MASTER OF COMPUTER APPLICATIONS

FIRST SEMESTER

PAPER	SUBJECT	FULL MARK	L–T–P	CREDIT
MCA 1.1	Mathematical Foundation of Computer Science	100	3-1-0	4
MCA 1.2	Data and File Structure	100	3-1-0	4
MCA 1.3	Computer System Architecture	100	3-1-0	4
MCA 1.4	Theory of Computation	100	3-1-0	4
MCA 1.5	Computer Network	100	3-1-0	4
MCA 1.6	Data and File Structure Lab	50	0-0-6	2
MCA 1.7	Computer Network Lab	50	0-0-6	2
	TOTAL	**600**		**24**

SECOND SEMESTER

PAPER	SUBJECT	FULL MARK	L–T–P	CREDIT
MCA 2.1	Database Systems	100	3-1-0	4
MCA 2.2	Algorithm Design and Analysis	100	3-1-0	4
MCA 2.3	Operating Systems	100	3-1-0	4
MCA 2.4	Artificial Intelligence	100	3-1-0	4
MCA 2.5	Cryptography and Network Security	100	3-1-0	4
MCA 2.6	Operating Systems Lab	50	0-0-6	2
MCA 2.7	Database Systems Lab	50	0-0-6	2
	TOTAL	**600**		**24**

THIRD SEMESTER

PAPER	SUBJECT	FULL MARK	L–T–P	CREDIT
MCA 3.1	Java Programming	100	3-1-0	4
MCA 3.2	Compiler Design	100	3-1-0	4
MCA 3.3	Data Warehousing and Data Mining	100	3-1-0	4
MCA 3.4	Software Engineering	100	3-1-0	4
MCA 3.5	Computer Graphics and Animation	100	3-1-0	4
MCA 3.6	Java Programming Lab	50	0-0-6	2
MCA 3.7	Software Engineering Lab	50	0-0-6	2
	TOTAL	**600**		**24**

FOURTH SEMESTER

PAPER	SUBJECT	FULL MARK	L–T–P	CREDIT
MCA 4.1	Mobile Computing	100	3-1- 0	4
MCA 4.2	Cloud Computing	100	3-1- 0	4
MCA 4.3	Internet of Things	100	3-1- 0	4
MCA 4.4	Project Work/Dissertation	300		12
	TOTAL	**600**		**24**
	GRAND TOTAL	**2400**		**96**

**There will be a 12 weeks project work to be undertaken by the students in any Industry / Institution. At the end of the project there will an evaluation of the project for 12 credits by an External & Internal Examiner.
 A student has to pass following additional bridge courses if required.

BRIDGE COURSE

PAPER	SUBJECT	FULL MARK	L – T – P	CREDIT
MCA B.1	**Mathematical Foundation for Computer Science – I**	**100**	**40 Hours**	
MCA B.2	**Mathematical Foundation for Computer Science – II**	**100**	**40 Hours**	

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

UNIT-I

Logic Propositional Equivalences, Predicates & Quantifiers, Mathematical Reasoning, Methods Of Proof, Mathematical Induction, Recursive Definitions, Recursive Algorithms.

UNIT-II

Relations: Relation & Their Properties, N-Ary Relations And Their Application, Representing Relations , Closures Of Relations, Equivalence Of Relations, Partial Orderings, Algorithms, Complexity of Algorithms, Integers And Division, Integers And Algorithms, Application To Number Theory.

UNIT-III

Recurrence Relations, Solving Recurrence Relations, Divide And Congruent Relations, Generating functions, Inclusion-Exclusion Counting, Permutation-Combination, Pigeonhole Principle.

UNIT-IV

Algebraic Structure, Group, Ring Monoid, Homomorphism, Isomorphism, Field Symmetric Group, Group Codes, Error Detecting And Correcting Codes, Fuzzy Set.

UNIT-V

Language And Grammars, Finite State Machines With Output, Finite-State Machines With No Output, Language Recognitions, Turing Machines.

BOOKS TEXT:

T1.Kennith H.Rosen, Discrete Mathematics& Its Applications,T.M.H.

T2.Kolman And Ross, Discrete Mathematics   .

REFERENCE BOOKS:

R1.   J. L MoH, Abraham kandal, Teodore P.Baker, Discrete Mathematics For Computer Scientist & Mathematician,P.H.I..

R2.   J.P. Trembley, R. Manohar, Discrete Mathematical Structure With Applications To Computer Science, McGraw Hills International Editions.

R3.   C. L. LIU, Elements Of Discrete Mathematics , Second Edition, McGraw-Hill, New-York 1985.

DATA & FILE STRUCTURE

UNIT-I

Elementary Data Organization, Data Structures and Operations, Algorithms : Complexity, Time-Space Tradeoff, Mathematical Notation and Functions, Development of Algorithms : Notations and Analysis, Complexity of Algorithms, Asymptotic Notations for Complexity of Algorithms, Sub algorithms.

UNIT-II

Arrays : Terminology, One-Dimensional Array : Memory Allocation, Operations, Application. Multidimensional Arrays : Two-dimensional, Sparse Matrices, Three-Dimensional and n-dimensional. Stacks : Representation, Operations, Application. Queue : Representation, Structures, Applications.

UNIT-III

Linked Lists : Single Linked List : Representation in Memory, Operations. Circular Linked List, Double Linked Lists, Circular Double Linked List, Application of Linked Lists: Sparse Matrix manipulation, Polynomial Representation, Dynamic Storage Management. Memory Representation : Fixed Block Storage, Variable Block Storage. Boundary Tag System, Deallocation Strategy, Compaction.

UNIT-IV

Trees : Definitions and Concepts : Binary Trees, Properties of Binary Tree. Linear and Linked Representation of Binary Tree. Insertion, Deletion, Traversals Operations on Binary Tree.

UNIT-V

Sorting and Searching : Insertion, Selection, Bubble, Merging, Merge Sort, Heap, Quick, Radix and Hashing. Searching : Linear Searching, Binary Searching.

Text Books:

1. Samanta, D. : Classic Data Structures, (PHI), (McGraw-Hill)

2. Lipschutz, S & Vijayalaxmi Pai, G. A. : Data Structures,

Reference Book:

1. Tremblay & Sorenson : Data Structures (McGraw-Hill)
2. Aho, A. V., Hopcroft J. E. & Ullman J. D. : Data Structures and Algorithms (Pearson)

COMPUTER SYSTEM ARCHITECTURE

<u>UNIT-I</u>

Register Transfer and Microoperations: Register Transfer Languages, Arithmatic, Logic and Shift Microoperations

Basic Computer Organization : Instruction Codes, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-Output and interrupt, Design of Computer and Accumulator Logic.

<u>UNIT-II</u>

Programming the Computer : Machine Language, Assembly Language, Assembler, Program Loops, Programming Arithmetic and Logic Operations, Subroutines, Input Output Programming.

Microprogrammed Control : Control Memory, Address Sequencing, Microprogram.

<u>UNIT-III</u>

Input-Output Organization : Peripheral Devices, Input-Output interface, Modes of transfer, Priority Interrupt, Direct Memory Acess (DMA), Input Output processor(lOP)

<u>UNIT-IV</u>

 Memory Organization : Memory Hierarchy, Main Memory, Auxiliary Memory,Associative Memory. Cache Memory, Virtual Memory, Memory Management Hardware.

<u>UNIT-V</u>

Parallel Processing : Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC

Pipeline. Vector Processing, Array Processors.

Multiprocessors : Interconnection Structures, Interprocessor Arbitration,

 Interprocessor Communication and Synchronization, Cache Coherence.

<u>Text Book</u>

1. Mano. M . M.: Computer System Architecture 3/ed. (PHI)

<u>Reference Books</u>

1. Hayes, J.P. : Computer Architecture and Organization 3/ed. (Mc. Graw-Hill Int.)

2. Stallings, W. Computer Organization and Architecture 4/ed. (PHI)

Theory of Computation

Unit 1

Deterministic Finite automata, Formal definition of a finite automaton , Examples of finite automaton , Designing finite automata. Non Deterministic finite automata. Equivalence of NFA's and DFA's.

Unit 2

Formal definition of a regular expression, Regular expression with finite automata. Closure under the regular operation. Non regular languages Pumping lemma for regular languages. Decision properties of regular languages.

Unit 3

Context free languages, formal definition of context free grammar, Parsing and ambiguity in grammar, Designing context free grammars. Chomsky normal form.

Unit 4

Deterministic Push down automata, Non-Deterministic Push down automata, Equivalence with context free grammars, Non-context-free languages, the pumping lemma for context free languages, Decision properties of Context Free languages.

Unit 5

Turing machine, Programming techniques for Turing machine, Variants of Turing machines, The Halting problems, Recursively enumerable languages, A simple Undecidable problem, Post Correspondence problem.

Text Book

1. Introduction to the theory of Computation, M. Sipser

References

1.Introduction to Automata Theory Languages and Computation ,J. Hopcroft, R. Motwani and J.D. Ullman

COMPUTER COMMUNICATIONS & NETWORKING.

UNIT – I
Introduction: Uses of Computer network, Network hardware, Network Software, Reference model, Example of networks. Transmission terminology: Simplex, Half-duplex, Full duplex, frequency spectrum and bandwidth, Analog and digital data transmission, Transmission impairments, Transmission media & its characteristics.

UNIT – II
Data encoding and communication techniques, Modulation: AM, FM, PM, PCM, Asynchronous and synchronous transmission, Communication Interfaces: RS – 232C, X-21, Multiplexing: FDM, TDM, Modems, Multiplexer/demultiplexer, concentrators, Front-end processors.

UNIT – III
Data link layer: Functionality, Framing error detection and correction – FEC, REC, CRC, Hamming and other codes, MAC Sub-layer: Advantage of multiple access sharing of channels, ALOHA, CSMA, CSMA/CD, Polling based MAC protocols: Token bus and Token ring.

UNIT – IV
Network Layer: Layer Functionality, connection-oriented and connectionless service, routing-static & dynamic routing algorithms, IP-Protocols, IP-routing, Congestion control, Transport Layer: TCPAP, Elements of transport protocols: Addressing, Establishing and releasing a connection, the Internet Transport protocol – TCP and UDP.

UNIT – V
Application layer: Network Security, DNS, SNMP, E-mail and Introduction to ATM.

Books recommended:

1. Tannenbaum, A.S. "Computer networks", PHI.
2. Forouzan B.A. "Data Communication and Networking", Tata Mc Graw Hill
3. Black U, "Computer Networks – Protocols, Standards and Interfaces", PHI
4. Stallings W., "Computer Communication Networks" (4th Edition) PHI.

DATABASE SYSTEMS

UNIT-I

Database System : Database System Applications, Database Systems versus File Systems, View of Data & Data Models, Database Languages, Database Users and Administrators, Transaction Management, Database System Structure, Application Architecture. Entity-Relationship Model : Basic Concepts & Constraints, Keys, Design Issues, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R Features, Design of E-R Database Schema, Reduction of an E-R Schema to Tables, Overview of Relational Model and Relational Database Design.

UNIT-II

SQL : Basic Structure, Set Operations, Aggregate Functions, Null Values, Nested Sub-queries, Views, Complex Queries, Modification of the Database, Joined Relations, Data-Definition Language, Embedded SQL. Dynamic SQL. Integrity and Security: Domain Constraints, Referential Integrity, Assertions, Triggers, Security and Authorization, Authorization in SQL, Encryption and Authentication.

UNIT-III

Query Processing: Measures of Query Cost, Selection Operation, Sorting, Join and other Operations, Evaluation of Expressions. Query Optimization: Estimating Statistics of Expression Results, Transformation of Relational Expressions, Choice of Evaluation Plans, Materialized Views.

UNIT-IV

Object-Oriented Databases: Complex Data Types, Object-Oriented Data Model, Object-Oriented Languages, Persistent Programming Languages, Persistent C++ Systems, Persistent Java Systems. Object-Relational Databases: Nested Relations, Complex Types, Inheritance, Reference Types, Querying with Complex Types, Functions and Procedures, Object-Oriented Vs Object-Relational.

UNIT-V

Transactions: Transaction, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Transaction Definition in SQL, Testing for Serializability. Concurrency Control: Lock-Based, Timestamp-Based, Validation-Based Protocols Multiple Granularity, Multiversion Schemes, Deadlock Handling, Insert and Delete Operations, Weak Levels of Consistency, Concurrency in Index Structures. Recovery System : Failure Classification, Storage Structure, Recovery and Atomicity, Log-Based Recovery, Shadow Paging, Recovery with Concurrent Transactions, Buffer Management, Failure with Loss of Nonvolatile Storage, Advanced Recovery Techniques, Remote Backup Systems.

Text Book:

Silbcrschatz. A,. Korth, H.F., and Sudarshan.S. : Database System Concepts 4/ed. (McGraw-Hill Int.)

ANALYSIS AND DESIGN OF ALGORITHMS

UNIT-I

Growth of Functions, Summations, Recurrence

UNIT-II

Sorting and Order Statistics : Heap Sort, Sorting in Linear Time, (Counting Sort, Radix Bucket Sort, Merdian Order Statistics) , Quick Sort .

UNIT-III

Elementary Data Structures, Hash Tables, Binary Search Trees, Redblack Trees, B-Tree, Fibonacci Heaps.

UNIT-IV

Advanced Design & Analysis Techniques : Dynamic Programming, Matrix Chain Multiplications, Elements of Dynamic Programming, Longest Common Subsequence; Greedy Algorithm : An Activity Selection Problem, Elements of Greedy Strategy, Huffman Codes

UNIT-V

Flow Network, cuts, Algorithms for Parallel Computers, Matrix Operations (Strassens Algorithm for Matrix Multiplication, Algebraic Number System and Boolean Matrix Multiplication), Polynomial and FFT, Computational Geometry, NP-Completeness.

Text Book

Thomas H. Cormen et al. : Introduction to Algorithms (PHI) 2000

OPERATING SYSTEMS

UNIT- I

Operating System, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special Purpose Systems, Computing Environments, Open-Source Operating Systems. Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating System Structure, Virtual Machines, Operating System Debugging, Operating System Generations. System Boot.

UNIT- II

Process: Process Concept, Process Scheduling, Operations on Processes, Inter-Process Communication, Examples of IPC Systems, Communication in Client-Server Systems. Multithreaded Programming: Multithreading Models, Thread Libraries, Threading Issues, Operating-System Examples.

UNIT- III

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling. Multiple-Process Scheduling. Synchronization: The Critical Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Monitors, Synchronization Examples, Atomic Transactions.

UNIT- IV

Deadlocks: System Model, Deadlock Characterization, Methods of Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Recovery from Deadlock. Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Example: The Intel Pentium.

UNIT- V

Virtual-Memory Management: Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory. File System: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.

TEXT BOOK:

Operating System Concepts: Silberschatz, Galvin, Gagne, 8/e (Wiley-India)

ARTIFICIAL INTELLIGENCE

UNIT –I

Introduction to AI: Structure of Intelligent Agent, Problem Solving and Searching: BFS, DFS, IDS, Bidirectional Search, Constraint Satisfactory Search, Informed Search, Best First Search, Heuristic Function, Memory Bounded Search, A*, IDA*, Game Playing,, Min-Max search, Alpha-Beta Pruning.

UNIT – II

Knowledge and Reasoning: Agent that reason logically, First Order Logic, Syntax and Semantics. Inference in First order Logic: Inference Rules, Modus Ponens, Unification, Forward and Back Ward Chaining, Resolution and Unification.

UNIT – III

Communication and Communicating Agents. Natural Language Processing: Parsing, DCG, BNF, CSG, CFG, Syntactic Processing, Semantic Analysis, Sense Ambiguity and Disambiguation, Practical application: Machine Translation, Efficient parsing.

UNIT – IV

Introduction to Pattern Recognition: Recognition and Classification Process, Learning, Classification of Patterns, Visual Image Understanding, Image Transformation. Perceptron: Image Formation, Image Processing Operation for easy Vision, Speech Recognition: Accent Analysis.

UNIT – V

Statistical Knowledge Base: Belief Network. Perceptron: Supervised and Unsupervised Learning: Artificial Neural Network, Kohonen Neural Network, Back Propagation Neural Network. Introduction to Robotics: Tasks, Parts and Architecture.

Text Book

1. Stuart Russel & Peter Norvig: Artificial Intelligence A Modern Approach, Pearson Education.

Reference

1. Nilsson N. J.: Artificial Intelligence: A New Synthesis, Narosa Publication.
2. George F. Luger, Artificial Intelligence, Structures and Strategies for Complex Problem Solving, Pearson Education.

CRYPTOGRAPHY AND NETWORK SECURITY

UNIT–I

Overview of cryptography, substitution and affine cipher and their cryptanalysis, Perfect Security, Block cipher, Data Encryption Standard(DES), Differential and linear Cryptanalysis, Block Cipher Design Principles, Block Cipher modes of operation, Advanced Encryption Standard.

UNIT–II

Principles of Public- key Cryptosystems, The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Authentication Functions, Message Authentication codes(MAC), Hash Functions, Security of Hash Functions and MAC, Secure Hash Algorithm, HMAC.

UNIT–III

Discrete Logarithms, ElGamal Cryptosystem, Algorithm for Discrete Logaritlun Problem, security of ElGamal System, Schnorr signature scheme, Baby step-Gaint step, Chinese reminder, The ElGamal signature scheme, The digital signature algorithm, Provable secure signature schemes.

UNIT–IV

Elliptic curve over the reals, Elliptic curves modulo a prime, Properties of Elliptic curves Point compression, Computing point multiples on Elliptic curves, Elliptic curve digital signature algorithm, Elliptic curve factorization, Elliptic curve primality test.

UNIT–V

Network Security Practice: Kerberos, X.509 Authentication Service, Public Key Infrastructure. E-Mail Security (Pretty Good Privacy), IP Security (Architecture, Authentication Header, Encapsulating Security Payload, Combining Security, Associations, Key Management), Web Security (Secure Sockets Layer and Transport Layer Security).

Text Books:

1.   W.Sta1lings- Cryptography and Network Security Principles and Practice, Person Education Asia, 2000. (3rd Edition) Chapters: [1,3, 5 , 9, 10(10.1,10.2), II, 12(12.2,12.4), 13(13.3), 14,15,16,17].

2.   D.Stinsori, Cryptography: Theory and Practice, CRC press, 2006. Chapters: [1,2(2.3),6,7,12].

References:

1.   A. Menezes, P. Van Oorsch, S. Vanstans- Handbook of Applied Cryptography, CRCpress,1997.
2.   B. Schmeier- Applied Cryptography, New York, Wiley, 1996.
3.   N.Koblitz: a course in number theory and cryptography, Springer verlag.

MCA - 3.1 JAVA PROGRAMMING

UNIT I

Introduction to Java Programming Language , Data Types and Operations , Structured Programming , Selection Statements , Loops , Methods , Method Abstraction and Stepwise refinement , Arrays , Object Oriented Programming , Classes and Objects , Constructors , Implementing & Designing Classes .

UNIT II

Use of Keywords : static , final , this , C ass , Abstraction and Encapsulation , Strings and Text I/O Inheritance and Polymorphism , Use of super keyword, Overriding vs. Overloading Object, The Cosmic Super class , Abstract Classes and Interfaces , Packages , Object Oriented Design and Patterns .

UNIT III

GUI Programming : GUI Basics , Graphics , Event Driven Programming , Creating User Interfaces , Applets and Multimedia , Exception Handling , Binary I/O .

UNIT IV

Files and Streams , Recursion , Dynamic Binding , Generics and Generic Programming , Java Collection Framework , Algorithm Efficiency , Searching & Sorting .

UNIT V

Multithreading Networking , JDBC , Internationalization , Advanced GUI Programming , MVC , Java Beans and Bean Events , Containers , Layout Managers and Borders , Menus , Toolbars, Dialogs and Swing Models , JTable and JTree , New Features of Java .

Text Books

1.   Programming with Java – E. Balguruswamy
2.   JAVA , The Complete Reference - Horbert Schildt.

MCA - 3.2 COMPILER DESIGN

UNIT – I

Compilers & Translators, Need of Translators, Structure of a Compiler, Phases, Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Code Optimization, Code Generation, Book Keeping, A Symbol Table in brief, Semantic Analysis, L-value, r-values, Error Handling.

UNIT – II

Rules of Lexical Analyser, Need for Lexical Analysis, Input Buffering, Preliminary Scanning, A simple Approach to the Design of Lexical Analysers, Transition Diagrams, Regular Expression, String & Languages, Finite Automata, Non-deterministic Automata, Deterministic Automata, From regular Expression to Finite Automata, Context free Grammars, Derivations & Parse Trees, Parsers, Shift Reduce Parsing, Operator- Precedence Parsing.

UNIT – III

Symbol Table Management, Contents of a Symbol Table, Names & Symbol table records, reusing of symbol table spaces, array names, Indirection in Symbol Table entries, Data Structures for Symbol Tables , List, Self Organizing Lists, Search Trees, Hash Tables, Errors, Reporting Errors, Sources of Errors Syntactic Errors, Semantic Errors, Dynamic Errors, Lexical Phase Errors, Minimum Distance Matching, Syntactic Phase Error, Time of Detection, Ponic mode, Case study on Lex and Yacc.

UNIT – IV

Principal Sources of Optimization, Inner Loops, Language Implementation Details Inaccessible to the User. Further Optimization, Algorithm Optimization, Loop Optimization , Code Motion, Induction Variables, Reduction in Strength, Basic Blocks, Flow Graphs, DAG Representation of Basic Blocks, Value Numbers & Algebraic Laws, Global Data Flow Analysis, Memory Management Strategies , Fetch Strategy, Placement Strategies, Replacement Strategies, Address Binding, Compile Time, Load Time, Execution Time, Static Loading, Dynamic Loading, Dynamic Linking.

UNIT – V

Problems in Code Generation, a Simple Code Generator, Next-Use Information, Register Descriptors, Address Descriptors, Code Generation Algorithm, Register Allocation & Assignment, Global Register Allocation, Usage Counts, Register Assignment for Outer Loops, Register Allocation by Graph Coloring , Code Generation from DAG's, Peep-Hole Optimization, Redundant Loads & Stores, Un-Reachable Code, Multiple Jumps, Algebraic Simplifications, Use of Machine Idioms.

Reference Books

A.V.Aho, R.Sethi and J. D. Ullman - Compilers – Principles , Techniques and Tools – Addison Wesley

MCA - 3.3 Data Warehousing and Data Mining

Unit-I

Data Processing and Introduction to data ware housing:

Data cleaning, data integration and reduction, What is a data warehouse? A multidimensional data model, Data warehouse architecture. Data warehouse implementation, From data warehousing to data mining.

Unit-II

Data cube computation and data generalization, Efficient computation of data cubes, Data cube and OLAP & OLTP technology, Attribute oriented induction, An alternative data generalization method.

Unit-III

Mining frequent patterns, Association and correlations, Basic concepts and a road map. Efficient and scalable frequent item set mining methods, Mining various kinds of association rules, from association mining to correlation analysis.

Unit-IV

Classification and prediction:

Classification by decision tree induction, Bayesian classification, Classification by back propagation, Support vector machines, Prediction, Accuracy and error measures.

Unit-V

Cluster Analysis:

What is 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 methods, Clustering high dimensional data, Constraint based clustering, outlier analysis.

Text Book:

Data Mining: concepts and techniques. By Jiewei Han and Micheline Kamber.(2nd edition) Elsivear

MCA - 3.4 Software Engineering

UNIT-I

Software Processes : Software Process Models, Process Iteration, Software Specification, Design and Implementation, Project Management : Management Activities, Project Planning, Project Scheduling, Software Requirements : Functional and Non-Functional Requirements, User Requirements, System Requirements, Software Requirements Document. Requirements Engineering Processes : Feasibility Studies, Requirements Elicitation and Analysis, Requirements Validation, Requirements Management.

UNIT-II

System Models : Context Models, Behavioural Models, Data Models, Object Models Architectural Design : System Structuring, Control Models, Modular Decomposition, Domain-Specific Architectures. Object-Oriented Design : Objects and Object Classes, Object-Oriented Design Process, Design Evolution. Design with Reuse : Component-Based Development, Application Families, Design Patterns.

UNIT-III

Dependability : Critical Systems, Availability and Reliability, Safety, Security. Critical Systems Specifications : Software Reliability Specification, Safety Specification, Security Specification. Critical Systems Development : Fault Minimisation, Fault Tolerance, Fault Tolerance Architectures, Safe System Design.

UNIT-IV

Verification and Validation : Verification and Validation Planning, Software Inspections, Automated Static Analysis, Cleanroom Software Development. Software Testing : Defect Testing, Integration Testing, Object-Oriented Testing, Testing Workbenches. Critical Systems Validation : Formal Methods and Critical Systems, Reliability Validation, Safety Assurance, Security Assessment.

UNIT-V

Software Cost Estimation : Productivity, Estimation Techniques, Algorithmic Cost Modeling, Project Duration and Staffing. Quality Management : Quality Assurance and Standards, Quality Planning, Quality Control, Software Measurement and Metrices. Process Improvement : Process and Product Quality, Process Analysis and Modelling, Process Measurement, SEI Process Capability Maturity Model, Process Classification. Configuration Management: Configuration management planning, Change management, Version and release management, System building

Text Book :

Sommerville, I : Software Engineering, 6/e (Pearson Education Asia)

Reference Book

Pressman, R. S : Software Engineering, 4/e (McGraw-Hill)

MCA-3.5 Computer Graphics and Animation

Unit-I:

Introduction: Computer Graphics, application, Image Processing, Interactive Graphics, Uses of Computer Graphics, Vector Display, Raster Display. Graphics Hardware: Monochromatic and Color CRTs, Raster –Scan Display Systems. Basic Raster Graphics Algorithms for 2D –Primitives: Algorithms for Scan Converting Lines: DDA, Midpoint Line Algorithm, Scan Converting Circles. Clipping Algorithms: Cohen -Sutherland, Cyrus-Beck

Unit-II:

Geometrical Transformations: 2D Transformations, Homogeneous coordinates and matrix representation of 2D Transformations, Composition of 2D Transformation, the window to view port Transformation, Matrix representation of 3D Transformation, Composition of 3D Transformations.

Unit-III:

Viewing in 3D: Projections. types of projections, Perspective and Parallel projections, Specifying an Arbitrary 3D View, mathematics of planner geometric projections, coordinate systems. Hidden surface removal: Introduction to hidden surface removal. 1.- buffer algorithm, scanline algorithm, area sub-division algorithm.

Unit-IV:

Representing Curves and Surfaces: Parametric representation of curves: Bezier curves, B-Spline curves. Parametric representation of surfaces; interpolation method. Illumination, shading, image manipulation: Illumination models, shading models for polygons. shadows, transparency. What is an image? Filtering, image processing. geometric transformation of images.

Unit-V:

Animation: Fundamentals of computer animation. Animation Techniques. Animation and Flash Overview, Using Layer and Creating Animation

Text Book:

Foley. J. D., Van Dam, A. V., Feiner. S.K., Hughes, J.F.,
Computer Graphics Principles & Practice, 2/ed. (Pearson Education)

Reference Books:

1. Hearn, D. & Baker. M. P., Computer Graphics. 2/ed. (PHI).
2. Rogers, D.F. Mathematical Elements of Computer Graphics (McGraw-Hill hit)
3. Newman, W. & Sproul, R.F., Principles of Interactive Computer Graphics (TMH)
4. Plastock R.A. & Kalley G., Theory and Problems of COMPUTER GRAPHICS (McGraw-Hill Schaum series)
5. Computer graphics, Multimedia and Animation by Malay. K.Pakhira, PHI, 2nd Edition, 2010

MOBILE COMPUTING

UNIT-I
Personal Communications Services (PCS) Architecture, Cellular Telephony, Cordless Telephony and Low-Tier PCS, Third-Generation Wireless Systems. Wireless Transmission: Transmission concepts, Signal Propagation. Multiplexing Techniques: Space Division Multiplexing (SDM), Time Division Multiplexing (TDM), Frequency Division Multiplexing (FDM), Code Division Multiplexing (CDM), Modulation, Spread spectrum techniques, Cellular System. Medium Access Control (MAC): Issues relating to MAC, SDMA, FDMA, TDMA, CDMA.

UNIT-II

Mobility Management: Handoff, Roaming Management for SS7 and CT2. Handoff Management: Mobility detection, Channel Assignment, Hard Handoff and Soft Handoff for Radio Link Transfer. Switching: Circuit Switched Data Services on Cellular Networks, Packet Switched Data Services on Cellular Networks. Addressing Mobile quality of service, Access point control protocol.

UNIT-III

Global System for Mobile Communication (GSM): GSM Architecture, Location Tracking and Call Setup, Data Services, Protocol Model, Mobility Management, Short Message Service (SMS), Roaming Facility and Security. Analog Mobile Phone Service (AMPS): IS-136 North American TDMA Standard, IS-95: The North American CDMA Digital Cellular Standard. General Packet Radio Service (GPRS): GPRS Architecture, GPRS Network, Interfaces and Procedures.

UNIT-IV

Third Generation Mobile Services (3G): IMT-2000, W-CDMA, CDMA-2000, Quality of Service (QoS) in 3G, Wireless Operating System for 3G Handset. Wireless LAN: Infrastructure and Ad hoc networks, IEEE 802.11, Hiperlan, Blue tooth. Mobile Multimedia (MM): Wireless ATM (WATM), WATM services, Reference model

UNIT-V

Mobile Network Layer: Mobile IP, Dynamic Host Configuration Protocol (DHCP), Ad hoc Networks. Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Security features. Wireless Application Protocol (WAP): WAP Model and Architecture, WAP Gateway, WAP Protocols, Wireless Markup Language (WML). Wireless Local Loop (WLL): WLL Architecture, WLL Technologies, and WLL Products.

TEXT BOOKS:

1.   Yi-Bing Lin and Imrich Chlamtac, "Wireless and Mobile Network Architectures", 2001, John Wiley and Sons.

2.   Jochen Schiller, "Mobile Communication", 2000, Pearson Education Asia.

REFERENCE:

1.   Raj Pandya, "Mobile and Personal Communication Systems and Services", 2001, Prentice Hall of India.

2.   C.Y. William Lee, "Mobile Cellular Telecommunications: Analog and Digital System", 2nd Edition, 1997, MC Graw Hill.

CLOUD COMPUTING

Unit I Introduction to Cloud Computing: Definition, Characteristics, Components, Layered Structure of Cloud Computing , Services (SAAS, PAAS, IAAS) , Deployment Model (Public , Private , Hybrid), Cloud provider. Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Issues and Challenges in Cloud Environment . Utility Computing, Elastic Computing .

Unit II Virtualization Technology: Virtual machine technology, Study of Hypervisors , Virtual Machine Manager (VMM), Classification of Virtualization Technology: Para Virtualisation , O.S Virtualisation , Hardware Virtualisation, And Full Vitualisation , Virtual Machine Migration Concept , Virtualization applications in enterprises, Its associated issues and challenges .

Unit III Load Balancing in Cloud : Introduction to Load Balancing , Reason of Load imbalance in cloud environment , Mathematical model for Load Structure , Different Schemes for Load Balancing such as FCFS ,RR , ESCEL , Throttled , Active Monitoring , Randomise , Min-Min , Min –Max , SCH , and PSO , GA .

Unit IV Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, Big Table, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Introduction to cloud development, Example/Application of Map reduce, Features and comparisons among GFS,HDFS etc, Map-Reduce model

Unit V Cloud security :Fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud , **Cloud computing security architecture:** Architectural Considerations- General Issues, Trusted Cloud computing, Identity Management and Access control-Identity management, Access control, Autonomic Security. Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment.

Text Book:
1. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition)
2. Enterprise Cloud Computing by Gautam Shroff,Cambridge
3. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India

Reference Book:
1. Google Apps by Scott Granneman,Pearson
2. Cloud Security & Privacy by Tim Malhar, S.Kumaraswammy, S.Latif (SPD,O'REILLY)
3. Cloud Computing : A Practical Approach, Antohy T Velte, et.al McGraw Hill,
4. Cloud Computing Bible by Barrie Sosinsky, Wiley India
5. Stefano Ferretti et.al.,QoS–aware Clouds", 2010 IEEE 3rd International Conference on Cloud Computing

INTERNET OF THINGS

UNIT-I:

INTRODUCTION To IoT: Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels and Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONFYANG- IoT Platforms Design Methodology.

UNIT-II:

IoT ARCHITECTURE: M2M high-level ETSI architecture – IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

UNIT-III:

IoT PROTOCOLS: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP – Security

UNIT-IV:

WEB OF THINGS: Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

UNIT-V:

APPLICATIONS: The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments – Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.

TEXT BOOKS:

1. Arshdeep Bahga, Vijay Madisetti, ―Internet of Things – A hands-on approach‖, Universities Press, 2015.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), ―Architecting the Internet of Things‖, Springer, 2011.

REFERENCE BOOKS:
1. Jan Ho¨ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
2. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010.
3. Olivier Hersent, David Boswarthick, Omar Elloumi , ―The Internet of Things – Key applications and Protocols‖, Wiley, 2012.