MAHARISHI MAHESH YOGI VEDIC VISHWAVIDYALAYA

DIRECTORATE OF DISTANCE EDUCATION

MMYVVDDE

Syllabus

MASTER OF COMPUTER SCIENCE
M.Sc. (CS)

w. e. f. July 2012

M.Sc. (CS) SEMESTER – I

S. No.	Paper Code	Paper No.	Paper Name	Marks
1.	1DMCS1	I	Maharishi Vedic Science – I	100
2.	1DMCS2	II	Operating System Concepts	100
3.	1DMCS3	III	Computer System Architecture	100
4.	1DMCS4	IV	Programming Fundamentals using C	100
5.	1DMCS5	V	System Analysis and Design	100
6.	1DMCS6	VI	Practical – 1DMCS3 and 1DMCS4	100

M.Sc. (CS) SEMESTER – II

S. No.	Paper Code	Paper No.	Paper Name	Marks
1.	2DMCS1	I	Maharishi Vedic Science – II	100
2.	2DMCS2	II	Data Structure and File Structure using C	100
3.	2DMCS3	III	Computer Networks	100
4.	2DMCS4	IV	RDBMS using Oracle	100
5.	2DMCS5	V	Software Engineering	100
6.	2DMCS6	VI	Practical – 2DMCS2 and 2DMCS4	100

M.Sc. (CS) SEMESTER – III

S. No.	Paper Code	Paper No.	Paper Name	Marks
1.	3DMCS1	I	Object Oriented Programming using C++	100
2.	3DMCS2	II	Internet and Java Programming with GUI	100
3.	3DMCS3	III	Principles of Complier Design	100
4.	3DMCS4	IV	Artificial Intelligence	100
5.	3DMCS5	V	Data Warehousing and Data Mining	100
6.	3DMCS6	VI	Practical – 3DMCS1 and 3DMCS2	100

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M.Sc. (CS) SEMESTER – IV

S. No.	Paper Code	Paper No.	Paper Name	Marks
1.	4DMCS1	I	Advanced .NET Programming	100
2.	4DMCS2	II	Object Oriented Modeling and Design using UML	100
3.	4DMCS3(A or B or C)	III (A or B or C)	Select any one from Optional Papers	100
4.	4DMCS4	IV	Practical - Practical – 4DMCS1 and 4DMCS2	100
5.	4DMCS5	V	Project	200

Optional Papers

Paper Code	Paper No.	Paper Name
4DMCS3(A)	III (A)	E - Technologies
4DMCS3(B)	III(B)	Enterprise Resource Planning
4DMCS3(C)	III (C)	Mobile Computing

The students who have got lateral entry in Third Semester through PGDCA will have to pass following additional papers in Third and Fourth Semester respectively.

In Third Semester

Paper Code	Paper Name
1DMCS2	Operating System Concepts

In Fourth Semester

Paper Code	Paper Name
2DMCS2	Data Structure and File Structure Using C

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FUNDAMENTALS OF MAHARISHI VEDIC SCIENCE

(MAHARISHI VEDIC SCIENCE –I)

PG COURSES

UNIT – I

Meaning of Guru Pujan

Name of 1-20 areas of Vedic Science & their expression in Human Physiology, detail with diagram

Consciousness – Characteristics and types.

UNIT – II

Maharishi's Yoga – Principles of Yoga Asans , A general Introduction of TM, TM & TM Sidhi Program

Types of Speech

UNIT – III

Third law of Thermodynamics, Miessiner Effect, Maharishi Effect

UNIT – IV

Introduction to Maharishi's Vedic Swasthya Vidhan, Theories of Dincharya & Ritucharya, Theories of Ayurved.

UNIT – V

Theory of Invincibility. Introduction to Maharishi Jyotish.

Suggested Readings:

Maharishi Sandesh -1and 2 -His Holiness Maharishi Mahesh Yogijee
Scientific Yoga Ashanas –Dr.Satpal.
Chetna Vigyan- His Holiness Maharishi YogiJee.
Dhyan Shailly by Brahmchari Dr. Girish Ji

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OPERATING SYSTEM CONCEPTS

UNIT- I: - What is an operating system simple batch systems, Multiprogrammed Batched systems. Time-sharing systems, Personal Computer systems Parallel systems, Distributed and Real Time systems, Computer –system operation, I/O structure, storage structure, storage hierarchy, Hardware Protection, General-system Architecture.

UNIT –II:- System components, operating – system services Operating System as resource manager, system calls, system programs, system structure, virtual machines, system design and Implementation, system Generation, Process Concept , Process scheduling, operation on process, Cooperating processes, Interposes communications.

UNIT- III: - Basic concept of CPU scheduling, scheduling criteria, scheduling Algorithms, Algorithms evaluation, Process synchronization, the critical section problem, synchronization hardware, semaphores, classical problem of synchronization, Critical regions, monitors, Case studies problem of dead lock in processor management, Methods for handling deadlock.

UNIT- IV: - Memory management, logical Vs physical Address space, swapping contiguous, Allocation, paging, segmentations, segmentation with paging, Demand paging performance of demand paging. Replacement Algorithm page, Thrashing, Demand segmentation, secondary-storage structure and Disk scheduling algorithms.

UNIT –V: - File-system structure, Access methods, Directory structure, protection, Allocation methods, Free-space management, directory implementation, efficiency and performance, Recovery Goals of protection, Domain of protection, Access matrix implementation of Access matrix.

Text Books :-

1. Operating System Concept (IVth ed.) by Silbersantz and Galvin (Addition Wesly)

Reference Books :-

1. Operating system Principles By P. B. Hansen, P.H.I.
2. An introduction to operating system design N. Haberman, Galgotia publication

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COMPUTER SYSTEM ARCHITECTURE

UNIT-I:

Data types and number System , Binary number system ,Octal & Hexa-decimal number system , I's& 2's complement ,Binary Fixed –point Representation , Arithmetic operation on Binary number , Overflow & underflow ,Floating Point Representation , codes ,ASCII, EBCDIC codes , Gray code , Gray code ,Excess -3& BCD, Error detection & correction codes.

UNIT-II:

Logic Gate , AND , OR NOT gates and their truth tables , NOR, NAND & XOR gate , Boolean Algebra , basic Boolean law's , Demorgan's theorem , MAP simplification , Minimization technique , K-Map , sum of product & product of sum.

UNIT-III:

Combination & Sequential circuit , half adder & full adder , full subtractor, Flip –flops RS, D ,JK, & T flip-flops ,shift register , RAM and ROM , Multiplexer , Demultiplexer , Encoder, Decoder, Idea about Arithmetic Circuit , program control , instruction Sequencing.

UNIT-IV:

I/O Interface , properties of simple I/O devices and their controller, Isolated versus memory-mapped I/O , Mode of Data transfer, Synchronous and Asynchronous data transfer, handshaking, Asynchronous serial transfer , I/O Processor.

UNIT-V:

Auxiliary memory, magnetic Drum , disk & tape ,semi- conductor memories ,Memory Hierarchy , Associative Memory , Virtual Memory ,Address space & Memory Space , Address mapping page tables , page replacement , cache memory , hit ratio , mapping , hit ratio ,mapping technique, Writing into Cache

Suggested Reading:

Barite, Digital computer fundamental TMH Publication ISBN 0-07-003899-6

Melvin, Digital computer Electronic TMH Publication ISBN 0-07-462235-8

Morris Mano, Computer system architecture PHI publication ISBN 81-203-0417-9

MYVDE

PROGRAMMING FUNDAMENTALS USING C

UNIT-I: An overview: Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithms & flowcharts; Characteristics of a good program - accuracy, simplicity, robustness, portability, minimum resource & time requirement modularization; Rules/ conventions of coding, documentation, naming variables; Top down design; Bottom-up design.

UNIT-II: Fundamentals of C Programming: History of C; Structure of a C Program; Data types; Constant & Variable, naming variables; Operators & expressions; Control Constructs - if-else, for, while, do-while; Case switch statement; Break, continue, exit(), goto & labels, Arrays; Formatted & unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.

UNIT-III: Modular Programming: Functions; Arguments; Return value; Parameter passing - call by value, call by reference; Return statement; Scope, visibility and lifetime rules for various types of variable, static variable; Calling a function; Recursion - basics, comparison with iteration, types of recursion- direct, indirect, tree and tail recursion, when to avoid recursion, examples.

UNIT-IV: Advanced Programming Techniques: String; Pointer v/s array; Pointer to pointer; Array of pointer & its limitation; Function returning pointers; Pointer to function, Function as parameter; Structure -basic, declaration, membership operator, pointer to structure, referential operator, self referential structures, structure within structure, array in structure, array of structures; Union - basic, declaration; Enumerated data type; Typedef; command line arguments.

UNIT-V: Miscellaneous Features: File handling and related functions; printf & scanf family; C preprocessor- basics, #Include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef; Variable argument list functions.

Text Books:

1. Kerninghan & Ritchie, "The C Programming Language", PHI
2. Programming in Ansi C by E. Balaguruswamy, TMH, 2004
3. Let us C Yaswant Kanetkar, BPB publications
4. Gottfried:"Problem solving in C",Schaum Series
5. How to solve it by Computer by R.G. Dromey (P.H.II),1994

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SYSTEM ANALYSIS AND DESIGN

Unit – I

Introduction to SAD: Fundamentals of System, Important Terms related to Systems, Classification of Systems, Real Life Business Subsystems, Real Time Systems, Distributed Systems, Development of a successful System and Various Approaches for development of Information Systems. Structured Analysis and Design Approach, Prototype, Joint Application Development.

Systems Analyst-A Profession: Why do Businesses need Systems Analysts? Users, Analysts in various functional areas, Systems Analyst in Traditional Business, Systems Analyst in Modern Business, Role of a Systems Analyst Duties of a Systems Analyst, Qualifications of a Systems Analyst, Analytical Skills, Technical Skills, Management Skills, Interpersonal Skills.

Unit – II

Process of System Development: Systems Development Life Cycle, Phases of SDLC, Project Identification and Selection, Project Initiation and planning, Analysis, Logical Design, Physical Design, Implementation, Maintenance, Product of SDLC Phases, Approaches to Development, Prototyping, Joint Application Design, Participatory Design, Case Study.

Introduction to Documentation of Systems : Concepts and process of Documentation, Types of Documentation, System Requirements Specification, System Design Specification, Test Design Document, User Manual, Different Standard for Documentation, Documentation and Quality of Software, Good Practices for Documentation.

Unit – III

Process of System Planning : Fact finding Techniques, Interviews, Group Discussion, Site Visits, Presentations, Questionnaires, Issues involved in Feasibility Study, Technical Feasibility, Operational Feasibility, Economic Feasibility, Legal Feasibility, Cost Benefit Analysis, Preparing Schedule, Gathering Requirements of System, Joint Application Development, Prototyping.

Modular and Structured Design: Design Principles, Top Down Design, Bottom Up Design, Structure Charts, Modularity, Goals of Design, Coupling, Cohesion.

System Design and Modeling : Logical and Physical Design, Process Modeling, Data Flow Diagrams, Data Modeling, E-R Diagrams, Process Specification Tools, Decision Tables, Decision Trees, Notation Structured English, Data Dictionary.

Unit – IV

Forms and Reports Design : Forms, Importance of Forms, Reports, Importance of Reports, Differences between Forms and Reports, Process of Designing Forms and Reports, Deliverables and Outcomes, Design Specifications, Narrative Overviews, Sample Design, Testing and Usability Assessment, Types of Information, Internal Information, External Information, Turnaround Document, General Formatting Guidelines, Meaningful Titles, Meaningful Information, Balanced Layout, Easy Navigation, Guidelines

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for Displaying Contents, Highlight Information, Using Color, Displaying Text, Designing Tables and Lists, Criteria for Form Design, Organization, Consistency, Completeness, Flexible Entry, Economy, Criteria for Report Design, Relevance, Accuracy, Clarity, Timeliness, Cost.

Physical File Design and Data base Design: Introduction to Database design, Flat files vs. Database, Steps in Database Design, ER model to Database Design, Inputs to Physical Database Design, Guidelines for Database Design, Design of Data Base Fields, Types of Fields, Rules for Naming Tables and Fields, Design of Physical Records, Design of Physical Files, Types of Files, File Organization, Design of Database, Case Study.

CASE Tools for Systems Development : Use of CASE tools by organizations, Definition of CASE Tools, Use of CASE tools by Organizations, Role of CASE Tools, Advantages of CASE Tools, Disadvantages of CASE Tools, Components of CASE, Types of CASE Tools, Classification of CASE Tools, Reverse and Forward Engineering, Visual and Emerging CASE tools, Traditional systems development and CASE based systems development, CASE environment, Emerging CASE Tools, Objected oriented CASE tools, Creating documentation and reports using CASE tools, Creating and executable prototype using Object Oriented CASE tools, Sequence Diagrams.

Unit – V

Implementation and Maintenance of Systems: Implementation of Systems, Conducting System Tests, Preparing Conversion Plan, Installing Databases, Training the end users, Preparation of User Manual, Converting to the new System, Maintenance of Systems, Different Maintenance activities, Issues involved in Maintenance.

Audit and Security of Computer Systems : Definition of Audit, Objectives of Audit, Responsibility and Authority of the System Auditor, Confidentiality, Audit Planning, Audit of Transactions on Computer, Transaction Audit, Audit of Computer Security, Audit of Application, Benefits of Audit, Computer Assisted Audit Techniques, Audit Software, Test Data, Audit Expert Systems, Audit Trail, Computer System and Security issues, Analysis of Threats and Risks, Recovering from Disasters, Planning the contingencies, Viruses, Concurrent Audit Techniques, Need for Concurrent Audit, Techniques, An Integrated Test Facility, Techniques, The Snapshot Techniques, SCARF, Continuous and Intermittent, Simulation Technique.

Management Information Systems : Role of MIS in an organization, Different kinds of Information Systems, Transaction Processing System, Management Information System, Decision Support System, Expert System.

An Introduction : Modern Science and Vedic Science, Unified Field based Computer Science.

TEXT & REFERENCE BOOKS:

- **System Analysis and Design,** Elias M. Awad ,Galgotia Publications (P) Ltd.
- **System Analysis and Design.** Interactional Ed. Perry Edward McGraw Hill Publications.
- **Information Technology & Computer Applications,** by V.K. Kapoor, Sultan Chand & Sons, Delhi.
- System Analysis and Design, A. Mansoor, Pragya Publication.

ADVANCED CONCEPT OF MAHARISHI VEDIC SCIENCE

(MAHARISHI VEDIC SCIENCE –II)

UNIT – I

Name of 21-40 areas of Vedic Science & their expression in Human Physiology and detail with diagram.
Consciousness, types of consciousness, characteristics of higher stages of consciousness.

UNIT – II

Introduction to Maharishi Gandharva Veda
Introduction to Maharishi Sthapatya Ved

UNIT – III

Introduction to Maharishi Vedic Management
Fundamental Elements of Vedic Management:- Totality
Ideal Management in Indian Society (Ashram Vavstha :Cast, Religious)
Management Science and Art.

UNIT – IV

Maharishi Absolute theory of Defence.
Maharishi Absolute theory of Development.
Maharishi Absolute theory of Information.

UNIT – V

Maharishi's Swasthya Vidhan.
Scientific Research based on T.M. & T.M. Sidhi Programme.

Suggested Readings:

Maharishi Sandesh -1and 2 , II-His Holiness Maharishi Mahesh YogiJee
Scientific Yoga Ashanas –Dr.Satpal.
Chetna Vigyan His Holiness Maharishi YogiJee.
Dhyan Shailly by Brahmchari Dr. Girish Ji

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DATA STRUCTURE AND FILE STRUCTURE USING C

UNIT- I :- Information and its storage representation, nature of information, transmission of information, storage of information, primitive data structure, operations on data structure, integer, real numbers, character information, logical and pointer information, representation and manipulation, storage representation of strings, string manipulation application, text handling analysis.

UNIT- II: - Linear Data structure and their sequential representation, Non- primitive data structures, storage structure for arrays, stacks, definition and operations on stacks, application of stack, recursion, polish expressions and their manipulation, Queues, operations on queues, simulation, priority queues, linked storage representation, pointers and linked allocation, linked linear lists, operations on linked lists, circulatory linked list, doubly links list, application of linked lists, polynomial manipulation, linked dictionary, multiple precision arithmetic.

UNIT- III :- Nonlinear Data Structures: Trees, definitions and concepts of general trees and binary trees, representation of binary trees, binary tree representation of general tree, binary tree traversal, Threaded binary trees, operation on binary trees, application of trees, binary search trees, evaluation of binary search trees, AVL trees, B.B. trees, M. Way search trees and B-trees, B* trees. Graphs and their representation, matrix representation, list structure, other representation of graphs, Breadth first search, depth first search, application of graphs, dynamic storage management.

UNIT- IV :-Sorting and Searching : Notation and concepts, selection sort, bubble sort, merge sort, tree sorts, partition exchange sort, radix sort, address calculation method, Summary of Sorting Methods, Searching Hash-table method, Hashing functions, Collision resolution techniques, external sorting, run list sorting, polyphase sorting, oscillating sorting sorting on disks, generating extended initial runs.

UNIT-V :- File Structure: Magnetic tapes, drums, disks, Mass storage devices and their characteristics, record organization, sequential file structure and processing of fixed sequential files (ISAM, direct files, structure and processing, external searching, multi list organization, inverted list organization, controlled list Length, cellular partitioned structures, maintenance of multilist, inverted list, maintenance of constrained list and cellular structures.

Text Books:-

1. J.P.Trembley & P.G. Sorrenson: An Introduction to Data Structures with Application, Mc-Graw Hill.
2. E.S.Loomis: Data Management and File Processing, P.H.I.

Reference Books-:

1. H.W.Sahnis: Fundamentals of Data Structures, Comp. Sc. Press.
2. D.E.Knuth : The Art of Computer Programing,Addision Wesly.

MYNOTE

COMPUTER NETWORKS

UNIT-I

Users of Computer Network, Network Hardware, Network software, Protocol Hierarchies, Design issue for the layers, Interfaces and services, connection oriented and connection-less services, service primitives, the relationship of services, to protocols, Reference Models, comparison of OSI and TCP/IP Reference models, Data communication services, SMDS, X.25, Frame Relay, Broadband ISDN, ATM and comparison of services.

UNIT-II

Physical layer, Theoretical Basis for data communication, Bandwidth-limited signals. Maximum Data Rate of a Channel, Transmission media, Magnetic media, Wireless, Transmission, The telephone systems, Narrowband and Broadband ISDN and ATM, communication satellites.

UNIT-III

Data Link layer, Design issues, Services provided to the Network layer, error detection and correction, elementary data link protocols, sliding window protocols, Protocol specification and verification, Case studies, HDLC and the Data link layer in the Internet.

UNIT-IV

Network layer design issues, routing algorithms, the optimality principle, shortest fath routing, Flooding, Flow-based Routing, Distance-vector and link-state routing broadcast and Multicast Routing, Congestion control algorithms, general principles of congestion control, Traffic shaping, choke packets, load shedding, jitter control.

UNIT-V

The transport layer, The transport service, Quality at service, Transport service Primitives, Addressing establishing a connection, Releasing a connection, Flow-Control and Buffering, Multiplexing, crash Recovery, The Internet Transport protocols, TCP service model, TCP protocol, TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management UDP.

Text Books:

Computer Networks, third edition, 1997 A.S. Tanenbanm, P.H.I.

Reference Books:

Data and Computer Communication 1996 William Stallings, P.H.I.

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RELATIONAL DATA BASE MANAGEMENT SYSTEM USING ORACLE

UNIT-I:- INTRODUCTION: -Advantages of DBMS approach, various views of data, data independence, Schema & sub-schema, Primary concepts of data models, Database languages, Transaction management, Database administrator & uses, data dictionary, Overall system architecture.
ER MODEL: - Basic concept, Design issues, Mapping constraints, Keys, ER diagram, weak & strong entity sets, specialization & generalization, aggregation, inheritance, design of ER schema, Reduction of ER schema to tables.

UNIT –II: - DOMAIN RELATIONS & KEYS: - Domains, Relations, Kinds of relation, relational databases, various types of keys, candidate, primary, alternate & foreign Keys.
RELATION ALGEBRA & SQL :- The structure, relation algebra with extended operations, Modification of database, idea of relational calculus, Basic structure of SQL, set operation, Aggregate function, Null values, Nested sub queries, Derived relations, views modification of database, Join relations, DDL & SQL .

UNIT– III:- FUNCTIONAL DEPENDENCIES & NORMALIZATION: Base definitions, Trivial & non-Trivial dependencies, Closure set of dependencies & of attributes, Irreducible set of dependencies, introduction to normalization, Non- loss decomposition, FD diagram of I, II & III NF, Dependencies prevention, BCNF, Multi-valued dependencies prevention's, BCNF, Multi-valued dependencies & ANF, Join dependencies & 4NF. DATABASE INTEGRITY :-General idea, Integrity rules, Domain rules, Attribute rules, Relation rules, Database rule, assertions, triggers, Integrity & SQL.

UNIT -IV: - DISTRIBUTED DATABASES: - Basic idea, distributed data storage, Data replication, Data Fragmentation, horizontal, vertical & mixed fragmentation. EMERGING TRENDS IN DBMS :- Object – Oriented database- Basic idea & the model Object structures Object, Class, inheritance, multiple object identity, Data warehousing terminology, definitions, characteristics, Data mining & its overview, Database on www, multimedia database difference with conventional DBMS, issues, similarity based retrieval continuous media data, multimedia data formats, video servers.

UNIT- V: - NETWORK & HIERARCHICAL MODEL: Basic idea , Data structure diagram, DBTG model, implementation, Tree structure diagram, Implementation techniques, comparison of three models.
TRANSACTION CONCURRENCY & RECOVERY:- Basic concept, ACID properties, Transaction state, Implementation of atomicity & durability concurrent executions, Basic idea of serializability, Basic idea of concurrency control, Basic idea of deadlock, Failure, classification, storage structure - types, stable storage implementation, data access, Recovery& Atomicity – Log based recovery, deferred database modifications, immediate database modifications, checkpoints.

Text Books:-

1. Henry F.Korth & A. Silbershatz: Data System Concepts. Mc-GrawHill.
2. Arun K. Majumdar & P.Bhattacharya: Data Base Management System. TMH

References Books:-

1. Bipin C. Desai: An Introduction to Database System, Galgotia Pub. Co.Ltd.
2. Jeffrey O. Ullman: Principles of Database Systems, Galgotia Pub. Co.Ltd.
3. James Martin: Principles of Database Management . PHI
4. James Martin, Computer Database organization. PHI

SOFTWARE ENGINEERING

UNIT - I

Software Engineering Fundamentals: Definition of Software, The birth of s/w engineering, Software development paradigms, software Characteristics and Applications. Software Development life cycle, water fall model, Prototyping, Incremental & Spiral model, 4th Generation Techniques etc.

Software Processes: Processes projects and products, Component software processes, characteristics of a software process, software Development Process, project management process, software configuration management process, software configuration management process, process management process.

UNIT - II

Software requirement Analysis and Specification: Software requirement, need for SRS, requirement process, problem analysis, analysis issues. Informal approach, structured analysis, object oriented modeling, other modeling approaches, prototyping, requirement specification, characteristics of an SRS, component of an SRS, specification languages, structure of requirement document validation requirement reviews, other method metrics, size measures, quality metrics.

UNIT - III

Planning Software Project:- Cost estimation, uncertainties in cost estimation, building cost estimation models, on size estimation, COCOMO model, project scheduling, average duration estimation, project scheduling and milestones, staffing and personnel planning, ayleigh curve, personnel plan, team structure, software configuration management plans, quality assurance plans, verification and validation, project monitoring plans, risk management.

UNIT - IV

Function Oriented Design:- Design principles, coupling, cohesion, design notation and specification, structured design methodology, verification, network metrics, stability metrics, information flow metrics Software Testing.

Testing Methods: Software testing fundamentals, test case design, white box testing, control structure testing, black-box testing, testing for specialized environments.

Software Testing Strategies: A Strategic Approach to software testing, strategic issues, unit testing, validation testing, system testing, the art of debugging.

UNIT - V

Re-Engineering: Software re-engineering, software maintenance, software reengineering process model, reverse engineering, reverse engineering user interfaces, restructuring, code restructuring, data restructuring, forward engineering the economics of reengineering.

Client/Server software Engineering: The structure of client/server systems, software engineering for c/s systems, analysis modeling issues, design for C/S systems, testing issues.

Computer-Aided software Engineering: What is case, building blocks for case, a taxonomy of case tools, integrated case environments, the integration architecture, the case repository.

Text Books:

1. Pressman Roger, Software, Engineering: A Practitioner's Approach Tata McGraw Hill, New Delhi.
2. Jalote Pankaj, An Integrated Approach to Software Engineering Narosa, New Delhi.

Reference Books:

1. R.E. Fairly. Software Engineering Concepts. McGraw Hill, Inc 1985.
2. Poyce, Software Project Management, Addison-Wesly.
3. Sommerville , Software Engineering, Addison-Wesly.

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OBJECT ORIENTED PROGRAMMING USING C++

UNIT-I PRINCIPLES OF OBJECT-ORIENTED PROGARAMMING: Object-Oriented Programming Paradigm, Basic Concepts of Object- Oriented Programming, Benefits of OOPs, Object-Oriented Languages, Applications of OOP, C++ Statements, Class, Structure of C++, Program, Creating the Source File, Compiling and Linking.

UNIT-II TOKENS, EXPRESSIONS AND CONTROL STRUCTURES: Introduction Tokens, Keywords, Identifiers, Basic Data types, User Defined Data Types, Derived Data Types, Symbolic Constants, Type Compatibility, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Dereferencing Operators, Manipulators, Type Cast Operator, Expressions and Implicit Conversions, Operator Precedence, Control Structures.

UNIT-III CLASSES AND OBJECTS: Specifying a class, Defining Member Function, making an Outside Function Inline, Nesting of Member function, private member function, Arrays within a class, Memory Allocation for Objects, Static Data Member, Static Member Functions, Arrays of Objects, Object as Function Arguments.

CONSTRUCTORS AND DESTRUCTORS: Introduction, Constructors, parameterized Constructors, Multiple Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructors, Dynamic Constructors and Destructor.

UNIT-IV FUNCTIONS IN C++: The Main Function, Function Prototyping, call by Reference, Return by reference, Inline Functions, Default Argument, Const. Arguments, Function Overloading, Friend and Virtual Function.

OPERATOR OVERLOADING AND TYPE CONVERSIONS: Introduction, Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators Using Friends, Manipulation of strings using operators, Rules for Overloading Operators, Type conversions.

UNIT-V INHERITANCE: EXTENDING CLASSES: Introduction, Defining Derived Classes, Single Inheritance Making a Private Member Inheritable, Multilevel Inheritance, Multiple Inheritance ,Hierarchical Inheritance, Hybrid Inheritance.

POINTERS, VIRTUAL FUNCTIONS AND POLYMORPHISM: Compile time Polymorphism, run time polymorphism, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.

TEXT & REFERENCE BOOKS:

Object Oriented Programming with C++ by E. Balaguruswami. TMH Publications ISBN 0-07-462038-x

Object Oriented Programming in C++ by Nabajyoti Barakati SAMS PHI Pvt. Ltd.

Insights into OOPS & C++. Rajeshwar Shukla, Pragya Publications .

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INTERNET AND JAVA PROGRAMMING WITH GUI

UNIT-I-

Understanding the Internet, what in the Internet, How TCP/IP makes the Internet work, who runs the Internet, Overview of the Internet, Services like E-mail, WWW, FTP, Telnet etc. Domain Name System (DNS), Simple Network Management, Protocols (SNMP),Internet security, Cryptography, Public-key algorithms, Authentication Protocols, Digital Signature, Multimedia, Audio, Video, Data Compression.

UNIT-II-

Java History, Java features, How Java differs from C and C++, Java and Internet, Java and WWW, Hardware and Software requirements, Java environments, Simple Java Program, Java Program Structure, Java Tokens, Java statements, Implementations a Java Program, Java virtual machine, Constants, variables and data types.

UNIT-III-

Operators and expressions, Arithmetic, Relational, Logical Bitwise operators, operator precedence and Associativity various control flow statement like if ….. else, switch while, do, for etc. classes object and methods, Inheritance extending a Class, Visibility control, Arrays strings and vectors.

UNIT-IV-

Interfaces, Multiple inheritance defining Interfaces, extending Interfaces, Implementing Interfaces, Accessing Interface variables, Java API Packages, Naming Conventions, Creating packages, Accessing a package, Adding a class to a package, Hiding classes. Multi threaded programming, Creating threads, extending thread class, life cycle of a Thread, Thread exception, Thread priority.

UNIT-V-

Exceptions, exception Handling in Java, Applet programming, Applet life Cycle, creating executable Applet, Applet Tag, Running an applet, passing parameters to applet, Graphics programming, GUI Concepts in Java, managing Input / Output files in Java.

Text Books:-

1. Programming with JAVA, A Primer. E. Balaguruswamy Publisher: Tata Mc-Graw Hill publication.
2. Computer Networks By A.S.Tanenbaum, P.H.I.

Reference Books:-

1. The Complete reference Java 2, 3rd Edi. By Patrick Naaghton, Herbert, Schild Tata Mc-Graw Hill.
2. Exploring Java : Patrick Nieaneyer and Joshna Peck O, Reilley S Associates, Inc.
3. Hareliy Hahn Teacher the Internets, 1999 By Harley Hahn, P.H.I.

PRINCIPLES OF COMPILER DESIGN

Unit-I
Compiler and Translators, why do we need translators, the structure of Compiler, Lexical Analysis, Syntax analysis, Intermediate code generation, Book keeping, error handling.

Unit-II
Finite Automata and Lexical analysis, The role of the lexical analyzer, regular expressions, finite automata, from regular expression to finite automata, minimizing the number of states of a DFA, A Language for specifying lexical analyzer, implementation of lexical analyzer using lex.

Unit-III
Context- free grammars, derivation of parse trees, capabilities of CFGs, Parsers, shift-reduce parsing, operators precedence parsing, top -down parsing, Predicitive parsing, LR parsers, The canonical collection of LR (0) items, constructing SLR parsing tables, constructing canonical LR parsing tables, constructing LALR parsing tables, Simple parsing exercises using Yacc.

Unit-IV
Syntax-directed translations schemes, implementation of syntax directed translators, intermediate code, postfix notation, parse trees and syntax trees, three-address code, quadruples, and triples, translations of assignment statements, Boolean expressions, statements that alter the flow of control, cost fix translations, translation with the top- down parser.

Unit-V
Symbol tables, the contents of symbol tables, data structures for symbol tables, representing scope information, run time storage administration, implementation of a simple stack allocation schemes, implementation of block structured languages, storage for block - structured languages.

Text Books:
1. Principles of Compiler Design by Alfred V. Aho., Jeffrey D. Ulman.
2. “Compilers: Principles, Techniques and Tools” Aho, Ravi Sethi, Ullman, Pearson Education, VIII Ed. 2002.

Reference Books:-
1. Lex and Yacc by Johan R. levine, Tonny Mason, et. al. O” Reilly and Assosiates.
2. “Compilers Design in C” Allen I. Holub, PHI eastern economy edition 2003.

ARTIFICIAL INTELLIGENCE

UNIT-I:
What is Artificial Intelligence, what is an AI technique, criteria for success, Problems, problem spaces and search, Production system, Problem characteristics, Hill-climbing, Best-First search, AO algorithm, constraint satisfaction.

UNIT-II:
Natural language Processing, Introduction, overview of linguistics, Grammars and language, Basic Parsing techniques, Semantic analysis and representation, structure, Natural Language generation, Natural Language systems (Chapter 12, Dan w Paterson).

UNIT-III:
Knowledge Representation Issues, Approaches to knowledge Representation, Representing simple facts in logic, computable functions and predicates, Procedural vs declarative knowledge, forward vs Backward Reasoning matching, control knowledge.

UNIT-IV:
Expert systems, Rule-Based system architecture Non-production system Architecture, dealing with uncertainty, knowledge acquisition and validation, knowledge system Building tools. (Chapter 15, Dan W Patterson).

UNIT-V:
Pattern Recognition, Recognition and classification process, learning classification Patterns, Recognizing and understanding speech.

Text Books :
1. Artificial Intelligence Elaine Rich and Kevin Knight Tata Mc-Graw Hill Edition.
2. Introduction to Artificial Intelligence and expert system. Dan. W. Patterson Prentic–Hall of India.

Reference Books:
1. Principles of Artificial Intelligence by Nils J. Nilson (Narosa Publication).

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DATA WAREHOUSING AND DATA MINING

UNIT-I:
Motivation, importance, Data type for Data Mining :relation Databases, Data Warehouses, Transactional databases, advanced database system and its applications, Data mining Functionalities: Concept/Class description, Association , Analysis classification & Prediction, Cluster Analysis, Outlier Analysis, Evolution Analysis, Classification of Data Mining Systems, Major Issues in Data Mining.

UNIT –II:
Data Warehouse and OLAP Technology for Data Mining: Differences between Operational Database Systems and Data Warehouses, a multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology.

UNIT-III:
Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Primitives. Languages, and System Architectures, Concept Description: Characterization and Comparison, Analytical Characterization
.

UNIT-IV:
Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single-Dimensional Boolean Association Rules from Transactional Databases: the Apriori algorithm, Generating Association rules from Frequent items, Improving the efficiency of Apriory, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint-Based Association Mining.

UNIT-V:
Classification & Prediction and Cluster Analysis: Issues regarding , classification & prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, Applications & Trends in Data Mining: Data Mining Applications, currently available tools.

Reference Books:-
1. J., Han and M. Kamber, -Data Mining: Concept and Techniques", Morgan Kaufmann Pub.
2. Berson -Dataware housing, Data Mining& DLAP, @004, TMH.
3. W.H. Inmon - Building the Datawarehouse, 3ed, Wiley India.
4. Anahory, "Data Warehousing in Real World", PearSon Education.
5. Adriaans, "Data Mining", Pearson Education.
6. S.K. Pujari, -Data Mining Techniques", University Press, Hyderabad.

Advanced .NET Programming

UNIT-I

HTML - Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head & Body Sections, Building HTML documents, Inserting texts, Images, Hyperlinks, Backgrounds and Colour controls, Different HTML tags, Table layout and presentation, Use of front size & Attributes. List types and its tags, Use of Frames and Forms in web pages, ASP & HTML Forms.

UNIT- II

Overview of C#, C# and .NET, similarities & differences from JAVA, Structure of C# program. Language features: Type system, boxing and unboxing, flow controls, classes, interfaces, Serialization and Persistence, Serializing an Object, Deserializing an Object. Delegates and Reflection.

UNIT III

Overview of Dynamic Web page, introduction & features of ASP.NET, Understanding ASP.NET Controls, Applications, Web servers, installation of IIS. Web forms, web form controls -server controls, client controls. Adding controls to a web form, Buttons, Text Box , Labels, Checkbox, Radio Buttons, List Box. Adding controls at runtime. Running a web Application, creating a multiform web project. Form Validation: Client side validation, server Side validation, Validation Controls : Required Field Comparison Range. Calendar control, Ad rotator Control, Internet Explorer Control.

UNIT-IV

Overview of ADO.NET, from ADO to ADO.NET. ADO.NET architecture, Accessing Data using Data Adapters and Datasets , using Command & Data Reader, binding data to data bind Controls, displaying data in data grid. XML in .NET , XML basics, attributes, fundamental XML classes: Document, text writer, text reader. XML validations, XML in ADO.NET, The XML Data Documents.

UNIT-V

Web services: Introduction, State management- View state, Session state, Application state. SOAP, web service description language, building & consuming a web service. Web Application deployment. Caching. Threading Concepts, Creating Threads in .NET, managing threads, Thread Synchronization, Security features of .NET, Role based security & Code access security, permissions,

TEXT & REFERENCE BOOKS:

- *ASP.NET 3.5 BLACK BOOK (COVERS C# AND VB 2008 CODES) - DREAMTECH PUBLICATION*
- *THE COMPLETE REFERENCE ASP.NET BY MATHEW MACDONALD - TMH*
- *PROFESSIONAL ASP.NET- WROX PUBLICATION*
- *INTRODUCTION TO .NET FRAMEWORK-WORX PUBLICATION*

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Object Oriented Analysis and Design using UML

Unit-I:

Introduction: Two views of software Developments: SSAD and OOAD, Why Object – Orientation? Object and classes, Abstraction and encapsulation, Methods and Message, Interfaces , Inheritance and Polymorphism, Access Control, The Business case for OO Developments.

Object Oriented Methodologies: Object Oriented Design –Booch, Object Modeling Techniques- Rumbaugh, Object – Oriented Analysis – Coad- Yourdan, Object – Oriented Software Engineering – Ivar Jacbson,

Unit-II:

Unified Approach: Diagramming and Notational Techniques using the UML, UML Notation, {Analysis Diagramming Techniques.} == Introduction to all (ten) Diagram, {Design Diagramming Techniques},Generalization / Specialization., Aggregation and composition, Association , Cardinality, Navigability, Icons , relationships and adornments.

Object-Oriented Systems Development Process: Rational Unified Process, Four Major phases: Inception , Elaboration, Construction, Transition, Requirements Engineering: Problem analysis, Understanding Stockholders need, Type of requirements, Use-case Model : Writing Requirements

Unit-III:

Analysis: Behavioral Analysis, Domain Analysis or Business Object Analysis, Use-case Driven Object Oriented analysis: The UML approach., Develop use-case Model, Usecase Description, Documentation, Activity Diagram, Identify the classes., Introduction to different approaches for identifying classes, "Noun Phrase" approach OR ,"Conman Class Pattern" approach Or , "CRC" approach Or, Usecase Driven Approach. Containment and Composition, Aggregation, Inheritance, Sub Types and IS-A Hierarchies, Association and Link Relationships, Diagramming System Events.

Unit IV:

Design Phases: Translating Analysis Concept into Design, Optimizing classes and Objects: The Multi-tiered Architecture View, ,Mapping System functions to objects., Object to Object Visibility, Collaboration Diagram, Sequential Diagram, Specification Class Diagram, Specifying Object Interfaces, Designing the Data Access layer, Design User Interface layer, Designing System Interfaces, Controls and Security.

Unit V:

Design Refinement : Designing for Extensibility, Design for reusability, Portioning class space, Checking Completeness and correctness.

Persistent Object and Database Issues: The Cood Data Management Domain, Object Persistence, Object-oriented Database Management System, Object- Oriented verses Relational Database, Mapping object to Relational Data structure.

Testing: Introduction to Testing Strategies, Impact of Object Orientation on Testing. Testing Business Process, Design Matrix, Discovering reusable pattern.

References

1. Object Oriented Analysis and Design with Applications, Grady Booch., Benjamin / Cummings , 1994.
2. Object –Oriented Modeling and Design. – J Rumbaugh , M Blaha , W .Premerlani
3. Principles of Object- Oriented Software Development , Anton Eliens , Addison Wesley.
4. Object Oriented System Development - Ali Bahrami . McGRAW-HILL International Edition.
5. Object-Oriented Software Engineering – Ivar Jacobson Pearson Education INC
6. Applying UML And Pattern - Craig Larman Pearson Education INC 7. UML Distilled - Martin flowler Pearson Education INC

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E –TECHNOLOGIES

UNIT – I

Introduction to Electronic Commerce: Electronic Commerce– Business Models, Revenue Models, and Business Processes – Economic Forces and Electronic Commerce – Identifying Electronic Commerce Opportunities – International Nature of Electronic Commerce. **Technology Infrastructure**: The Internet and the Word Wide Web– Internet and World Wide Web – Packet – Switched Networks – Internet Protocols – Markup Languages and the Web – Intranets and Extranets – Internet Connection Options - Internet and The Semantic Web. **The Environment of Electronic Commerce:** Legal, Ethical and Tax issues.

UNIT – II

Selling on the Web: Revenue Models and Building a Web Presence – Marketing on the Web - Business– to – **Business Strategies:** From Electronic Data Interchange to Electronic Commerce –Online Auctions, Virtual Communities and **Web Protocols: –** Auction Overview – Online Auctions and Related Business – Virtual Communities and Web Portals.

UNIT – III

Web Server Hardware and Software: – Software for Web Servers – Electronic Mail (E-Mail) – Web Site and Internet Utility Programs – Web Server Hardware. **Electronic Commerce Software**: Basic Functions of Electronic Commerce Software – Advanced Functions of Electronic Commerce Software – Electronic Commerce Software for Small and Midsize Companies – Electronic Commerce Software for Midsize to Large Businesses – Electronic Commerce for Large Businesses. **Electronic Commerce Security:** -Payment Systems for Electronic Commerce-Planning for Electronic commerce.

UNIT - IV

E- Marketing: Traditional Marketing – Identifying Web Presence Goals – The Browsing Behavior Model – Online Marketing – E-Advertising - Internet Marketing Trends – Target Markets – E-Branding – Marketing Strategies. - E-security – **E-Payment Systems:** E-Customer Relationship Management: E Supply Chain Management.

UNIT – V

E-Strategy: Information and Strategy – The Virtual Value Chain – Seven Dimensions of E-Commerce Strategy – Value Chain and E-Strategy – Planning the E-Commerce Project – E – Commerce Strategy and Knowledge Management – E-Business Strategy and Data Warehousing and Data mining. **Mobile Commerce:–** Wireless Applications – Technologies for Mobile Commerce– WAP Programming Model – Wireless Technologies – Different Generations in Wireless Communication – Security issues Pertaining to Cellular Technology –M-Commerce in India. Customer – **Effective Web Design:**-Legal and Ethical Issues.

TEXT BOOKS:-

1. Gary P. Schneider, E-Commerce Strategy, Technology and Implementation, CENGAGE Learning INDIA Private Limited,. Reprint 2008 (Unit-I: Chapter 1,2,3 Unit-II: Chapter 4,5,6,7, & III Chapter – 8,9,10,11,12).

2. P.T. JOSEPH, E-Commerce an Indian Perspective Third Edition Prentice Hall of India, (Unit-IV: Chapter 4,5,6,7,8 & V – Chapter 9,10,11,12).

REFERENCE BOOKS:

1. Mike Papazologn, E-Business, Organizational and Technical Foundations, Wiley India Pvt Ltd, 2008

2. Elias M. Awad, Electronic Commerce, Prentice-Hall of India, 2008.

3. Kenneth C.Laudon, Carlo Guercio Traver E- Commerce-business, technology, society, Pearson Education 2009.

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ENTERPRISE RESOURCE PLANNING

UNIT – I

Introduction to ERP: Evolution of ERP – What is ERP? – Characteristics of ERP – Features of ERP– Need for ERP- Benefits of ERP – Enterprise – an Overview – ERP and related Technologies : Business Process Reengineering – Management Information System – Decision Support System – Executive Information System – Data Warehousing – Data Mining – On-line Analytical Processing(OLAP) – Supply Chain Management.

UNIT – II

ERP- A Manufacturing perspective: Introduction - CAD/CAM - Materials requirement planning - Bill of Material - Closed loop MRP Manufacturing resource planning – Distribution requirements planning- Production data management - Data management – Process management - Benefits of PDM. ERP Modules: Finance management – manufacturing management - Plant maintenance – Quality management – Materials management – Human resources – Sales and distribution.

UNIT – III

ERP Market: SAP AG – Baan company – Oracle corporation – People soft – JD Edwards world solution ' s company – QUAD – System software associates Inc. (SSA). ERP Implementation life cycle: Pre evaluation screening – Package evaluation – Project planning phase – Gap analysis – Re-Engineering – Configuration – Implementation team training – Testing - End – user training – Post Implementation.

UNIT – IV

Selection of ERP: Difficulty in selecting ERP – Approach to ERP selection – "Request For Proposal" approach – Proof of Concept (POC) approach - application of POC approach – Comparison of RFP and POC approach – Analytic Hierarchy Process approach - application of AHP in evaluation of ERP - Vendor , Consultants and Users – Future directions in ERP.

UNIT-V

Technologies in ERP Systems and Extended ERP, Case Studies Development and Analysis of ERP Implementations in focusing the various issues through Soft System approaches or qualitative Analysis tools, Learning and Emerging Issues, ERP and E-Commerce. ERP Resources on the Internet.

TEXT BOOK

1. Alexis Leon, Enterprise Resource Planning, 1999, Tata McGraw Hill. (Chapters: 1,2,3,4,5,6,7,8,9,10,11)
2. Ravi Shankar S. Jaiswal, Enterprise Resource Planning 1999, Galgotia Publications Pvt. Ltd. (Chapters: 1,9)

REFERENCE BOOK

1. Alexis Leon, ERP Demystified, 2000, Tata McGraw Hill.
2. Ashim Raj Singla, Enterprise Resource Planning, 2008, Cengage Learning India Pvt. Ltd. New Delhi.
3. Brady, Manu, Wegner, "Enterprise Resource Planning", TMH

Mobile Computing

Unit I:

Introduction, Wireless Transmission and Medium Access Control: Applications, A short history of wireless communication. Wireless Transmission: Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems. Medium Access Control: Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access.

Unit II:

Telecommunication, Satellite and Broadcast Systems: GSM: Mobile services, System architecture, Radio interface, Protocols, Localization And Calling, Handover, security, New data services; DECT: System architecture, Protocol architecture; ETRA, UMTS and IMT-2000: UMTS Basic architecture, UTRA FDD mode, UTRA TDD mode, Satellite Systems: History, Applications, Basics: GEO, LEO, MEO; Routing, Localization, Handover, Examples Broadcast Systems: Overview, Cyclic repetition of data, Digital audio broadcasting: Multimedia object transfer protocol; Digital video broadcasting.

Unit III:

Wireless LAN and ATM: Infrared vs. Radio transmission, Infrastructure and Ad hoc Networks, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, Future development; HIPERLAN: Protocol architecture, Physical layer, Channel access control. Sublayer, Medium access control Sublayer, Information bases And Networking; Bluetooth: User scenarios, Physical layer, MAC layer, Networking. Security, Link management. Wireless ATM: Motivation for WATM, Wireless ATM working group, WATM services, Reference model: Example configurations, Generic reference model; Functions: Wireless mobile terminal side, Mobility supporting network side; Radio access layer: Requirements, BRAN; Handover: Handover reference model, Handover requirements, Types of handover, Handover scenarios, Backward handover, Forward handover; Location management: Requirements for location management, Procedures and Entities; Addressing, Mobile quality of service, Access point control protocol.

Unit IV:

Mobile Network and Transport Layers: Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation , Optimizations, Reverse tunneling, Ipv6; Dynamic host

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configuration protocol, Ad hoc networks: Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics, Mobile Transport Layer: Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP.

Unit V:

Support for Mobility: File systems: Consistency, Examples; World Wide Web: Hypertext transfer protocol, Hypertext markup language, Some approaches that might help wireless access, System architectures; Wireless application protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language, WML script, Wireless telephony application, Examples Stacks with Wap, Mobile databases, Mobile agents.

References:

1. Jochen Schiller, .Mobile communications., Addison wisely , Pearson Education

2. William Stallings, .Wireless Communications and Networks.

3. Rappaort, .Wireless Communications Principals and Practices.

4. YI Bing Lin , .Wireless and Mobile Network Architectures., John Wiley

5. P. Nicopolitidis , .Wireless Networks., John Wiley

6. K Pahlavan, P. Krishnamurthy, Principles of Wireless Networks.

7. M. Richharia , .Mobile Satellite Communication: Principles and Trends., Pearson Education.

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