

Vikram University, Ujjain

Board of studies in Computer science

Under the Faculty of Engineering Science

SYLLABUS of MCA Programme

[Choice Based Credit System & Grading System (CBCS& GS)]

Exclusively for University Teaching Department (ICS, VUU)

TWO YEAR MCA PROGRAMME of UTD (ICS, VUU)

(Effective from Academic Session 2020-21)

[Modified as according to the provision of “Ordinance 14: Choice Based Credit System”]

COURSE STRUCTURE

MCA- FIRST SEMESTER

S N	Course Type	Course code	Title	End term sem Exam	Inter nal	Max Marks	Credits*	Distribution of Credits		
								C	L	T
1	Core Course	MCA-101	Mathematical Foundation of Computer Science	60	40	100	6	4	2	
		MCA-102	Operating system & system software	60	40	100	6	4	2	
2	Course for Ability Enhancem ent & skill Developme nt (AE & SD)	MCA-103	Programming Skill Development using C and C++	60	40	100	6	4		2
Choose any one From MCA 104- E1 and 104- E2										
3	Elective Discipline Centric	MCA 104- E1	Computer organisation & Architecture	60	40	100	6	4	2	
		MCA 104- E2	System Analysis and Design	60	40	100	6	4	2	
Choose any one From MCA 105-E1 , 105-E2 and 105-E3										
4	Elective Generic Categories	MCA 105- E1	Data Communication and Computer Network	60	40	100	6	4	2	
		MCA 105- E2	Internet Programming	60	40	100	6	4		2
		MCA 105- E3	Any Course from Massive Open Online Courses (MOOCs)available at SWAYAM	60	40	100	6	4	2	
5		MCA-106	Comprehensive Viva Voce	50	-	50	04 <u>Virtual (VR)</u>			
			Total			550	<u>30+4</u>	<u>20</u>	<u>06</u>	<u>04</u>

(C=Credit Per Week) / (L = Lectures Per Week)/ (T & PW =Tutorials & Practical Work per week)

***One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial) and two hours (120 minutes) for practical**

Note: (1) The students will have the choice to opt a course under the category of Elective Courses available within the UTD (ICS, VUU) or in other UTDs but from same level of the programmes. (2)An alternative choice will also be available to the students to opt a course in each semester under elective-generic category including skill development course from Massive Open Online Courses (MOOCs) available at SWAYAM plate form. (3) The student can also opt a course under Elective- Discipline Centric category from Massive open online courses (MOOCs) available at SWAYAM plate form. In such cases, the provisions “Ordinance 14 : Choice Based Credit System” shall be applicable and the conditions mentioned therein will need to be satisfied by the student if they opt courses from Massive Open Online Courses (MOOCs) available at SWAYAM plate form.

MCA-SECOND SEMESTER

S N	Course Type	Course code	Title	End term sem Exam	Inter nal	Max Marks	Credits*	Distribution of Credits		
								C	L	T
			Core Courses				C	L	T	P
1	Core Course	MCA-201	Data Structure Using C++	60	40	100	6	4		2
		MCA-202	Data Base Management System	60	40	100	6	4	2	
2	Course for Ability Enhancem ent & skill Developme nt (AE & SD)	MCA-203	Project Management Skill with JAVA	60	40	100	6	4		2
Choose any one From MCA 204- E1 and 204- E2										
3	Elective Discipline Centric	MCA 204- E1	Software Engineering	60	40	100	6	4	2	
		MCA 204- E2	Design and Analysis of Algorithm	60	40	100	6	4	2	
Choose any one From MCA 205-E1 , 205-E2 and 205-E3										
4	Elective Generic Categories	MCA 205- E1	Computer Oriented Optimization Technique	60	40	100	6	4	2	
		MCA205- E2	Computer System Architecture and parallel Processing	60	40	100	6	4	2	
		MCA205- E3	Any Course from Massive Open Online Courses (MOOCs)availabl e at SWAYAM	60	40	100	6	4	2	
5		MCA-206	Comprehensive Viva Voce	50	-	50	04 <u>Virtual (VR)</u>	20	06	04
			Total			550	30+04			

(C=Credit Per Week) / (L = Lectures Per Week)/ (T & PW =Tutorials & Project Work per week)

*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial)and two hours (120 minutes) for practical

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MCA - THIRD SEMESTER

S N	Course Type	Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
								C	L	T
1	Core Course	MCA-301	Theory of Compiler Design	60	40	100	6	4	2	
		MCA-302	Data Mining and Data Warehousing	60	40	100	6	4	2	
2	Course for Ability Enhancement & skill Development (AE & SD)	MCA-303	Project Skill Development with Minor Project	60	40	100	6			6
Choose any one From MCA304- E1 and 304- E2										
3	Elective Discipline Centric	MCA304-E1	Computer Graphics and Multimedia	60	40	100	6	4	2	
		MCA 304-E2	Distributed Computing	60	40	100	6	4	2	
Choose any one From MCA 305-E1, 305-E2 and 305- E3										
4	Elective Generic Categories	MCA 305- E1	DOT NET Technology	60	40	100	6	4		2
		MCA 305- E2	Programming with PHP	60	40	100	6	4		2
		MCA305-E3	Any Course from Massive Open Online Courses (MOOCs)available at SWAYAM	60	40	100	6	4	2	
5		MCA-306	Comprehensive Viva Voce	50	-	50	04 <u>Virtual (VR)</u>			
			Total			550	<u>30+04</u>	<u>16</u>	<u>06</u>	<u>08</u>

C=Credit Per Week) / (L = Lectures Per Week)/ (T & PW =Tutorials &Practical Work per week)

*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial)and two hours (120 minutes) for practical

Note: (1) The students will have the choice to opt a course under the category of Elective Courses available within the UTD (ICS, VUU) or in other UTDs but from same level of the programmes. (2)An alternative choice will also be available to the students to opt a course in each semester under elective-generic category including skill development course from Massive Open Online Courses (MOOCs) available at SWAYAM plate form. (3) The student can also opt a course under Elective- Discipline Centric category from Massive open online courses (MOOCs) available at SWAYAM plate form. In such cases, the provisions “Ordinance 14 : Choice Based Credit System” shall be applicable and the conditions mentioned therein will need to be satisfied by the student if they opt courses from Massive Open Online Courses (MOOCs) available at SWAYAM plate form.

MCA- FOURTH SEMESTER

S N	Course Type	Course code	Title	End term sem Exam	Inter nal	Max Mark s	Credits*	Distribution of Credits		
								C	L	T
1	Core Course	MCA-401	Network Security	60	40	100	6	4	2	
		MCA-402	Artificial Intelligence and Machine Learning	60	40	100	6	4	2	
2	Course for Ability Enhancem ent & skill Developme nt (AE & SD)	MCA-403	Project Skill Development with Major Project	60	40	100	6			6
Choose any one From MCA404- E1 and 404- E2										
3	Elective Discipline Centric	MCA 404- E1	Internet of Things (IOT)	60	40	100	6	4	2	
		MCA 404- E2	Cloud Computing	60	40	100	6	4	2	
Choose any one From MCA 405-E1 ,405-E2 and 405- E3										
4	Elective Generic Categories	MCA 405- E1	Python Programming	60	40	100	6	4		2
		MCA405- E2	Mobile Computing	60	40	100	6	4	2	
		MCA405- E3	Any Course from Massive Open Online Courses (MOOCs)available at SWAYAM	60	40	100	6	4	2	
5		MCA-406	Comprehensive Viva Voce	50	-	50	04 Virtual (VR)			
			Total			550	<u>30+04</u>	<u>16</u>	<u>06</u>	<u>08</u>

C=Credit Per Week) / (L = Lectures Per Week)/ (T & PW =Tutorials & Practical Work per week)

*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial)and two hours (120 minutes) for practical

Note: (1) The students will have the choice to opt a course under the category of Elective Courses available within the UTD (ICS, VUU) or in other UTDs but from same level of the programmes. (2)An alternative choice will also be available to the students to opt a course in each semester under elective-generic category including skill development course from Massive Open Online Courses (MOOCs) available at SWAYAM plate form. (3) The student can also opt a course under Elective- Discipline Centric category from Massive open online courses (MOOCs) available at SWAYAM plate form. In such cases, the provisions “Ordinance 14 : Choice Based Credit System” shall be applicable and the conditions mentioned thereinwill need to be satisfied by the student if they opt courses from Massive Open Online Courses (MOOCs) available at SWAYAM plate form.

MCA 101: Mathematical Foundations of Computer Science

UNIT 1

Set Theory: Introduction, Sets and Elements, Universal Set and Empty Set, Subsets, Venn Diagrams. Relations: Introduction, Product Sets, Relations, Pictorial Representation of Relations, Composition of Relations, Types of Relations, Partial Ordering Relations.

UNIT 2

Functions: Introduction, One-to-One, Onto, and Invertible Functions, Cardinality. Logic and Propositional Calculus: Introduction, Propositions and Compound Propositions, Basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions.

UNIT 3

Counting: Introduction, Basic Counting Principles, Factorial Notation, Binomial Coefficients, Permutations and Combinations. Pigeon hole Principle.

UNIT 4

Graph Theory: Introduction, Graphs and Multigraphs, Subgraphs, Paths, Connectivity, Weighted Graphs, Complete, Regular and Bipartite Graphs. Directed Graphs: Introduction, Rooted Trees, Graph Algorithms: Depth first and Breadth-First Searches.

UNIT 5

Finite Automata & Regular Expression: Finite State Systems, Basic Definitions, Nondeterministic Finite Automata, Finite Automata with ϵ -moves, Finite Automata with Output, Two-way Finite Automata, Context-free Grammars, Derivation Trees, Simplification of Context-free Grammars.

Reference Books:

1. Elements of Discrete Mathematics, C.L.Liu, Second Edition, TMH
2. Introduction to Automata Theory, Languages & Computation, J E Hopcraft & JD Ullman, Narosa Publications
3. Discrete Mathematics and its applications, Kenneth H. Rosen, (Fifth Edition), Tata McGraw Hill Publishing Company.
4. Theory and Problems of Discrete Mathematics, Semmour Lipschutz, Marc Lipson, Second Edition, Schaum's Outline, T.M.H
5. Theory of Computer Science, KLP Mishra & N Chandra Sekhar, PHI

MCA 102: Operating System and System Software

UNIT 1

Introduction to System Programs & Operating Systems, Evolution of Operating System (mainframe, desktop, multiprocessor, Distributed, Network Operating System, Clustered & Handheld System), Operating system services, operating system structure, System Call & System Boots, Operating system design & Implementations, System protection, Buffering & Spooling. Types of Operating System: Bare machine, Batch Processing, Real Time, Multitasking & Multiprogramming, timesharing system. File: concepts, access methods, free space managements, allocation methods, directory systems, protection, organization, sharing & implementation issues.

UNIT 2

Process: Concept, Process Control Blocks(PCB), Scheduling criteria Preemptive & non Preemptive process scheduling, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling, operations on processes, threads, inter process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock: Characterization, Methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock Process Management in Linux.

UNIT 3

Memory Hierarchy, Concepts of memory management, MFT & MVT, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, and paging combined with segmentation. Structure & implementation of Page table. Concepts of virtual memory, Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation.

UNIT 4

Mass Storage Structure: Disk Structure, Disk Scheduling- FCFS, SSTF, SCAN Scheduling, Disk Management, Swap-Space Management. Distributed operating system:-Types, Design issues, File system, Remote file access, RPC, RMI, Distributed Shared Memory(DSM), Basic Concept of Parallel Processing & Concurrent Programming.

UNIT 5

System software and application software, layered organization of system software. Assemblers, Macros, Compilers, Cross compilers, Linking and loading, Relocation. Case study of Unix, Linux & Windows

Reference Books:

1. Operating Systems Concepts, A. Silberschatz, P.Galvin, G.Gagne, John Wiley & Sons, Inc.
2. Systems Programming and Operating Systems (Part II - Operating Systems), Dhamdhere, 2nd Edition, TMH
3. Donovan, J.J. : System programming, Mcgraw Hill,1972.
4. Dhamdhere. D.M.: Introduction to system software, Tata Mcgraw Hill Publ.comp. 1986

MCA 103: Programming Skill Development using ‘C’ and ‘C++’

UNIT 1

Character Set, Identifiers, Keywords, Variables, Character Strings, Typecasting, Constants, Operator and Expression, Operator Precedence and Associativity.

Control Statements: If, If-Else, Multi-way decision, Compound Statements, loops: for, while do-while, break, switch, continue statement, Arrays, Strings.

UNIT 2

Functions: Introduction, Parameter Passing: call by value, call by reference, return values, recursion vs iteration, scope extent, passing arrays and function to functions.

Pointers: Introduction, address operator, pointer variables, pointer arithmetic, pointer to pointer, array of pointers. Structures: Operations, self referential structure, array of structure.

UNIT 3

Introduction to traditional programming with C, Object Oriented Programming, Objectives of OOP, Procedural VS OOP, Concepts of Objects, Classes, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding and Message passing.

Classes and Objects: Classes, Structure & Classes, Friend Function, Friend Classes, Inline Function, Static Data Member, Static Member Function, Passing object to function, Returning objects, Array of object.

UNIT 4

Constructor and Destructor: Introduction, Default constructor, Parameterized constructor, Multiple constructor in a class, Constructor with default argument, Copy constructor, Destructor.

Function and Operator Overloading: Function overloading, Creating a member operator function, Operator overloading using friend function.

UNIT 5

Inheritance and Polymorphism: Introduction, Base and Derived Classes, Base class access control, Protected members, Single Inheritance, Multiple Inheritance, Multilevel inheritance, Hierarchical Inheritance, Hybrid inheritance. Virtual function, Virtual base classes.

Template: Class templates, Class templates with multiple parameters, Function templates, Function templates with multiple parameters, Overloading of template functions.

Reference Books:

1. Kanetkar y: Let us C.
2. Cooper, Mullish : The spirit of C. An introduction to modern programming, Jaico Publ. House, New Delhi, 1987.
3. Kenneth, A. : C problem solving and programming, Prentice Hall international.
4. Object-Oriented Programming with C++: E. Balagurusamy, TMH, 2005
5. Object Oriented Programming in C++, Robert Lafore, Galgotia Publication.
6. Object Oriented Programming, Tomothy Budd, Pearson education.

MCA 104 E1: Computer Organization and Architecture

UNIT 1

Binary Systems: Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, Complements, Binary Codes. Boolean Algebra and Logic Gates: Boolean Functions, Digital Logic Gates. Simplification of Boolean Functions: The Map Method, Two and Three Variable Maps, Four Variable Map, Product of Sums Simplification, NAND and NOR Implementation, Don't-Care Conditions.

UNIT 2

Combinational Logic: Introduction, Design Procedure, Adders, Subtractors, Code Conversion, Analysis Procedure. Combinational Logic with MSI and LSI: Binary Parallel Adder, Decoders, Multiplexers. Sequential Logic: Introduction, Flip-Flops, Triggering of Flip-Flops.

UNIT 3

Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design Procedure, Design of Counters. Processor Logic Design: Introduction, Processor Organization, Arithmetic Logic Unit, Design of Arithmetic Circuit, Design of Logic Circuit, Design of Arithmetic Logic Unit, Status Register, Design of Shifter, Processor Unit.

UNIT 4

Microcomputer System Design: Introduction, Microprocessor Organization, Basic Concept of Instruction, Instruction Types, Micro Instruction Formats and Addressing Modes, Subroutines Interrupt, Fetch and Execution cycle, Hardwired control unit, Micro-programmed Control unit- microprogram sequencer Control Memory, Sequencing and Execution of Micro Instruction.

UNIT 5

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory. Input Output Organization: Peripheral Devices, Input-Output Interface, Direct Memory Access (DMA), Input-Output Processors (IOP), Structure of Multiprocessor- Inter-processor Arbitration, InterProcessor Communication and Synchronization. Memory in Multiprocessor System, Concept of Pipelining, Vector Processing, Array Processing, RISC And CISC, Study of Multicore Processor – Intel, AMD.

Reference Books:

1. Digital Logic and Computer Design, M. Morris Mano, P.H.I., Eastern Economy Edition.
2. Computer System Architecture (3rd ed.), M.Morris Mano, P.H.I., Eastern Economy Edition.
3. Computer Architecture and Organization, J.P. Hays, McGraw Hill.
4. Digital Principle and Applications, Malvino and Leach
5. Digital Computer Fundamentals, Thomas C. Bartee

MCA 104 E2: Systems Analysis and Design

UNIT 1

System Concept: Definition, Characteristics, Elements of system, Physical and abstract system open and closed system, man-made information systems,

System Development Life Cycle: Various phases of system development, Considerations for system planning and control for system success. **System Planning:** Base for planning a system, Dimensions of Planning.

UNIT 2

Initial Investigation: Determining users requirements and analysis, fact finding process and techniques. **Feasibility study:** Determination of feasibility study, Technical, Operational & Economic Feasibilities, System performance constraints, and identification of system objectives, feasibility report.

Cost/Benefit Analysis: Data analysis cost and benefit analysis of a new system. Categories determination and system proposal.

UNIT 3

Tools of structured Analysis: Logical and Physical models context, diagram, data dictionary, data diagram, form driven methodology, IPO and HIPO charts, Gantt charts, system model, pseudo codes, Flow charts, system flow chart, run flow charts etc., decision tree, decision tables, data validation. **Input/ Output and Form Design:** Input and output form design methodologies, menu, screen design, layout consideration.

UNIT 4

Management standards Systems analysis standards, Programming standards, Operating standards. Documentation standards User Manual, system development manual, programming manual, programming specifications, operator manual. **System testing & quality:** System testing and quality assurance, steps in system implementation and software maintenance. System security: Data Security, Disaster/ recovery and ethics in system development, threat and risk analysis, System audit.

UNIT 5

Organisation of EDP: Introduction, Job Responsibilities & duties of EDP, Personnel- EDP manager, System Analyst, Programmers, Operators etc. Essential features in EDP Organization. **Selection of Data Processing Resources:** purchase, lease, rent-advantages and disadvantages. Hardware and software procurement – In-house purchase v/s hiring and lease.

Reference Books:

1. System Analysis & Design by V K Jain, Dreamtech Press
2. Modern System Analysis & Design by A Hoffer. F George- S Valaciahlow Priced Edn. Pearson Education.
3. Information Technology & Computer Applications. by V.K.Kapoor, Sultan Chand & Sons, New Delhi.

MCA 105 E1: Data Communication and Computer Networks

UNIT 1

Network goals and application, Network structure, Network services, Example of networks and Network Standardization, Networking models : centralized, distributed and collaborative. Network Topologies : Bus, Star, Ring, Tree, Hybrid : Selection and Evaluation factors.

UNIT 2

Theoretical Basis for Data communication, Transmission media, Twisted pair (UTP, STP), Coaxial Cable, Fiber optics : Selection and Evaluation factors. Line of Sight Transmission, Communication Satellites. Analog and Digital transmission. Transmission and switching, frequency division and time division multiplexing , STDM, Circuit switching, packet switching and message switching,

UNIT 3

Brief Overview of LAN (Local Area Network) : Classification. Brief overview of Wide Area Network (WAN) . Salient features and differences of LAN with emphasis on : Media, Topology, Speed of Transmission, Distance, Cost. Terminal Handling, Polling, Token passing, Contention. IEEE Standards : their need and developments.

UNIT 4

Open System : What is an Open System ? Network Architectures, ISO-OSI Reference Model, Layers : Application, Presentation, Session, Transport, Network, Data Link & Physical . Physical Layer - Transmission, Bandwidth, Signaling devices used, media type. Data Link Layer - : Addressing, Media Access Methods, Logical link Control, Basic algorithms/protocols.

UNIT 5

Network Layer : Routing : Fewest-Hops routing, Type of Service routing, Updating Gateway routing information. Brief overview of Gateways, Bridges and Routers, Gateway protocols, routing daemons. OSI and TCP/IP model. TCP/IP and Ethernet. The Internet : The structure of the Internet, the internet layers, Internetwork problems. Internet Standards.

Reference Books:

1. Tannanbaum, A.S.: Computer Networks, Prentice Hall, 1985.processing, Prentice Hall,1983.
2. Black : Computer Networks : Protocols, standords and Interfaces, Prentice Hall International

MCA 105 E2: Internet Programming

UNIT 1

Introduction to Internet Programming- Client-Server model, Browsers-Graphical and Hypertext Access to the Internet, HTTP–Hyper Text Transfer Protocol (how it actually works), The Phases of Web Site Development

UNIT 2

Creating Internet World Wide Web pages- HTML - Hypertext Markup Language , Basic HTML Concepts, HTML: Structured Language ,headers, body, html tags, tables , Text, graphics, sounds, video clips, multi-media ,Client side image mapping

UNIT 3

HTML forms programming: Building a form, Text fields and value, size, max length html buttons, radio, checkboxes, Selection lists.

CSS: Introduction To Style sheet, types of style sheets- Inline, External, Embedded CSS, text formatting properties, CSS Border, margin properties, Positioning Use of classes in CSS, color properties, use of <div>&

UNIT 4

Intro to script, types, intro of JavaScript, JavaScript identifiers, operators, control & Looping structure, Intro of Array, Array with methods, Math, String, Date Objects with methods User defined & Predefined functions, DOM objects, Window Navigator, History, Location, Event handling, Validations On Forms

UNIT 5

Intro & features of XML, XML writing elements, attributes etc. XML with CSS, DSO, XML Namespaces XML, DTD, XML Schemas, Writing Simple sheets using XSLT, SAX & DOM Parsers, SOAP Introduction.

Reference Books:

1. Joe Fawcett,Danny Ayers,Liam R.E. Quin, “Beginning XML” Wrox Press, 5th Ed., 2012
2. Deitel & Deitel, “XML how to program”, Pearson, 2000
3. Hofstetter fred , “Internet Technology at work”, Osborne pub. , ISBN : 9780072229998, 2004
4. Ivan Bayross , “HTML, DHTML, JavaScript, Perl & CGI” ,BPB pub. 3rd Ed.,2004
5. Ivan Bayross, “Web enabled commercial application development using HTML, DHTML, JavaScript, PERL-CGI”, BPB pub., 2nd Ed., 2000

MCA 201 : Data Structures Using C++

UNIT 1

Stacks and Queues: Introduction to Data Structures, ADT Stack and its implementation in C++, Evaluation of postfix expressions, ADT Queue and its implementation in C++.

UNIT 2

Searching algorithms: Linked Lists: Defining & implementing linked lists with creation, insertion and deletion operations in C++, Sequential search & Binary search algorithms, Implementation in C++.

UNIT 3

Sorting Algorithms: Implementation and Algorithm Analysis of Insertion sort, Selection sort, Merge Sort and Quick Sort.

UNIT 4

Trees and Graphs: Definition and Implementation of ADT Binary tree, AVL Trees. Definition of Graph, Representation of Graphs, Graph Traversal methods.

UNIT 5

Hash Tables, Hashing Functions, Overflow Handling, Chaining. Fields, records, files, index techniques, cylinder-surface indexing, tree indexing-B-trees, trie indexing, file organizations.

Reference Books:

1. Introduction to Data Structures and Algorithms with C ++, GLENN W.ROWE, Prentice Hall India, 2003
2. Data Structures and Algorithms, Alfred V. Aho, John E. Hopcraft, Jaffrey D. Ullman, Pearson education

MCA 202: Database Management System

UNIT 1

DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach, Advantages, of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Overall Database Structure, Functions of DBA and designer, ER data model:Entities and attributes, Entity types, Defining the E-R diagram,Concept of Generalization, Aggregation and Specialization. transforming ER diagram into the tables. Various other data models object oriented data Model, Network data model, and Relational data model, Comparison between the three types of models.

UNIT 2

Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Intension and Extension, Relational Query languages:SQL-DDL, DML, integrity constraints, Complex queries, various joins, indexing, triggers, assertions,Relational algebra and relational calculus, Relational algebra operations like select, Project,Join, Division, outer union. Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations.

UNIT 3

Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies.Query Optimization: Introduction, steps of optimization, various algorithms to implement select, project and join operations of relational algebra, optimization methods: heuristic based, cost estimation based.

UNIT 4

Transaction Processing Concepts: - Transaction System, Testing of Serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: - Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction. Introduction to Distributed databases, data mining, data warehousing, Object Technology and DBMS, Comparative study of OODBMS Vs DBMS . Temporal, Deductive, Multimedia, Web & Mobile database.

UNIT 5

Study of Relational Database Management Systems through Oracle/Postgres SQL/MySQL: Architecture, physical files, memory structures, background process. Concept of table spaces, segments, extents and block. Dedicated server, multi threaded server. Distributed database, database links, and snapshot. Data dictionary, dynamic performance view.Security, role management, privilege management, profiles, invoker defined security model. SQL queries, Data extraction from single, multiple tables equi-join, non equi-join, self-join, outer join. Usage of like, any, all, exists, in Special operators. Hierarchical queries, inline queries, flashback queries. Introduction of ANSI SQL, anonymous block, nested anonymous block, branching and looping constructs in ANSI SQL. Cursor management: nested and parameterized cursors, Oracle exception handling mechanism. Stored procedures, in, out, in out type parameters, usage of parameters in procedures. User defined functions their limitations. Triggers, mutating errors, instead of triggers

Reference Books:

1. Date C J, “An Introduction To Database System”, Pearson Educations
2. Korth, Silbertz, Sudarshan, “Fundamental of Database System”, McGraw Hill
3. Rob, “ Data Base System:Design Implementation & Management”, Cengage Learning
4. Elmasri, Navathe, “Fundamentals Of Database Systems”, Pearson Educations

MCA 203: Project Management with JAVA

UNIT 1

The Java Environment: History of Java: Comparison of Java and C++; Java as an object oriented language: Java buzzwords; A simple program, its compilation and execution; the concept of CLASSPATH; Basic idea of application and applet; **Basics:** Data types; Operators- precedence and associativity; Type conversion; The decision making – if, if..else, switch; loops – for, while, do...while; special statements–return, break, continue, labeled break, labeled continue; Modular programming methods; arrays; memory allocation and garbage collection in java keywords. **Object Oriented Programming in Java:** Class; Packages; scope and lifetime; Access specifiers; Constructors; Copy constructor; this pointer; finalize () method; arrays; Memory allocation and garbage collection in java keywords **Inheritance** : Inheritance basics, method overriding, dynamics method dispatch, abstract classes.

UNIT 2

Interfaces : defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces. **Multithreading and Exception Handling:** Basic idea of multithreaded programming; The lifecycle of a thread; Creating thread with the thread class and runnable interface; Thread synchronization; Thread scheduling; Producer-consumer relationship; Daemon thread, Selfish threads; Basic idea of exception handling; The try, catch and throw; throws Constructor and finalizers in exception handling; Exception Handling.

UNIT 3

Applets: Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTML Tags for applet.**The AWT:** The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, Choice menu, Text area, Scroll list, Scroll bar; Frame; Layout managers flow layout, Grid layout, Border layout, Card layout. **The Java Event Handling Model:** Java's event delegation model – Ignoring the event, Self contained events, Delegating. **Events:** The event class hierarchy; The relationship between interface, methods called, parameters and event source; Adapter classes; Event classes action Event, Adjustment Event, Container Event, Focus Event, Item Event, Key Event, Mouse Event, Text Event, Window Event.

UNIT 4

Input/Output : Exploring Java i.o., Directories, stream classes The Byte stream : Input stream, output stream, file input stream, file output stream, print stream, Random access file, the character streams, Buffered reader, buffered writer, print writer, serialization. **JDBC:** JDBC-ODBC bridge; The connectivity model; The driver manager; Navigating the result set object contents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

UNIT 5

Networking & RMI: Java Networking : Networking Basics : Socket, Client server, reserved sockets, proxy servers, Inet address, TCP sockets, UDP sockets. ; RMI for distributed computing; RMI registry services; Steps of creating RMI Application and an example. **Collections:** The collections framework, collection interfaces, collection classes.

Reference Books:

1. Naughton & Schildt “The Complete Reference Java 2”, Tata McGraw Hill
2. Deitel “Java- How to Program:” Pearson Education, Asia

MCA 204 E1: Software Engineering

UNIT 1

Introduction to Software Engineering : Software development, and life cycle; Project size and its categories; Planning a software project.

UNIT 2

Project control & Project team standards; Design of solution strategies; Software cost estimation and evaluation techniques.

UNIT 3

Software Design : Various Design concepts and notations; Modern design techniques; Verification and validation methods; Documentation & implementation procedures; Performance of software systems; Software metrics and models. Documentation of Project-systems, manuals and implementation.

UNIT 4

Software Reliability : Definition and concept of software reliability; software errors, faults, repair and availability; Re-availability & availability models; Use of database as a study tool.

UNIT 5

Modern Programming Language Features Relevant to Software Engineering: data abstraction, exception handling, concurrency mechanism, etc; Software development environments.

Reference Books:

1. Fairley, B.E. : Software Engineering concepts, Mcgraw- Hill 1985.
2. Lewis, T.G. : Software Engineering concepts, Mcgraw Hill,1982.
3. Kernighan,B., Plauger, P. : software tools, Addison Wesley ,1976.
4. Meyers,G. : The Art of software testing, Wiley-inter- science,1979.
5. Gehani,N : Introduction of ADA, Mcgraw Hill, 1983.

MCA 204 E2: Design and Analysis of Algorithms

UNIT 1

Introduction and Review: What is an Algorithm, Algorithm's Performance, order architecture: **Θ -Notation, O -Notation, Ω -Notation**, Algorithm Analysis: time space complexities, **Worst-case Complexity, Average-case Complexity**.

UNIT2

Divide and conquer: Structure of divide-and –conquer algorithms: examples, Binary search, quick sort, Analysis of divide and conquer, run time recurrence relations.

UNIT 3

Graph Searching and Traversal: Overview, Traversal methods: depth first and breadth first search.

Greedy Method: Overview of the greedy method, Minimum spanning trees, Single source shortest paths.

UNIT 4

Dynamic programming: The general method, principle of optimality, difference between dynamic programming and greedy method, Applications: optimal binary search trees, **Back tracking:** The general method, 8-queens problem.

UNIT 5

Branch and Bound Algorithm: The **Branch and bound** method, FIFO and LIFO branch and bound, LC (Least Cost) search, Traveling Salesman Problem, LCBB on Traveling Salesman Problem.

Reference Books:

1. Fundamentals of Computer Algorithms By Ellis Horowitz and Sartaj Sahni, Galgotia Publications.
2. Ullman “Analysis and Design of Algorithm” TMH
3. Goodman “ Introduction to the Design & Analysis of Algorithms, TMH-2002
4. Sara Basse, A.V. Gelder, “ Computer Algorithms, “ Addison Wesley
5. T.H. Cormen, Leiserson, Rivert and stein, “ Introduction of Computer algorithm, “ PHI
6. E. Horowitz, S. Sahni, and S. Rajsekar, “Fundamentals of Computer Algorithms, “ Galgotia Publication.

MCA 205 E1: COMPUTER ORIENTED OPTIMIZATION TECHNIQUES

UNIT 1

Optimization and Operations Research: Linear Simultaneous Equations, Solution of Simultaneous Equations by Gauss-Jordan method, Linear Programming: Introduction, Formulation of LP Problems, Assumptions and Applications of linear programming.

UNIT 2

Graphical Solution of LP Problems, Important geometric properties of LP Problems, Principles of simplex methods, Computational Procedure of Simplex Methods, Two Phase Method.

UNIT 3

Duality in Linear Programming: Concepts of duality, Definition of Primal-Dual Problems, General rules for Converting Primal into It's Dual, Duality Theorems, Dual simplex method, sensitivity analysis.

UNIT 4

Special types of Linear programming problems- Transportation and Assignment problems.

UNIT 5

Integer Linear Programming: Introduction, Importance of Integer Programming Problems, Definitions, Branch and Bound techniques, Computational demonstration of Branch and Bound Method.

Reference Books:

1. Hiller, F.S. & Liberman,G.J. : Introduction to Operations Research ,2nd Edn. Holdewn Day Inc. London, 1974.
2. Tara, H.A. : Operation Research,3rd Edn. McMillan Publishing Company, 1982.
3. Bightler, C.S. & Phillips ,D.T. : Foundation of Optimization, 2nd Edn. Prentice-Hall,1979.
4. McMillan Claude Jr. : Mathematical programming ,2nd Edn. Wiley series ,1979

MCA 205 E2: Computer System Architecture and Parallel Processing

UNIT 1

Programming and language : Relationship between Electronics & Programming. Flow Chart, Programming Language, assembly Language.

UNIT 2

Computer Architecture, Microprocessor Architecture, Microprocessor Families , 6502 family, 6800/6808 family.

UNIT 3

Addressing Modes, Arithmetic Instruction, Logical Instructions, 8086/8088 family.

UNIT 4

Parallel Processing : Mechanism, Parallelism in uniprocessor system, Parallel Computer Structure, Architecture Classification Scheme.

UNIT 5

Pipeline and Vector Processing : Instruction and arithmetic Pipeline, SIMD Computers.

Reference Books:

1. Hawang, K.,Briggs, F.A. : Computer Architecture and Parallel processing, Mcgraw Hill,1985.
2. Kogg, H.: The Architecture of pipelined computers Mcgraw Hill,1981.
3. Bear, J.L.: Computer system architecture,computer sci.Press,1980
4. Evans,D.J.: Parallel processing System, Cambridge Univ.1982
5. Hockney,R.W.,Jesshope, C.R.:Parallel computers : Architecture programming and Algorithm, Adam.Hilger,1981.
6. Malvino , Brown : Digital Computer electronics

MCA 301: Theory of Compiler Design

UNIT 1

Introduction of Compiler, Major data Structure in compiler, BOOT Strapping & Porting, Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, Lexical analysis: Input buffering , Specification & Recognition of Tokens, LEX. The roll of lexical analyzer, design of lexical analyzer.

UNIT 2

Syntax analysis: CFGs, Top down parsing, Brute force approach, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence parsing, LR parsers (SLR,LALR, LR),Parser generation.Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attributed definition, L-attribute definition, Top down translation, Bottom Up evaluation of inherited attributes Recursive Evaluation, Analysis of Syntax directed definition.

UNIT 3

Type checking: type system, specification of simple type checker, equivalence of expression, types, type conversion, overloading of functions and operations, polymorphic functions. Run time Environment: storage organization, Storage allocation strategies, parameter passing, dynamic storage allocation , Symbol table.

UNIT 4

Intermediate code generation: Declarations, Assignment statements, Boolean expressions, Case statements, Back patching, Procedure calls Code Generation: Issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks, peephole optimization, generating code from DAG.

UNIT 5

Introduction to Code optimization: sources of optimization of basic blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations ,Data flow analysis of structure flow graph Symbolic debugging of optimized code.

Reference Books:

1. Aho, ullman : Principles of compiler design.
2. Raghavan, Compiler Design, TMH Pub.
3. Louden. Compiler Construction: Principles and Practice, Cengage Learning
4. A. C. Holub. Compiler Design in C , Prentice-Hall Inc., 1993.
5. Mak, writing compiler & Interpreters, Willey Pub.

MCA – 302 Data Mining and Data Warehousing

UNIT 1

Introduction : Data Mining: Definitions, KDD v/s Data Mining, DBMS v/s Data Mining , DM techniques, Mining problems, Issues and Challenges in DM, DM Application areas. Association Rules & Clustering Techniques: Introduction, Various association algorithms like A Priori, Partition, Pincer search etc., Generalized association rules.

UNIT 2

Clustering paradigms; Partitioning algorithms like K-Medoid, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; categorical clustering algorithms, STIRR, ROCK, CACTUS. Other DM techniques & Web Mining: Application of Neural Network, AI, Fuzzy logic and Genetic algorithm, Decision tree in DM. Web Mining, Web content mining, Web structure Mining, Web Usage Mining.

UNIT 3

Temporal and spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis. Spatial Mining, Spatial Mining tasks, Spatial clustering, Spatial Trends.

UNIT 4

Data Mining of Image and Video : A case study. Image and Video representation techniques, feature extraction, motion analysis, content based image and video retrieval, clustering and association paradigm, knowledge discovery.

UNIT 5

The vicious cycle of Data mining, data mining methodology, measuring the effectiveness of data mining data mining techniques. Market baskets analysis, memory based reasoning, automatic cluster detection, link analysis, artificial neural networks, generic algorithms, data mining and corporate data warehouse, OLA

Reference Books :

1. Data Mining Techniques ; Arun K.Pujari ; University Press.
2. Data Mining; Adriaans & Zantinge; Pearson education.
3. Mastering Data Mining; Berry Linoff; Wiley.
4. Data Mining; Dunham; Pearson education.

MCA 304 E1: Computer Graphics and Multimedia

UNIT 1

Overview of Graphic Systems: Display Devices, Refresh Cathode-Ray Tubes, Random-Scan and Raster-Scan Monitors, Color CRT Monitors, Direct-View Storage Tubes, Plasma-Panel Displays, LED and LCD Monitors. Hard-Copy Devices: Printers, Plotters. Interactive Input Devices.

UNIT 2

Output Primitives: Points and Lines, Line-Drawing Algorithms, DDA Algorithm, Bresenham's Line Algorithm, Antialiasing Lines, Circle-Generating Algorithms, Circle Equations, Bresenham's Circle Algorithm, Character Generation. Attribute of Output Primitives: Line Styles, Line Types, Line Width, Line Color. Color and Intensity: Color Tables, Gray Scale. Area Filling: Scan-Line Algorithm.

UNIT 3

Two Dimensional Transformations: Basic Transformations, Translation, Scaling, Rotation. Matrix Representations and Homogeneous Coordinates. Composite Transformations: Translations, Scalings, Rotations, Scaling Relative to a Fixed Point, Rotation about a Pivot Point, General Transformation Equation. Windowing and Clipping: Windowing Concepts, Clipping Algorithms, Line Clipping, Polygon Clipping, Area Clipping, Text Clipping, Window to Viewport Transformation.

UNIT -4

Viewing in 3D: Three dimensional transformation, Translation, Scaling, Rotation. Matrix Representations projections : Parallel, prospective, view points . Colour Model.

UNIT 5

Introduction to Multimedia, Multimedia Components, Multimedia Hardware, SCSI, IDE, MCI, Multimedia Data and File Formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia Tools, Presentation Tools, Authoring Tools. Computer Aided Design. Graphs Charts and Models. Computer Art, Computer Animation, Graphical User Interface, Graphics for Home use, Image Processing.

Reference Books:

1. Computer Graphics, Donald Hearn and M.Pauline Baker, PHI 2nd Edition
2. Multimedia Making it Works, Third Edition: Tay Vaughan, Tata-McGraw-Hill
3. Procedural Elements of Computer Graphics, Rogers, McGraw Hill
4. Principles of Interactive Computer Graphics, Newman and Sproull, McGraw Hill
5. Mathematical Elements of Computer Graphics, Rogers, McGraw Hill

MCA–304E2 Distributed Computing

UNIT 1

Introduction to Distributed Systems: Goal of Distributed Systems, Hardware and Software concepts, the client server model, Remote procedure call, remote object invocation, message and stream oriented communications.

UNIT 2

Process and synchronization in distributed system: Threads, Client Server codes, migration, clock synchronization, mutual exclusion, Bully and Ring algorithm, Distributed transactions.

UNIT 3

Consistency, Replication, fault tolerance and security: Object replication, data centric, consistency model, client centric consistency models, introduction to fault tolerance, process resilience, recovery, distributed security architecture, security management, KERBEROS, secure socket layer, cryptography.

UNIT 4

Distributed Object based and file systems : CORBA, Distributed COM, Goals and Design Issues of Distributed file system, types of distributed file system, sun network file system.

UNIT 5

Distributed shared memory, DSM servers, shared memory consistency model, distributed document based systems, the world wide web, distributed coordination based system: JNI.

Reference Books:

1. Andrew S Tannebaum, “ Distributed System Principles and Paradigms” Pearson Education.
2. Robert J. “ Distributed Processing System”, Prentice Hall.

MCA 305 E1 Dot Net Technology

UNIT 1

Introduction to .NET, .NET Framework- features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries. Event Drive Programming, Methods and Events Related with Mouse and Keyboard. Introduction to visual studio, Project basics, types of project in .Net, IDE of .NET- menu bar, toolbar, toolbox, solution explorer, property window & form designer .

UNIT 2

C#.NET Language: Overview of C#, Structure of C# program, Language features: Type system, boxing and unboxing, flow controls, classes, interfaces, inheritance, Polymorphism, Exception Handling.

VB.NET Language: Overview of VB.NET - Data Type, Variables, Constants, Arrays, Subroutines, Functions, Control flow statements: conditional & loop statement, OOPs using VB.NET.

UNIT 3

Windows Programming: Working with Forms, MDI form, Windows Form Controls-Textbox, Rich Text Boxes, Label, Link Label, Button, Checkbox, Radio Button, Panel, Group Box, Picture Box, Listbox, Combobox, Check Listbox, scroll bar, Timer. Advance Controls: Menus, Context Menus, ListView, TreeView, toolbar, StatusBar. Built-in Dialog Box: OpenFileDialog, SaveFileDialog, FontDialog, ColorDialog, PrintDialog, Printing. MsgBox & Inputbox.

UNIT 4

Web Programming: Basics of Internet, www, web server, web browser, web forms, HTML, XML, CSS & JavaScript. Client server architecture. Overview of ASP.NET, ASP.NET Controls- Buttons, TextBox, Labels, Checkbox, Radio Buttons, Drop down list, List box, Ad Rotator, calendar, menu bar, gridview, datalist & web form validation Controls. Creating Master page, applying themes & skin on web pages. Uses of web.config & global.asax files. State management-Viewstate, Session state, Application state.

UNIT 5

ADO.NET: Architecture, creating connection, accessing data using data adapter & dataset, using command & data reader Object, data bind controls, displaying data. Execute sql queries for add, update, delete & search records in SQL SERVER & Access database. Generate Reports Using Crystal Report.

Reference Books:

1. Steven Holzner VB.Net Programming-Black Book-Dreamtech Publications.
2. Evangelos Petroustos Mastering VB.Net - BPB Publications
3. Mathew Macdonald-The Complete Reference Asp.Net-TMH
4. Professional ASP.Net- Wrox Publication
5. Stephen Walther Active Server Pages 2.0 (Unleashed) –Techmedia
6. Eric a. Smith Asp 3 Programming Bible: IDG Books
7. C# Programming-Wrox Publication
8. Matt Telles-C# Programming Black Book-Dreamtech Publication

MCA-305 E2 Programming with PHP

UNIT 1

HTML and Graphics : HTML Tag Reference, Global Attributes, Event Handlers, Document Structure Tags, Formatting Tags, Text Level formatting, Block Level formatting, List Tags, Hyperlink tags, Image and Image maps, Table tags, Form Tags, Frame Tags, Executable content tags. **Imagemaps :** What are Imagemaps? Client-side Imagemaps, Server-side Imagemaps, Using Server-side and Client-side Imagemaps together, alternative text for Imagemaps.

UNIT 2

Tables : Introduction to HTML tables and their structure, The table tags, Alignment, Aligning Entire Table, Alignment within a row, Alignment within a cell, Attributes, Content Summary, Background color, Adding a Caption, Setting the width, Adding a border, Spacing within a cell, Spacing between the cells, spanning multiple rows or columns, Elements that can be placed in a table, Table Sections and column properties, Tables as a design tool.

Frames : Introduction to Frames, Applications, Frames document, The `<FRAMESET>` tag, Nesting`<FRAMESET>` tag, Placing content in frames with the `<FRAM>` tag, Targeting named frames, Creating floating frames, Using Hidden frames,

UNIT 3

Forms: Creating Forms, The `<FORM>` tag ,Named Input fields, the input `<INPUT>` tag, Multiple lines text windows, Drop down and list boxes, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms and Scripting, Action Buttons, Labelling input files, Grouping related fields, Disabled and read-only fields, Form field event handlers, Passing form data.

UNIT 4

PHP : Why PHP and MySQL?, Server-side web scripting, Installing PHP, Adding PHP to HTML, Syntax and Variables, Passing information between pages, Strings, Arrays and Array Functions, Numbers, Basic PHP errors / problems.

UNIT 5

Advanced PHP and MySQL : PHP/MySQL Functions, Displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, Type and Type Conversions, E-Mail.

XML : Introduction to XML, Anatomy of an XML, document, Creating XML Documents, Creating XML DTDs, XML Schemas, XSL.

References:

1. Web Design The complete Reference, Thomas Powell, Tata McGrawHill
2. HTML and XHTML The complete Reference, Thomas Powell, Tata McGrawHill
3. JavaScript 2.0 : The Complete Reference, Second Edition by Thomas Powell and Fritz Schneider
4. PHP : The Complete Reference By Steven Holzner, Tata McGrawHill

MCA-401 NETWORK SECURITY

UNIT 1

Convention Encryption : Conventional Encryption Model , Stenography , Classical Encryption Techniques, Simplified DES , Block Cipher Principles , The Data Encryption Standard, The Strength of DES , Differential and Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of operation, Conventional

UNIT 2

Encryption algorithms: Public Key Encryption And Hash Functions Public Key Cryptography , Principles of Public Key Cryptosystems , The RSA Algorithm , Key Management , Diffie Hellman Key Exchange , Elliptic Curve Cryptography.

UNIT 3

Message Authentication and Hash Functions Authentication Requirements, Authentication Functions, Message Authentication Codes , Hash Functions , Security of Hash Functions

UNIT 4

Hash And Mac Algorithms MD5 Message Digest Algorithm , Secure Hash Algorithm (SHA-I) , RIPEMD ,HMAC

UNIT 5

Digital Signatures and Authentication Protocols Digital Signatures , Authentication Protocols -Digital Signature Standard Authentication Applications , IP Security , Web Security Intruders, Viruses and Worms Intruders , Viruses and Related Threats Firewalls Firewall Design Principles , Trusted Systems

Reference Books :

1. William Stallings, “Cryptography and Network Security”, Second edition, Prentice Hall, 1999.
2. Atul Kahate, “Cryptography and Network Security,” TMH
3. William Stallings, "Cryptography and Network Security",Third Edition, Pearson Ed
4. Introduction to network security, Krawetz, Cengage

MCA-402 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

UNIT 1

Introduction of Artificial Intelligence: What is AI ? The Importance of AI. AI and related fields. Introduction to Natural Language Processing . Basic Problem solving methods: Production systems-state space search, control strategies, Breadth first search, Depth first search, Heuristic search, Hill Climbing techniques: Best First search, forward and backward reasoning.

UNIT 2

Knowledge : General Concepts, Definition and Importance of Knowledge, Knowledge based system, representation of Knowledge, Knowledge Organization , Knowledge Manipulation , Acquisition of Knowledge. Introduction to Expert System: Definition, Characteristics, Importance and Applications of Expert System, structure of Expert System. Case study of MYCIN & DENDRAL.

UNIT 3

LISP AND AI PROGRAMMING LANGUAGES : Introduction to LISP : Syntax and Numeric Functions, Basic List Manipulation Functions in LISP , Functions, Predicates, and Conditionals, Input, Output, and Local Variables, Iteration and Recursion, Property List and arrays, PROGLOG and Other AI Programming Languages.

UNIT 4

FORMALIZED SYMBOLIC LOGICS : Introduction , Syntax and Semantics for Propositional Logic , Syntax and Semantics for FOPL , Properties of Wffs , Conversion to Clausal Form, Inference Rules , The Resolution Principle , Representations Using Rules. Neural Network: Basic structure of neuron, perception, feed forward and back propagation, Hopfield network.

UNIT 5

Learning Problems-Perspectives and Issues-Concept Learning - Version Spaces and Candidate Eliminations- Inductive bias-Decision Tree learning-Representation Algorithm- Heuristic Space Search.

BOOKS :

1. Dan W. Patterson: Introduction to Artificial Intelligence and Expert System, Prentice Hall.
2. Stuart Russell, Peter Norvig: Artificial Intelligence: A Modern Approach, Pearson New International Edition
3. Elaine Rich and Kevin Knight: Artificial Intelligence
4. Charniak, E. : Introduction of Artificial Intellegence, Narosa publ. House.
5. Winston,P.H. : LISP, NArosa publ. House.
6. clark, K.L. : Micro Prolog , Prentice Hall india.1987.

MCA 404 E1 INTERNET OF THINGS (IOT)

UNIT 1

Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT.

UNIT 2

Machine-to-machine (M2M), SDN (software defined networking) and NFV(network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.

UNIT 3

Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IOT, Media Access control.

UNIT 4

Sensor Technology , Participatory Sensing, Industrial IOT and Automotive IOT , Actuator, Sensor data Communication Protocols ,Radio Frequency Identification Technology, Wireless Sensor Network Technology.

UNIT 5

IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view.IOT Privacy and security solutions, Raspberry Pi & arduino devices. IOT Case studies: smart city streetlights control & monitoring.

Reference Book:

1. Rajkamal,"Internet of Things", Tata McGraw Hill publication
2. Vijay Madisetti and Arshdeep Bahga, "Internet of things(A-Hand-on-Approach)" 1st Edition ,Universal Press
3. Hakima Chaouchi "The Internet of Things: Connecting Objects", Wiley publication.
4. Charless Bell "MySQL for the Internet of things", Apress publications.
5. Francis dacosta "Rethinking the Internet of things:A scalable Approach to connecting everything", 1st edition, Apress publications 2013.
6. Donald Norris"The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black", McGraw Hill publication

MCA–404 E2 Cloud Computing

UNIT 1

Historical development, Vision of Cloud Computing, Characteristic of Cloud Computing As Per NIST, Cloud Computing Reference Model, Cloud computing Environments, Cloud service requirements, cloud and dynamic infrastructure, cloud adaptation and rudiments. Overview of cloud application: ECG Analysis in the cloud, Protein Structure prediction, Gene Expression Data Analysis, Satellites Image Processing, CRM and ERP, Social networking.

UNIT 2

Cloud Computing Architecture: Cloud Reference model types of cloud, cloud interpretability and standards, scalability and fault tolerance, cloud solutions, cloud eco- system, cloud business process management, cloud service management, cloud offerings, cloud analytics, testing under control, virtual desktop infrastructure.

UNIT 3

Cloud Management and virtualization and technology Resiliency, Provisioning, Asset Management, Concepts of MAP reduce, Cloud governance, High availability and disaster recovery, virtualization, fundamentals concepts of compute storage, networking, desktop and application virtualization, virtualization benefits, server virtualization, block and file level storage virtualization, hypervisor management software, infrastructure requirements, virtual LAN (VLAN), and virtual SAN (VSAN) and their benefits.

UNIT 4

Cloud security: Cloud information security fundamentals, cloud security services, design principles, Secure cloud software requirements, policy implementations, cloud computing security challenges, virtualization security management, cloud computing security architecture.

UNIT 5

Market based Management of clouds, federated clouds/ inter cloud: Characterization and definition, Cloud federation status, third party cloud services. Case study: Google App Engine, Hadoop, Amazon, Aneka.

Reference Books:

1. Tomar Saurabh, Cloud Computing, Wiley Pub.
2. Selvi : Mastermind Cloud Computing, TMH, Pub.

MCA – 405 E1 PYTHON PROGRAMMING

UNIT 1

Introduction: check icon History, Features, Setting up path, Variable and Data Types, Operator. **Conditional Statements:** if, if-else, if-elif, nested if-else and Looping: for, while, nested loops with break, continue and pass keyword. **String Manipulation:** Accessing Strings, Basic Operations, String slices, Function and Methods. **Functions:** Defining and Calling of a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.

UNIT 2

Collection: list, tuple , Dictionaries. Introduction, Accessing values, Working, Properties, Functions and Methods. **Modules:** Importing module, Math module, Random module, os module, date-time module, calendar module, Packages, user defined module, introduction of pip. **IO:** Printing on screen and Reading data from keyboard, Opening and closing file, Reading and writing files, Functions.

UNIT 3

Exception Handling: Except, Try, else, finally clause, User Defined Exceptions, raise user- defined exception, nested try-except. **OOPs concept:** Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding, final and abstract class. Database: Introduction, Connections with MYSQL, Executing queries, Transactions) web-designing: HTML, CSS, JAVASCRIPT.

UNIT 4

CGI: Introduction, Architecture, CGI environment variable, GET and POST methods. application using CGI: signup, login and session tracking with server side programming.

UNIT 5

DJANGO: working of MVT, Environment setting and installation, creating a Project, Apps Life Cycle, Admin Interface, Views, URL Mapping. **Template System:** DTL and JINJA. Models, Page Redirection, Form Processing, project with signup and login.

References:

1. Programming and Problem Solving with Python (Ashok Namdev Kamthane and Amit Ashok Kamthane) McGraw Hill publication
2. Let Us Python (Kanetkar Yashavant) BPB Publication
3. Python Complete Refernce (Brown Martin C.) McGraw Hill publication
4. Python Programming A Modular Approach (Naveen and Kumar and Taneja Sheetal) PEARSON
5. Beginning Django (Rubio Daniel) Apress

MCA – 405 E2 MOBILE COMPUTING

UNIT 1

Overview of the emerging fields of mobile computing; Historical perspectives (mainly from the perspective of radio), Mobile applications, Limitations, Health Concerns, Cordless phone, Land mobile vs. Satellite vs. In-building communications systems, Frequencies for radio transmission.

Characteristics of Cellular Systems, Mobility support in cellular telephone networks, Personal Communications Systems/Personal Communications Networks, Wireless Personal Area Network, Wireless Local Area Network and Internet Access.

UNIT 2

Mobile communication: Fiber or wire based transmission, Wireless Transmission - Frequencies, Signals, Antennas and Signal Propagation, Modulation Techniques, Multiplexing techniques, Coding techniques. Cellular structure, Voice Oriented Data Communication GSM, CDMA. GSM Architecture, Authentication & security, frequency hopping.

UNIT 3

Satellite Systems: History, Application, and Basics of Satellite Systems: LEO, MEO, GEO, Routing, Handover, VSAT, installation & Configuration. Cyclic repetition of data, Digital Audio Video Broadcasting, Multimedia object transfer Protocol, Wireless LAN topologies, requirements. Physical layer, MAC sub-layer, IEEE802.11.HIPERLAN: Protocol architecture, layers, Information bases and networking, Bluetooth.

UNIT 4

Basics of Discrete Event Simulation, Application and Experimentation, Simulation models. Case Study on Performance Evolution of IEEE 802.11 WLAN configuration using Simulation, Mobile IP, goals, assumptions requirements, entities and terminology, IP packet delivery, tunneling and encapsulation, Feature and format of IPv6, DHCP, TCP over Wireless. Characteristic of Ad Hoc networks, Applications, need for routing, routing classification, Wireless sensor networks, classification and Fundamentals of MAC protocol for wireless sensor networks.

UNIT 5

Economical Benefits of Wireless Networks, Wireless Data Forecast, Charging issues, Role of Government, Infrastructure manufacturer, Enabling Applications Mobile operating System, HTTP versus HTML. WML,XML application for wireless handheld devices. UWB systems Characteristics, Current approaches for security.

Reference Books:

1. Mobile Communications author Jochen Schiller, publication John Willy & Sons, Ltd.
2. Wireless And Mobile Systems, D. P. Agrawal, Qing-An zeng, Thomson publication.