkin, Robert L Cardy, “Managing Human Resource”, PHI Learning, 2012.
4. Bernadin, "Human Resource Management”, 8th edition, Tata Mcgraw Hill, 2012.
5. Wayne Cascio, “Managing Human Resource”, McGraw Hill, 2007.
6. Ivancevich, “Human Resource Management”, McGrawHil,l 2012.
7. Uday Kumar Haldar, Juthika Sakar, "Human Resoruce Management", Oxford, 2012.

CA8017 M-COMMERCE L T P C
3 0 0 3

COURSE OBJECTIVES:
- To understand Mobile Business strategies.
- To understand Mobile marketing tools and techniques.
- To know about Mobile technologies.

UNIT I INTRODUCTION 9
Introduction – Mobile Marketing Campaign - Fortune 500 and Mobile Marketing - Consumers Engagement with Mobile Terminologies.

UNIT II MOBILE MARKETING 9
Businesses Vs Mobile Marketing - Classic Mistakes in Mobile Marketing - Laying Foundation for Successful Mobile Marketing Campaign - Understanding Technology behind Mobile Marketing – Android – iOS - Windows Phone.

UNIT III MOBILE MARKETING TOOLS 9
Strategic thinking about Mobile Marketing Campaign - Mobile Marketing Tools – Setting up Mobile Website for Different Firms using SMS - MMS And Apps - To Drive Customers to Business and Other Ways to Attract Customers.

UNIT IV MOBILE APPLICATIONS 9
Location Based Marketing – LBS – NFC - Bluetooth and LBA - 2D Codes – Tablet - Other Mobile Applications - Business Firms Connecting To Customers Using Mobile – Case Study - Mobile Marketing For B2B Companies - Mobile E-Commerce to Drive Revenue.

UNIT V MOBILE APPLICATION DEVELOPMENT 9
Mobile Payments - Present and Future Mobile Technology - Mobile Application Development.

TOTAL:45 PERIODS

COURSE OUTCOMES:
Upon Completion of the course, the students should be able to:
- Analyze various mobile marketing strategies.
- Market Mobile based Applications.
- Apply various tools in mobile marketing.

REFERENCES:

1. Jeanne Hopkins, Jamie Turner, “Go Mobile: Location Based Marketing, Apps, Mobile Optimized Ad Campaigns, 2D codes and other Mobile Strategies to Grow your Business”, John Wiley&Sons Inc., 2012.
2. Paul Skeldon, “M- Commerce”, Crimson Publishing, 2012.
3. Norman Sadeh, “M-Commerce Technologies, Services and Business Models", Wiley, 2002.
4. Paul Mary, Tom Jell, “Mobile Commerce, Opportunities, Applications and Technologies of Wireless Business", Cambridge University Press, 2001.

CA8018 OPERATIONS RESEARCH L T P C
3 0 0 3

COURSE OBJECTIVES:

This course aims at providing the necessary basic concepts of a few deterministic optimization techniques, queuing theory, simulation and applies them to various engineering problems.

UNIT I QUEUEING MODELS 9+3

Markovian Queues - Steady state analysis of Single and Multi-server Models - Little’s Formula - Finite and Infinite capacity models - Machine Interference Model - Self-service Queue.

UNIT II LINEAR PROGRAMMING 9+3

Formulation - Graphical solution - Simplex method - Two-phase method - Transportation and Assignment Models.

UNIT III NON-LINEAR PROGRAMMING 9+3

Constrained Problems - Equality constraints - Lagrangean Method - Inequality constraints – Karush-Kuhn-Tucker (KKT) conditions - Quadratic Programming.

UNIT IV DYNAMIC PROGRAMMING 9+3

Dynamic programming - Principle of optimality - Forward and backward recursion – Applications of dynamic programming - Problem of dimensionality.

UNIT V SIMULATION MODELLING 9+3

Monte Carlo Simulation - Types of Simulation - Elements of Discrete Event Simulation - Generation of Random Numbers - Applications to Queuing systems.

L: 45 +T: 15 TOTAL: 60 PERIOD

COURSE OUTCOMES:

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

- Have a clear perception of the power of mathematical programming tools and acquire skills to analyze queuing models.
- Demonstrate the application of the operations research techniques to problems drawn from industry, management and other engineering fields.

REFERENCES:

1. Taha H.A., “Operations Research: An Introduction”, Ninth Edition, Pearson Education, New Delhi, 2010.
2. Gupta P.K. and Hira, D.S., “Operations Research“,Revise Edition, S.Chand & Company Ltd., 2012.
3. Ravindran A., Don T. Phillips and James J. Solberg, “Operations Research”, Second Edition, Wile India Edition, 2006.
4. Sharma J. K., “Operations Research”, Third Edition, Macmillan Publishers India Ltd., 2009.

CA8019 PROFESSIONAL PRACTICES L T P C
3 0 0 3

COURSE OBJECTIVES:

- To make the students aware of their responsibilities and duties as a computer professional.
- To acquaint and help the students to analyze the social implications of the rapid computerization.
- To gain knowledge about the ethical issues involved in computing, and improve communication skills.

UNIT I INTRODUCTION 9

History of Computing - Social Context of Computing – Privacy – Profiling – Anonymity - Data Matching – Mining - Censorship - offensive Materials.

UNIT II PROFESSIONAL ETHICS AND RESPONSIBILITIES 9

Methods and Tools of Moral Analysis - Professional and Ethical Responsibilities - Risks and Liabilities of Computer-Based Systems - Computer Crime - Computers and Work - Broader Issues on the Impact and Control of Computers - Professional Ethics and Responsibilities Surveillance - Data Protection and Encryption - Computers in Workplace - Computer Crime and Legal Issues.

UNIT III INTELLUCTUAL PROPERTY RIGHTS 9

Intellectual Property - Privacy and Civil Liberties - Privacy Enhancing Technology – OPS - P3P - Filtering - Blocking – Rating - Computer Crimes - Economic Issues in Computing – Monopolies - Labor and Computing.

UNIT IV FRAMEWORKS 9

Philosophical Frameworks - Encryption - Identification - Anonymization - Information Technology and the Law.

UNIT V COMPUTER ETHICS 9

Introduction - Why Computer Ethics - Philosophical Bases for Computer Ethics - Professional Ethics - Privacy laws - Information Ethics - On-line Ethics - The Meaning of Ethics - Professional Ethics - Social Ethical and Professional Issues in Computing - Computer Crime - Software Theft - Hacking and Viruses - Unreliable Computers - The Invasion of Privacy - Artificial Intelligence and Expert Systems - Computerizing the Workplace - Property Rights and Intellectual Property - Reliability and safety of computer systems - Accountability and responsibility in Information Technology – Freedom - Information and Images - Censorship of the Internet - Intellectual Property - Privacy - Responsibility - What Computers Should Not Do - Quality of Life and Work - Virtual Reality – Minds – Machines - and Morality - Unwrapping the Gift - Privacy and Personal Information - Encryption and the Interception of Communications - Can We Trust the Computer - Freedom of Speech in Cyberspace - Intellectual Property.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Make students aware of their responsibilities and duties as a computer professional.
- Acquaint and help students to analyze the social implications of the rapid computerization.
- Adopt the ethical issues involved in computing, and improve communication skills.

REFERENCES:

1. John Weckert and Douglas Adeney, “Computer and Information Ethics”, Greenwood Press, 1997.
2. G. D. Johnson, “Computer Ethics”, 3rd Edition, Prentice-Hall, 2003.
3. S. Al-Fedaghi, “Professional and Computer Ethics”, Kuwait University Press, 2003.

CA8020 **REAL TIME SYSTEMS** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To learn the fundamentals of real time computing systems.
- To understand real time databases.
- To familiarize with real time reliability techniques.

UNIT I INTRODUCTION **9**

Introduction - Issues in Real Time Computing - Structure of a Real Time System - Task Classes - Performance Measures for Real Time Systems - Estimating Program Runtimes - Task Assignment and Scheduling - Classical Uniprocessor Scheduling Algorithms - Uniprocessor Scheduling of IRIS Tasks - Task Assignment - Mode Changes - and Fault Tolerant Scheduling.

UNIT II PROGRAMMING LANGUAGES AND TOOLS **9**

Programming Language and Tools – Desired Language characteristics - Data Typing- Control structures - Facilitating Hierarchical Decomposition - Packages - Run-time (Exception) Error handling - Overloading and Generics - Multitasking - Low Level Programming - Task scheduling - Timing Specifications - Programming Environments - Run-time Support.

UNIT III REAL TIME DATABASES **9**

Real time Databases - Basic Definition - Real time Vs General Purpose Databases - Main Memory Databases - Transaction priorities - Transaction Aborts - Concurrency Control Issues - Disk Scheduling Algorithms - Two-Phase Approach to improve Predictability - Maintaining Serialization Consistency - Databases for Hard Real Time systems.

UNIT IV COMMUNICATION **9**

Real-Time Communication - Communications Media - Network Topologies Protocols - Fault Tolerant Routing - Fault Tolerance Techniques - Fault Types - Fault Detection - Fault Error containment Redundancy - Data Diversity - Reversal Checks - Integrated Failure handling.

UNIT V EVALUATION TECHNIQUES **9**

Reliability Evaluation Techniques - Obtaining Parameter Values - Reliability Models for Hardware Redundancy - Software Error Models - Clock Synchronization - Clock - A Nonfault -Tolerant Synchronization Algorithm - Impact of Faults - Fault Tolerant Synchronization in Hardware - Fault Tolerant Synchronization in Software.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Design and Implement real time applications.
- Apply real time communication techniques in networks.
- Evaluate reliability in real time applications.

REFERENCES:

1 C.M. Krishna, Kang G. Shin, “Real-Time Systems”, McGraw-Hill International Editions, 1997.
2 Stuart Bennett, “Real Time Computer Control-An Introduction”, Second edition, Prentice Hall PTR, 1994.
3 Peter D. Lawrence, “Real time Micro Computer System Design – An Introduction”, McGraw Hill, 1988.
4 S.T. Allworth and R.N. Zobel, “Introduction to real time software design”, II Edition, Macmillan, 1987.
5 R.J.A Buhur, D.L. Bailey, “An Introduction to Real-Time Systems”, Prentice-Hall
6 International, 1999.
7 Philip.A.Laplante “Real Time System Design and Analysis”, III Edition, PHI, April 2004.

CA8021 SOFTWARE QUALITY MANAGEMENT L T P C
3 0 0 3

COURSE OBJECTIVES:

- To give a clear picture on quality management, documentation and control for software quality.
- To provide knowledge on standards, models and tools used for quality management.
- To understand how to perform measurement and assessment of software quality.

UNIT I BASICS OF SOFTWARE QUALITY 9

Introduction to Software Quality - Establishment of a Software Quality Program - Software Quality Assurance Planning - Software Quality Assurance Management.

UNIT II CONTROLLING AND DOCUMENTING 9

Documentation - Reviews and Audits - Problem Reporting and Corrective Action – Defect prevention and removal - Code Control - Media Control - Supplier Control – Records - Collection - Maintenance and Retention - Training - Risk Management.

UNIT III QUALITY STANDARDS 9

Need for standards – ISO 9000 Series – ISO 9000-3 for software development – CMM and CMMI – Comparison of the ISO 9000 Model with SEI Vs CMM - Six Sigma concepts - Integration Pattern - The PTR Submodel - The PTR Arrival and Backlog Projection Model - Reliability Growth Models - Criteria for Model Evaluation - In-Process Metrics and Reports - Orthogonal Defect Classification – Applying Seven Basic Quality Tools in Software Development.

UNIT V QUALITY METRICS AND ASSESMENT 9

Fundamentals of Measurement Theory - Software quality Metrics overview – Availability Metrics – Conducting In-Process quality assessment - Conducting software project Assessments.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Learn how to document, control and manage software quality with the aid of tools and standards.
- Practice the process of measurement and assessment to ensure Software Quality.

REFERENCES:

1. Stephen H. Kan, “Metrics and Models in Software Quality Engineering”, Pearson Education (Singapore) Pte Ltd., 2002.
2. Mordechai Ben – Menachem and Garry S.Marliss, “Software Quality”, CL EMEA, 2009.
3. Allan C. Gillies, “Software Quality: Theory and Management”, Thomson Learning, 2003.
4. Mary Beth Chrissis, Mike Konrad and Sandy Shrum, “CMMI”, Pearson Education (Singapore) Pte Ltd, 2003.

CA8022 SOFTWARE RELIABILITY AND METRICS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To introduce the basics of software reliability.
- To illustrate how to perform planning, execution and testing for software reliability.
- To learn about various metrics and models of software reliability.

UNIT I INRODUCTION TO RELIABILITY CONCEPTS 9

Problem - Process and Product - The Software Reliability Engineering Process – Learning Reliability Concepts – Software Reliability and Hardware Reliability.

UNIT II OPERATING PROFILES 10

Implementing Operational Profiles - Developing Operational Profiles - Using the Graphical Representation of the Operational Profile - Applying the Module Usage Table - Learning Operations and Run Concepts - Applying Operational Profiles.

UNIT III EXECUTION AND TESTING 9

Failure - Faults and Testing - Defining Failure - Failure Intensity – Software Safety- Failures – Faults - and Errors – Availability - Test - Preparing and Executing.

UNIT IV FUNDAMENTALS OF MEASUREMENTS 8

Measurements in Software Engineering – Scope of Software Metrics – Fundamentals of Measurements Theory – Goal Based Framework – Software Measurement Validation.

UNIT V METRICS AND MODELS 9

Measurement of Internal Product Attributes – Size and Structure – External Product Attributes - Reliability Model – Exponential Distribution and Reliability Growth Model – Availability Metrics.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Learn reliability concepts, metrics and models used to evaluate the software reliability.
- Work with planning, execution and testing of software for reliability.

REFERENCES:

1. John D. Musa, “Software Reliability Engineering”, Tata McGraw Hill, 2004.
2. Norman E. Fenton, Shari Lawrence Pfleeger, "Software metrics", Second Edition, International Student Edition, 2003.
3. John D. Musa, Anthony Iannino, Kazuhira Okumoto, “Software Reliability – Measurement, Prediction, Application, Series in Software Engineering and Technology”, McGraw Hill, 1987.
4. Stephen H. Kan, “Metrics and Models in Software Quality Engineering”, Second Edition, Addison-Wesley Professional, 2002.

CA8023 TCP/IP DESIGN AND IMPLEMENTATION L T P C

3 0 0 3

COURSE OBJECTIVES:

- To understand the interaction between TCP/IP suite and OS.
- To study about the complicated data structures that are used to implement the various protocols.
- To learn about the routing methodologies within AS and across AS.
- To study about the timer management of TCP in detail.
- To learn the implementation of ICMP and IGMP.

UNIT I INTRODUCTION 9

Internetworking – Necessity and Concepts – Structure of TCP/IP Software in OS – Process synchronization - IPC and Device drivers – Network Interface Layer – Logical state - Local host interface and Buffer management – Multiplexing and demultiplexing packets – Reference model vs Interface Address discovery and binding – Data structures for ARP Cache.

UNIT II OTHER PROTOCOLS 9

Address discovery and binding – Data structures for ARP Cache – Output processing - Input processing - Cache management and Configuration Parameters for ARP and RARP – Table Construction Protocols – Forwarding Protocols.

UNIT III IP IMPLEMENTATION 9

IP global software organization – Routing table – Data Structures - Routing algorithms – Fragmenting Datagrams – Data structures for reassembly – Adding fragment to the list – Discarding during overflow – Reassembly – Building a datagram from fragments - Maintenance of fragment lists.

UNIT IV ICMP & IGMP 9

ICMP Message Formats – Handling and Redirecting ICMP messages – Buffer allocation – Generation of messages – Error avoidance – IGMP – Multicast group member information – Searching - Adding and Removing members – Multicast Router – Membership Reports.

UNIT V TCP IMPLEMENTATION 9

Data structure and input processing – transmission control blocks – Output processing – 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

COURSE OUTCOME:

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

- Design a sample protocol stack.
- Come up with more efficient data structures for the protocols.
- Embed the protocol suite in a better and secure way in the OS.
- Come up with the variants of TCP according to the applications.
- Modify IP according to the applications.

REFERENCES:

1. Douglas E Comer, “Internetworking with TCP/IP Principles, Protocols and Architecture”, Vol V edition 2006 and Vol 2, III Edition, 1999.
2. W.Richard Stevens, “TCP/IP Illustrated”, Vol 1. Pearson Education, 2003.
3. Forouzan, “TCP/IP Protocol Suite” Second Edition, Tata MC Graw Hill, 2003.
4. W.Richard Stevens “TCP/IP Illustrated” Volume 2, Pearson Education, 2003.

CA8024 **UNIX INTERNALS** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To understand the design of the UNIX operating system.
- To become familiar with the various data structures used.
- To learn the various low-level algorithms used in UNIX.

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.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Design and implement any subsystem of an operating system.
- Modify the existing data structures of Linux kernel.
- Modify the existing subsystem of Linux kernel and rebuild it.
- Design and implement new data structures and algorithms for the kernel of an operating system.
- Critically analyze different data structures and algorithms used in the building of a kernel.

REFERENCES:

1. Maurice J. Bach, “The Design of the Unix Operating System”, First Edition,Pearson Education, 1999.
2. B. Goodheart, J. Cox, “The Magic Garden Explained”, Prentice Hall of India,1986.
3. 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.

CA8025 USER INTERFACE DESIGN L T P C
3 0 0 3

COURSE OBJECTIVES:

- To know about the user.
- To learn the importance of best interface.
- To know about object oriented user interface (OOUI).
- To know about the merging of PC interface with Internet Web browser interfaces.

UNIT I FOUNDATIONS OF USER INTERFACE DESIGN 9

Designing quality software user interface – user experiences and expectations – software user interface – user interface models – psychology of humans and computer – golden rules of user interface design.

UNIT II USER INTERFACE EVOLUTION 9

Computer standards and user interface guidelines – software usability testing – command lines and menus – graphical user interface.

UNIT III OBJECT- ORIENTED USER INTERFACE 9

Introduction – basic of OOUIs – core skills needed for OOUIs – user interface architecture behind OOUIs – OOUIs and the user's model – User's Memory load – Semantics of OOUIs – migrating from GUI to OOUIs.

UNIT IV USER INTERFACE DESIGN PROCESS 9

An iterative user interface design process – Design Team approach – User involved and learner – Centered design – Four-phase Interface design process – Iterative nature of interface design – Case Study – Gather and analyze user information – Design the user interface – Construct the user interface – Validate the user interface – Testing – evaluation.

UNIT V ADVANCED USER INTERFACE TECHNIQUES AND TECHNOLOGIES 9

Interface Designer's Tool kit – Uses of color – Audio and animation in the user interface - top ten usability – Problems with GUI and OOUIs – Help - advisors - wizards and multimedia – Social user interface and intelligent agents – The new worlds of PC – internet user interfaces.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Design an efficient User interface with required information.
- Analyze user requirements thoroughly.
- Implement Object oriented approach in interface design.

REFERENCES:

1. Theo Mandel; "The Elements of user Interface Design" John wiley & sons, Inc 1997
2. Wilbent. O. Galitz, " The Essential Guide To User Interface Design", John Wiley & Sons, 2001.
3. Deborah Mayhew, "The Usability Engineering Lifecycle", Morgan Kaufmann, 1999.
4. Alan Cooper, "The Essential Of User Interface Design", Wiley, 2002.
5. Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale, "Human – Computer Interaction", Third Edition, Pearson, 2004.
6. Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, "Research Methods in Human Computer Interaction," Wiley, 2010.
7. Ben Shneiderman and Catherine Plaisant, "Designing the User Interface: strategies for Effective Human Computer Interaction", Addison– Wesley, 5th Edition, 2009.

CA8026 VIRTUALIZATION TECHNIQUES L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the concept of virtualization.
- To understand the various issues in virtualization.
- To familiarize the students with the types of virtualization.
- To compare and analyze various virtual machines products.

UNIT I OVERVIEW OF VIRTUALIZATION 10

Basics of Virtualization - Virtualization Types – Desktop Virtualization – Network Virtualization – Server and Machine Virtualization – Storage Virtualization – System-level or Operating Virtualization – Application Virtualization - Virtualization Advantages - Virtual Machine Basics – Taxonomy of Virtual machines - Process Virtual Machines - System Virtual Machines – Hypervisor - Key Concepts.

UNIT II SERVER CONSOLIDATION 8

Hardware Virtualization – Virtual Hardware Overview - Sever Virtualization – Physical and Logical Partitioning - Types of Server Virtualization – Business cases for Sever Virtualization – Uses of Virtual server Consolidation – Planning for Development –Selecting server Virtualization Platform.

UNIT III NETWORK VIRTUALIZATION 10

Design of Scalable Enterprise Networks - Virtualizing the Campus WAN Design - WAN Architecture - WAN Virtualization - Virtual Enterprise Transport Virtualization – VLANs and Scalability - Theory Network Device Virtualization Layer 2 - VLANs Layer 3 VRF Instances Layer 2 - VFIs Virtual Firewall Contexts Network Device Virtualization – Data Path Virtualization Layer 2 - 802.1q - Trunking Generic Routing Encapsulation – IPSec -L2TPv3 Label Switched Paths - Control-Plane Virtualization – Routing Protocols - VRF -Aware Routing Multi-Topology Routing.

UNIT IV VIRTUALIZING STORAGE 8

SCSI - Speaking SCSI - Using SCSI buses – Fiber Channel – Fiber Channel Cables – Fiber Channel Hardware Devices – iSCSI Architecture – Securing iSCSI – SAN backup and recovery techniques – RAID – SNIA Shared Storage Model – Classical Storage Model – SNIA Shared Storage Model – Host based Architecture – Storage based Architecture – Network based Architecture – Fault tolerance to SAN – Performing .Backups – Virtual tape libraries.

UNIT V VIRTUAL MACHINES PRODUCTS 9

Xen Virtual machine monitors - Xen API – VMware – VMware products - Vmware Features – Microsoft Virtual Server – Features of Microsoft Virtual Server .

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Create a virtual machine and to extend it to a virtual network.
- Discuss on various virtual machine products.
- Compile all types of virtualization techniques and utilize them in the design of virtual machines.

REFERENCES:

1. William von Hagen, “Professional Xen Virtualization”, Wrox Publications, January, 2008.
2. Chris Wolf, Erick M. Halter, “Virtualization: From the Desktop to the Enterprise”, A Press 2005.
3. Kumar Reddy, Victor Moreno, “Network virtualization”, Cisco Press, July, 2006.
4. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and David Marshall, Wade A. Reynolds, “Advanced Server Virtualization: VMware and
5. Microsoft Platform in the Virtual Data Center”, Auerbach Publications, 2006.

CA8027 VISUALIZATION TECHNIQUES L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the importance of data visualization.
- To know the different types of visualization techniques.
- To create various visualizations.

UNIT I INTRODUCTION 9

Introduction – Issues – Data Representation – Data Presentation – Common Mistakes in design.

UNIT II FOUNDATIONS FOR DATA VISUALIZATION 9

Visualization stages – Experimental Semiotics based on Perception Gibson's Affordance theory – A Model of Perceptual Processing – power of visual perception -Types of Data -visualization and data objects.

UNIT III COMPUTER VISUALIZATION 9

Non-Computer Visualization – Computer Visualization - Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Interacting with visualization.

UNIT IV MULTIDIMENSIONAL VISUALIZATION 9

One Dimension – Two Dimensions – Three Dimensions – Multiple Dimensions – Trees – Web Works – Data Mapping - Document Visualization – Workspaces.

UNIT V CASE STUDIES 9

Small interactive calendars – Selecting one from many – Web browsing through a key Hole – Communication analysis – Archival analysis.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Compare various visualization techniques.
- Design creative visualizations.
- Apply visualization over different types of data.

REFERENCES:

1. Colin Ware, "Information Visualization Perception for Design", 2nd edition, Margon Kaufmann Publishers, 2004.
2. Robert Spence "Information visualization – Design for interaction", 2nd Edition, Pearson Education, 2007.
3. Stephen Few, "Information Dashboard Design-The Effective Visual Communication of Data", 1st Edition, O'Reilly Media Publisher, 2006
4. Stuart.K.Card, Jock.D.Mackinlay and Ben Shneiderman, "Readings in Information Visualization Using Vision to think", Morgan Kaufmann Publishers.

CA8028 **XML AND WEB SERVICES** **L T P C**
3 0 0 3

COURSE OBJECTS:

- To learn the basics of XML technology.
- To understand the background of distributed information system.
- To analyze and design a web service based application.
- To learn the security features of web services and service composition.

UNIT I XML FUNDAMENTALS 9

XML – structuring with schema DTD – XML Schema – XML Processing DOM – SAX – Presental XSL – Transformation XSLT – XPath – XQuery.

UNIT II DISTRIBUTED INFORMATION SYSTEM 9

Distributed information system – Design of IB – Architecture of IB – Communication in an IS – Middleware RPC – TP monitors – Object brokers – Message oriented middleware – EAI – EAI Middleware – Workflow – Management – benefits and limitations – Web technologies for Application Integration.

UNIT III WEB SERVICES 9

Web Services – Definition – Web Services and EAI – Web Services Technologies – web services Architecture – SOAP – WSDL – UDDI – WS-Addressing – WS-Routing – WS-Security – WS-Policy – Web Service invocation framework - web services using java – WS using .NET - mobile web service.

UNIT IV XML SECURITY 9

XML Security and meta framework - XML signature – XML Encryption – SAML – XKMS – WS-Security – RDF – semantic Web service.

UNIT V SERVICE COMPOSITION 9

Service Coordination and Composition coordination protocols – WS-Coordination – WS-Transaction – RosttaNet – ebXML –WSCI – Service Composition – Service Composition Models – Dependencies between coordination and composition – BPEL – Current trends

. **TOTAL: 45 PERIODS**

COURSE OUTCOMES:

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

- Create, validate, parse, and transform XML documents.
- Design a middleware solution based application.
- Develop web services using different technologies.
- Compose set of web services using BPEL.

REFERENCES:

1. Gystavo Alonso, Fabio casasi, Hareemi kuno, vijay machiraju, “Web Services – Concepts, Architecture and Applications”, Springer, 2004.
2. Ron Schmelzer etal, “XML and Web Services”, Pearson Education, 2002.
3. Sandeep Chatterjee and James Webber, “Developing Enterprise web services: An Architect’s and Guide”, Practice Hall, 2004.
4. Freunk p.coyle, “XML, web Services and the Data Revolution”, Pearson, 2002.