SRI VENKATESWARA UNIVERSITY: TIRUPATI

DEPARTMENT OF COMPUTER SCIENCE

ADOPTION OF CBCS SYSTEM FOR TWO YEAR MCA PROGRAMMEWITHEFFECT FROM 2020-21

Semester	Course Number	Course Title	Core/Generic Elective/Open Elective	No Of Credits	L	T	P	Total	Maximum marks		Total Marks
									Session	univ	
I SEM	MCA 101	Discrete Mathematical Structures	Compul Foundation	4	3	1		4	30	70	100
	MCA 102	Object Oriented Programming with Java	Core	4	3	1		4	30	70	100
	MCA 103	Computer Organization	Core	4	3	1		4	30	70	100
	MCA 104	Operating Systems	Core	4	3	1		4	30	70	100
	MCA 105	105A.Accounting and Financial management 105B.Accounting Essentials for Computer Applications	Generic Elective	4	3	1		4	30	70	100
	MCA 106 P	Software Lab I (based on 101 & 103)	----	4	---	---	4	4	30	70	100
	MCA 107 P	Object Oriented Programming Lab	----	4	---	---	4	4	30	70	100
	MCA 108P	Operating Systems Lab	----	4	---	---	4	4	30	70	100
II SEM	MCA 201	Computer Oriented Operations Research	CompulFoundation	4	3	1		4	30	70	100
	MCA 202	Data Structures using Java	Core	4	3	1		4	30	70	100
	MCA 203	Data Communication and Computer Networks	Core	4	3	1		4	30	70	100
	MCA 204	Advanced Database Management Systems	Core	4	3	1		4	30	70	100
	MCA 205	205A. E-Commerce 205B. Cyber Security 205C. Neural Networks	Generic Elective	4	3	1		4	30	70	100
	MCA 206	Group Discussion		2				2			50
	MCA 207P	Software Lab II (Based on 201 & 203)	----	4	--	--		4	30	70	100
	MCA 208P	Data Structures Lab	----	4	--	--		4	30	70	100
	MCA 209P	Advanced Database Management Systems Lab	----	4	--	--		4	30	70	100

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III SEM	MCA 301	Software Engineering	Compul Foundation	4	3	1		4	30	70	100
	MCA 302	Computer Graphics	Core	4	3	1		4	30	70	100
	MCA 303	Web Technologies	Core	4	3	1		4	30	70	100
	MCA 304	304A.Data warehousing and Data mining 304B.Big Data Analytics 304C System Programming	Generic Elective	4	3	1		4	30	70	100
	MCA 305	305A. Cryptography and Network Security 305B.Artificial Intelligence 305C.Mobile Application Development	Generic Elective	4	3	1		4	30	70	100
	MCA 306	The courses offered by Other departments	Open Elective	4	3	1		4	30	70	100
	MCA 307	Technical Seminar		2				2			50
	MCA 308P	Software Lab III (301&302)	----	4	--	--		4	30	70	100
	MCA 309P	Web Technologies Lab	----	4	--	--		4	30	70	100
	MCA 310P	Minor Project work	----	4	--	--		4	30	70	100
IV SEM	MCA 401	401A.Cloud Computing 401B. Dot Net Technologies 401C. Software Testing	Generic Elective	4	3	1		4	30	70	100
	MCA 402	402A. Essentials of Data Science 402B.Deep Learning 402C.Internet of Things	Generic Elective	4	3	1		4	30	70	100
	403	Major Project work (One Month Course work & 3 Months **on site** project)		12				12	100	200	300

The following are the Open Elective Courses offered by the Department Of Computer Science for the Students other Disciplines:

MCA III Semester:

1. Programming in C
2. Open Source Tools
3. Internet Fundamentals

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SRI VENKATESWARA UNIVERSITY, TIRUPATI

Department of Computer Science

ADOPTION OF CBCS SYSTEM FOR TWO YEAR MCAPROGRAMME WITH EFFECT FROM 2020–21

MCA I SEMESTER

MCA 101:Discrete Mathematical Structures

UNIT-I

Logic and Proof: Propositional Logic, Propositional Equivalent, Predicators and Quantifiers, Nested Quantifiers, Rules of Inference, Induction to Proofs, Proof Methods and Strategies.

UNIT-II

Induction and Recursion: Mathematical Induction, Strong Induction and Well Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms.

UNIT-III

Counting: The basics of counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized permutations and Combinations, Generating Permutations and Combinations.

UNIT-IV

Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide and Conquer algorithms and Recurrence Relations, Inclusion – Exclusion, Applications of Inclusion – Exclusion.

UNIT – V

Graphs: Graphs And Graph Methods, Graph Terminology And Special Types of Graphs, Representing Graphs and Graphs Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring,

Text books

1. Discrete Mathematics and Its Applications, By Kenneth H Rosen, McGraw Hill, Sept.2002.

Reference Books

1. Discrete Mathematical Structures with Applications to Computer Science, By J.P.Tremblay, R.Manohar, McGraw Hill Pub, 1975.

2. Discrete Mathematics by N. Chandrasekaran and M. Umaparvathi, Prentice-Hall of India.

MCA 102: Object Oriented Programming with Java

UNIT-I

Introduction: Object Oriented Programming Concepts, Features of Java Language, Architecture, Data Types, Variables, Operators, Control Structures, Arrays. Classes: Classes, Wrapper Classes, Constructors, Overloading of methods, Access control, Nested and Inner classes, Abstract classes. Inheritance: Inheritance basics, Using Super, Multilevel hierarchy, Method overriding, Dynamic method dispatch, Final with inheritance.

UNIT-II

Math Class and Methods, Packages and Interfaces, Exception Handling: fundamentals, exception types, uncaught exceptions, using try, nested try statements, throw, throws, Java built-in exceptions, user defined exceptions. Multithreading: Thread model, main thread, creating a thread, Multiple threads, Thread priorities, synchronization, Inter thread communication, String handling.

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UNIT-III

Wrapper Classes: Number class, Character class, Boolean class.More utility classes: Vector, Stack, Dictionary, Hash table. String Tokenizer, Bit set, Date, Calendar. Input/output: File, Stream classes, Byte Streams, Character Streams.GUI Programming,

UNIT-IV

Features Applets: Applet basics, Applet architecture, an applet skeleton, Applet display method, Repainting, Using Status window, HTML APPLET tag, passing parameters to applet, Audio Clip interface. Even Handling; two event handling mechanisms, Event model, Event classes, sources of events, Event Listener interfaces, Adapter classes. Introduction to SWING: Window Fundamentals, working with frame windows, creating window programs, working with color, fonts, SWING Controls, Layout Managers and Menus: Control fundamentals, Labels, Using buttons, check boxes, checkbox group, choice controls, lists, scroll bars, Text field, layout managers, menu bars, and menus.

UNIT-V

Network Programming with Java: Networking classes and Interfaces, Internet Address, Factory method, Instance Methods, Sockets, Knowing IP address URL-URL Connection class. Creating a server that sends data, creating a client that receives data, two way communications between server and client, Stages in a JDBC program, registering the driver, connecting to a database, Preparing SQL statements, improving the performance of a JDBC program.

Text Book

1. Herbert Scheldt: "The Complete Reference Java "(Eighth Edition),TMH.

Reference Books

1. Dietel&Dietel : "Java2 How to Program", Prentice Hall.
2. Thamus Wu: "An Introduction to Object Oriented Programming With Java." TMH
3. Balagurusamy:"Programming With Java": TMH.

MCA103: Computer Organization

UNIT I

Flip-flops – Registers and shift registers – counters – decoders – Multiplexers – PLDs – sequential circuits.Basic Structure of Computers. Functional UNITs – Basic operational concepts – Bus structures – performance – Multiprocessors and Multi computers – Historical Perspective.

UNIT II

Addressing Methods and Machine Program Sequencing: 1. Basic Concepts: –Memory locations and address, Main Memory operations, Instructions and Instruction Sequencing –Addressing Modes.

UNIT III

Input / Output organization: Accessing I/O Devices – Interrupts – Direct Memory Access-I/O Hardware-Standard I/O Interface.

UNIT IV

Memory System Concepts: – Semiconductor RAM Memories - Read only memories – Cache Memories – Performance Considerations –Virtual Memories: - Memory Management Requirements, Arithmetic: - Addition and subtraction of sign members – Design of fast adders – Multiplication of positive members – Signed operand multiplication – Fast multiplication – Integer division – Floating point numbers and operations.

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UNIT V

Basic Processing UNIT: Concepts – execution of a complete instruction – Multiple – Bus organization – Hardware control – Micro Programmed Control. Pipelining: Concepts – Data hazards – Instruction hazards – Influence on Instruction sets - data path and control constructions.

Text Book:

1. Hamacher C, Vranesic Z, and Zaky S. Computer Organization, 5th edition, McGraw – Hill,2002.
2. Stallings W, Computer Organization and Architecture, 6th edition. Parson Education,2003.

Reference Books:

1. Yarbrough JM, Digital Logic – Applications and Design, Thomas Learning, 1997.

MCA 104: Operating Systems

UNIT I

Computer System Structures: Computer System operation, I/O Structure, storage structures, Storage hierarchy, Hardware protection, Network structure. Operating system structures: System components, Operating System services, System calls, System programs, System structure, Virtual machines, System Design and Implementation, System Generation. Processes: Processes Concept, Processes Scheduling, Operations in processes, Inter processes communication, Communication in Client server systems, Threads: overview, multithreading models, Threading issues, PThreads,

UNIT II

CPU Scheduling: Scheduling criteria, Scheduling Algorithms, Multiple processor Scheduling, Real-time scheduling. Process Synchronization: - The critical-section problem, Synchronization hardware, Semaphores, Classic problems of Synchronization, Critical regions, Monitors. Dead Locks: Deadlock characterization, Deadlock handling, Deadlock prevention, Deadlock avoidance, Deadlock detection, and Recovery.

UNIT III

Memory Management: Swapping, Contiguous memory allocation, Paging, Segmentation with paging Concept of Virtual memory Demand paging Page replacement, Allocation of frames, Thrashing. File System Interface & Implementation: File concept, Access methods, Directory structure, File System Mounting File Sharing Protection, File system structure, and implementation, Directory implementation, Allocation methods. Free space management, Efficiency and performance, Recovery.

UNIT IV

I/O Systems: overview, I/O hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O to Hard ware operations, streams , Performance of I/O. Mass Storage Structure:- Disk Structure Disk Scheduling, Disk management, Swap-space Management,
RAID Structure,

UNIT V

Security: User authentication, program threats, system threats, security systems Facilities, Linux system: History, Design principles, Kernel modules, process management, Scheduling Memory Management, File Systems.

Text Books:

1. Silberschatz A, Galvin P.B, and Gaghe G. Operating System Concepts, 8th edition, John Wiley, 2002.
2. Tenenbaum A.S., Modern Operating Systems, 2nd edition, Pearson Education, 2001.

Reference Books:

1. Dhamdhere D.M., Operating Systems – A concept based Approach, Tata McGraw-Hill, 2002.
2. Bhatt P.C.P., An Introduction to Operating Systems – Concepts and Practice, PHI, 2003.

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MCA 105A: Accounting and Financial Management

UNIT I

Introduction to Financial Accounting Concepts: Definition and concepts, Significance, Branches of Accounting, Accounting Cycle-Journal – Ledger – Trial Balance – Final accounts.

UNIT II

Cost Accounting: Elements of Cost, Nature and significance – Cost classification and Allocation, Cost Sheet – Method of Inventory Valuation.

UNIT III

Financial Management: Meaning, scope and role. Financial Analysis through Ratios: Types of Ratios, Liquidity, Activity, Capital Structure and profitability ratio, Limitations of Ratios.

UNIT IV

Working Capital Management: Nature, Elements and Importance of working capital, types of working capital, Determinants of working capital.

UNIT V

Budgeting: Budgets, Purpose, Budgetary control, preparation of budgets, Types of budgeting methods, difference between Master Budget, fixed and flexible budgeting.

Text Books:

1. RajeswaraRao K and Prasad G, Accounting & Finance (MCA), Jai Bharat Publishers, Guntur
2. Jain and Narang, *Cost Accounting*, Kalyani Publishers.

Reference Books:

1. Sharma R K, and Gupta S K, *Management Accounting*, Kalyani Publishers.
2. Financial Management Text and Problems: M.Y.Khan, P.K.Jain.
3. Financial Management Theory and Practices, Prasanna Chandra tata McGraw Hills.

MCA 105B: Accounting Essentials for Computer Applications

UNIT I

Introduction to accounting Packages Ms Excel as Accounting tool Features of MS Excel Function wizard Different categories of functions Date, numeric string, Accounting and Misc. Functions. An overview of Accounting functions Auditing Tool in MS Excel.

UNIT II

Annual budgeting applications of spreadsheet preparation of cash budget preparation of Production budget - preparation of Flexible Budget Preparation of projected profit and loss statement and proforma balance sheet. Introduction to Tally, Tally Features.

UNIT III

Cost Volume Profit Applications of Computer spreadsheet Pricing and product decisions including special order pricing, product addition and deletion and make or buy decisions.

UNIT IV

Financial accounting software package features of an accounting package voucher Entry Ledger preparation of Trail Balance, Profit and Loss Account and Balance using Tally. Sheet under specific package environment. Inventory accounting software package Basic Features Economic order quantity Maintenance of stock levels Stock valuation and reporting using Tally.

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UNIT - V

Problems of Accounting Software Packages Security Problems Power problems Data integrity problems Computer virus problems of system adoptions.

Text books

1. Horngreen Introduction to Management Accounting, Prentice Hall
2. Smith, J.L. Keith, R.M. and Stemphens, W. L. Managerial Accounting, McGraw Hill

Reference Books

1. Guy Hart Davis, The ABCs of Microsoft Office, BPB Publications
2. Computer Accounting with Tally 7.2 Paperback – 2006 by Firewall Media
3. Implementing Tally 9/7.2/6.3 A.K.Nandhini ,K.K.Nandhini-First Edition 2007 BPB publications

MCA II SEMESTER

MCA 201: Computer Oriented Operations Research

UNIT-I

Linear Programming: Concept ofLinear Programming Model, Development ofLP Model, Graphical Method, Simplex Method, Duality, Formulation of DualProblem, Application ofDuality,(Text Book 1).

UNIT-II

Transportation Problem: mathematical Model for Transportation Problem, Types of transportation problem, Finding the Initial Basic Solution, Optimal Solution by U-V method, Assignment problem, Formulation of Assignment problem-Hungerian Method, Method of Solution, Branch and Bound Technique for Assignment Problem,(Text Book 1).

UNIT-III

Network Techniques: Shortest-Path Model, Systematic Method- Dijkstra'sAlgorithm, Floyid's Algorithm, Minimum Spanning Tree Problem, Prime Algorithm, Krusakals Algorithm, Maximal Flow Problem, Linear Programming Modeling for Maximal Flow Problem, Maximal Flow Problem Algorithm, (Text Book 1).

UNIT-IV

Games and Strategies : Two –Person Zero- Sum Games, Maximin- Minimax Principle, Games Without Saddle Points- Mixed Strategies, Graphic Solution Of 2 x n, And m x 2 Games , Dominance Property, Arithmetic Model For n x n Games, General Solution For m x n Rectangular Games(Text Book 2).

UNIT – V

QueueingTheory:Queueing System, Elements OfQueueing System, Operating Characteristics Of Queueing System, Probability Distributions In QueueingSystem, Classification Of Queueing Models, Poisson Queueing Systems, Non Poisson Queueing Systems. Network Scheduling by PERT / CPM: Rules Of Network Construction, Critical Path Analysis, Probability Considerations In PERT (Text Book 2).

Text Books:

1. R.Pannerselvam., "Operations Research" 2nd Edition, Prentice-Hall of India
2. KantiSwarup., P.K.Gupta and Man Mohan, ., "Operations Research" 12th Edition Sultan chand& Sons

Reference Books:

1. Taha H.A., Operations Research: An Introduction, Prentice-Hall of India
2. S.D.Sharma., Operations Research, KedarNath Ram Nath, Delhi

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MCA 202: Data Structures Using Java

UNIT I

Linear Data Structures : Abstract Data Types - Asymptotic Notations: Big-Oh, Omega and Theta – Best, Worst and Average case Analysis: Definition and an example – Arrays and its representations – Stacks and Queues – Linked lists – Linked list based implementation of Stacks and Queues – Evaluation of Expressions – Linked list based polynomial addition.

UNIT II

Non-Linear Data Structures; Trees – Binary Trees – Binary tree representation and traversals – Threaded binary trees – Binary tree representation of trees – Application of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals DFS and BFS – Connected components, Applications of Graphs-Minimum cost spanning tree using Kruskal's algorithm, Dijkstra's algorithm for Single Source Shortest Path Problem.

UNIT III

Search Structures And Priority Queues: AVL Trees – Red-Black Trees – Splay Trees – Binary Heap – Leftist Heap-Implementation of priority Queue ADT with Heap

UNIT IV

Sorting: Insertion sort – Merge sort – Quick sort – Heap sort – Radix Sort- Comparison of sorting algorithms in terms of Complexity - Sorting with disks – k-way merging – Sorting with tapes – Polyphase merge.

UNIT V

Searching And Indexing: Linear Search – Binary Search - Hash tables – Overflow handling – Cylinder Surface Indexing – Hash Index – B-Tree Indexing, B+ Trees.

Text Book:

1. SartajSahni, Data Structures, Algorithms and Applications in Java, Second Edition, University Press.
2. Gregory L. Heilman, Data Structures, Algorithms and Object Oriented Programming, Tata Mcgraw-Hill, New Delhi, 2002.

References:

1. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Second Edition, Tata McGraw-Hill, New Delhi, 1991.
2. Alfred V. Aho, John E. Hopcroft and Jeffry D. Ullman, Data Structures and Algorithms, Pearson Education, New Delhi, 2006.

MCA 203: Data Communication and Computer Networks

UNIT I

Introduction, Network models – Internet model, OSI model Physical Layer: Signals – Analog, Digital, Digital Transmission – Coding, Sampling, Analog Transmission – Modulation of digital and analog signal, Multiplexing – FDM, WDM, TDM, Transmission Media – cable, wireless, Circuit switching and Telephone network, DSL Technology, Cable modern, SONET.

UNIT II

Data Link Layer: Error detection and correction, Data link control and Protocols – Stop and wait, Go-back-n, Selective repeat, HDLC, Point to point access, LANS – Traditional Ethernet, Fast Ethernet, Wireless LAN's – IEEE 802.11, Blue tooth, Connecting LANs – Connecting devices, Backbone networks, Virtual LANS, 2G,3G,4G,5G wireless technologies, Satellite networks, Virtual circuit switching, Frame relay, ATM.

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UNIT III

Network Layer: Inter-networks, Addressing, Routing, Network layer Protocols, Types of Internet protocols – ARP, IPV4, ICMP, IPV6, Routing – Introduction, Unicast routing, Protocols – RIP, OSPF, BGP, Multicast Routing.

UNIT IV

Transport Layer: Process-to-Process Delivery, UDP, TCP, Data traffic, Congestion and Control, Quality of service (QOS) and techniques to improve QOS, Integrated services, QOS in Switched networks. Security: Introduction. Symmetric-key and Asymmetric cryptography, Key Management and Kerberos, Message security, Digital signature, User authentication, E-mail Security, Web security, Social Issues.

UNIT V

Application Layer: Design issues, file transfer, access and management. Client-Server model, Socket interface Introduction to DNS, Distribution of name space, DNS in the Internet. Electronic mail, SMTP, File Transfer, FTP, HTTP, World Wide web, Video-conferencing.

Text Books:

1.Forouzan B A, Data Communications and Networking, 4th edition, Tata McGraw-Hill, 2007.
2.Tanenbaum A S, Computer Networks, 4th edition, Pearson Education, 2003.
3.Ajay R. Mishra, Fundamentals of network planning and optimization, Willey,2nd edition,2018

Reference Books:

1. Stallings W, Data and Computer Communications, 7th edition, Pearson Education, 2004.
2. Gallo M A, and Hancock W M, Computer Communications and Networking Technologies, Thomson Brooks/Cole, 2002.

MCA 204: Advanced Database Management Systems

UNIT-I

Introduction: Database- System Application – Purpose of Database Systems – View of Data – Database Languages– Relational Databases – Database Design–Object– based and Analysis – Database Architecture. Entity Relationship Model-Constraints-Entity-Relationship Diagrams, Design Issue-Weak Entity Sets-Database Design for Banking Enterprise and Unified Modeling language. Structure of Relational Databases - Relational Algebra Operation– Modification of the Database.

UNIT-II

SQL : Data Definition- Structure of SQL Queries- Set Operations- Aggregate Functions- Nested Sub queries-Complex Queries – SQL Data Types and Schemas- Integrity Constraints-Authorization- Embedded SQL-Dynamic SQL- -Authorization in SQL.;PL/SQL Programming: Introduction, Control structures, Functions, Exception handling, Cursors, Triggers, Package.

UNIT-III

Object- Databases and XML: Object-based databases – Complex data types, structured types and inheritance in SQL, table inheritance, array and Multiset types in SQL, object identity and reference types in SQL, implementing O-R features, Persistent programming languages, OO vs OR. XML – Structure of XML, Document Schema, Querying and Transformation, API in XML, XML applications.

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UNIT-IV

Query Processing: Measures of Query Cost-Selection Operation-Sorting-Joint Operation-Evaluation of Expressions-Query Optimization: Transformation of Relational Expressions-Estimating Statistics of Expression Results-Choice of Evaluation Plans.

UNIT-V

Transactions: Transaction concept, Transaction State-Implementation of Atomicity and Durability-Concurrent Executions- Serializability- Recoverability-Implementation of Isolation-Testing for Serializability, Concurrency Control: Lock Based Protocols-Timestamp-Based Protocols-Validation-Based Protocols-Multiple Granularity-MultiversionSchemes. Deadlock handling-Insert and Delete Operations-Weak Levels of Consistency-Concurrency in Index Structures

Text Book:

1.Silberschatz A. Korth H F, and Sudarsan S, *Database System Concepts*, 5th edition, McGraw-Hill 2002. Chapters 1to 4, 6 to 10 and 13 to 17)

2.SQL, PL/SQL: The Programming Language of Oracle by Ivan Bayross, BPB Publications, 2nd Revised Edition.

Reference Books:

1. Date C J,AnIntroduciton to Database Systems, 7th edition, Pearson Educaiton, 2000.
2. Elmasri R, and Navathe S B, Fundamentals of Database Systems, 4th edition, Pearson Education, 2004.
3. Mannino M V, Database Application Development and Design, McGraw-Hill, 2001.

MCA 205A: E-Commerce

UNIT I

Electronic Commerce: Electronic Commerce Framework; Electronic Commerce and Media Convergence; The Anatomy of E-Commerce Application; Electronic Commerce Organization Applications- The Network Infrastructure for Electronic Commerce: Market Forces Influencing the I- Way; Components of the I Way; Network Access Equipment; the Last Mlle: Local Roads and Access Ramps; Global Information Distribution: Networks: Public Policy Issues Shaping the I-Way. Case study: B2B ecommerce

UNIT II

The Internet as a Network Infrastructure: The Internet Terminology; Chronological History of the Internet NSFNET: Architecture and Components: Globalization of the Academic Internet; Internet Governance: The Internet Society –An Overview of Internet:Applications –Electronic Commerce; World Wide Web(WWW) as the Architecture: Web Background: Hypertext Publishing; Technology behind the Web: Security and the Web-Consumer-Oriented Electronic Commerce: Oriented Applications; Mercantile Process,Models Mercantile Models from the Consumer's Perspective; Mercantile Models from the Merchant's Perspective. Case study: E-Commerce/High Security (Pci).

UNIT III

Electronic Payment Systems: Types of Electronic Payment Systems; Smart Cards and Electronic Payment Systems; Credit Card-Based Electronic Payment systems: Risk and Electronic Payment Systems Designing Electronic Payment systems – Inter organizational Commerce and EDI: Legal, security, and Privacy Issues:EDI and Electronic Commerce – EDI Implementation, MIME, and Value- Added Networks : Standardization and EDI;EDI Software Implementation: EDI Envelope for Message Transport: Value- Added Networks (VANs); Internet – Based EDI.Case study: Social Media Marketing.

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UNIT IV

Intra organization Electronic Commerce: Internal Information System: Macro forces and Internal Commerce; Work-Flow Automation and Coordination; Customization and Internal Commerce; Supply Chain Management (SCM) – The Corporate Digital Library: Dimensions of Internal Electronic Commerce Systems; Making a Business Case for a Document Library; Types of Digital Document Library; Types of Digital Documents; Issues behind Document Infrastructure; Corporate Data Warehouses. Case study: Email Marketing, Email Personalization

UNIT V

M-Commerce: Introduction to Mobile Commerce, Limitations, history, applications,architecture, transaction models, payment methods, advantages, disadvantages Case study: Mobile app marketing case study: O2 Priority Moments gets small businesses on side.

Text Book:

1. Ravi Kalakota and Andrew B.Whinston. Frontiers of Electronic commerce, Pearson Education.

Reference Books:

1. Henry Chan, Raymond Lee. TharanDillan and E.Chany,E-Commerce, Wiley,2003.
2. DanjelMinoli and EmunaMimoli, Web Commrece Technology, Tata MicGraw Hill, 1999.
3. Marilyn Greenstein and Todd M Feinman, aElectronic Commerce, TaraMcGraw Hill Edition.

MCA 205B:Cyber Security

UNIT I

History of Cyber Security-Introduction to Cyber Security-Definition-Key terms-cyber Attacks and Security tools-Security Threats-Vulnerability assessments-roles in Security-Cyber Security-today- Critical Thinking in Cyber Security

UNIT II

Cyber Threat Actors and their Motives-Security Attacks, Actors and their Motive-A brief overview of types of actors and their motives-Hacking organizations-Major different types of cyber-attack-Security Attack Definition-Security services-Security Mechanisms-Network Security Model-Organizational Threats-Attacks-Security Architecture Attacks-Security Architecture -Attack models-Malware and Ransomware-Threat Examples-Threat Protection Defined-Internet Security Threats – Mapping-Internet Security Threats - Packet Sniffing-Security Threat - IP Spoofing-Security Threats - Denial of service-Security Attacks - Host insertions-What is Social Engineering, Phishing and Vishing- Cyber warfare

UNIT III

Overview of Cyber Security Concepts-CIA Triad – Confidentiality-CIA Triad – Integrity-CIA Triad – Availability-Non - Repudiation - How does it apply to CIA?-Access Management-Incidence Response-Key Concepts - Incident Response-Incident Response Process-Introduction to Frameworks and Best Practices-IT Governance Process-Cybersecurity Compliance and Audit Overview-Pentest Process and Mile 2 CPTE Training-OWASP framework

UNITIV

Introduction to Key Security Tools -Introduction to Firewall-Firewalls - Packet Filtering-Firewalls - Application Gateway-Firewalls - XML Gateway-Firewalls - Stateless and Stateful- Firewall Administration – Firewall Selection-Firewall Administration – Firewall Configuration-IDPS Administration-VPN Administration-Antivirus/Antimalware-Penetration Testing Introduction-Penetration test Methodologies-Vulnerability Tests

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UNIT V

Cyber Security –Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing Security and privacy Implications- Digital Forensic- Protecting people privacy in the organizations Forensic best practices for organizations. Case Studies.

Text Books

1. Nina Godbole&SunitBelapure "Cyber Security", Wiley India, 2012.
2. Cyber Security by Paul Augustine, Crescent Publication
3. Information Security Policies, Procedures, and Standards: Guidelines for Effective Information Security Management, Thomas Peltier, Auerbach Publication

References:

1. Harish Chander, "cyber laws & IT protection", PHI learning pvt.ltd, 2012.
2 MS.M.K.Geetha&Ms.SwapneRaman"Cyber Crimes and Fraud Management, "MACMILLAN,2012.
3. PankajAgarwal : Information Security& Cyber Laws (Acme Learning), Excel, 2013.

MCA 205C:Neural Networks

UNIT I

Introduction: What is Neural network, Human Brain, Models of a Neuron, Neural networksviewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks, Learning Process: Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem,Memory, Adaption, Statistical nature of the learning process,

UNIT II

Single Layer Perceptrons: Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perception – convergence theorem, Relation between perception and Bayes classifier for a Gaussian Environment.

UNIT III

Multilayer Perceptron: Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, Computer experiment, feature detection, BACK PROPAGATION - back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning, Accelerated convergence, supervised learning.

UNIT IV

Self-Organization Maps: Two basic feature mapping models, Self-organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive patter classification, Hierarchal Vector quantifier, contexed Maps.

UNIT V

Neuro Dynamics: Dynamical systems, stability of equilibrium states, Attractors, Neurodynamical models, manipulation of attractors' as a recurrent network paradigm

HOPFIELD MODELS – Hopfield models.

Text Book:

Neural networks A comprehensive foundations, Simon Hhaykin, Pearson Education 2nd Edition 2004

Reference Books:

Artificial neural networks - B.Vegnanarayana Prentice Halll of India P Ltd 2005

Neural networks in Computer intelligence, Li Min Fu TMH 2003

Neural networks James A Freeman David M S kapura Pearson Education 2004

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MCA III SEMESTER
MCA 301: Software Engineering

UNIT I

Software and Software Engineering: Introduction, Software, Software Myths, Software Engineering-Process:- Software Engineering, Software Processes models; Evolutionary process Models, Component based development; Formal Methods Model, Fourth generation Techniques. An Agile view of processes and Development: Software Engineering practice – Software Engineering, communication, planning, modeling, construction practices and deployment.

UNITII

System Engineering: Computer-based systems, the system engineering Hierarchy, business process engineering, product engineering and system modeling. Building the analysis model, Requirement analysis, modeling approaches, data modeling.Behavioral model.

UNIT –III

Design Engineering: Design process and quality, design concepts the design model, and pattern-used software design. Architectural design: Software architecture, data design, architectural styles and patterns, architectural design mapping data flow into software architecture. Component-based software engineering, Critical systems development, Software reuse, User interface design, web apps design issues and architecture design.

UNIT –IV

Testing strategies: Strategies and issues, testing strategies for and object-oriented software.Validation testing and system testing. Software testing tactics: Fundamentals, black-box and white-box testing white-box testing basis path testing. Control structure testing, Black-box testing, Object-oriented testing methods. Testing methods applicable at the class level inter class testing case design.

UNIT V

Product Metrics: Software quality, framework, metrics for analysis model design model, source case and testing. Managing Software Projects: The management spectrum, the W^5 HH principle, metrics in process, software measurement,Estimation: Observations, Decomposition Techniques, Empirical Models, Estimation For Object-Oriented Projects Other Estimation Techniques, Project Scheduling, Risk Management, Reengineering.

Text Books:

1. Roger, S, Pressman, Software Engineering, A Practitioner's Approach, Six Edition, McGraw-Hill, International Edition, 2005.
2. Ian Sommerville, Software Engineering, Pearson Education, 8th Edition.
3.

Reference Books:

1. James F Peters, Software Engineering, John Wiley
2. Waruan S Jawadekar, Software Engineering, Tata McGraw Hill, 2004.
3. Carlo Ghezzi, Mehdi Jazayeri, Dino Manrioli, Fundamentals of Software Engineering, PHI, 2001 PankajJalote, An Integrated approach to Software Engineering Narosa

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MCA 302: Computer Graphics

UNIT I

Overview of Graphics systems, Application areas of Computer Graphics, video-display devices, Raster-scan systems, random scan systems, graphics monitors and workstations and input devices. Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms.

UNIT II

Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms. 2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates.

UNIT III

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland – Hodgeman polygon clipping algorithm.

UNIT IV

3-D Object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces. Basic illumination models, polygon rendering methods.

UNIT V

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

Computer Animation: Design of animation sequence, general computer animation functions, Raster animations, Computer animation languages, Key frame systems

Text Books:

1. Donald Hearn and M.Pauline Baker, Computer Graphics C Version, Second Edition, Pearson Educations.2005.

Reference Books:

1. Steven Harrington (1987), Computer Graphics – A Programming Approach, Second Edition, McGraw – Hill International Editions.
2. William M. Newman and Robert F. Sprowli (1979), Principles of Interactive Computer Graphics, second Edition, McGraw – Hill International Editions.

MCA 303:Web Technologies

UNITI

Introduction to Internet-Browser Architecture-IE: Chrome-Search Engines-Introduction to HTML-5-HTML-5 Tags-Audio, Video Tags – HTML-5 Forms-Controls-CSS Styling-CSS Tags-Attributes.

UNIT II

Java Script-JQuery: JavaScript Programming Scripts- Control structures- Functions-Document, Browser, Date, Math, String objects-Events- JQuery Libraries-JQuery Objects, Functions – JQuery Events-Animations.

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UNIT III

AJAX Concepts: Simple AJAX objects-Ajax Libraries-Examples, Webservers IIS, Tomcat-Hosting Website in a Web servers.

UNIT IV

Introduction to PHP: Control Structures-Arrays-Functions-Database connectivity-Introduction to ZEND Framework and applications

UNIT-V

Introduction to Java Servlets: Servlet classes and interfaces - Java Database Connectivity- Introduction to JSP-Java Server Page scriptlets -JSP Objects-JSP Web applications.

Text Books:

Deitel, Deitel and Goldberg Internet & World Wide Wide how to program"by End. Pearson Education
Ivan Bayross, Webenavled commercial Application Development in Java 2.0 BPB.
HTML 5 Black book, Kogent Learning Solutions Inc.

Reference Books:

Raj Kamal Internet and web Technologies, Tata McGraw Hill, 2002.
Chirs Bates, Web Programming, John Wiley, 2nd Edition

MCA 304A: Data Warehousing and Datamining

UNIT I

Data warehousing and OLAP**:**Data Warehouse basic concepts, Data Warehouse Modelling, Data Cube and OLAP: Characteristics of OLAP systems, Multidimensional view and Data cube, Data Cube Implementations, Data Cube operations, Implementation of OLAP and overview on OLAP Software.

UNIT II

Data Mining and its Applications **:**Introduction, What is Data Mining, Motivating Challenges, Data Mining Tasks, Which technologies are used for data mining, Kinds of pattern that can be mined, Data Mining Applications, Data Pre-processing, Data cleaning, data integration, data reduction and data transformation.

UNIT III

Association Analysis: Basic Concepts and Algorithms **:**Frequent Item set Generation, Rule Generation, Compact Representation of Frequent Item sets, Alternative methods for generating Frequent Item sets, FP Growth Algorithm, Evaluation of Association Patterns

UNIT IV

Classification: Methods, Improving accuracy of classification:Basics, General approach to solve classification problem, Decision Trees, Rule Based Classifiers, NearestNeighbour Classifiers. Bayesian Classifiers, Estimating Predictive accuracy of classification methods, Improving accuracy of classification methods, Evaluation criteria for classification methods, Multiclass Problem.

UNIT V

Clustering Techniques: Overview: Features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods, Quality and Validity of Cluster Analysis

Text Books:

1.Jiawei Han and MichelineKamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.

2.Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Addison- Wesley, 2005.

Reference Books:

1. Arun K Pujari: Data Mining Techniques University Press, 2nd Edition, 2009.
2. G. K. Gupta: Introduction to Data Mining with Case Studies, 3rd Edition, PHI, New Delhi, 2009.
3. Alex Berson and Stephen J.Smith: Data Warehousing, Data Mining, and OLAP Computing McGrawHill Publisher, 1997

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MCA 304B:Big Data Analytics

UNIT I

What is Big Data : Varieties of Data – Unstructured data – Trends in Data Storage - Basically Available Soft State Eventual Consistency (BASE) - Industry Examples of Big Data.

NIT - II

Big Data Technology: New and older approaches – Data Discovery –Terminologies used in Big Data Environments- Open Source technologies for Big Data Analytics – Cloud and Big Data – Big Data Foundation – Computation – Limitations – Big Data Emerging Technologies.

UNIT III

Business Analytics –Consumption of Analytics – Creation to Consumption of Analytics – Data visualization by Organizations – 90/10 rule of critical thinking – Decision sciences and analytics – Learning over knowledge – Agility – Scale and convergence – Privacy and security in Big Data.

UNIT IV

Predictive Analytics – Target Definition - Linear Regression – Logistic Regression - Decision trees – Neural Networks – Support Vector machines - Classification trees – Ensemble methods – Association Rules – Segmentation , Sequence Rules, Social Network analytics.

UNIT V

Hadoop – Why Hadoop? – Why not RDBMS? – RDBMS Versus Hadoop - Components of Hadoop – Hadoop File System – Hadoop Technologies Stack – Managing Resources and Applications with Hadoop YARN - Dataware housing Hadoop Concepts – Applications of Hadoop using PIG,YARN,HIVE.

Text Books

1. Big Data and Analytics, seemaAcharya ,Subhashinichellapan, Wiley publicaitons
2. Baesens, 2014, Analytics in a Big Data World: The Essential Guide to Data Science and Its applications, Wiley India Private Limited

Reference Books

"Big Data Analytics: Systems, Algorithms, Applications" **Prabhu**, C.S.R., **SreevallabhChivukula**, A., **Mogadala**, A., **Ghosh**, R., **Livingston**, L.M.J.

MCA 304C: System Programming

UNIT I

Background introduction, system software and machine architecture, SIC, RISC, and CISC architecture. Assembler: basic assembler functions, machine dependent and independent assembler features, assembler design options, and implementation examples.

UNIT II

Loading and linkers basic loader junction, machine dependent and independent loader features, loader design options and implementation examples. Macro processors, basic macro processor functions machines – independent macro processor features, macro processor design options, implementation examples.

UNIT III

Compilers: basic compiler functions, machine dependent and independent compiler features, compiler design options and implementation examples. Other system software: text editors and interactive debugging systems

UNIT-IV

Introduction to Device Drivers, Design issues-Types of Drivers, Character driver-1 and Design issues, Character Driver-2- A/D converter and its design issues, Block driver-1 and its design issues.

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UNIT-V

Introduction to Linux- Linux Architecture- X-windows- Linux administration tools - Commands to use Linux OS- Executing Linux Shell scripts – Shell Programming concepts-Shell scripts.

Text Books:

1. Leland .Beck, System Software: An Introduction to systems programming :3/e, Pearson Educations Asia,2003.
2. George pajari, Writing Unix Drivers, Addison – Wesley, 1991.

Reference Books:

1. Richard Petersen, Linux complete Reference, McGraw Hill Education (India) Private Limited; 6 edition (21 November 2007
2. Dhamdhere, System programming and operation Systems Book 2/E, Tata McGraw, Hill, 1999

MCA 305A:Cryptography and Network Security

UNIT I

Cryptography – Terminology, Conventional Encryption Model, Steganography, Classical Encryption Techniques, DES Data Encryption Standard, Block Cipher Design principles and Modes of Operation.

UNIT II

Conventional Encryption Algorithms: Triples DES, International Data Encryption Algorithm, Blowfish, RC5, Characteristics of advanced symmetric Block Ciphers, Confidentiality using Conventional Encryption.

UNIT III:

Public-Key Cryptography, Introduction to Number Theory: Prime Numbers, Modular Arithmetic, Euler‟s Theorem, Primary and Factorization, discrete logarithm, D-H Key sharing technique, RSA and its variants-Homomorphic Encryption Techniques Message Authentication and Hash Functions – Hash and MAC algorithms..

UNIT IV

Digital, Signatures and authentication Protocols, Digital Signature Standard, Network Security Practice, Authentication Applications. Basic overview of Electronic Mail Security: pretty Good Privacy‟s/MIME: IP Security, Web Security – Intruders, Viruses and Worms – Firewalls.

UNIT V

Mobile Security, Risk Model, EcoSystem, Service Risks, App Risks, Countermeasures- Cloud Computing Security- Threats-Security in Cloud.Security at service layers. Introduction to Block chain, Crypto currency, BitCoin Security and working, *Ethereum*.

Text Books

1. Cryptography and Network Security – by William Stallings, Principles and Practice, 7th Edition,Pearson
2. Cryptography and Network Security, by John Wiley, Edn,.2001
3.

Reference Books

1. Bruce Schneier, Applied Cryptography, John Wiley, Second Edn,2001.
2. Charke Kaufman, Rodia Perlman and Mike Speciner, Network Security

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MCA 305B: Artificial Intelligence

UNITI

Introduction Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree

UNIT II

Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.

UNIT III

Probability, conditional probability, Constraint Satisfaction, Propositional Logic &Satisfiability, Uncertainty in AI, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

UNIT IV

MDP formulation, utility theory, utility functions, value iteration, policy iteration and partiallyObservable MDPs.

UNIT V

Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning. Introduction to Machine learning ,Deep Learning.

Text Books

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach" , 3rd Edition, Prentice Hall
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill

Reference Books

1. SarojKaushik, "Artificial Intelligence", Cengage Learning India, 2011
2. David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press 2010.

MCA 305C: Mobile Application Development

UNIT I

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

UNIT II

Basic Design :Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III

Advanced Design: Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing.

UNIT IV

Technology I - Android : Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

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UNIT V

Technology II–IOS: Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application

Text Books

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012
2. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech, 2012

Reference Books

1. http://developer.android.com/develop/index.html
2. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS
3. Development: Exploring the iOS SDK”, Apress, 2013.

MCA IV SEMESTER
MCA 401A: Cloud Computing

UNIT I

Cloud Architecture and Model:Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture, Cloud Models: Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public Vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

UNIT II

Virtualization: Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation. VMWare, Virtual Box Virtualization software.

UNIT III

Cloud Infrastructure:Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources. Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation

UNIT IV

Programming Model: Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support – Software environments for service development; Amazon, Azure, GoogleApp Engine, AWS - Cloud Environments - Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim. Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

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UNIT V

Security In The Cloud : Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control.

Text Books:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Rittinghouse, John W., and James F. Ransome, ―Cloud Computing: Implementation, Management and Security‖, CRC Press, 2017.

Reference Books

1. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
2. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India,2011.

MCA 401B: Dot Net Technologies

UNITI

The .NET Framework **:** Introduction, Common Language Runtime, Common Type System, Common Language Specification, The Base Class Library, The .NET class library Intermediate language, Justin Time compilation, garbage collection, Application installation & Assemblies, Web Services, Unified classes.**C# Basics** -Introduction, Data Types, Identifiers, variables & constants, C# statements, Object Oriented Concept, Object and Classes, Arrays and Strings, System Collections, C# - Regular Expressions.

UNIT II

C# Using Libraries -Namespace-System, Input Output, Multi-Threading, Networking and Sockets, Data Handling, Windows Forms, C# in Web application, Error Handling.

UNIT III

Advanced Features Using C#**:**Delegates and Events, Indexes Attributes, versioning, Web Services, Windows services, messaging, Reflection, COM and C#, localization. Distributed Application in C#, XML and C#, Unsafe Mode, Case Study (Messenger Application).

UNIT IV

Advanced Programming Constructs: Database Connectivity with ADO.NET Creating Distributed Web Applications, XML and ADO.NET, Graphics, Printing, data Reports, crystal Reports,C# libraries for Image Processing, .Net applications to Azure platform

UNIT V

ASP.NET 2.0**:** Features of ASP.NET 2.0, Stages in Web Forms Processing, Introduction to Server Controls, HTML Controls, Validation Controls, User control, Data Binding Controls, Master-detail forms, Configuration, Personalization, Session State, Database Connectivity with ADO.NET.

Text Books:

1. Joe Mayo, "C# 3.0 Unleashed: With the .NET Framework 3.5", Pearson Education, 2009.
2. `Powell R & Weeks R, "C# and The .NET Framework", BPB Publications, 2007.
3. Chappell D, "Understanding .NET", Pearson Education, 2007.

Reference Books:

1. Balagurusamy E, "Programming with C#", Tata McGrawHill, 2008.
2. Onion Fritz and Keith Brown, "Essential ASP .NET 2.0", Pearson Education, 2007.
3. Fundamentals of Azure, by Michael Collier, Robin Shahan,Microsoft Press-2016

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MCA 401C:Software Testing

UNIT I

The role of process in software quality: Testing as a process - Overview of the Testing Maturity Model (TMM) - Basic definitions - Software testing principles - Origins of defects - Defect classes, Defect repository - Test design - Defect example: the coin problem

UNIT II

Test case design strategies : Black box approach - Random testing - Equivalence class partitioning - Boundary value analysis - Cause and Effect graphing - State transition testing - Error guessing - White box approach - Test adequacy criteria - Coverage and control flow graphs - Covering code logic - Data flow and white box test design - Loop testing - Mutation testing - Evaluating test adequacy criteria.

UNIT III

Levels of testing : Unit test: functions, procedures, classes and methods as units - Unit test planning - Designing test units - The class as a testable unit - The test harness - Integration test: goal - Integration strategies for procedures and functions - Integration strategies for classes - Designing integration test - System test - The different types - Regression testing - Alpha, beta and acceptance test - Test planning - Test plan components - Test plan attachments - Reporting test results.

UNIT IV

Software quality: Defining Quality: importance of quality - Quality control v/s quality assurance - Quality assurance at each phase of SDLC - Quality assurance in software support projects - SQA function - Quality management system in an organization - Software quality assurance plans - Product quality.

UNIT V

Software metrics and models: Walkthroughs and Inspections - Software Configuration Management - ISO:9001 Model - CMM Model - CMM and ISO comparative analysis - CMM-I .

Text Books

1. IIeneBurnstein, "Practical Software Testing", Springer International Edition, First Indian reprint, 2004.
2. Nina S Godbole, "Software Quality Assurance, Principles and Practice", Narosa Publishing House, 2004.

Reference Books

1. P.C. Jorgensen, "Software Testing - A Craftman's Approach", CRC press, 1995.
2. Boris Beizer, van Nostrand Reinhold, "Software Testing Techniques", 2nd Edition, 1990.

MCA 402A: Essentials of Data Science

UNIT I

Introduction: What is Data Science? - Big Data and Data Science, Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model - Intro to R Language.

UNIT II

Exploratory Data Analysis and the Data Science Process - Basic tools (plots, graphs and summary statistics) of EDA - Philosophy of EDA - The Data Science Process - Case Study: RealDirect (online real estate firm)

UNIT III

Feature Generation and Feature Selection (Extracting Meaning From Data) - Motivating application: user (customer) retention - Feature Generation (brainstorming, role of domain expertise, and place for imagination) - Feature Selection algorithms – Filters; Wrappers; Decision Trees; Random Forests.

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UNIT IV

Data Visualization: Basic principles, ideas and tools for data visualization 3 - Examples of inspiring (industry) projects - Exercise: create your own visualization of a complex dataset

UNIT V

Data Science and Ethical Issues - Discussions on privacy, security, ethics - A look back at Data Science - Next-generation data scientists

Text Books

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.

References Books

1. Jure Leskovek, AnandRajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014. (free online)
2. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. ISBN 0262018020. 2013.

MCA402B:Deep Learning

UNIT I

Basics Of Neural Networks: Basic concept of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Networks.

UNIT II

Introduction To Deep Learning: :Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout.

UNIT III

Convolutional Neural Networks: :CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning

UNIT IV

More Deep Learning Architectures\:LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- VariationalAutoencoders – Adversarial Generative Networks – Autoencoder and DBM

UNIT V

Applications Of Deep Learning: Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

Text Books:

1. Ian Good Fellow, YoshuaBengio, Aaron Courville, "Deep Learning", MIT Press, 2017.
2. Navin Kumar Manaswi, "Deep Learning with Applications Using Python", Apress, 2018.

Reference Books

1. Francois Chollet, "Deep Learning with Python", Manning Publications, 2018.
2. Phil Kim, "Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence", Apress , 2017.
3. RagavVenkatesan, Baoxin Li, "Convolutional Neural Networks in Visual Computing", CRC Press, 2018.

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MCA402C:Internet of Things

UNIT I

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

UNIT II

Sensors Networks : Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

UNITIII

Wireless Technologies ForIot**:** WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet, Modbus. IP Based Protocols ForIoT:IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT.
Edge connectivity and protocols

UNI IV

Data Handling& Analytics**:** Introduction, Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications, Edge/Fog Computing

UNIT V

Applications of IoT**:** Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

Text Books:

1. Olivier Hersent, David Boswarthick, and Omar Elloumi, — "The Internet of Things: Key Applications and Protocols", WileyPublications
2. Vijay Madisetti and ArshdeepBahga, — "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.

Reference Books

1. Daniel Minoli, — "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
2. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press

MCA 310 P: Minor Project Work

1. Students shall be grouped into teams not exceeding three per team for pursuing Minor Project work.
2. Each team shall identify a real-life problem pertaining to a Manufacturing / Service / Trading System and offer a solution in the form of a Computer – Based system.
3. The team should put m a combined effort of 360 student-hours (i.e, 3 students x 120 hours per student) and submit their combined report. However, the reports should reflect the contributions or individuals.
4. The students shall select appropriate: Analysis and Design Methodologies for the development of Computer Based System.
5. Operating system platform, programming Languages/ Front-End and Back-End Tools/ Packages for implementation.
6. The team shall follow the guidelines given below while preparing their project Report: 1The report should be given a title and it should have correlation with the contents of the report. Good quality A4 size papers shall be used of preparing the report and it shall be in the bound form. There shall be a front page depicting the Title of the Project Report, Authors Names and other information in the suggested format.

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7. Minor Project Credits:

a) Project Presentation and Project Report (2 Credits)

b) Project Execution and Project Viva Voice (2 Credits)

MCA307:Technical Seminar

1. Every student shall give two seminars of 30 minutes of duration each. The seminar topics should be outside the syllabus and from the emerging areas of computer Applications.

2. The student shall submit the seminar material in type written form to the teacher concerned at least two days in advance of seminar presentation date.

3. The student shall use LCD Projector for seminar presentation. He shall not use Black Board except for answering the questions after the seminar presentation, if any.

MCA 403. Major Project Work: 12 Credits

1. Project Seminar &. Project Report: 6 credits

2. National / International Conference Publication Proceedings (External) : (paper based on National / International Journal Publication (External) (paper based on project should be submitted to the journal and should be published): 2 credits

3. Viva Voce (External) &. Project Execution (External) : 4 credits

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