

MCA Course Outcome

Semester-1

CS 101 : Introduction to Computing and It's Applications

Course Outcome: This Course provides details about Computer System, Classification of computers, Transistors, Integrated Circuits(LSI, VLSI), Operation of processor, Number System, Digital Circuits, ALU, Memory Chips(RAM, ROM, DRAM), storage Devices, Memory Hierarchy, I/O Devices, Bus System, Operating System: Windows and Linux, Network communication infrastructure, Protocols, Wireless LAN Mobile Computing, Web Technology, The Internet and Intranet, WWW, Java fundamentals, Multimedia Application, e-Commerce.

CS 102 : Mathematical Foundation

Course Outcome: This Course provides details about Discrete structures and Significance, Fundamental Discrete Structure, Sets, Sequences, Product Set, Relation and Computing Significance, Permutation, Combination, Recurrence Relations, Fundamental proof Techniques, Partial Orders and Poset, External Elements Lattices, Finite Boolean Algebras, Boolean Function and Polynomial, Propositions, Logical Connectives and Operation, Conditionals, Bi-conditionals, Contradiction, Contrapositive. Tautology, contingency and Contradiction, Transformation to Propositional Forms Reasoning Using Equivalence Transformation. Rules of Substitution and Inferences, Normal Forms: DNF, CNF, PDNF, PCNF, Graph, it's types and Computing Significance, Graph as a DATA Structure, Eulerian and Hamiltonian Paths, and Circuits. Alphabets, Strings and Languages, Discrete Automation.

CS 103 : Programming in C Language

Course Outcome: This course provides details about Algorithms and Flow-charts, Programming Languages, Compilation, Linking, Testing, Debugging and Documentation. Introduction to C language; Character set, Variables and Identifiers, Built in data type, Arithmetic operator and expression, Constant and Literals, Relational operator and logical connectivity, Sample assignment statement, Basic Input/ Output statement, Simple C program, Conditional statement and loops. Decision making within a program, Different conditional statement in C, Looping statement in C, Structured programming, Nested loop, Infinite loop. Array and Pointer, Static and Dynamic memory allocation, Function: Modular programming and Functions, Structure, Union and File system, Graphics in C.

CS 104 : Statistical Techniques

Course Outcome: This course provides details about Various definition of Probability, Additive and Multiplicative theorems, Independent event, Probability distribution, Mathematical expectation, Additive and Multiplicative theorems of expectation, Binomial, Poisson and Normal distributions, Fitting of probability distributions. Measure of central tendency, Dispersion, Measures of dispersion, Moments. Product moment correlation coefficient, Rank correlation, Linear regression, Properties of regression coefficient, Multiple linear regression. Transcendental and Polynomial Equation: Iterative method, Regula-Falsi method. Newton-Raphson method, Roots of Polynomial: Graeffe's and Bairstow methods, Solution of system of linear algebraic equations: Gauss elimination, Gauss-Jordan method, Data fitting, Method of least squares. Null and alternative hypotheses, one tail and two tail tests, Two types of error. Large sample tests,

Small sample tests: Test of single mean, test of equality of two means, Paired test, Test of goodness of fit, test of independence of attributes, test of variance. Sampling and Complete enumeration, Simple random sampling, Stratified random sampling, Proportional and Optimum allocations.

CS 105 : Business Data Processing and File Systems

Course Outcome: This course provides details about Basic Ideas of the System: System and its Characteristics, Introduction Systems and Technology, Business system, data processing and technology, Business System Context, Environment. Framework for a system in Business, Role of IT in Business Data Processing. System Related Challenges for Business: Improving Business Processes. Benefiting from Trends and Innovations, Maximizing Benefit from Information, Extending Human Skills, Extracting the most from Surrounding Infrastructure, responding to System related Risk, Building and Maintaining Systems, Analyzing System in Business Terms: Need for Framework and Models, Business and BP as System, IS and Business Processes, Analyzing IS and Business Point of View, Strategy for Analyzing, Description and Evaluation of B-Process Architecture, Linking B-Process and Product Performances, Evaluation of B-Process Performances, Evaluation of B-Product Performances, Information Technology in Business, Information and its Determinations. IT and its Functions, IT Trend and Limitations, IT Performance Variable, Computer System Architecture and Trend, Software and Programming, Programming as a B-Process, Major Developments in Programming, Structured Programming, Principles and Techniques of Programming, Program Planning Tools, Testing and Verification, File System and BDP tools, File and other Structures, File Type, Organization and Operations, File Management, Introduction to Suitable BDP tools.

Semester-2

CS 201 : Computer Architecture

Course Outcome: This course provides details about Review of Number Systems; Combinational System, Switching algebra and logic circuits, Karnaugh map, Logic gates, simplification of expressions, implementation using gates, One bit Adder, One bit ALU(add sub, AND, OR), Encoders, multiplexers, Tri-state logic gates, Sequential System, Latches and Flip-Flops, Registers, Counters, Half-adders, Full-adders. Introduction to Computer Design: Design levels, data paths, Registers, Busses. Instruction Set Design: Instructions Formats, Addressing Modes, Assembly Language, RISC Machine, Control Design. Hardwired and Microprogramming. Memory & I/O Memory organization, Cache Memory, Memory Management, I/O, Interrupts, DMA, Pipelining, Parallel Processor, Recent development in computer Architecture. Performance and Cost: Selecting Computers based on Benchmarks.

CS 202 : Data Structure and Program Design

Course Outcome: This course provides details about Basic Concepts of Data Representation: Abstract Data Types, Fundamental and Derived Data Types, Representation and Implementation, Different Data Structures, Algorithm Design and Comparison Algorithm. Array and Linked Lists: Representation of arrays and Linked Lists, Comparison of Array and Linked List. Stacks and Queues: Representation of Stack and Queues (Dynamic and Static), Operation on Stack and Queues, Applications of Stack and Queues. Trees: Representation of Trees (Static and Dynamic), Different types of trees, Operations on Trees, Tree Construction, Application of Trees. Searching And Sorting: Different method of Searching, Comparison of Different Searching Method, Different Methods of Sorting, Comparison of Different method of Representation, Operations of Graph, Minimal Spanning tree Algorithm, Shortest Path Algorithm.

CS 203 : Object Oriented Programming

Course Outcome: This course provides details about Introduce to Java, Java Buzzworld Data type and Variable, Operators, Control Statements, Arrays, Methods, Recursion, Constructors, This and Find keywords, Garbage collection, Object-Oriented Programming. Introduction Objects, Superclass's and Subclasses. Protected Members. Relationship between superclass Object and Subclass Objects. Constructors and finalizes in Subclasses. Encapsulation. Inheritance, Polymorphism, Packages and Interfaces, Example of Packages and Interfaces. Exception Handling and Multithreading, Exception Types, Uncaught Exceptions. Using Try and Catch Nested Try Statement, Throw, Throws, finally. Java Thread Model, Thread Priorities, Synchronization, Main Thread. Advance Java. Overview of JDBC, Applets, Servers, Java Beans, EJB. Different types of Drivers. Jar files. Java Security Tools.

CS 204 : Database Management System

Course Outcome: This course provides details about Database: Concept, Comparative view, goals etc. Data Independence, Consistency, Security & Integrity. DBMS models: Hierarchical, Relational and Network; Structured Query Language and Programming Interface; Database design and architecture: DBMS Applications: ORACLE/DB2/Progress/any other; Introduction to Distributed Database, Concurrency control and recovery, Assorted Topics in Database.

CS 205 : Object Oriented Analysis and Design

Course Outcome: This course provides details about Introduction: Object oriented approach, its features & significance, S/W Complexity & its causes, S/W Crisis & the related issues need to be resolved. Modeling: Object Modeling: Objects & Classes, Links & Associations, Generalization & inheritance, Grouping Constructs, Advanced Objects Modeling Aggregation, abstract classes, multiple inheritance, Meta Data, Candidate Keys and Constraints. Dynamic Modeling: Events & states, operations, nested state diagram, concurrency. Functional Modeling: DFDS, specifying operation, constraints, Analysis and System design: Analysis: Object Modeling, Functional Modeling adding operations, iteration, System design: Subsystem, Concurrency, Allocation to processors and takes, management of data stores, control implementation, Boundary condition, Architectural framework, Object Design, Optimization, Implementation of control, Adjustment of inheritance, Design of associations, documentation, comparison of methodologies, Implementation: Using a programming language, using a database system, Programming styles: Object Oriented Style: Reusability, extensibility, robustness and Programming-in-the-language

Semester-3

CS 301 : Operating System

Course Outcome: This course provides details about Definition, Components & types of Operating System, Operating System Services, System Calls, System Programs, System Structure, System Design & Implementation, System

Generations. I/O Subsystem Overview, I/O H/R. Application I/O Interface, Kernel I/O Subsystem, Linux User & Program Interface. Process Concepts, Process State & Process Control Block, Process Scheduling. Scheduling

Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real Time Scheduling, Threads Introduction, Multithreading Models, Example System – Process Management in Linux. The Critical Sections Problem, Semaphores, Classical Problem of Synchronization, Example System-Inter Process, Communication in Linux, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined Approach to Deadlock. Storage Management, Logical versus Physical Address Space, Swapping, Contiguous Allocating, Paging, Segmentation, Segmentation with Paging, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing, Demand Segmentation, Example System Memory Management in Linux. Disk Scheduling, Disk Management, Swap Space Management, Disk Reliability, Stable Storage Implementation, File Concepts, Directory Structure, Protection File System in Linux.

CS 302 : Computer Networks

Course Outcome: This course provides details about Evolution of Computer Networks, Networks Goals, User & Applications, Network H/R and S/R; Protocol Hierarchies, Design Issues for the Layer, Reference Models, OSI & TCP/IP – Example Networks – Internal. Data Transmission System & Operations, Encoding, Standard Encoding Schemes, Transmission Media, Magnetic Media, Twisted wire-pair, Co-axial Cables, Fibre Optics, Wireless Media-Ratio & Microwave Transmission, Switching Message, Circuit & Packet Switching, Serial & Parallel Transmission – Asynchronous and Synchronous Transmission. Need for Data Link Control, Service provided by the Data Link Layer.

Frame Design Consideration. Flow Control Mechanism. Data Link Error Control, Error Control in Stop-and-Stop Mechanism & Sliding Windows Mechanism, Sequence Numbering. Piggybacking Acknowledgement. MAC layer & It's Different Protocols. Contention Access, CSMA, CSMA/CD, Physical Topology of Ethernet, Ethernet Repeater, Types of Ethernet. Static Routing, Dynamic Routing, Distance Vector Routing Algorithm, Router Information Protocol, Link State Routing, OSPF Routing Protocol, Border Gateway Protocol, Congestion Control by Chock Packet, QoS, Leaky Bucket and Token Bucket. Congestion Control Algorithms, General Principle of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual Circuit Subnet & Datagram, Techniques for achieving good quality of service (QoS).

CS 303 : Design and Analysis of Algorithm

Course Outcome: This course provides details about Algorithm, Performance Evaluation of Algorithms, Space & Time Complexity, Nation of Optimality. Finding the Maximum & Minimum – Quick Sort – Selection – Stassen’s Matrix Multiplication, etc. Knapsack Problem, (1 Knapsack, Fractional Knapsack), Activity Section Problem. Huffman’s Codes, Minimum Spanning Tree, Kruskal’s Algorithm, Prim’s Algorithm, Dijkstra’s Algorithm, etc. Knapsack Problem DP Solution, Activity Selection Problem DP Solution, All Pairs Shortest Paths, Travelling Salesman Problem. Basic ideas of Randomized Algorithms (Las Vegas & Monte Carlo types). Simple examples (Randomized Quick Sort and it’s analysis, Min – Cut Algorithm and it’s Analysis), Amortized Analysis and its significance (Illustration through examples). Breadth First Search (BFS), Depth First Search (DFS), Strongly Connected Components, Euler Tour, Minimum Spanning Tree, Kruskal’s Algorithm, Prim’s Algorithm, Single Source Shortest Path.

CS 304 : Software Engineering

Course Outcome: This course provides details about Concept of Program, Concept of Software Product & Types of Software, Concept of Software based system, Evolution of Software Engineering, Software Process, People & project, System Development Life Cycle (SDLC). Capability Maturity Model, ISO, OMG, CORBA, IEEE, ANSI, Linear Sequential Model (Water Fall), Evolutionary model, Proto Typing Model, Spiral Model. Initial Requirement Analysis, System Modeling, Function Point Analysis, Project Scheduling Gantt Chart, Project Estimation COCOMO, Project Control PERT, Risk Management, Software Team, Life Cycle Model Selection. Functional Requirement, Non Functional Requirements, Requirement Gathering, Fact Finding Methods, Requirement Verification & Validation, Requirement Specification (SRS). Design tools- UML, DFD, VTOC, HIPO, ERD, System Architecture Design, Object Oriented Design using UML tools, Coupling & Cohesion, System structure/modular design, Data Design (ERD), Process Design, I/O Design, User Interface Design, System Interface Design. Code Review, Code Documentation, Code Optimization. Concept of Software Testing, Testing Strategies (Black Box & White Box), Testing methods (Coverage based Mutation Test), Test Cases (Test System), Alpha Test & Beta Test. Software Configuration Item, Baseline, Software Change Implementation, Software Change Control, Software Re-Engineering, Clean Room Software Engineering.

CS 305 : Compiler Design

Course Outcome: This course provides details about Compilers and Translators, The Phases of a Compiler, Compiler writing tools, The Lexical & Syntactic Structure of a language, Operators, Assignment Statements and Parameter Translation. The role of the Lexical Analyzer, Specification of Tokens, Lexical Analysis tools. Role of Parser, CFG, Top-Down parsing, Bottom-up Parser, Operator-Precedence Parsing,, LR Parsers, The Canonical Collection of LR (0) items, Constructing SLR, Canonical LR and LALR Parsing tables, Use of ambiguous grammars in LR Parsing, An Automatic Parser generator, Implementation of LR Parsing tables and Constructing LALR sets of items. Syntax tree, Bottom – Up evolution of S-Attributed definition, L – Attributed definition, Top-Down translation, Bottom – Up evaluation of inherited attributed, Recursive Evaluators. Structure of Symbol Table, Simple Symbol Tables (Linear Table Ordered List, Tree, Hash Table). Scoped Symbol Table (Nested Lexical Scoping, One Table per Scope, One Table for all Scopes). Need for Optimization, Optimization of Basic blocks, Loops in flow graph, Optimizing Transformation (Compile time evaluation, Common sub-expression elimination, Variable Propagation, Code Movement Optimization, Strength Reduction, Dead Code Optimization, Loop Optimization), Local Optimization, Global Optimization, Computing Global Data Flow Equation, Setting up data flow equation, Setting up data flow equations, Iterative Data flow Analysis.

Semester-4

CS 401 : Web Technology

Course Outcome: This course provides details about Concept of JDBC (Java Database Connectivity), Working with SQL, Stored Procedure, Security in Java, Class Loader, Byte Code Verification, Security Manager and Permission, Digital Signatures, Code Signing, Encryption. Its advantage, Enterprise Architecture Types, Understanding EJB, its architecture, EJB Roles, Benefits and limitations of Enterprise Beans, Session Beans: Stateful and Stateless Beans, Entity Beans, Beans Managed Persistence, Container Managed Persistence. Understanding Directory Services and JNDI, Introduction to LDAP, LDAP Operation, Working with LDAP Server, Introduction to Web Containers and Web Applications, Introduction to HTTP Protocol, Web Application Life Cycle. Understanding Servlet programming, Its life cycle, Servlet Configuration, Understanding Servlet sessions, Understanding of JSP and JSTL, JSP documents, Elements, tag extensions, tag libraries, validation, translation time mechanism, translation-time classes, Understanding JavaServer Pages, Standard Tag Library, tags in JSTL, core tag library, XML tag library, using Internationalization Actions. Enterprise Application Development Process, Deploying Web Application, Understanding CLASSPATH, Securing Web Applications, basic authentication with JAX-RPC example, Client certification Authentication over HTTP/SSL.

CS 402 : Cryptography and Network Security

Course Outcome: This course provides details about The OSI Security Architecture, Security attack, Security services, Security Mechanism, A Model for Network Security. Classical Encryption Techniques, Symmetric Cipher Model, Block Cipher Principles, DES, Differential and Linear Cryptanalysis, Block Cipher Design Principle, The Euclidean Algorithm, Finite field of Form $GF(p)$, Advance Encryption Standard (AES), AES Cipher, Multiple Encryption and Triple DES, Stream Cipher and RC4, Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random number generation. Fermat's & Euler's Theorems, The Chinese Remainder Theorem, RSA Algorithm, Deffie-Hellman Key Exchange, Elliptic Curve Cryptography, Message Authentication Code, Security of Hash Functions and MAACs, Secure Hash algorithm, Whirlpool, HMAC, CMAC, Digital Signature. Kerberos, X.509 Authentication Service, S/MIME, IP Security Architecture, Encapsulating Security Payload, Secure Socket Layer (SSL), Transport Layer Security, Secure Electronic Transaction. Intrusion Detection, Password Management, Virus Countermeasure, Denial of Service Attack, Firewall design Principles, Trusted System.

CS 403 : Soft Computing

Course Outcome: This course provides details about Essentials of Artificial Neural Networks: Introduction, Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity (Feed forward, feedback, Single and Multi-layer), Neural dynamics (Activation and Synaptic), Learning Strategy(Supervised, Unsupervised and Reinforcement), Learning Rules (error Correction, Hebbian, Competitive, Stochastic), Types of Application (Pattern Classification, Pattern Clustering, Pattern Association/ Memory, Function Approximation, Prediction, Optimization) Support Vector Machines, Boltzmann Machine, Feedback (Recurrent) Networks and Dynamical Systems Matrix Memories, Bidirectional Associative Memory, Hopfield Neural Network, Principal Component Analysis Networks (PCA), Kohonen's Self-Organizing Maps, Linear Vector Quantiation, Independent Component Analysis Networks(ICA).

CS 404 : Computer graphics & Multimedia Applications

Course Outcome: This course provides details about History, Advantages, Application, I/O Devices Graphic Packages, Languages. Jag Free Images on a Raster CRT Interactive Graphics processor for Digital Logic Simulation System, Interactive techniques for 3D shaded Graphics. Drawing Elementary figures, Polygon Filling, Transformations, Windowing and clipping, Display file segmentation, Interactive graphics: Interactive input techniques, Event handling, Input functions. Device Independence AI in Graphics Software, Implementation of Graphics Kernel System (GKS). Mathematical Preliminaries, Curves and Surfaces , Clipping, Hidden line and surface removal, rendering, Computer Animation, 3D Shaded Computer Animation the use of 3D abstract Graphical Types in Computer Graphics and Animation, 3D ReConstruction . A case Study, Real-Time Graphics.

CS 405 : Management & Information System

Course Outcome: This course provides details about Types of Management System, Management System Requirement, Anagement level. Sale and Order Processing, Finance & Budgeting, Human Resource Management, Production Plan & Control, Marketing. Portfolio Management Concept, Portfolio Management Method, Design & Implementation of Portfolio Management, Tools & Techniques. Evolution of Enterprise Information System, Concept of ERP, Supply Chain Management, Customer Relationship Management, ERP Design & Implementation, ERP Tools: SAP, iCUBE.

Semester-5

CS 501 : Wireless Networks

Course Outcome: This course provides details about wireless, IEEE802.11. Challenges for MAC, Access Mode, Contention Based access using DCF, Fragmentation and reassembly, Frame Format, 802.11 framing in detail(DS bits, BSSID, RTS, CTS, Control frame, management frame), Contation based data service, Frame processing and bridging, 802.11 to Ethernet. WEP cryptographic operations, WEP data processing, Problem with WEP, User Authentication with 802.1x. Temporal key integrity protocol, Counter mode with CCB-MAC, Robust security network operation. Physical layer architecture, Radio Link, RF with 802.11, Frequency, GFSK, PLSP, DSSS, HR/DSSS. 802.11a and 802.11j (OFDM Phy), 802.11g(extended rate Phy), 802.11n: MIMO-OFDM. Network Requirement, PHY layer selection and design, Planning placing AP, Using Antennas to tailor Coverage.

CS 502 : Distributed System

Course Outcome: This course provides details about Definitions, Evolution of distributed computing system, Distributed Computing System Models, Distributed Operating System, Designing a distributed Operating System, Introduction of distributed computing environment. Introduction Desirable features, Issues in IPC by message passing, synchronization, Buffering, Multi datagram messages, encoding and decoding message

data. Introduction, The RPC Model, Transparency of RPC, Implementing RPC mechanism, RPC message server management, parameter – passing and call semantic, Communication protocols for RPC's. Introduction, Architecture of DSM Systems Design and implementation, granularly, structure of shared memory space consistency models, replacement strategy, Threshing. Desirable feature, Task assignment approach, Load-balancing approach, Load sharing approach.

CS 503 : Data and Web Mining

Course Outcome: This course provides details about Introduction to data mining, need for data warehousing and data mining, application potential, keywords and techniques. Aggregation operations, models for data warehousing, star schema fact and dimension tables, conceptualisation of data warehouse and multidimensional databases, Relationship between warehouse and mining. Data preprocessing, data integration, data transformation, Definition and specification of a generic data mining task. Description of Data mining query language with examples. Different methods for mining association rules in transaction based databases. Illustration of confidence and support. Multidimensional and multilevel association rules. Classification of Association rules. Association rule algorithms – A period and frequent pattern growth. Different classification algorithms. Use of genie index, decision tree induction, Bayesian classification, neural network technique of back propagation, fuzzy set theory and genetic algorithms. Partition based clustering, hierarchical clustering, model based clustering for continuous and Discrete data. Scalability of clustering algorithms. Parallel approaches for clustering.

CS 504 : Parallel Computing

Course Outcome: This course provides details about Introduction to Parallel Computing, Supercomputers and grand challenge problems, Modern Parallel Computers, Data Parallelism, Functional Parallelism, Pipelining and Data Clustering, Minsky Conjecture. Introduction, SpeedUp, Super Linear Speedup and Efficiency, Arridahl's Law, Gustafson Law, Gustafson-Barsis's Law, The Karp-Flatt Metric, The Isoefficiency Metric, Isoefficiency Relation, Cost and Scalability. Tree, Diamond Network, Mesh, Linear Array, Ring, Star, Hypercube, Chordal ring, Cube-connected-cycles, Pefect Shuffle network, ILLIAC IV, Torus, Butterfly, Mesh-of-tree, Pyramid, Generalized Hyperbus, Twisted Cube Folded Hypercube, Incomplete Hypercube, Enhanced incomplete Hypercube, Cross Connected Cube, Bansyan Hypercube. PRAM, CRCW, CREW EREW, Simulating CRCW on CREW & SREW, PRAM algorithms, P-Complete problems. PVM, MPI Paradigms, Simple parallel programs in MPI/PVM environments, Parallel algorithms on network, Addition of Matrices, Multiplication of Matrices, Systolic Array.

CS 505 : .NET

Course Outcome: This course provides details about Introduction to .NET Architecture, Features of Visual Studio .NET. Introduction to .NET Framework – Controls – Menus and Dialog Boxes – Variables and Operators – Decision Structures – Loops and Timers – Debugging – Trapping and Handling Errors. Modules and Procedures – Arrays and Collections – Exploring Text Files and String Processing – Automating Microsoft

Office Applications – Deployment of VB.NET Applications. Windows Forms – Graphics and Animation – Inheriting Forms and Creating Base Classes – Working with Printers – ADO.NET – Data Grid Control. Windows Programming Fundamentals – Event Driven Programming – MFC Library Application Framework – App Wizard – Class Wizard – Event Handling – Message Mapping – Device Context – Dialog Data Exchange and Validation (DDX and DDV). Dialog Based Applications- Windows Common Controls – Using ActiveX Controls – SDI and MDI applications – Document View Architecture – Splitter Windows – Serialization – Reading and Writing Documents – ODBC – MFC Database Classes.