

SYLLABUS

MASTER OF COMPUTER APPLICATIONS (MCA)

Programme Structure

Semester-I

Course Code	Course Title	Course Type	Credits
MCACS1T01	Software Engineering	Core Course	5
MCACS1T02	Advanced Database Management System	Core Course	5
MCACS1T03	Design & Analysis of Algorithm	Core Course	5
MCACS1T04	Computer Networks & Security	Core Course	5
MCACS1L05	Lab on Responsive Web Designing	Core Course	3
MCAGI1T01	Statistical and Numerical Computing	Generic/ Interdisciplinary	5
MCASE1L01	Lab Based on Statistical Package	Skill Enhancement Course	-
MCASE1L02	Training on Computer Networking	Skill Enhancement Course	-

Semester-II

Course Code	Course Title	Course Type	Credits
MCACS2T06	Object Oriented Analysis and Designing	Core Course	5
MCACS2T07	Distributed Computing	Core Course	5
MCACS2L08	Mini Project I (Lab)	Core Course	3
MCAGI2T02	Optimization Techniques	Generic/ Interdisciplinary	5
	Elective-1		5
MCADSE2T1A	Compiler Design	Discipline Specific Elective	
MCADSE2T1B	Digital Image Processing & Multimedia	Discipline Specific Elective	
MCADSE2T1C	Computer Graphics	Discipline Specific Elective	
	Elective-2		5
MCADSE2T2A	Introduction to Machine Learning	Discipline Specific Elective	
MCADSE2T2B	Artificial Intelligence	Discipline Specific Elective	
MCADSE2T2C	Soft Computing	Discipline Specific Elective	
MCASE2L03	Technical Presentation & Report Writing	Skill Enhancement Course	-
MCASE2L04	Personality Development	Skill Enhancement Course	-

Semester-III

Course Code	Course Title	Course Type	Credits
MCACS3T09	Advanced Web Designing using J2EE	Core Course	5
MCACS3T10	Cloud Computing	Core Course	5
MCACS3T11	Data & Web Mining	Core Course	5
MCACS3L12	Mini Project II (Lab)	Core Course	3
	Elective-3		5
MCADSE3T3A	MIS and E-Commerce	Discipline Specific Elective	
MCADSE3T3B	Enterprise Resource Management	Discipline Specific Elective	
MCADSE3T3C	Principles of Management & Organizational Behavior	Discipline Specific Elective	
	Elective-4	Discipline Specific Elective	5
MCADSE3T4A	Parallel Computing	Discipline Specific Elective	
MCADSE3T4B	Wireless Network	Discipline Specific Elective	
MCADSE3T4C	Big Data Analytics	Discipline Specific Elective	
MCASE3L05	MOOCs	Skill Enhancement Course	-
MCASE3L06	Seminar	Skill Enhancement Course	-

Semester-IV

Course Code	Course Title	Course Type	Credits
MCACS4P13	Internship	Core Course	12
MCACS4P14	OJT Project	Core Course	24

* Wherever there is practical there will be no tutorial and vice-versa.

Detailed Syllabus

SEMESTER - I

MCACS1T01: SOFTWARE ENGINEERING

Unit	Topics to be covered
1	Introduction to Software Engineering: Characteristics of software -The Changing Nature of software — Legacy Software and Software myths — A Generic view of process — Software Engineering: A layered Technology and A process framework - Capability Maturity Model Integration - Process Models — Prescriptive models Specialized Process Models and The Unified Process -An agile view of Process.
2	Requirements Analysis and Design : System Engineering - Requirements Engineering — Requirements Engineering Tasks - Initiating the Requirements Engineering Process-Eliciting Requirements — Building the Analysis Model Analysis Modeling Approaches — Data Modeling Concepts and Scenario based Modeling and Flow Oriented Modeling— Design Engineering - Software Design Concepts-The Design Model
3	Testing Strategies and Tactics: Introduction to Testing - Definition of Testing Terminologies-Testing Strategies for Conventional Software-Validation Testing - System Testing - Debugging Process- Testing Tactics — White Box Testing - Black Box Testing - Testing for Specialized Environments. Project Management, Estimation and Scheduling : Project Management Spectrum - The People and the Product- The Process and the Project -Metrics for Process and Projects-Estimation - The Project Planning Process — Resources - Decomposition Techniques - Empirical Estimation Models - Project Scheduling Concepts — Timeline charts and Tracking the Scheduling
4	Quality, Change and Risk Management: Reactive and Proactive Risk Strategies — Software Risks —Risk Identification and Risk Projection — Risk refinement and Risk Mitigation, Monitoring and Management -Quality Concepts -Software Quality Assurance -Software Reviews and Formal Technical Reviews - Statistical Quality Assurance - The Software Configuration Management and the SCM Repository-Business Process reengineering - Reverse Engineering
5	Assignment

Reading List:

1. Roger, S. Pressman (2004), *Software Engineering: A Practitioner Approach*, McGraw Hill International Edition, Sixth Edition, New Delhi (For 1 to 5 units).
2. Waman, S Jawadekar (2004), *Software Engineering: Principles and Practice*, McGraw Hill Education Pvt. Limited, New Delhi.
3. RohitKhurana (2011), *Software Engineering-Principles and Practices*, Vikas Publishing House Pvt. Ltd., Second Edition, New Delhi.
4. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli (1991), *Fundamentals of Software Engineering*, Prentice Hall of India, New Delhi.

MCACS1T02: ADVANCED DATABASE MANAGEMENT SYSTEM

Unit	Topics to be covered
1	Introduction: Database & Database Users, Characteristics of the Database Systems. Concepts & Architecture, Data Models: hierarchical, relational and network, Schemas & Instances, DBMS Architecture & Data Independence Data Modelling using the Entity- Relationship Approach, Attributes, Tuple, Domain Constraints, key constraints, Integrity constraints, Database Design , Conceptual Design ERD Logical Design Schema, subschema, Relational Data Model & Relational Algebra (Union, Intersection, Cartesian product, Difference), Relational Model Concepts , Relation Operation(SELECT, PROJECT, JOINS DIVISION)
2	Structured Query Language: DBMS tools: SQL - A Relational Database Language (DDL, DML, DCL), View & Queries in SQL, DBMS Applications: ORACLE/a Relational Database Management Systems ORACLE/ INGRES, PL/SQL, Case studies on ER diagram, Normalization and SQL
3	Relational Data Base Design: Function Dependencies & Normalization for Relational Databases, Data Redundancy, Functional Dependencies, Normal forms based on primary keys (1NF, 2NF, 3NF & BCNF), Boyce-Codd Normal Form. Lossless Join & Dependency preserving decomposition,

	Physical Design: (File Organization, Heap Organization Sequential Organization, Index File, ISAM, VSAM), Query Processing and Optimization
4	Database Transaction Management: Concurrency Control Techniques & Recovery Techniques: Locking Techniques, Time stamp ordering, Granularity of Data items, Database Security & Recovery Techniques ,Recovery concepts, Database backup and recovery from catastrophic failures
5	Assignment

Reading List:

1. Date C.J., Kannan A.,Swamynathan S.,introduction to *Database System*
2. GehaniNarain&AnnamalaiMelliyaI, *The Database Book Principles & Practice using the Orac/e Database System*
3. Byross, *SQL/PL/SQL-Prog. Language of Oracle*, BPB Pub

MCACS1T03: Design and Analysis of Algorithm

Unit	Topics to be covered
1	Basics of Algorithms and Mathematics: What is an algorithm? Mathematics for Algorithm Analysis of Algorithm: The efficient algorithm, Average, Best and worst case Asymptotic Notations, Analyzing control statement, Loop invariant and the correctness of the algorithm, Sorting Algorithms and analysis: Bubble sort, Selection sort, Insertion sort, Shell sort Heap sort, Sorting in linear time: Bucket sort, Radix sort and Counting sort
2	Divide and Conquer Algorithm: Introduction, Recurrence and different methods to solve recurrence Knapsack Problem DP solution, Activity selection problem DP solution, all pairs shortest paths, Traveling salesman problem. Dynamic Programming: Introduction, The Principle of Optimality, Problem Solving using Dynamic Programming, Knapsack Problem DP solution, Activity selection problem DP solution, All pairs shortest paths, Traveling salesman problem, Merge Sort, Strassen's matrix multiplication.
3	Greedy Algorithm: General Characteristics of greedy algorithms, Problem solving using, Greedy Algorithm -Activity selection problem, Elements of Greedy Strategy, Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm), Graphs: Shortest paths, The Knapsack Problem, Job Scheduling Problem, Huffman code Graphs: An introduction using graphs and games, Undirected Graph, Directed Graph, Traversing Graphs, Depth First Search, Breath First Search, Topological sort, Connected components, Euler Tour, Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm, Single Source Shortest Path. Backtracking and Branch and Bound: Introduction, The Eight queens problem , Knapsack problem, Travelling Salesman problem, Minimax principle
4	Randomized Algorithms and Amortized Analysis: Basics ideas of randomized Algorithms (Las Vegas and Monte Carlo types), Simple examples (Randomized Quick sort and its analysis, Min-Cut algorithm and its analysis), Amortized analysis and its significance (Illustration through examples). Introduction to NP-Completeness: The class P and NP, Polynomial reduction, NP- Completeness Problem, NP-Hard Problems Travelling Salesman problem, Hamiltonian problem, Approximation algorithms.
5	Assignment

Reading List:

1. Cormen, Thomas H., Charles E.,Leiserson, Ronald L. Rivest, andstein, Clifford,"introduction to Algorithm",PHI
2. Aho, A.V.,Hopcroft, J.E. and Ullman I.D.,*"The Design and Analysis of Computer Algorithms"*, Pearson Education.
3. Harris Simen,Ross James,"Beginning Algorithms", Wiley India.
4. Johansonbaugh Richard, and Schaefer Marcus,"Algorithms", Pearson
5. Baase, S., *"Algorithms—introduction to Design and Analysis"*, Pearson Education.
6. Wilf,H.S."*Algorithmsand Complexii:y"*, PHI

MCACS1T04: COMPUTER NETWORKS & SECURITY

Unit	Topics to be covered
1	Data Communications, Data Networking and Data Transmission: Fourier analysis, Band limited signals, The communication channel, Maximum data rate of a channel, Electromagnetic spectrum, electromagnetic waves, frequency and wave length, bandwidth, bandwidth and channel capacity, Modulation, types of Modulation, Concepts and Terminology, Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity Signal Encoding Techniques: Digital Data, Digital Signals; Digital Data, Analog Signals; Analog Data, Digital Signals; Analog Data, Analog Signals Digital Data Communication Techniques: Digital communication, advantages of digital communication, Sampling Theory, Analog to digital conversion -Pulse Code Modulation (PCM), Delta modulation (DM); encoding of digital signals, Multiplexing and Modulation of Digital Signals, digital radio, digital amplitude modulation, frequency shift keying (FSK), phase shift keying (PSK), quadrature amplitude modulation (QAM), bandwidth efficiency, carrier recovery, differential phase shift keying,(DPSK), clock recovery, probability of error & bit error rate, trellis encoding, Asynchronous and Synchronous Transmission.
2	Data Link Control Protocols: Need for Data Link Control, Service provided by the Data Link Layer, Frame Design Consideration, Flow Control Mechanism, Types of Errors, Error Detection, Error Correction, Line Configurations, Flow Control, Error Control, High-Level Data Link Control (HDLC), Data Link Error Control Error Control in Stop-and-wait Mechanism & Sliding Window Mechanism, Sequence numbering, Piggybacking Acknowledgements. Mac layer and its different protocols. Multiplexing, Circuit Switching and Packet Switching: Frequency-Division Multiplexing, Synchronous Time- Division Multiplexing, Statistical Time-Division Multiplexing, Asymmetric Digital Subscriber Line, xDSL, Switched Communications Networks, Circuit Switching Networks, Circuit Switching Concepts, Soft switch Architecture, Packet-Switching Principles, Modems.
3	FUNDAMENTALS AND MATHEMATICS OF CRYPTOGRAPHY Overview – Classical Crypto Systems —Substitution Ciphers —Transposition Ciphers - Stream and Block Ciphers — Introduction to Number Theory — Congruences — Chinese Remainder theorem — Modular Arithmetic - Modular Exponentiation — Fermats and Eulers Theorem - Finite Fields — GF(2ⁿ) Fields ENCRYPTION TECHNIQUES: Data Encryption Standard — Advanced Encryption Standard — Confidentiality using Symmetric Encryption, Public-Key Cryptography and RSA — Key Management - Diffie-Hellman Key Exchange — Elliptic Curve Cryptography — Symmetric Key Distribution — Kerberos - X.509 Authentication Service. HASH FUNCTIONS AND SIGNATURES Message Authentication and Hash Functions — Description of MD Hash Family — Secure Hash Algorithms — SHA-512 Digital Signatures and Authentication Protocols — Digital Signature Standard — Process - Services - Attacks on Digital Signature - Digital Signature Schemes.
4	NETWORKSECURITY Security at the application layer - E-Mail - Pretty Good Privacy — S/MIME — Security at the transport layer - SSL Architecture — Protocols — Message Formats - TLS — Security at the Network Layer - IPSec — Two modes - Authentication Header (AH) — Encapsulating Security Payload (ESP) — Security Policy — Security Association — Internet Key Exchange. SYSTEM SECURITY Intruders — Intrusion Detection — Password Management — Malwares and Related Threats — DOS Attacks - Distributed Denial of Service Attacks - Firewalls — Firewall Types-Configuration and Implementation - Demilitarized Zone - Firewall Forensics -Services and Limitations - Intrusion Prevention System.
5	Assignment

Reading List:

- Forouzan, "DataCommunication & Networking", TMH
- Tannenbaum, "ComputerNetworks", PHI
- Dordal Peter, L, (2018) "An Introduction fo Computer Networks"
- Bonaveture Olivier (2011) "Computer Networking: Principals, Protocols & Practice"
- Stallings William, (2013), "Cryptography And Network Security — Principles and Practices", Sixth Edition,

Pearson Education.

6. ForouzanBehrouz A., Mukhopad hyay, Debdeep, (2010), "*Cryptography and Network Security*", Second Edition, Tata McGraw Hill.
7. KahateAtul, (2003), "*Cryptography and Network Security*", Tata McGraw Hill.
8. Kizza Joseph Migga, (2010), "*A Guide to Computer Network Security*", Springer International Edition.

MCACS1L05: LAB ON RESPONSIVE WEB DESIGNING

Unit	Topics to be covered
1	HTML Basics, HTMLS Semantic Elements, CSS, CSS3, Responsive Websites, Viewport, Bootstrap - Grid System, Typography, Navigation bar, Carousal, Glyphicons, Tables, Images, Tabs, Modal, Using JavaScript, Using jQuery

MCAGI1T01: Statistical and Numerical Computing

Unit	Topics to be covered
1	Basic statistics: Measure of central tendency, dispersion. Probability' distribution, introduction to mass function, density function, distribution function, estimation of parameters. Regression Analysis: Linear and Non-linear regression. Multiple regression Testing of Hypothesis: Test of Significance, Chi-square test, t-test, ANOVA, F- test.
2	Interpolation: Newton's Forward, Backward, Sterling & Bessel's Interpolation formula. Lagrange's Interpolation.
3	Integration: Trapezoidal, Simpson's 1/3rd, Weddel's Rule, Rombergintegration. Gauss- Legendre two & three-point formula, Newton cotes Formula. Gram-Schmidtorthogonalisation, Tchebycheff Polynomial.
4	Solution of transcendental and system of linear equations: Method of Iteration, Method of Bisection. Newton - Raphson Method, Regula-Falsi method. Secant Method; Gauss Elimination Method, Gauss-Jacobi, Gauss-Seidel' LU factor ization, Tridiagonalisation, Inverse interpolation. Least Square curve fitting: linear & non-linear. Solution of Differential Equations: Picard's method, Euler-modified method, Taylor's Series method, Runge-Kutta method, Milne's Predictor- Corrector method.
5	Assignment

Reading List:

1. Pal, *Numerical Methods*, OUP
2. Balaguruswamy. *Numerical and Statistical Methods*, TMH
3. V. Rajaraman, "Introductory methods of Numerical Analysis", PHI.
4. A.M. Goon, M.K. Gupta and T.S. Dasgupta, "*Fundamental of Statistics*", The World Press Pvt. Ltd.

MCASE1L01: Lab Based on Statistical Package

Unit	Topics to be covered
1	Analyze the data from the term experiment. Be sure you interpret the results to your instructor. Then, practice with the following problems. As you do the problems remember to answer these questions. You may collaborate with your classmates, but you should try to do the analyses yourself. 1. How many means are being tested? 2. Are the observations independent or related? 3. Is the hypothesis one-tailed or two-tailed? 4. Do the means fit the hypothesis? Where the means significantly different? 6. How do you know?

MCASE1L02: Training on Computer Networking

Unit	Topics to be covered
1	IP Addressing, Data Sharing, Data Security, Blocking of Site, RAID Configuration, Blocking of ICMP

SEMESTER – II

MCACS2T06: Object Oriented Analysis and Design

Unit	Topics to be covered
1	Introduction: Object Oriented approach, its features & significance., S/W Complexity & its causes, S/W Crisis & the related issues need to be resolved
2	Modeling: Object Modeling: Objects & classes, Links & Associations, Generalization & inheritance, Grouping Constructs, Advanced Object 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 operations, constraints., Analysis and System design: Analysis: object modeling, Functional modeling adding operations, iteration.
3	System design : subsystem, concurrency, allocation to processors and tasks, 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.
4	Implementation: Using a programming language, using a database system, Programming Styles: Object Oriented style : Reusability, extensibility, robustness and Programming-In-The-Large.
5	Assignment

Reading List:

1. Object Oriented Modeling and Design, J. Rum Baugh, PHI,2003
2. Object Oriented Analysis and Design, G. Booch,2000

MCACS2T07: Distributed Computing

Unit	Topics to be covered
1	Fundamentals: Definition, Evolution of distributed Computing System Distributed Computing System Models, Distributed Operating System, Designing a distributed Operating System, Introduction of distributed computing environment Message Passing: Introduction Desirable features, Issues in IPC by message passing , synchronization, Buffering, Multi datagram messages, encoding and decoding message data.
2	Remote Procedure Calls: Introduction, The RPC Model, Transparency of RPC, Implementing RPC mechanism RPC messages server management, parameter- passing and call semantic, Communication protocols for RPC's. Distributed Shared Memory: Introduction, Architecture of DSM Systems Design and implementation, granularly, structure of shared memory space Consistency models, replacement strategy, Thrashing.
3	Resource Management: Desirable feature, Task assignment approach, Load-balancing approach, Load-sharing approach. Process Management: Process Migration, Threads.
4	Distributed File Systems: Intakes, Desirable features, File models, File accessing models, file- sharing semantic, File-caching schemes, File replication on Fault tolerance, Automatic Transactions, Design principle.
5	Assignment

Reading List:

1. George Coulouris, Jean Dollimore and Tim Kindberg, (2002), "*Distributed Systems Concepts and Design*", Third Edition, Pearson Education Asia.
2. Liu, *Distributed Computing*, Pearson Education.
3. HagitAttiya and Jennifer Welch, *Distributed Computing*, Wiley India.
4. Sinha P.K., *Distributed Operating Systems: concept and Design*, PHI
5. Tanenbaum, *Distributed Operating System*, Pearson Education.

MCACS2L08: Mini Project I (Lab)

Unit	Topics to be covered
1	Student will complete the Synopsis work of the Mini Project II to be covered in the next semester
5	Assignment

MCAGI2T02: OPTIMIZATION TECHNIQUES

Unit	Topics to be covered
1	Introduction: Nature and Meaning, History, Management Applications, Modeling. Principles. Characteristics, Scope, Development of OR In India, Role of Computers in OR
2	Linear Programming: Introduction and Applications of LP, Limitations of LP Formulation of a LP Model, Graphical Solution of a LPP, Simplex Method, Two Phase Method, Big-M Method.
3	Transportation, Assignment and Replacement Problem: Introduction to Transportation Problem. Mathematical Formulation, Feasible Solution and Optimum Solution: Introduction to Assignment Problem, Mathematical Formulation. Traveling Salesman Problem; Introduction to Replacement Problem, Capital Equipment, Discounted Cost. Replacement in Anticipation of Failure.
4	Queuing Problems: Classification of self-problems, processing of n jobs through two machines, three machines, processing of two jobs through m machines. Project Management by PERT-CPM: Introduction, History & Applications, Basic Steps. Network Diagram Representation, Rules, Time Estimates and Critical Path in Network, Analysis, Uses and Applications of PERT/CPM.
5	Assignment

Reading List:

1. Pai, "OperationResearch", OUF!
2. Paneerselvam, "OperationResearch", PHI.
3. Hillier & Liebermann, "Operations Research", TMH.

MCADSE2T1A: Elective 1 (Option 1: Compiler Design)

Unit	Topics to be covered
1	INTRODUCTION TO COMPILING: Compilers Analysis of source Program, The Phases of a compiler, the tasks of a compiler, Analysis of the Source Program, Phases and Passes in compilers. LEXICAL ANALYSIS: Lexical Analysis - The role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzer, Review of Regular Expressions, Finite State Machines, Finite Automata based, Pattern Matching. Specification and recognition of tokens, a language for specifying lexical analyzer, Lexical Analyzer Generator, Design of Lexical Analyzer generator, Programming assignment on lex, Regular expression to finite automation - Use of a tool for generating lexical analyzer.

2	SYNTAX ANALYSIS- Introduction to syntax analysis, the Role of Parser, Review of grammars, Chomsky Hierarchy, Context-free Grammars, Writing a Grammar, Top-down Parsing, error recovery in Top down parsers, Bottom-up Parsing, Overview of Shift reduce parsing, Operator- Procedure Parsing, Finite automata of LR(0) items and LR (0) parsing, SLR parsing, Canonical LR Parsing, LALR Parsing, Compaction of LR parsing table, Using ambiguous grammars, Error recovery in bottom up TYPE CHECKING: Type systems, Specification of simple type checker, equivalence of type expressions, type conversions, overloading of functions and operators, Polymorphic functions, an algorithm for unification.
3	DYNAMIC STORAGE ALLOCATION TECHNIQUES: Introduction to Dynamic storage, symbol tables, Symbol Table Organization, Symbol attributes and Symbol table entries, Local Symbol Table management, Global Symbol table structure, language facilities for dynamic storage allocation, dynamic storage allocation techniques. Symbol Table for block structured language, Different types of dynamic storage Allocation Techniques, Static versus dynamic storage allocation techniques. INTERMEDIATE CODE GENERATION: Intermediate language, declarations, Assignments, Boolean Expression, Flow control statements - Back patching, Case Statements CODE GENERATION: Introduction to optimization techniques, Issues in the design of code Generator, the target Machine, Run-Time storage Management, Basic blocks and flow graphs, Next-use information
4	A SIMPLE CODE GENERATOR: Design of a simple code generator, A simple code generator, Register allocation and Assignment, The DAG representation of Basic blocks. CODE OPTIMIZATION-I: Introduction, Early Optimizations, The Principle of Optimization, Optimization of Basic Blocks, Loops in flow graphs, Constant-Expression Evaluation (Constant Folding, Algebraic Simplifications and Re- association, Value numbering, Copy Propagation. Redundancy Elimination: Common -Sub Expression Elimination, Loop-invariant Code Motion, Partial-Redundancy Elimination, Redundancy Elimination and Re-association, Code Hoisting, Loop Optimizations: Induction- Variable Optimizations, Unnecessary Bounds — Checking Elimination. Procedure Optimizations: Tail-Call Optimization and Tail -Recursion Elimination, Procedure Integration, In-Line Expansion, Leaf-Routine Optimization and Shrink Wrapping.
5	Assignment

Reading List:

1. Torben/ MongensenEgidius,Basics of Compiler design
2. W Andrew, *Modern Compiler Implementation in C*. AppelCambridge University Press
3. Aho Alfred V., Lam Monica S., Jeffrey Ravi Sethi, , Ullman D., *Compiler Principles, techniques and Tools*, 2nd edition, Pearson Publication.

MCADSE2T1B: Elective 1 (Option 2: Digital Image Processing & Multimedia)

Unit	Topics to be covered
1	Overview, Computer imaging systems, Image analysis, preprocessing, Human visual system, Image model, Electronic Eye Contact, Spectrum Oct09, Image enhancement
2	Gray scale mods, Histogram mod, Discrete transforms, Fourier, Discrete cosine, Walsh- Hadamard, Haar, PCT, Filtering, Wavelet transform, Pseudocolor, Image enhancement, Sharpening, Smoothing, Image restoration, Overview, System model, Noise removal: order filters
3	Image restoration: noise removal: mean & adaptive filters, Degradation model, Inverse filter, Freq. filters, Geometric transforms, Image compression: system model, Lossless methods, Image compression: lossy methods
4	Multimedia Overview-Definition; Applications and Design; Authoring (HyperStudio), Introduction to HyperStudio-The Metaphor; The Basics (Cards, Buttons, Text) ; HyperStudio Resources, Instructional Design-Objectives; Content (print, graphics, sounds, etc.); Interaction; Assessment; Closure, Screen Design-Metaphors and Themes; Colors and Backgrounds; Text (size, color, placement); Navigation; Consistency; Transitions and Links, Use of Sound, HyperStudio Sounds, Internet Resources, HyperStudio Tips and Tricks, Multimedia Portfolios, Advanced Button Features.
5	Assignment

Reading List:

1. Gonzalez Rafael.C. & Woods Richard E. *Digital Image Processing*, 2nd Ed., Prentice Hall
2. Gonzalez R.C. and Thomason M.G. *Syntactic Pattern Recognition: An introduction*

3. Devijver P.A. and Kittler J. *Pattern Recognition - A Statistical Approach*
4. Jain A.K. *Fundamentals of Digital Image Processing*
5. Duda R.O. and Hart P.E. *Pattern Classification and Scene Analysis*
6. Li Ze — Nian *Fundamentals of Multimedia*
7. Mayer Richard E. *Multimedia Learning*

MCADSE2T1C: ELECTIVE 1 (OPTION 3: COMPUTER GRAPHICS)

Unit	Topics to be covered
1	Introduction: History, Advantages, Application, I/O Devices Graphic Packages, Languages. Jag Free Images on a Raster CRT Interactive Graphics processor for Digital Logic Simulation System
2	Graphics Techniques: Video-Display Devices, Raster-Scan and Random-Scan Systems; Graphics Monitors, Input Devices, Points and Lines; Line Drawing Algorithms, Mid-Point Circle and Ellipse Algorithms; Scan Line Polygon Fill Algorithm, Boundary-Fill and Flood-Fill Translation, Scaling, Rotation, Reflection and Shear Transformations; Matrix Representations and Homogeneous Coordinates; Composite Transforms, Transformations Between Coordinate Systems, Viewing Pipeline, Viewing Coordinate Reference Frame, Window to View-Port Coordinate Transformation, Viewing Functions, Line and Polygon Clipping Algorithms.
3	2-D Geometrical Transforms and Viewing: Drawing Elementary figures, Polygon Filling, Transformations, Windowing and clipping, Display file segmentation. Interactive Graphics: Interactive input techniques, Event handling, input functions, Hidden line and surface removal, rendering, Computer Animation, 3D Shaded Computer Animation the use of 3D abstract Graphical types in Computer Graphics and Animation. 3-Dimensional Reconstruction. A case study, Real-time graphics.
4	3-D Object Representation, Geometric Transformations and Viewing: Polygon Surfaces, Quadric Surfaces, Spline Representation, Bezier and B-Spline Curves; Bezier and B-Spline Surfaces; Illumination Models, Polygon Rendering Methods, Viewing Pipeline and Coordinates; General Projection Transforms and Clipping.
5	Assignment

Reading List:

1. Hearn Donald, and Baker M. Pauline *"Computer Graphics"* C Version, Pearson Education.
2. Hearn, and Baker *"Mathematical Elements for Computer Graphics"*, Tata McGraw Hill Computer Graphics by, PHI
3. Newman and Sproull R. F. *"Principles of Interactive Graphics"*, McGraw-Hill.

MCADSE2T2A: Elective 2 (Option 1: Introduction to Machine Learning)

Unit	Topics to be covered
1	Introduction to Machine Learning Introduction, Different Types of Learning, Hypothesis Space and Inductive Bias, Evaluation and Cross-Validation, Linear Regression, Introduction to Decision Trees, Learning Decision Tree, Overfitting
2	KNN, Feature Selection and Extraction, Bayesian Learning k-Nearest Neighbour, Feature Selection, Feature Extraction, Collaborative Filtering, Exercise on KNN and PCA Bayesian Learning, Naive Bayes, Bayesian Network
3	Logistic Regression, SVM and Neural Network Logistic Regression, Introduction Support Vector Machine SVM : The Dual Formulation, SVM : Maximum Margin with Noise, Nonlinear SVM and Kernel Function, SVM : Solution to the Dual Problem Neural Network Introduction, Multilayer Neural Network, Neural Network and Backpropagation Algorithm, Deep Neural Network
4	Computational Learning, Sample Complexity and Clustering Introduction to Computational Learning Theory, Sample Complexity : Finite Hypothesis Space, VC Dimension Introduction to Clustering, K Means Clustering, Agglomerative Hierarchical Clustering
5	Assignment

Reading List:

1. Tom M. Mitchell (2017), *Machine Learning*, McGraw Hill Indian Edition.
2. Andreas Muller and Sarah Guido (2017), *Introduction to Machine Learning with Python*, O'Reilly Publication, 2nd Edition.
3. Yuxi (Hayden) Liu (2017), *Python Machine Learning By Example*, Packt Publishing, Mumbai.

MCADSE2T2B: Elective 2 (Option 2: Artificial Intelligence)

Unit	Topics to be covered
1	Approaches to AI: Turing Test and Rational Agent Approaches; State Space Representation of Problems, Heuristic Search Techniques, Game Playing, Min-Max Search, Alpha Beta Cutoff Procedures.
2	Knowledge Representation: Logic, Semantic Networks, Frames, Rules, Scripts, Conceptual Dependency and Ontologies; Expert Systems, Handling Uncertainty in Knowledge. Planning: Components of a Planning System, Linear and Non Linear Planning; Goal Stack Planning, Hierarchical Planning, STRIPS, Partial Order Planning.
3	Natural Language Processing: Grammar and Language; Parsing Techniques, Semantic Analysis and Pragmatics. Multi Agent Systems: Agents and Objects; Agents and Expert Systems; Generic Structure of Multi agent System, Semantic Web, Agent Communication, Knowledge Sharing using Ontologies, Agent Development Tools.
4	Fuzzy Sets: Notion of Fuzziness, Membership Functions, Fuzzification and Defuzzification; Operations on Fuzzy Sets, Fuzzy Functions and Linguistic Variables; Fuzzy Relations, Fuzzy Rules and Fuzzy Inference; Fuzzy Control System and Fuzzy Rule Based Systems. Artificial Neural Networks (ANN): Supervised, Unsupervised and Reinforcement Learning; Single Perceptron, Multi-Layer Perceptron, Self-Organizing Maps, Hopfield Network
5	Assignment

Reading List:

1. Norving Peter and Russell Stuart J., "Artificial Intelligence: A modern Approach"
2. S.S, Chandra, Vinod and Hareendrans Anand, "Artificial Intelligence and Machine Learning", PHI

MCADSE2T2C: Elective 2 (Option 3: Soft Computing)

Unit	Topics to be covered
1	Neural Networks, Application Scope of Neural Network, Fuzzy Logic, Genetic Algorithm, Hybrid Systems and Soft computing. Artificial Neural Network: Fundamental Concept, Evolution of Neural Networks, Basic Models of Artificial Neural Network, Important Terminologies of ANNs, McCulloch-Pitts Neuron, and Hebb Network
2	Introduction to Fuzzy logic, Classical Sets (Crisp Sets), Operations of Classical Sets, Fuzzy Sets Operations. Classical Relations and Fuzzy Relations: Cartesian Product of Relation, Classical Relation, Fuzzy Relations, Tolerance and Equivalence Relations, No interactive Fuzzy Sets. Membership Functions: Features of Membership Functions, Fuzzification and Defuzzification.
3	Fuzzy Rule Base and Approximate Reasoning Introduction, Truth Values and Table in Fuzzy Logic, Fuzzy Propositions, Fuzzy Reasoning, Fuzzy Inference System. Fuzzy Decision Making: Individual Decision Making, Multi person Decision Making, Multi objective Decision Making, Multi attribute Decision Making, Fuzzy Bayesian Decision Making. Fuzzy Logic Control Systems: Control System Design, Architecture and Operation of FLC system, FLC System Models, Application of FLC Systems.
4	Hybrid Soft Computing Techniques Neuro-Fuzzy Hybrid Systems, Generic Neuro- Hybrid Systems, Genetic Fuzzy Hybrid and Fuzzy Genetic Hybrid Systems, Simplified Fuzzy ARTMAP! Applications of Soft Computing: A Fusion Approach of Multispectral Images with SAR (Synthetic Aperture Radar), Optimization of Traveling Salesmen Problem using Genetic Algorithm Approach, Genetic Algorithm-Based Internet Search Technique, Soft computing Based Hybrid Fuzzy Controllers.
5	Assignment

Reading List:

1. Sivanandam S.N., Deepa S.N. *Principles of Soft Computing*, Wiley.
2. Bernadette Bouchon-Meunier *Fuzzy Logic and Soft Computing*, World Scientific.
3. Chaturvedi Devendra K., *Soft Computing: Techniques and its Applications in Electrical Engineering*, Springer Science & Business Media.

MCASE2L03: Technical Presentation and Report Writing

Unit	Topics to be covered
1	Grammatical Use: punctuation, vowel, consonant, Preposition + noun, uncountable and plural nouns, verb patterns, uses of tenses, Meanings & opposites Writing Skills: Sentence formation; Use of appropriate diction; Paragraph and Essay Writing; Coherence and Cohesion. Technical Writing: Differences between technical and literary style, Elements of style, Common Errors. Letter Writing: Formal, informal and demi-official letters; business letter Job Application: Cover letter, Differences between bio-data, CV and Resume. Report Writing: Basics of Report Writing, Structure of a report; Types of reports. Presentation Skills: Oral presentation and public speaking skills; business presentations. Technology - based Communication: Netiquettes: effective e-mail messages; power- point presentation; enhancing editing skills using computer software

MCASE2L04: Personality Development

Unit	Topics to be covered
1	Personality Development

Semester – III

MCACS3T09: Advanced Web Designing using J2EE

Unit	Topics to be covered
1	Web Programming: 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. Introduction to J2EE: 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.
2	Advanced Web Technology in J2EE : 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.
3	Creating Web Application: 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
4	Web Application Deployment and Authentication: Enterprise Application Development Process, Deploying Web Application, Understanding CLASSPATH, Securing Web Applications, basic authentication with JAX-RPC Example, Client Certificate Authentication over HTTP/SSL
5	Assignment

Reading List:

1. Shah Deven N (2012), "A Complete Guide to Internet and Web Programming", DreamTech Press, New Delhi
2. KamaRaj I (2002), "Internet and Web Technologies", TataMcGraw Hill, New Delhi.
3. YoungMargaretLevine (2002), "Internet the Complete Reference", TataMcGraw Hill, Second Edition, New Delhi.

MCACS3T10: CLOUD COMPUTING

Unit	Topics to be covered
1	Introduction- Objectives, from collaborative to the Cloud — A short history Client — Server Computing, Peer-to-Peer Computing, Distributed Computing, Collaborative Computing, Cloud Computing, Functioning of Cloud Computing, Cloud Architecture, Cloud Storage, Cloud Services, Industrial Applications, Infrastructure Services, Platform Services, Software Services -Software as service, Management and Administration, Performance, Security and Energy Efficiency Cloud Computing Technology- Introduction- Objectives, Clients — Mobile — Thin — Thick, Security - Data Linkage - Offloading Work - Logging Forensics - Development — Auditing, Network- Basic Public Internet- The Accelerated Internet- Optimized Internet Overlay- Site-to-Site VPN- Cloud Providers- Cloud Consumers - Pipe Size- Redundancy, Services- Identity- Integration- Mapping- Payments- Search.
2	Accessing the Cloud and Data Management - Introduction - Objectives, Platforms- Web Application Framework- Web Hosting Services- Proprietary Methods, Web Applications- API's in Cloud Computing, Browsers for Cloud Computing- Internet Explorer- Mozilla Firefox- Safari- Chrome. Information Storage in Cloud Computing- Introduction- Objectives, Storage as a Service, Storage Providers- Amazon Simple Storage Service- Nirvanix- Google
3	Data Management- Introduction- Objectives, Data Security- Data Location- Data Control- Securing data for transport, Scalability and Cloud Services- Large Scale Data Processing- Databases and Data Stores- Data Archival. Cloud Computing Standards- Introduction- Objectives, Best Practices and Standards, Practical Issues- Interoperability- Portability- Integration- Security, Standards Organizations and Groups- Cloud Security Alliance- Distributed Management Task Force (DMTF)- National Institute of Standards and Technology (NIST)- Open Cloud Consortium (OCC)
4	Desktop and Device Management- Introduction- Objectives, Desktop Virtualization- Across Industries- Client Desktops, Desktop placement in the cloud- Merits- Desktop as a Service (DaaS), Desktop Management- Watching the four areas- Asset Management. Cloud Governance-Introduction-objectives, IT Governance, Deciding the Governor, Risk Assessment of running the cloud- Understanding possible risks- Performance monitoring and measurement- Measurement Methods, Working of Governance- Establishment of the Governance Body- IT Service Performance — Monitoring and Measuring- Cataloging control and Compliance Data, Virtualization concepts
5	Assignment

Reading List:

1. Kai Hwang, Geoffrey C.Fox, and Jack J. Dongarra, “Distributed and Cloud Computing”, Elsevier India Private Limited, 2012.
2. Foster and Kesselman, “The Grid : Blueprint for a New Computing Infrastructure”, Morgan Kauffman publishers Inc.2004
3. Coulouris, Dollimore and Kindber, “Distributed System: Concept and Design”, Fifth Edition, Addison Wesley, 2011.
4. Michael Miller, “Cloud Computing”, Dorling Kindersley India,2009.
5. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, “Cloud computing: A practical Approach”, McGraw Hill,2010

MCACS3T11: DATA AND WEB MINING

Unit	Topics to be covered
1	Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multidimensional Data Model, Introduction to KDD process — Knowledge Discovery from Databases - Need for Data Preprocessing —Data Cleaning — Data Integration and Transformation. Data Cubes, Stars, SnowFlakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting. ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse. Relationship between warehouse and mining. Data mining issues in object oriented databases, spatial databases and multimedia databases and text bases.

2	Data Mining: Overview, Motivation (for Data Mining), Data Mining- Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Description of Data mining query language with examples. Introduction - Data Mining Functionalities Association Rule Mining — Multidimensional and multilevel association rules. Classification association rules. Association rule Algorithms-A priori and frequent pattern growth
3	Classification vs. Prediction: Different classification algorithms. Classification by Decision Tree Introduction — Bayes i an Classification — Rule Based Classification — Classification by BackPropagation — fuzzy set theory and genetic algorithms, Classification methods K- nearest neighbor classifiers
4	Cluster Analysis: Types of Data in Cluster Analysis—A Categorization of Major Clustering Methods — Partitioning Methods — Hierarchical methods — Density-Based - Grid-Based Methods — Model-Based Clustering for continuous for discrete data, Scalability of clustering algorithms. Parallel approaches for clustering. Introduction, Web Usage mining, Web content mining, Web log attributes. Web Structure mining
5	Assignment
	TOTAL

Reading List:

1. Han J.,Kamber M., Data Mining Concepts and Techniques, Harcourt India.
2. Dunham M.,Data Mining: Introductory and Advanced Topics, Pearson Pub.
3. Pujari, A.K.,Data Mining Techniques, Universities Prss.
4. PudiVikram,KrishnaF!Radha, Data Mining,
5. Han Jiawei,KamberMicheline,Pei Jian,Data Mining Concepts and Techniques, Morgan Kaufmann Pub.

MCACS3L12: Mini Project II (Lab)

Unit	Topics to be covered
1	Apply the concept of Web Technology to develop mini project such as: 1) Online e-Market Buy/Sell Goods 2) Complaint management System 3) Dynamic College Website 4) Online Job Portal 5) E-Shop
2	Assignment

MCADSE3T3A: Elective 3 (Option 1: Management Information System & E-Commerce)

Unit	Topics to be covered
1	Management system: Organization, Types of Organization, Types of Management system, Levels of Management, Management System Requirement, role of MIS , Objectives, characteristics, Components of MIS, System- Information System: classification, characteristics, Information Resource Management: Objective, component, Information System: TPS, MIS, ISS, OAS, Data Processing, Introduction to DBMS: objectives, components.
2	Decision Support System: Types of Decision, Decision making process and MIS, Decision support system: DSS Definition, characteristics, Types of DSS, DSS components, DSS functions DSS Model: Development of DSS, DSS Applications, Group DSS Portfolio Management & IT application: Portfolio Management Concept, Portfolio Management Method, Design and Implementation of Portfolio management, Tools and Techniques.

3	Management Function and Business process: Sale and Order processing, Finance & Budgeting, Human Resource Management, Production Plan & Control, Marketing Enterprise Resource Plan (ERP): Evolution of Enterprise Information System, Concept of ERP, supply Chain Management, Customer Relationship Management, ERP Design and Implementation, ERP tools: SAP, iCUBE.
4	Introduction, Advantages and Disadvantages of E-commerce , Traditional commerce vs. E-commerce, Growth of E-Commerce, E-Commerce Models, Electronic payment Systems, E-Customer Relationship Management, E-Supply Chain Management, security Issues in E-Commerce
5	Assignment

Reading List:

1. Laudon K.C. and Laudon J.P., *Management Information System (Managing the Digital firm)* PHI.
2. Sadagopan S., Management Information System, TMH

MCADSE3T3B: Elective 3 (Option: 2 Enterprise Resource Management)

Unit	Topics to be covered
1	ERP Introduction: Introduction, ERP Planning, Definition, ERP– A System Perspective, Components of an ERP System, Operating System, Evolution, Benefits of ERP, Reasons for the growth of ERP Market ERP & Related Technologies : Introduction: BPR, MIS, DSS, EIS, Introduction to Product Life Cycle Management (PLM), Advantages & Areas of PLM,
2	ERP Marketplace and Market Dynamics Market Overview, SAPAG, Product & Technology, Knowing ERP Market, ERP Functional Modules: Introduction, Finance, Sales & Distribution Manufacturing, Human Resources, Plant Maintenance, ERP Implementation Strategy: ERP Implementation, BIG Bang Strategy, Variants, Phased & Parallel Implementation
3	Vendors, Consultants and Employees In-House ERP Development & Implementation, Cost-Benefit Analysis, Supply Chain, Detailed Analysis,
4	ERP vs E-Commerce: Meaning of E-Commerce, Future Directives in ERP, ERP & Internet, Integrating ERP into Organizational Culture, ERP & CRM Integration.
5	Assignment

Reading List:

1. Zaveri Jyotindra (2012), *"Enterprise Resource Planning"*, Himalaya Publishing House, 2nd Revised Edition
2. Goyal, D.P., (2011), *"Enterprise Resource Planning"*, Tata Mc.Graw- Hill Education.

MCADSE3T3C: Elective 3 (Option: 3 Principles of Management & Organizational Behaviour)

Unit	Topics to be covered
1	Management Fundamentals: Managerial Skills — planning, forecasting, Staffing, directing, controlling, Social responsibilities, Levels of Management, Roles & Skills. Planning: purpose, principles, characteristics of a good plan, reasons of failures of plans Decision Making: Types of decisions, programmed & non programmed, operational & strategic, barriers in effective decision makings. Delegation: Decentralization, accountability, barriers in effective delegation
2	Organizational Behaviour: organization, organizational structure, culture; Perception & Learning; Personality and values; Theories of personality, trait theory, psychoanalytic theory, Introversion, Extroversion, Type A and B personalities Motivation: Positive & Negative Motivation; Theories of motivation — Mc Gregor's Participation Model theory X and theory Y, Maslow's Need Hierarchy theory, Herzberg's Two Factor theory, McClelland's Three Need theory Alderfer's ERG theory, Financial & Non-financial incentives

3	Leadership: Concept, Characteristics of good Leadership, Leadership styles, Likert's management Systems & Leadership, Trait Theory of Leadership, Behavioral Theory of Leadership Group Dynamics: Formal & informal groups, Clique, Group formation, Advantages & disadvantages of informal groups, Team Development, Team Spirit
4	Organizational Conflict Management: Dynamics of conflict, Resolution of conflict. Organizational Development: Concept; Change management Need for change, resistance to change; Theories of planned change.
5	Assignment

Reading List:

1. Koontz & Weirich, (2003), Essentials of Management, Tata McGraw Hill.
2. VSP Rao, V Hari Krishna — Management: Text and Cases, Excel Books.
3. Robbins.S. Organisational Behaviour, X edition., Prentice-Hall, India.
4. Hellinegal Slocum, Woodman, Organisational Behaviour, IX edn., Thomson learning.

MCADSE3T4A: Elective 4 (Option 1: Parallel Computing)

Unit	Topics to be covered
1	Parallel Computers-Introduction The Demand of Computational Speed, Types of Parallel Computers, Architectural Features of Message passing Multicomputer, Networked Computers as a Multicomputer Platform, Potential for increased computational speed. Parallel Computer Architecture: A Taxonomy of Parallel Architectures, Control Mechanism, Address-space Organization, Interconnection Networks, Processors Granularity; SIMD Architecture: Overview of SIMD Architecture, Design and Performance Issues; MIMD Architecture: Shared Memory Architecture, Uniform and Non-Uniform Memory Access Multi Processors, Parallel Vector Processors (PVP), Symmetric Multiple Processors (SMP), CC - NUMA, NUMA and COMA Architectures. Distributed Memory Architecture: Cluster Architecture - Design and other Issues ,MPP Architecture.
2	System Interconnection and Gigabit Network Basics of Interconnection Network Network Topologies and Properties, Buses, Crossbar, and Multistage switches, Gigabit Network Technologies, Comparison of Network Technologies Parallel Programming: Paradigms and Programmability: Algorithmic Paradigms, Programmability issues Parallel Programming Examples; Parallel Programming Models: Implicit Parallelism, Explicit Parallel Models, Other Parallel Programming Models; Shared Memory Programming: The POSIX Threads (P-threads) Model, The Openmp Standard; Message-Passing Programming: The Message Passing Paradigm, Message Passing Interface (MPI), Parallel Virtual Machine (PVM). Data Parallel Programming: The Data Parallel Model, The Fortran 90 Approach, Other Data Parallel Approaches.
3	Performance Metrics and Benchmarks Performance Metrics for Parallel Systems, Run Time, Speedup, Efficiency Cost. Scalability and Speedup Analysis: Amdahl's Law: Fixed Problem Size, Gustafson's Law: Fixed Time, Sun and Ni's Law: Memory Bounding, Iso performance Models. System and Application Benchmarks: Micro Benchmarks, Parallel Computing Benchmarks, Business and TPC Benchmarks, SPEC Benchmark Family; Performance v/s Cost, Performance of parallel Computers, Performance of Parallel Programmes, Parallel Paradigms and Programming Models: Parallel Programming Models, Implicit Parallelism, Explicit Parallel Models, Other Parallel Programming Models. Shared Memory Programming: The POSIX Threads (P-threads) Model, The Open MP Standard.
4	Message-Passing Programming The Message Passing Paradigm, Message Passing Interface (MPI), Parallel Virtual Machine (PVM). Data Parallel Programming: The Data Parallel Model, the FORTRAN 90 Approach, Other Data Parallel Approaches Parallel Algorithms and Applications Sorting Algorithms, Searching Algorithms, Dynamic Programming, Matrix Multiplication, Dense Matrix Computations, Sparse Matrix Computations.
5	Assignment

Reading List:

1. Hwang Kai and Zhiwei Xu (1997), "Scalable Parallel Computing", McGraw Hill New York.
2. Wilkinson Barry and Allen Michael (1999), "Parallel Programming", Pearson Education Asia.
3. Brawer Steven, "Introduction to Parallel Programming"
4. Shasikumar M., Shikhare Dinesh and Prakash P. Ravi, "Introduction to Parallel Processing".
5. Rajaraman V. and Murthy C. Siva Ram, "Parallel Computers- Architecture and Programming"

MCADSE3T4B: Elective 4 (Option 2: Wireless Network)

Unit	Topics to be covered
1	Introduction: Issues in mobile computing, overview of wireless telephony: cellular concept, GSM, channel structure, location management: HLR-VLR, hierarchical, hand offs, channel allocation in cellular systems, CDMA, GPRS. Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Bluetooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications. Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks.
2	Introduction to Adhoc networks: definition, characteristics features, applications. Characteristics of Wireless channel, Ad Hoc Mobility Models: - Indoor and outdoor models. MEDIUM ACCESS PROTOCOLS MAC Protocols: design issues, goals and classification. Contention based protocols-with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN. NETWORK PROTOCOLS Routing Protocols: Design issues, goals and classification.
3	Routing: Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing. END-END DELIVERY AND SECURITY Transport layer: Issues in designing- Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols. Cross Layer Design and Integration of Ad Hoc for 4g Cross Layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary perspective.
4	Introduction to sensor networks and its applications Architecture and factors influencing the sensor network design. Routing protocols- data centric routing protocols, hierarchical routing protocols, location based routing, energy efficient routing etc., Node Scheduling and coverage issues, topology control. Querying, data collection and processing, Collaborative information processing and group connectivity. Target tracking and identity management using sensor networks. Localization. Application & future research Challenges.
5	Assignment

Reading List:

1. Adelstein Frank, Gupta S.K.S., Richard III Golden G. and Schwiebert Loren, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill Professional.
2. Taniar David, "Mobile Computing: Concepts, Methodologies, Tools, and Applications".
3. Toh C.K., Ad-Hoc Mobile Wireless Networks — Protocols and Systems, Prentice Hall.
4. Stojmenovic and Cacute, Handbook of Wireless Networks and Mobile Computing, Wiley.

MCADSE3T4C: Elective 4 (Option 3: Big Data Analytics)

Unit	Topics to be covered
1	INTRODUCTION TO BIG DATA AND HADOOP: Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analyzing Data with Unix tools, Analyzing Data with Hadoop, IBM Big Data Strategy, Introduction to NoSQL. Introduction to Infosphere BigInsights and Big Sheets
2	HDFS(Hadoop Distributed File System) : The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingestion Tools, Data Ingest with Flume
3	Map Reduce: Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.
4	Data Analytics with R: Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering.

Reading List:

1. Eaton Chris, Deroos Dirk, "Understanding Big data", Tata McGraw Hill.
2. Lublinsky Boris, T. Smith Kevin, Yakubovich Alexey, "Professional Hadoop Solutions ", Wiley Publication
3. White Tom, (2012) "HADOOP: The definitive Guide", O Reilly Publication.

MCASE3L05: MOOCs

Unit	Topics to be covered
1	MOOCs

MCASE3L06: Seminar

Unit	Topics to be covered
1	Industry seminars are suggested to enable the students of MCA to appreciate the software development which is going on in industries in India. These seminars will help the students to face interviews with some confidence. The students should attend these and submit a report.

SEMESTER – IV

MCACS4P13: Internship

A student has to undertake at least two software development projects/training work of at least one-month duration during 1st, 2nd or 3rd semester.

MCACS4P14: OJT Project

OJT Project is of 500 Marks (24 credits) out of which all 24 credits for the development of the project and project report (unguided learning hours). The IV semester, being kept for fulfillment of the academic requirement, is entirely devoted to preparation of a major project report. For this purpose, each candidate shall have to undertake a major project, at least of 4 month durations, in a reputed organization. Project work has to be done individually. However if the project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others.