MASTER OF COMPUTER APPLICATION

Duration: 24 Months (2Years) Eligibility: Graduation with Maths Subject

COURSE STRUCTURE MASTER OF COMPUTER APPLICATION (MCA) SEMESTER Ist														
Course Details				**External Assessment**		**Internal Assessment**				**Credit Distribution**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	**Max Marks**	**Min Marks**				
Theory Group													
6IMCA101	**Core Course**	Programming in C and data Structure	100	50	17	20	08	30	12	2	1	-	3
6IMCA102	**Core Course**	Statistical Mathematics	100	50	17	20	08	30	12	2	1	-	3
6IMCA103	**Core Course**	Operating System and Architecture	100	50	17	20	08	30	12	2	1	-	3
6IMCA104	**Core Course**	Information Technology	100	50	17	20	08	30	12	2	1	-	3
6IMCA105	**Core Course**	Communication Skills	100	50	17	20	08	30	12	2	1	-	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
6IMCA106	**Practical**	C and DS Lab	200	100	40	-	-	100	40	-	-	6	6
6IMCA107	**Practical**	Operating System Lab	50	25	08	-	-	25	08	-	-	2	2
	Grand Total		**750**							**10**	**5**	**8**	**23**

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/Lab Performance Assignment 50%

MASTER OF COMPUTER APPLICATION

Duration: 24 Months (2Years) Eligibility: Graduation with Maths Subject

COURSE STRUCTURE MASTER OF COMPUTER APPLICATION (MCA) SEMESTER IInd														
Course Details				**External Assessment**		**Internal Assessment**				**Credit Distribution**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	**Max Marks**	**Min Marks**				
Theory Group													
6IMCA201	**Core Course**	DBMS	100	50	17	20	08	30	12	2	1	-	3
6IMCA202	**Core Course**	Computer Network	100	50	17	20	08	30	12	2	1	-	3
6IMCA203	**Core Course**	Software Engineering and UML	100	50	17	20	08	30	12	2	1	-	3
6IMCA204	**Core Course**	Algorithm Design	100	50	17	20	08	30	12	2	1	-	3
6IMCA205	**Core Course**	Object oriented Programming with JAVA	100	50	17	20	08	30	12	2	1	-	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
6IMCA206	**Practical**	Java and OOPS Lab	200	100	40	-	-	100	40	-	-	6	6
6IMCA207	**Practical**	DBMS	50	25	08	-	-	25	08	-	-	2	2
	Grand Total		**750**							**10**	**5**	**8**	**23**

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

Skill Elective I – Any other course being offered in this semester as per the list given at the end of course structure.

MASTER OF COMPUTER APPLICATION

Duration: 24 Months (2Years) Eligibility: Graduation with Maths Subject

COURSE STRUCTURE MASTER OF COMPUTER APPLICATION (MCA) SEMESTER IIIrd													
Course Details				**External Assessment**		**I nternal Assessment**				**Credit Distributio n**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	**Max Marks**	**Min Marks**				
Theory Group													
6IMCA301	**Core Course**	Data Mining	100	50	17	20	08	30	12	2	1	-	3
6IMCA302	**Core Course**	Artificial Intelligence	100	50	17	20	08	30	12	2	1	-	3
6IMCA303	**Discipline Specific Elective**	Elective – I	100	50	17	20	08	30	12	2	1	-	3
6IMCA304	**Discipline Specific Elective**	Elective-II	100	50	17	20	08	30	12	2	1	-	3
6IMCA305	**Discipline Specific Elective**	Elective-III	100	50	17	20	08	30	12	2	1	-	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
6IMCA306	**Practical**	Minor Project	200	100	40	-	-	100	40	-	-	6	6
6IMCA307	**Practical**	Elective -1 Lab	50	25	08	-	-	25	08	-	-	2	2
	Grand Total		**750**							**10**	**5**	**8**	**23**

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

Skill Elective I – Any other course being offered in this semester as per the list given at the end of course structure.

ELECTIVE-I		**ELECTIVE-II**		**ELECTIVE-III**	
6IMCA303A	Python	6IMCA304A	Machine Learning	6IMCA305A	Computer Ethics
6IMCA303B	Web Technology	6IMCA304B	Soft Computing	6IMCA305B	Advanced Databases
6IMCA303C	Introduction to data Science and big data	6IMCA304C	Internet of Things	6IMCA305C	Distributed Systems

MASTER OF COMPUTER APPLICATION

Duration: 24 Months (2Years) Eligibility: Graduation with Maths Subject

COURSE STRUCTURE MASTER OF COMPUTER APPLICATION (MCA) SEMESTER IVth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
6IMCA401	**Discipline Specific Elective**	Elective-IV	100	50	17	20	08	30	12	2	1	-	3
6IMCA402	**Discipline Specific Elective**	Elective-V	100	50	17	20	08	30	12	2	1	-	3
6IMCA403	**Discipline Specific Elective**	Elective-VI	100	50	17	20	08	30	12	2	1	-	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
6IMCA404	**Practical**	Major Project	400	250	80	-	-	150	50	-	-	12	12
6IMCA405	**Practical**	Lab of Elective-IV ,V and VI	50	25	08	-	-	25	08	-	-	2	2
	Grand Total		**750**							**6**	**3**	**14**	**23**

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

Compulsory Project/Dissertation with choice in any Disciplinary specific elective. Compulsory one paper presentation certificate in related discipline.

ELECTIVE-IV		ELECTIVE-V		ELECTIVE-VI	
6IMCA401A	Advanced Python	6IMCA402A	Deep Learning	6IMCA403A	Information Security
6IMCA401B	Advanced Web Technology	6IMCA402B	Cloud Computing Technologies	6IMCA403B	Block Chain and Cryptocurrency
6IMCA401C	Big data with Analytics	6IMCA402C	Digital marketing	6IMCA403C	Mobile Computing

AISECT University, Hazaribag (Jharkhand)

MCA, First -Semester

6IMCA101 Programming in C with Data Structure

UNIT I

Fundamentals of C Programming : Structure of a C Program, Data types, Identifiers and keywords, Operators & expressions, Preprocessor directive, Input output, Casting, Precedence, Scope of variables Control Constructs and Iteration Constructs Functions: Defining and accessing: passing arguments, Function prototypes, Recursion, Storage classes

UNIT II

Arrays: Defining and processing, passing arrays to a function, Multi-dimensional arrays. Strings, operations on strings.

Pointers : Pointer expression, pointer arithmetic Arrays of pointers, Function returning pointers, Pointer to function, malloc(), calloc(), free(), Structures, Unions. File handling and related functions

UNIT III

Overview of Data Structure: Need for Data Structure, Execution Time, Algorithm Analysis, Algorithm Complexity , Space Complexity , Time Complexity , Asymptotic Analysis, Asymptotic Notations

Stack and Queue: Contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack, evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback, circular queue, Enqueue Operation , Dequeue Operation, linked implementation of stack and queue, isfull(), isempty()

UNIT IV

General List: list and it's contiguous implementation, it's drawback, singly linked list-operations on it, doubly linked list-operations, circular linked list; linked list using arrays.

UNIT V

Trees: definitions-height, depth, order, degree, parent and child relationship etc; Binary Trees-various theorems, complete binary tree, almost complete binary tree; Tree traversals-preorder, in order and post order traversals, their recursive and non-recursive implementations; expression tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree. Heap-definition.

BOOKS

1. Kerninghan & Ritchie "The C programming language", PHI
2. Schildt "C:The Complete reference" 4th ed TMH
3. Kruse R.L. Data Structures and Program Design in C; PHI

6IMCA102 Statistical Mathematics

UNIT I MATRICES AND EIGENVALUE PROBLEMS

Matrices - Rank of a Matrix - Consistently of a system of linear equations - Solution of the matrix equation $Ax = b$ - Row - reduced Echelon Form - Eigenvalues and Eigenvectors - Properties - Cayley - Hamilton Theorem - Inverse of a matrix.

UNIT II CALCULUS

Functions of a single variable, limit, continuity, differentiability, Mean value theorems, indeterminate forms, L'Hospital's rule, Maxima and minima, Product and chain rule, Beta and gamma functions, Functions of multiple variables, limit, continuity, partial derivatives

UNIT III TESTING OF HYPOTHESIS

Sampling distributions - Tests based on small and large samples - Normal, Student's t, Chi-square and F distributions for testing of mean, variance and proportion and testing of difference of means variances and proportions - Tests for independence of attributes and goodness of fit.

UNIT IV PROBABILITY AND PROBABILTY DISTRIBUTION

Probability - Axioms of Probability - Conditional Probability - Addition and multiplication laws of Probability, Probability mass function and Probability density functions Properties - Binomial, Poisson, Normal distributions and their properties.

UNIT V Discrete Math

Sets, subsets, power sets, Counting functions, countability,
Basic proof techniques: induction, proof by contradiction, Basics of inductive,
deductive, and propositional logic, Basic data structures: stacks, queues, graphs,
arrays, hash tables, trees,Graph properties: connected components, degree,
maximum flow / minimum cut concepts, graph coloring

REFERENCE BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, New Delhi, 2015.
2. James Stewart ,calculus,7th edition
3. Miller and M. Miller, Mathematical Statistics, Pearson Education Inc., Asia 7th Edition,New Delhi,
4.Richard Johnson, Miller and Freund's Probability and Statistics for Engineer, Prentice Hall of India Private Ltd., 8th Edition, New Delhi, 2011..
5. D.C.Agarwal ,Discrete Structure, 5thedition,Bhopal

6IMCA103 Operating system and Architecture

UNIT I

Register Transfer Language and Micro-operations: Concept of bus, data movement among registers, a language to represent conditional data transfer, data movement from/to memory. Design of simple Arithmetic & Logic Unit & Control Unit, arithmetic and logical operations Along with register transfer, timing in register transfer.

Architecture of a simple processor: A simple computer organization and instruction set, instruction formats, addressing modes, instruction cycle, instruction execution in terms of microinstructions, interrupt cycle, concepts of interrupt and simple I/O organization, Synchronous & Asynchronous data transfer, Data Transfer Mode: Program Controlled, Interrupt driven, DMA (Direct Memory Access). Implementation of processor using the building blocks. Pin Diagram of 8086, Architecture of 8086.

UNIT II

Introduction: Evolution of operating systems (History of evolution of OS with the generations of computers), Types of operating systems, Multitasking, Timesharing, Multithreading, Multiprogramming and, Real time operating systems, Different views of the operating system, System Programmer's view, User's view, Operating system concepts and structure, Layered Operating Systems, Monolithic Systems. Processes: The Process concept, The process control block, Systems programmer's view of processes, Operating system services for process management, Scheduling algorithms, First come first serve, Round Robin, Shortest run time next, Highest response ratio next, Multilevel Feedback Queues, Performance evaluation of scheduling algorithms stated above

UNIT III

Memory Management : Memory management without swapping or paging, Concepts of swapping and paging, Page replacement algorithms namely, Least recently used, Optimal page replacement, Most recently used, Clock page replacement, First in First out (This includes discussion of Belady's anomaly and the category of Stack algorithms), Modeling paging algorithms, Design issues for paging system, Segmentation, Segmented Paging, Paged Segmentation

UNIT IV

Inter-process Communication and Synchronization: The need for inter-process synchronization, Concept of mutual exclusion, binary and counting semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, Classical problems in concurrent programming, Dining Philosopher's problem, Bounded Buffer Problem, Sleeping Barber Problem, Readers and Writers problem, Critical section, critical region and conditional critical region, Monitors and messages. Deadlocks: Concepts of deadlock detection, deadlock prevention, deadlock avoidance. Banker's Algorithm

UNIT V

File System: File systems, directories, file system implementation, security protection mechanisms. Input/output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access. Principles of I/O software: Goals interrupt handlers, device drivers, and device independent I/O software. User space I/O Software. Disks: Disk hardware, Disk scheduling

algorithms (namely First come first serve, shortest seek time first, SCAN, C-SCAN, LOOK and C-LOOK algorithms) Error handling, track-at-a-time caching, RAM Disks. Clocks: Clock hardware, memory-mapped terminals, I/O software.

BOOKS:

1. Milenkovic, M., "Operating Systems - concepts and Design" McGraw Hill International EditionComputer Science series 1992.
2. Galvin P., J.L. Abraham Silberschatz. "Operating System Concepts". John Wiley & Sons Company, 1989. 4. Tanenbaum, A.S. "Modern Operating System", Prentice Hall of India Pvt. Ltd.1995.
3. William Stallings “Operating Systems” , Prentice Hall of India Pvt. Ltd.
4. M. Morris Mano, “Computer System Architecture”, PHI, 3rd edition, 1993
5. Liu and Gibson, “8086/8088 Micro processor Assembly Language”

6IMCA104 Information Technology

UNIT I

Introduction and basic concept of modern communication and technology: CDMA, WLL, GSM, VOIP, Bluetooth, WI-Fi, Communication Technology: 2G, 3G, 4G, And 5G. Communication over radio, microwave systems, Communication satellite, radar, fiber optics, ISDN-their properties, Geographic Information System (GIS), Components of a GIS- H/W,S/W, Data, people, methods, working and application of GIS.

UNIT II

Information Security: Introduction, malicious programs, cryptography, digital signature, Firewall, Users Identification and Authentication, Security awareness and policies, Application areas requiring security. Mobile Commerce: Introduction, Growth, Success Stories of Mobile commerce, Technologies for mobile commerce, M-commerce in India, Digital Marketing.

UNIT III

Artificial Intelligence: Concept of Artificial Intelligence, Introduction to branches of Artificial Intelligence: Machine Learning, Neural Network, Robotics, Natural Language Processing, Expert System, and Fuzzy Logic. Applications of all the branches of AI, General application of AI.

UNIT IV

Introduction to IoT: Characteristics of IoT, physical design of IoT, Logical design of IoT, Functional blocks of IoT, home Automation, Industry applications, Surveillance and other IoT applications. Introduction to Virtual Reality (VR): Defintion, Application of VR, Smart Systems, Embedded Systems.

UNIT V

Computing and Cloud Computing: History of Centralized and Distributed Computing, Overview of Distributed Computing, Cluster computing, Grid computing. Introduction to Cloud Computing- Cloud issues and challenges – Properties – Characteristics – Service models, Deployment models. Cloud resources: Network and API – Virtual and Physical computational resources – Data-storage.

Text Books

1. Fundamental of Information Technology by Alex Leon & M.Leon, Vikas Publications, New Delhi
2. Security in Computing (Third Edition) by C.P. Pfleeger, S.L. Pfleeger,D.N. Shah, S. Ware, Prentice Hall 2002.
3. Recent Magazines of Computers and Communication.
4. Cloud Computing PHI by Rao M.N.
5. Internet of Things, McGrawHill by Raj Kamal

Reference Books

1. Introduction to Information Technology – ITL Education Solutions Ltd.,Seventh Impression, Pearson Education 2008.
2. Concepts in Computing-Kenneth Hoganson, First Indian Edition, Jones & Bartlett Publishers, Inc. 2010
3. Computer Networks – Andrew S. Tanenbaum, 4th Edition, Pearson Education.

6IMCA105 Communication Skills

UNIT I

Listening: Barriers of Listening skill-Approaches to Listening –How to improve Listening exercises. Speaking: Paralanguage: Sounds, stress, intonation- Art of conversation – Presentation skills – Public speaking- Expressing Techniques

UNIT II

Reading: Kinds of Reading – Causes of reading difficulties – Reading strategies – exercises. Writing: Effective writing – Paragraph ,Essay, Reports, Letters, Articles, Notices, Agenda & Minutes.

UNIT III

Communication: Modes of Communication- Barriers – Interpersonal skills , Negotiation skills Non- Verbal communication – Etiquettes

UNIT IV

Group Dynamic skills: Group Discussion – Team building & Team work – Be a manager or leader – Decision making – creativity – Time & Stress management skills.

UNIT V

Interview skills: Types of Interviews – Preparing for interview – Preparing a CV – Structuring the interview , Mock Interview _ Quick Tips.

Reference Books:

1. Sanghi, Seema, Improve your communication skills. 2nd edition.
2. Burnard, Philip. Interpersonal skills Training: A source book of activities. 2005.
3. Ashley, Roderic. How to enhance your employability. 1998.
4. Dr. Alex, K. Soft sill: know yourself & Know the world. 2010.
5. Cornerstone. Developing softskills. 4th edition 2005.
6. Jones, Daniel. An outline of English phonetics.
7. Aggarwal, Rohini. Business communication and Organization & Management.
8. Grath. E.H. Basic Managerial skills for all.
9. Maxwell, John C. Developing the leader within you.
10. Sunitha, V. Personality Development & communicative English

6IMCA106 C and DS Lab

1. Program using control structure (if else.. Switch..)
2. Program using iterative structure (for… While…)
3. Array Manipulation Program
4. String manipulation programs
5. Program using structures
6. Program for Stack
7. Implement Stack using Linked lists use it to convert infix expression to postfix expression.
8. Program for Queue using pointers
9. Linked List Using Arrays
10. Program for Linked list using pointers
11. Program using Dynamic allocation operator
12. File handling program
13. Program for Trees

6IMCA107 Operating System Lab

1. Program for CPU Scheduling Algorithms to find turnaround time and waiting time. a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority
2. Program for File Allocation Strategies - a) Sequential b) Indexed c) Linked Memory
3. Program to simulate the following contiguous memory allocation techniques a) Worst-fit b) Best-fit c) First-fit
4. Program for any one of Deadlock Management Techniques
5. Program to simulate disk scheduling algorithms a) FCFS b) SCAN c) C-SCAN
6. Program for Page Replacement Algorithms a) FIFO b) LRU c) LFU
7. Program to simulate producer-consumer problem using semaphores
8. Program to simulate the concept of Dining-Philosophers problem.

AISECT University, Hazaribag (Jharkhand)

MCA, Second -Semester

6IMCA201 Data Base Management System

UNIT I

Introduction: Advantage of DBMS approach, various view of data, data independence, schema and subschema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture.
ER model: basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.

UNIT II

Domains, Relations and Keys: domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys.
Relational Algebra & SQL: Features of good relational database design,Codd's rule, The structure, relational algebra with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL.
PL/SQL programming:working with stored procedures,triggers,cursor
Database Integrity: general idea. Integrity rules, domain rules, attribute rules, relation rules, Database rules, assertions, triggers, integrity and SQL.

UNIT III

Functional Dependencies and Normalization: basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first, second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and fourth normal form, Join dependency and fifth normal form.

UNIT IV

Transaction, concurrency and Recovery: basic concepts, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, basic idea of serializability, basic idea of concurrency control, basic idea of deadlock, failure classification, storage structure types, stable storage implementation, data access, recovery and atomicity- log based recovery, deferred Database modification, immediate Database modification, checkpoints. Distributed Database: basic idea, distributed data storage, data replication, data fragmentation: horizontal, vertical and mixed fragmentation.

UNIT V

Emerging Fields in DBMS: object oriented Databases-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity, data warehousing- terminology, definitions, characteristics, data mining and it's overview, Database on www, multimedia

Databases-difference with conventional DBMS, issues, similarity based retrieval, continuous media data, multimedia data formats, video servers.
Storage structure and file organizations: overview of physical storage media, magnetic disk performance and optimization, basic idea of RAID, file organization, organization of records in files, basic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization
Network and hierarchical models: basic idea, data structure diagrams, DBTG model, implementations, tree structure diagram, implementation techniques, comparison of the three models.

BOOKS

1. A Silberschatz, H.F Korth, Sudersan "Database System Concepts" –, MGH Publication.
2. C.J Date "An introduction to Database Systems" –6th ed.
3. Elmasri & Navathe "Fundamentals of Database systems" – III ed.
4. B.C. Desai. "An introduction to Database systems" BPB
5. Raghurama Krishnan "Database Systems" TMH

6IMCA202-Computer Network

UNIT I

Introduction: Computer Network, Layered Network Architecture-Review of ISO-OSI Model., Transmission Fundamentals-, Communication Media-Conductive Metal (Wired Cable), Optical Fiber links, Wireless Communication-Radio links, Setellite Links, Communication Services & Devices, Telephone System., Integrated Service Digital Network (ISDN)., Cellular Phone., ATM. Network Security, Virtual Terminal Protocol, Overview of DNS, SNMP, email, WWW, Multimedia.

UNIT II

Data Security and Integrity: Parity Checking Code, Cyclic redundancy checks (CRC), Hemming Code, Protocol Concepts –, Basic flow control, Sliding window protocal-Go-Back-N protocol and selective repeat protocol, Protocol correctness- Finite state machine

UNIT III

Local Area Network: Ethernet : 802.3 IEEE standard, Token Ring : 802.5 IEEE standard, Token Bus : 802.4 IEEE standard, FDDI Protocol, DQDB Protocol, Inter Networking, Layer 1 connections- Repeater, Hubs, Layer 2 connections- Bridges, Switches, Layer 3 connections- Routers, Gateways.

UNIT IV

Wide Area Network: Introduction, Network routing, Routing Tables, Types of routing, Dijkstra's Algorithm, Bellman-Ford Algorithm, Link state routing, Open shortest path first, Flooding, Broadcasting, Multicasting, Congestion & Dead Lock, Internet Protocols, Overview of TCP/IP, Transport protocols, Elements of Transport Protocol, Transmission control protocol (TCP), User data-gram protocol (UDP).

UNIT V

Wireless Broadband Networks Technology Overview, Platforms and Standards: Wireless broadband fundamentals and Fixed Wireless Broadband Systems, Platforms- Enhanced Copper, Fibre Optic and HFC, 3G Cellular, Satellites, ATM and Relay Technologies, HiperLAN2 Standard, Global 3G CDMA Standard, CDMA Harmonization G3G Proposal for Protocol Layers

BOOKS

1. A.S.Tanenbaum, "Computer Network", 4th addition,PHI
2. Forouzan "Data Communication and Networking 3ed", TMH
3. J.F.Hayes, "Moduling and Analysis of Computer Communication Networks", Plenum Press
4. D.E.Comer, "Internetworking with TCP/IP", Volume Ist & IInd, PHI
5. Willium Stalling, "Data & Computer communications",Maxwell Macmillan International Ed.
6. D.Bertsekas and R.Gallager,"Data Networks", 2nd Ed. ,PHI.
7. G.E. Keiser ,"Local Area Networks ", McGraw Hill, International Ed.
8. Joh R. Vacca, "Wireless Broadband Networks Handbook 3G, LMDS and Wireless Internet" Tata McGraw-Hill, 2001

6IMCA203 Software Engineering and UML

UNIT I Introduction

Software Engineering paradigms – Waterfall Life cycle model – Spiral Model – Prototype Model– Software Requirement - Requirements Elicitation Techniques – Initial Requirements Document –– SRS Document – Requirements Change Management - Project Management

UNIT II Software Design

Abstraction – Modularity – Software Architecture – Cohesion – Coupling – Various Design Concepts and notations – Development of Detailed Design & Creation of Software Design Document - Dataflow Oriented design – Designing for reuse – Programming standards.

UNIT III Software Metrics 9

Scope – Classification of metrics – Measuring Process and Product attributes – Direct and Indirect measures – Reliability – Software Quality Assurance – Standards.
Need of Software Estimation – Function Point – Risk Management

UNIT IV Software Testing And Maintenance 9

Software Testing Fundamentals – Software testing strategies – Black Box Testing – White Box Testing – System Testing – Functional Testing – Structural Testing – Regression Testing - Testing Tools – Test Case Management –
Challenges of Software Maintenance – Types of Maintenance. Software Maintenance Organization – Maintenance Report

UNIT V Unified Modeling Langauge

Introduction to UML : Use Case Approac,: Identification of Classes and Relationships, Identifying State and Behavior, Use Case DiagramClass Diagram – State Diagram - Sequence ' Diagram – Activity Diagram – Deployment Diagrams Case Study - LMS

Books:

1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach, Tata McGraw-Hill Education, 8th Edition, 2015.
2. I. Sommerville, "Software Engineering", Sixth Edition, Addison Wesley-Longman, 2004.
3. Pankaj Jalote, "An Integrated approach to Software Engineering", Second Edition, Springer Verlag, 1997.
4. Timothy C. Lethbridge and Robert Laganiere, "Object – Oriented Software Engineering, Practical Software Development using UML and Java", Tata McGraw Hill Publishing Company Limited, Second Edition, 2004

6IMCA204 Algorithm Design

UNIT I LINEAR DATA STRUCTURES

Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double Ended Queue - Applications of stack – Evaluating Arithmetic Expressions - Other Applications - Applications of Queue - Linked Lists - Singly Linked List - Circularly Linked List - Doubly Linked lists – Applications of linked list – Polynomial Manipulation.

UNIT II NON-LINEAR DATA STRUCTURES

Binary Tree – expression trees – Binary tree traversals – applications of trees – Huffman Algorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree - Splay Trees – Heap- Heap operations- -Binomial Heaps - Fibonacci Heaps- Hash set.

Searching, Hashing and Sorting: requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search,

Hashing-basics, methods, collision, resolution of collision, chaining; Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.

UNIT III GRAPHS

Representation of graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra's algorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms. Basic idea of AVL tree- definition, insertion & deletion operations, basic idea of B-tree- definition, order, degree, insertion & deletion operations, B+-Tree- definitions, comparison with B-tree

UNIT IV ALGORITHM DESIGN AND ANALYSIS

Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Quick Sort - Binary Search - Greedy Algorithms – Knapsack Problem – Dynamic Programming – Optimal Binary Search Tree - Warshall's Algorithm for Finding Transitive Closure.

UNIT V ADVANCED ALGORITHM DESIGN AND ANALYSIS

Backtracking – N-Queen's Problem - Branch and Bound – Assignment Problem - P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem-Amortized Analysis

Books

1. Ullman "Analysis and Design of Algorithm" TMH
2. Goodman "Introduction to the Design & Analysis of Algorithms, TMH-2002.
3. Aho, "Data Structure & Algorithms

6IMCA205 Object oriented Programming with JAVA

UNIT I

OOP concepts – Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism,

The Java Environment: Setting Class path; Data types; Operators - precedence and associativity; Type conversion; Control and Iterative statements; Modular programming methods;.

Object Oriented Programming in Java: Class; Objects; Packages; Scope and lifetime; Access Modifiers; Constructors; Copy constructor; this pointer; finalize () method; Arrays; Memory allocation and garbage collection

Inheritance : Inheritance basics, method overriding, dynamics method dispatch, abstract classes.

Interfaces : Defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces.

UNIT-II

Multithreading and Exception Handling: Basic idea of multithreaded programming; The lifecycle of a thread; Creating thread with the thread class and runnable interface; Thread synchronization; Thread scheduling; Producer-consumer relationship; Daemon thread, Selfish threads; The try, catch and throw; throws Constructor and finalizers in exception handling;

Applets: Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTML Tags for applet.

UNIT-III

Input/Output : Exploring Java I/O, Directories, stream classes The Byte stream : Input stream, output stream, file input stream, file output stream, print stream, Random access file, the character streams, Buffered reader, buffered writer, print writer, serialization.

JDBC: JDBC-ODBC bridge; The connectivity model; The driver manager; Navigating the resultset object contents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

Collections: The collections framework, collection interfaces, collection classes.

UNIT-IV

AWT Fundamentals: The class hierarchy of window fundamentals; The basic user interface components , Frame, Layout managers, flow layout etc.

The Java Event Handling Model: Java's event delegation model , Event class hierarchy; Adapter classes; Event classes action and different Events

SWINGS: Introduction, Hierarchy of swing components. Containers, Top level containers - JFrame, JWindow, JDialog, JPanel, JButton, JToggleButton, JCheckBox, JRadioButton, JLabel,JTextField, JTextArea, JList, JComboBox, JScrollPane.

UNIT-V

Introduction of Web Designing: HTML basics

Servlets Overview, Servlet Lifecycle: init(), service(),destroy(), Generic Servlet,Servlet Request, and Servlet Response, http Servlet Request, http Servlet Response and http Servlet, Request-response, headers, GET, POST

JSP: JSP architecture, JSP tags and JSP expressions, Fixed Template Data ,Lifecycle of a JSP, Model View Controller (MVC), Data Sharing among servlets & JSP, Request, application, session and page scope, JSP implicit objects, isElignore attribute, buffer and auto flush attributes, info attribute ,errorPage and is errorPage attributes, is Thread safe Attribute, extends attribute, language attribute, Including files and applets in jsp Pages, using java beans components in JSP documents.

Struts Framework: Struts Architecture, Struts classes ActionForward, ActionForm, ActionServlet, Action classes, Understanding struts config. xml, Understanding Action Mappings, Struts flow with an example application.

BOOKS

1. Naughton & Schildt "The Complete Reference Java 2", Tata McGraw Hill
2. Deitel "Java- How to Program:" Pearson Education, Asia
3. Horstmann & Cornell "Core Java 2" (Vol I & II) , Sun Microsystems
4. Ivan Bayross "Java 2.0" : BPB publications 5. Ivor Horton's "Beginning Java 2, JDK 5 Ed., Wiley India. Note : Paper is to be set unit wise with internal choice.
5. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
6. Jakarta Struts Cookbook, Bill Siggelkow, S P D O'Reilly for chap 8
7 An Introduction to web Design and Programming –Wang Thomson
8 Web Applications Technologies Concepts- Knuckles,John Wiley

6IMCA206 Java and OOPS lab

1) Write a Java program to determine maximum from given 100 numbers.
2) Write a Java program to calculate the factorial of a given numbers.
3) Java program to check whether a given character is alphabet or not.
4) Java program to find sum of all digits.
5) Write a Java program to add two binary numbers.
6) Write a Java program for switch statement.
7) Write a Java program to print perfect numbers
8) Write a Java program to convert a decimal number to binary number.
9) Write a Java program for Parameterized Constructor.
10) Write a Java program using while loop, do while loop, "for" loop.
11) Write a Java program to check whether number is Armstrong or not.
12) Write a Java program for Hierarchical Inheritance.
13) Write a Java program for abstract class and for interface.
14) Write a Java program to declare, initialize and display the contents of an array of 5 integer values. Also show in Java how the length of array can be found.
15) Write a program to accept a string and count total capital and small letters in string.
16) Write a Java program to print following output:
    0,1,1,2,3…..(20 such items)
17) Write a Java program for method overloading and for method overriding.
18) Write a Java program to design a class Student that has three data member name ; Roll no; Marks in five subject and member function to assign streams on the basis of table given below

	Average marks	**Stream**
1)	90% or more	Computer
2)	80-90%	Electronics
3)	75-80%	Mechanical
4)	70-75%	Chemical
5)	60-70%	Civil

PRACTICAL LIST

1. Create the following Databases.

Salesmen

SNUM	SNAME	CITY	COMMISSION
1001	Piyush	London	12 %
1002	Sejal	Surat	13 %
1004	Miti	London	11 %
1007	Rajesh	Baroda	15 %
1003	Anand	New Delhi	10 %

SNUM : A unique number assigned to each salesman.

SNAME : The name of salesman.

CITY : The location of salesmen.

COMMISSION: The Salemen's commission on orders.

Customers

CNUM	CNAME	CITY	RATING	SNUM
2001	Harsh	London	100	1001
2002	Gita	Rome	200	1003
2003	Lalit	Surat	200	1002
2004	Govind	Bombay	300	1002
2006	Chirag	London	100	1001

2008 Chinmay Surat 300 1007

2007 Pratik Rome 100 1004

CNUM : A unique number assigned to each customer.

CNAME : The name of the customer.

CITY : The location of the customer.

RATING : A level of preference indicator given to this customer.

SNUM : The number of salesman assigned to this customer.

Orders

ONUM AMOUNT ODATE CNUM SNUM

3001 18.69 10/03/97 2008 1007

3003 767.19 10/03/97 2001 1001

3002 1900.10 10/03/97 2007 1004

3005 5160.45 10/03/97 2003 1002

3006 1098.16 10/03/97 2008 1007

3009 1713.23 10/04/97 2002 1003

3007 75.75 10/04/97 2004 1002

3008 4723.00 10/05/97 2006 1001

3010 1309.95 10/06/97 2004 1002

3011 9891.88 10/06/97 2006 1001

ONUM : A unique number assigned to each order.

AMOUNT : The amount of an order.

ODATE : The date of an order.

CNUM : The number of customer making the order.

SNUM : The number of salesman credited with the sale.

Write queries :-

1. Produce the order no, amount and date of all orders.
2. Give all the information about all the customers with salesman number 1001.
3. Display the following information in the order of city, sname, snum and commission.
4. List of rating followed by the name of each customer in Surat.
5. List of snum of all salesmen with orders in order table without any duplicates.
6. List of all orders for more than Rs. 1000.
7. List of names and cities of all salesmen in London with commission above 10%.
8. List all customers whose names begins with a letter 'C'.
9. List all customers whose names begins with letter 'A' to 'G'.
10. List all orders with zero or NULL amount.
11. Find out the largest orders of salesman 1002 and 1007.
12. Count all orders of October 3, 1997.
13. Calculate the total amount ordered.
14. Calculate the average amount ordered.
15. Count the no. of salesmen currently having orders.
16. List all salesmen with their % of commission.
17. Assume each salesperson has a 12% commission. Write a query on the order table that will produce the order number, salesman no and the amount of commission for that order.

18. Find the highest rating in each city in the form :

For the city (city), the highest rating is : (rating)

19. List all in descending order of rating.

20. Calculate the total of orders for each day and place the result in descending order.

21. Show the name of all customers with their salesman's name.

22. List all customers and salesmen who shared a same city.

23. List all orders with the names of their customer and salesman.

24. List all orders by the customers not located in the same city as their salesman.

25. List all customers serviced by salespeople with commission above 12%.

26. Calculate the amount of the salesman commission on each order by a customer with rating above 100.

27. Find all pairs of customers having the same rating with out duplication.

28. List all orders that are greater than the average of October 4,1997.

29. Find the average commission of salesmen in London.

30.Find all orders attributed to salesmen in 'London' using both the subquery and join methods.

31 List the commission of all salesmen serving customers in 'London'.

32.Find all customers whose cnum is 1000 above than the snum of Sejal.

33 Count the no. of customers with the rating above than the average of 'Surat'.

34.Find all salesmen with customers located in their cities using ANY

and IN.

35. Find all salesmen for whom there are customers that follow them in alphabetical order.

36.Find all customers having rating greater than any customer in 'Rome'.

37 List all orders that has amount grater than atleat one of the orders from 6th October, 1997.

38. Find all orders with amounts smaller than any amount for a customer in 'London'.

39. Find all the customers who have greater rating than every customer in 'Rome

40. Create a union of two queries that shows the names, cities and ratings of all customers. Those with rating of >= 200 should display 'HIGH RATING' and those with < 200 should display 'LOW RATING'.

41 Produce the name and number of each salesman and each customer with more than one current order in the alphabetical order of names.

42. Create union of three queries. First select snum of all salesman in Surat, second, the cnum of all customers in 'Surat' and third, the onum of all orders of 3rd Oct. Retain duplicates between the last two queries but remove the duplicates between either of them and the first..

43. Remove all orders from customer Chirag from the orders table.

44.Set the ratings of all the customers of Piyush to 400.

45. Increase the rating of all customers in Rome by 100.

AISECT University, Hazaribag

MCA, Third -Semester

6IMCA301 Data Mining

UNIT – I Motivation, importance, Data type for Data Mining : relation Databases, Data Warehouses, Transactional databases, advanced database system and its applications, Data mining Functionalities: Concept/Class description, Association Analysis classification & Prediction, Cluster Analysis, Outlier Analysis, Evolution Analysis, Classification of Data Mining Systems, Major Issues in Data Mining.

UNIT – II Data Warehouse and OLAP Technology for Data Mining: Differences between Operational Database Systems and Data Warehouses, a multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology.

UNIT- III Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Primitives, Languages, and System Architectures, Concept Description: Characterization and Comparison, Analytical Characterization.

UNIT – IV Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single-Dimensional Boolean Association Rules from Transactional Databases: the Apriori algorithm, Generating Association rules from Frequent items, Improving the efficiency of Apriory, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint-Based Association Mining.

UNIT – V Classification & Prediction and Cluster Analysis: Issues regarding classification & prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, Applications & Trends in Data Mining: Data Mining Applications, currently available tools.

BOOKS

1. J. Han and M. Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Pub. 2. Berson "Dataware housing, Data Mining & DLAP, @004, TMH. 3. W.H. Inmon " Building the Datawarehouse, 3ed, Wiley India. 4. Anahory, "Data Warehousing in Real World", Pearson Education. 5. Adriaans, "Data Mining", Pearson Education. 6. S.K. Pujari, "Data Mining Techniques", University Press, Hyderabad

6IMCA302 Artificial Intelligence

UNIT I General Issues and Overview of AI The AI problems, what is an AI technique, Characteristics of AI applications. Introduction to LISP programming: Syntax and numeric functions, Basic list manipulation functions, predicates and conditionals, input output and local variables, iteraction and recursion, property lists and arrays.

UNIT II Problem Solving, Search and Control Strategies General problem solving, production systems, control strategies forward and backward chaining, exhausive searches depth first breadth first search. Heuristic Search Techniques Hill climbing, branch and bound technique, best first search & A* algorithm, AND / OR graphs, problem reduction & AO* algorithm, constraint satisfaction problems.

UNIT III Knowledge Representations First order predicate calculus, skolemization, resolution principle & unification, interface mechanisms, horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

UNIT IV Natural Language processing Parsing techniques, context free grammer, recursive transitions nets (RNT), augmented transition nets (ATN), case and logic grammers, symantic analysis. Game playing Minimax search procedure, alpha-beta cutoffs, additional refinments. Planning Overview an example domain the block word, component of planning systems, goal stack planning, non linear planning.

UNIT V Probabilistic Reasoning and Uncertainty Probability theory, bayes theorem and bayesian networks, certainty factor.
Expert Systems Introduction to expert system and application of expert systems, various expert system shells, vidwan frame work, knowledge acquisition, case studies, MYCIN.
Learning Rote learning, learning by induction, explanation based learning

BOOKS

1. Elaine Rich and Kevin Knight “Artifical Intelligence” - Tata McGraw Hill.
2. “Artifical Intelligence” 4 ed. Pearson
. 3. Dan W. Patterson “Introduction to Artifical Intelligence and Expert Systems”, Prentice India.
4. Nils J. Nilson “Principles of Artifical Intelligence”, Narosa Publishing House.
5. Clocksin & C.S.Melish “Programming in PROLOG”, Narosa Publishing House.
6. M.Sasikumar,S.Ramani etc. “Rule based Expert System”, Narosa Publishing House

Elective –I 6IMCA303 (1) PYTHON PROGRAMMING

UNIT I INTRODUCTION TO PYTHON:
Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT II CONTROL FLOW, FUNCTIONS
Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT III LISTS, TUPLES, DICTIONARIES
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: Sorting and Searching
.

UNIT IV
Classes and Inheritance: Object Oriented Programming, Class Instances, Methods Classes Examples, Why OOP, Hierarchies, Your Own Types – An Extended Example: Building a Class, Visualizing the Hierarchy, Adding another Class, Using Inherited Methods

UNIT V FILES, MODULES, PACKAGES
Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

BOOKS

1. ReemaThareja, "Python Programming using Problem Solving Approach", Oxford University Press, 2017
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", SecondEdition, Shroff O'Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)
3. Guido van Rossum, Fred L. Drake Jr., "An Introduction to Python – Revised andUpdated forPython 3.2, Network Theory Ltd., Edition2011

Elective –I 6IMCA303 (2) Web Technology

UNIT I

Concept of Internet : Client / Server model,Internet and WWW, IP, URL, ISP, DNS; Web Design : Principals of effective Web Design, Page layout and linking, designing effective navigation for your website, planning and publishing websites, Responsive web design : Responsive vs adaptive web design

UNIT II

HTML and Style Sheets : Working with HTML - Formatting and Fonts, Basic Tags, Hyperlinks, Tables, Images, Forms, XHTML, Meta tags. Style Sheets (CSS): Introduction, Need, basic syntax and structure, class, id, background Images, Colors and Properties, Manipulating Texts, Margins, Positioning.

UNIT III

Javascript : Client side scripting with JavaScript, Data Types and Variables, Expressions, Operators and Statements, Objects and Arrays, Functions, loops, Classes, Modules, DOM, Forms and Validations.

UNIT IV

XML : Introduction, Features, Anatomy, Declaration, Uses, Key Components, DTD and Schema, Markup Elements and Attributes, XML Objects, XML Scripting, Using XML with application, Transforming XML using XSL and XSLT, XPATH - Template Based Transformations.

UNIT V

Introduction to AJAX: AJAX Components, The XMLHttpRequest Object, Using XSLT with AJAX; Webservices : Web Service architecture, introduction to webservices, Web Services VS other technologies, Web Services Benefits

Books

1.Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.
2.Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India
3.Web Technologies, Black Book, dreamtech Press
4.Web Design, Joel Sklar, Cengage Learning
5.Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel Pearson.
6.Steven Holzner,"HTML Black Book", Dremtech press.
7.Kogent Learning Web Technologies: HTML, Javascript Wiley India

Elective –I 6IMCA303 (3) Introduction to Data Science and Big Data

UNIT I INTRODUCTION TO DATA SCIENCE AND BIG DATA

Introduction to Data Science – Data Science Process – Exploratory Data analysis – Big data: Definition, Risks of Big Data, Structure of Big Data – Web Data: The Original Big Data – Evolution Of Analytic Scalability – Analytic Processes and Tools – Analysis versus Reporting – Core Analytics versus Advanced Analytics– Modern Data Analytic Tools – Statistical Concepts: Sampling Distributions – Re-Sampling – Statistical Inference – Introduction to Data Visualization.

UNIT II DATA ANALYSIS USING R

Univariate Analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis – Bivariate Analysis: Correlation – Regression Modeling: Linear and Logistic Regression – Multivariate Analysis – Graphical representation of Univariate, Bivariate and Multivariate Analysis in R: Bar Plot, Histogram, Box Plot, Line Plot, Scatter Plot, Lattice Plot, Regression Line, Two-Way cross Tabulation.

UNIT III DATA MODELING

Bayesian Modeling – Support Vector and Kernel Methods – Neuro – Fuzzy Modeling – Principal Component Analysis – Introduction to NoSQL: CAP Theorem, MongoDB: RDBMS VsMongoDB, Mongo DB Database Model, Data Types and Sharding – Data Modeling in HBase: Defining Schema – CRUD Operations

UNIT IV DATA ANALYTICAL FRAMEWORKS

Introduction to Hadoop: Hadoop Overview – RDBMS versus Hadoop – HDFS (Hadoop Distributed File System): Components and Block Replication – Introduction to MapReduce – Running Algorithms Using MapReduce – Introduction to HBase: HBase Architecture, HLog and HFile, Data Replication – Introduction to Hive, Spark and Apache Sqoop.

UNIT V STREAM ANALYTICS

Introduction To Streams Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window.

1. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons
2. Rachel Schutt, Cathy O'Neil, “Doing Data Science”, O'Reilly

Elective –II 6IMCA304(1) Elective –II Machine Learning

UNIT I Introduction to machine learning, scope and limitations, regression, probability, statistics and linear algebra for machine learning, convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets, machine learning models, supervised and unsupervised learning.

UNIT II Linearity vs non linearity, activation functions like sigmoid, ReLU, etc., weights and bias, loss function, gradient descent, multilayer network, backpropagation, weight initialization, training, testing, unstable gradient problem, auto encoders, batch normalization, dropout, L1 and L2 regularization, momentum, tuning hyper parameters.

UNIT III Convolutional neural network, flattening, subsampling, padding, stride, convolution layer, pooling layer, loss layer, dance layer 1x1 convolution, inception network, input channels, transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc.

UNIT IV Recurrent neural network, Long short-term memory, gated recurrent unit, translation, beam search and width, Bleu score, attention model, Reinforcement Learning, RL-framework, MDP, Bellman equations, Value Iteration and Policy Iteration, , Actor-critic model, Q-learning, SARSA

UNIT V Support Vector Machines, Bayesian learning, application of machine learning in computer vision, speech processing, natural language processing etc, Case Study: ImageNet Competition

TEXT BOOKS RECOMMENDED:

1. Christopher M. Bishop, “Pattern Recognition and Machine Learning”, Springer-Verlag New York Inc., 2nd Edition, 2011.
2. Tom M. Mitchell, “Machine Learning”, McGraw Hill Education, First edition, 2017. 3. Ian Goodfellow and Yoshua Bengio and Aaron Courville, “Deep Learning”, MIT Press, 2016

REFERENCE BOOKS:

1. Aurelien Geon, “Hands-On Machine Learning with Scikit-Learn and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems”, Shroff/O'Reilly; First edition (2017).
2. Francois Chollet, "Deep Learning with Python", Manning Publications, 1 edition (10 January 2018).
3. Andreas Muller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", Shroff/O'Reilly; First edition (2016).
4. Russell, S. and Norvig, N. “Artificial Intelligence: A Modern Approach”, Prentice Hall Series in Artificial Intelligence. 2003.

Elective –II 6IMCA304(2) SOFT COMPUTING

UNIT I Overview of Soft Computing, Difference between Soft and Hard computing, Brief descriptions of different components of soft computing including Artificial intelligence systems Neural networks, fuzzy logic, genetic algorithms. Artificial neural networks Vs Biological neural networks, ANN architecture, Basic building block of an artificial neuron, Activation functions, Introduction to Early ANN architectures (basics only)-McCulloch & Pitts model, Perceptron, ADALINE, MADALINE

UNIT II Artificial Neural Networks: Supervised Learning: Introduction and how brain works, Neuron as a simple computing element, The perceptron, Backpropagation networks: architecture, multilayer perceptron, backpropagation learning-input layer, accelerated learning in multilayer perceptron, The Hopfield network, Bidirectional associative memories (BAM), RBF Neural Network.

UNIT III Artificial Neural Networks: Unsupervised Learning: Hebbian Learning, Generalized Hebbian learning algorithm, Competitive learning, Self- Organizing Computational Maps: Kohonen Network.

UNIT IV Fuzzy Logic Crisp & fuzzy sets fuzzy relations fuzzy conditional statements fuzzy rules fuzzy algorithm. Fuzzy logic controller.

UNIT V Genetic algorithms basic concepts, encoding, fitness function, reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections, Convergence of GA, Applications of GA case studies. Introduction to genetic programming- basic concepts.

BOOK

1. R. Rajasekaran and G. A and Vijayalakshmi Pa, *Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications*, Prentice Hall of India
2. D. E. Goldberg, *Genetic Algorithms in Search, Optimisation, and Machine Learning*, Addison-Wesley

SUPPLEMENTARY READING

1. . L. Fausett, *Fundamentals of Neural Networks*, Prentice Hall
2. T. Ross, *Fuzzy Logic with Engineering Applications*, Tata McGraw Hill

Elective –II 6IMCA304(3) Internet of Things

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

Reference Book:

1. Rajkamal,"Internet of Things", Tata McGraw Hill publication
2. Vijay Madisetti and ArshdeepBahga, "Internet of things(A-Hand-on-Approach)" 1st Edition ,UniversalPress
3. HakimaChaouchi "The Internet of Things: Connecting Objects", Wiley publication.
4. Charless Bell "MySQL for the Internet of things", Apresspublications.
5. Francis dacosta "Rethinking the Internet of things:A scalable Approach to connecting everything", 1st edition, Apress publications2013.
6. Donald Norris"The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black", McGraw Hillpublication.

Elective –III 6IMCA305(1) Computer Ethics

UNIT-1 An Overview of Ethics: Ethics: Definition of Ethics, The Importance of Integrity, The Difference between Morals, Ethics, and Laws. Ethics in the Business World: Why Fostering Good Business Ethics Is Important, Improving Corporate Ethics, Creating an Ethical Work Environment, Including Ethical Considerations in Decision Making. Ethics in Information Technology Ethics for IT Workers and IT Users: IT Technicians, IT Professionals: Are IT Workers Professionals, The Changing Professional Services Industry, Professional Relationships That Must Be Managed, Professional Codes of Ethics, Professional Organizations, Certification, Government Licensing, IT Professional Malpractice. IT Users, Common Ethical Issues for IT Users, Supporting the Ethical Practices of IT Users.

UNIT II Computer and Internet Crime, IT Security Incidents: A Major Concern, Why Computer Incidents Are So Prevalent, Types of Exploits, Types of Perpetrators, Federal Laws for Prosecuting Computer Attacks, Implementing Trustworthy Computing: Risk Assessment, Establishing a Security Policy, Educating Employees, Contractors, and Part-Time Workers, Prevention, Detection, Response. Privacy: Privacy Concerns Abound with New IRS Systems, Privacy Protection and the Law: Information Privacy, Privacy Laws, Applications, and Court Rulings. Key Privacy and Anonymity Issues: Identity Theft, Consumer Profiling, Treating Consumer Data Responsibly, Workplace Monitoring, Advanced Surveillance Technology.

UNIT III Freedom of Expression: First Amendment Rights, Obscene Speech, Defamation, Freedom of Expression: Key Issues, Controlling Access to Information on the Internet, Anonymity on the Internet, Defamation and Hate Speech, Corporate Blogging, Pornography. Intellectual Property: What Is Intellectual Property? Copyrights: Copyright Term, Eligible Works, Fair Use Doctrine, Software Copyright Protection, The Prioritizing Resources and Organization for Intellectual Property (PRO-IP) Act of 2008, General Agreement on Tariffs and Trade (GATT), The WTO and the WTO TRIPS Agreement (1994), The World Intellectual Property Organization (WIPO) Copyright Treaty (1996), The Digital Millennium Copyright Act (1998), Patents: Software Patents, Software Cross-Licensing Agreements, Defensive Publishing and Patent Trolls, Submarine Patents and Patent Farming. Trade Secrets: Trade Secret Laws, Employees and Trade Secrets, Key Intellectual Property Issues: Plagiarism, Reverse Engineering, Open Source Code, Competitive Intelligence, Cybersquatting

UNIT IV Software Development: Strategies for Engineering Quality Software,:The Importance of Software Quality, Software Product Liability, Software Development Process, Capability Maturity Model Integration. Key Issues in Software Development, Development of Safety-Critical Systems, Quality Management Standards The Impact of Information Technology on Productivity and Quality of Life: The Impact of IT on the Standard of Living and Worker Productivity, IT Investment and Productivity, The Digital Divide, The Impact of IT on Healthcare Costs, Electronic Health Records, Use of Mobile and Wireless Technology in the Healthcare Industry, Telemedicine, Medical Information Web Sites for Laypeople

UNIT V Social Networking: What Is a Social Networking Web Site? Business Applications of Online Social Networking, Social Network Advertising, The Use of Social Networks in the Hiring Process, Social Shopping Web Sites, Social Networking Ethical Issues, Cyberbullying, Cyberstalking, Encounters with Sexual Predators, Uploading of Inappropriate Material, Online Virtual Worlds, Crime in Virtual Worlds, Educational and Business Uses of Virtual Worlds. Ethics of IT Organizations: Key Ethical Issues for Organizations, The Need for Nontraditional Workers, Contingent Workers, Advantages of Using Contingent Workers, Disadvantages of Using Contingent Workers, Deciding When to Use Contingent, Outsourcing, Offshore Outsourcing, Pros and Cons of Offshore Outsourcing, Strategies for Successful Offshore Outsourcing, Whistle-Blowing, Protection for Whistle-Blowers, Whistle-Blowing Protection for Private-Sector Workers, Dealing with a Whistle-Blowing Situation, Green Computing, ICT Industry Code of Conduct.

Books :

1. George W. Reynolds, ETHICS IN INFORMATION TECHNOLOGY, Third Edition, Course Technology, ISBN-13: 978-0-538-74622-9, Cengage Learning.

2. Deborah Johnson, Computer Ethics, Fourth Edition

3. Richard Spinello and Herman Tavani, CyberEthics, 2nd Edition

Elective –III 6IMCA305(2) Advanced DBMS

UNIT-I Objected Oriented and Object Relational Databases Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity and its implementation, Clustering, Equality and Object Reference, Architecture of Object Oriented and Object Relational databases, Persistent Programming Languages, Cache Coherence. Case Studies: Gemstone, O2, Object Store, SQL3, Oracle xxi, DB2.

UNIT-II Deductive Databases Data log and Recursion, Evaluation of Data log program, Recursive queries with negation. Parallel and Distributed Databases Parallel architectures, shared nothing / shared disk / shared memory based architectures, Data partitioning, Intra-operator parallelism, pipelining.

Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation.

UNIT-III Advanced Transaction Processing Advanced transaction models: Savepoints, Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors, Shared disk systems.

UNIT-IV Active Database and Real Time Databases Triggers in SQL, Event Constraint and Action: ECA Rules, Query Processing and Concurrency Control, Recursive query processing, Compensation and Databases Recovery, multi-level recovery.

UNIT-V Image and Multimedia Databases Modeling and Storage of Image and Multimedia Data, Data Structures – R-tree, k-d tree, Quad trees, Content Based Retrieval: Color Histograms, Textures, etc., Image Features, Spatial and Topological Relationships, Multimedia Data Formats, Video Data Model, Audio & Handwritten Data, Geographic Information Systems (GIS). WEB Database Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems – Oracle xxi, DB2.

BOOKS

1. Elmarsi, "Fundamentals of Database Systems", 4 th Edition, Pearson Education
2. R. Ramakrishnan, "Database Management Systems", 1998, McGraw Hill International Editions
3. Elmagarmid.A.K. "Database transaction models for advanced applications", Morgan Kaufman.
4. Transaction Processing, Concepts and Techniques, J. Gray and A. Reuter, Morgan Kauffman..
5. S. Abiteboul, R. hull and V. Vianu, "Foundations of Databases", 1995, Addison – Wesley Publishing Co., Reading Massachusetts.
6. W. Kim, "Modern Database Systems", 1995, ACM Press, Addison – Wesley.
7. D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rockville, Maryland

Elective –III 6IMCA305(3) Distributed Systems

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

UNIT-II Process and synchronization in Distributed Systems : Threads, clients, servers, code migration, clock synchronization, mutual exclusion, Bully and Ring Algorithm, Distributed transactions.

UNIT-III Consistency, Replication, fault tolerance and security: Object replication, Data centric consistency model, client-centric consistency models, Introduction to fault tolerence, process resilience, recovery, distributed security architecture, security management, KERBEROS, secure socket layer, cryptography.

UNIT-IV Distributed Object Based and File Systems : CORBA, Distributed COM, Goals and Design Issues of Distributed file system, types of distributed file system, sun network file system,.

UNIT-V Distributed shared memory, DSM servers, shared memory consistency model, distributed document based systems : the world wide web, distributed co-ordination based systems: JINI Implementation: JAVA RMI, OLE, ActiveX, Orbix, Visbrokes, Object oriented programming with SOM

BOOKS

1. Andrew S. Tanenbaum, Maarten Van Steen "Distributed Systems Principles and Paradigms" Pearson Education Inc. 2002.

2. Lui "Distributed Computing Principles and Applications".

3. Harry Singh "Progressing to Distributed Multiprocessing" Prentice-Hall Inc.

4. B.W. Lampson "Distributed Systems Architecture Design & Implementation", 1985 Springer Varlag.

5. Parker Y. Verjies J. P. "Distributed computing Systems, Synchronization, control & Communications" PHI.

6. Robert J. & Thieranf "Distributed Processing Systems" 1978, Prentice Hall.

7. George Coulios, "Distribute System: Design and Concepts", Pearson Education

AISECT University, Hazaribag (Jharkhand)

MCA, Fourth –Semester

Elective –IV 6IMCA401 (1) Advanced Python

UNIT I

Introduction to Python, use IDE to develop programs, Basic coding skills, working with data types and variables, working with numeric data, working with string data, Python functions, Boolean expressions, selection structure, iteration structure, working with lists, work with a list of lists, work with tuples, work with dates and times, get started with dictionaries

UNIT II

Classes in Python: OOPS Concepts, Classes and objects , Classes in Python, Constructors, Data hiding, Creating Classes, Instance Methods, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes, Iterators, generators and decorators.

UNIT III

I/O and Error Handling In Python :Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Handling IO Exceptions, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, Working withDirectories.

UNIT IV

An Introduction to relational databases: SQL statements for data manipulation, Using SQLite Manager to work with a database, Using Python to work with a database, Creating a GUI that handles an event, working with components.

UNIT V

Implement Machine Learning algorthims:Usage of Numpy for numerical Data, Usage of Pandas for Data Analysis, Matplotlib for Python plotting, Seaborn for Statistical plots, interactive Dynamic visualizations, SciKit for Machine learning.

TEXT BOOKS

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach,2016
2. Haltermanpython
3. Mark Lutz, Programming Python, O`Reilly, 4th Edition,2010.

Elective –IV 6IMCA401 (2) Advanced Web Technology

UNIT I

Responsive web design and introduction to Bootstrap : Bootstrap grid, bootstrap components and plugins

UNIT II

XML- Introduction to XML, Comparing XML with HTML, Describing the Structure of XML - Declaration, Elements, Attributes, Comments, CDATA, XML Entity References, Parsers ,Describing Document Type Definitions, Using XSLT with
XML :xsl:template Element, xsl:apply-templates Element,xsl:import , xsl:include Element, Element,xsl:element Element, xsl:attribute Element, xsl:value-of Element, using Conditional Statements, Sorting Elements, XSLTfunctions, Creating Well-formed and Valid Documents.

UNIT III

Introduction to Ajax – AJAX Web Application Model, Working of AJAX, Asynchronous Data Transfer with XMLHttpRequest - Creating the XMLHttpRequest Object, XMLHttpRequest Properties, XMLHttpRequest Methods, Using the XMLHttpRequest Object in Different Browsers, Reading a File Synchronously, Reading a File Asynchronously, Performing Tasks Using the XMLHttpRequest Object, Integrating PHP and AJAX-Sending Data from a Web Application to a Server, Validating a Field Using AJAX and PHP

UNIT IV

Handling XML Data using PHP and AJAX-JavaScript, properties for Extracting with nodeValue,
Accessing XML, Elements by Name, Accessing Attribute Values in XML Elements. Validating XML Documents in Ajax Applications Retrieving Data from a Database Using PHP and AJAX Consuming Web Services Using AJAX-Exploring Web Service Protocols-SOAP,Web Service Description Language, UDDI, REST, Consuming Web Services Using AJAX

UNIT V

jQuery-JavaScript DOM objects their methods and properties-Window,
History, Location Document, Form etc. Fundamentals of jQuery, Loading and using jQuery, using jQuery Library files, Callback functions, jQuery Selectors , jQuery Methods to Access HTML Attributes, jQuery Methods of traversing, jQuery Manipulators, jQuery Events, jQuery Effects, jQuery with AJAX

Books

1. Bootstrap: Responsive Web Development
2. XML: A Beginner's Guide by Steven Holzner
1. AJAX For Beginners , Ivan Bayross and Sharanam Shah, SPD
2. Web Development with jQuery (WROX) by Richard York
3. Learning PHP, MySQL & JavaScript with j Query, CSS & HTML5 – by Robin Nixon ,SPD
4. Ajax in Action Dave Crane, Eric Pascarello, Darren James
5. Ajax for Dummies Steve Holzner,PhD, Wiley Publishing Inc.

Elective –IV 6IMCA401 (3) BIG DATA ANALYTICS

UNIT I INTRODUCTION TO BIG DATA

Evolution of Big data – Best Practices for Big data Analytics – Big data characteristics – Validating – The Promotion of the Value of Big Data – Big Data Use Cases- Characteristics of Big Data Applications – Perception and Quantification of Value -Understanding Big Data Storage – A General Overview of High-Performance Architecture – HDFS – MapReduce and YARN – Map Reduce Programming Model

UNIT II CLUSTERING AND CLASSIFICATION

Advanced Analytical Theory and Methods: Overview of Clustering – K-means – Use Cases – Overview of the Method – Determining the Number of Clusters – Diagnostics – Reasons to Choose and Cautions .- Classification: Decision Trees – Overview of a Decision Tree – The General Algorithm – Decision Tree Algorithms – Evaluating a Decision Tree – Decision Trees in R – Naïve Bayes – Bayes' Theorem – Naïve Bayes Classifier.

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM

Advanced Analytical Theory and Methods: Association Rules – Overview – Apriori Algorithm – Evaluation of Candidate Rules – Applications of Association Rules – Finding Association& finding similarity – Recommendation System: Collaborative Recommendation- Content Based Recommendation – Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT IV STREAM MEMORY

Introduction to Streams Concepts – Stream Data Model and Architecture – Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating
moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) applications – Case Studies – Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics

UNIT V NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION 9

NoSQL Databases : Schema-less Models : Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores – Tabular Stores – Object Data Stores – Graph Databases Hive – Sharding –-
Hbase – Analyzing big data with twitter – Big data for E-Commerce Big data for blogs – Review of Basic Data Analytic Methods using R.

Books

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press,
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.
3. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing,Visualizing and Presenting Data", Wiley publishers,2015.

4. Bart Baesens, “Analytics in a Big Data World: The Essential Guide to Data Science and its Applications”, Wiley Publishers.
5. DietmarJannach and Markus Zanker, “Recommender Systems: An Introduction”, Cambridge University Press
6. Kim H. Pries and Robert Dunnigan, “Big Data Analytics: A Practical Guide for Managers “CRC Press,

MOOC REFERENCES:

1. www.swayam.gov.in: Big Data Computing
2. www.coursera.org:Big Data Essentials: HDFS, MapReduce and Spark RDD
3. www.udemy.com: Big Data and Hadop: Interactive Intense Course
4. www.edx.org: Big Data Fundamentals, Processing Big Data with Hadoop in Azure HDInsight

Elective –V 6IMCA402 (1) DEEP LEARNING

UNIT I NEURAL NETWORK

Building Intelligence Machine-Expressing Linear Perceptron as Neurons-Feed Forward Neural Netwoks - Activation function. Supervised and Unsupervised Learning:Single Layer Perceptron Perceptron Learning Algorithm – Least Mean Square Learning Algorithm - Multilayer Perceptron – Back Propagation Algorithm – XOR problem – Limitations of Back Propagation Algorithm- Implementing Neural Networks in TensorFlow.

UNIT II CONVOLUTION NEURAL NETWORK

Introduction-Filter and Feature Maps-Full Description of CNN-Max Pooling- Full Architectural Description of CNN-Image Preprocessing Pipeline Enable More Roburst Models-Accelerating Training with Batch Normalization-Visualizing Learning with Convolution Network-Leveraging and Learning Convolution Filters - Predefined Convolutional Filters Network (PCFNet)- Transfer Learning with Convolutional Neural Networks.

UNIT III DEEP NETWORKS

History of Deep Learning- A Probabilistic Theory of Deep Learning- Backpropagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks - Convolutional Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning

UNIT IV OPTIMIZATION AND GENERALIZATION

Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning.

UNIT V DEEP REINFORCEMENT LEARNING

Markov Decision Processes-Explore versus Exploit-Policy versus Value Learning-Pole-Cart with Policy Gradients-Q Learning and Deep Q Networks-Improving and Moving Beyond DQN

BOOKS

Nikiil Buduma, Nicholas Locascio, “Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms”, First Edition, O'ReillyMedia, 2017

SudharsanRavichandiran, Hands on Deep Learning Algorithms with Python, FirstEdition, Packt Publishing Limited, 2019.

François Chollet, Deep Learning with Python, First Edition,Manning Publications Company, 2017.

Ian Goodfellow, YoshuaBengio and Aaron Courville, Deep Learning, First editionMIT Press, London, 2016

Rachel Schutt, Cathy O'Neil, “Doing Data Science”, O'Reilly

Elective –V 6IMCA402 (2) Cloud Computing Tecnhologies

UNIT I

Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , NIST architecture of cloud computing, Applications cloud computing, Business models around Cloud – Major Players in Cloud Computing - Eucalyptus ,Nimbus ,Open Nebula, CloudSim, VMware.

UNIT II

Types of Computing and Clouds: Cluster Computing, Grid Computing, Grid Computing Versus Cloud Computing, Key Characteristics of Cloud Computing, Cloud Models, Benefits of Cloud Models, Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud, Shared Private Cloud, Dedicated Private Cloud, and Dynamic Private Cloud.

UNIT III

Cloud Services and File System: Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service- Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force, Clarizen.

UNIT IV

Virtualization: Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms , Virtualization of CPU, Memory, I/O Devices and OS ,Virtualization for Data-center Automation, Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

UNIT V

Security in the Cloud: Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

Books

1. Cloud Computing "A Practical Approach" Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGraw Hill. Kai Hwang, Geoffrey C Fox, Jack G Dongarra,
2. "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
3. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
5. Kumar Saurabh, " Cloud Computing – insights into New -Era Infrastructure", Wiley India, 2011.
6. Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India,

Elective –V 6IMCA402 (3) Digital Marketing

UNIT I

Introduction to Digital Marketing:What is Digital Marketing,Why Digital Marketing,Digital Marketing platforms,Digital Marketing – Organic & Paid,Digital Marketing era and the way forward,Digital Marketing for students, professionals and businesses
Search Engine Optimization (SEO):What is SEO,Growth of SEO in the recent years,Ecosystem of a search engine,What are the kinds of traffic

UNIT II

On Page Optimisation (OPO):What is on-page optimization,HTML basics,CSS basics,Meta Tags usage,Using Javascript to our Advantage,Graphics Optimization,Contextual interlinking,Microformats & schemas,Improving demographic score
Off-Page Optimization:Linking Strategies,Competitor Analysis,Sculpting,Link Baiting,Professional Article Exchange,Social Book Marking and Promotions,Directory submissions

UNIT III

Search Engine Marketing (SEM):Introduction to SEM,SEM platforms – paid platforms,Introduction to Google AdWords,What is Google AdWords?,How is it different from other platforms?,Create an AdWords account,Key terminologies in Google AdWords,Google AdWords Account Structure,Ad approval process,Campaign creation process,Search & Display network,Keyword Match types,Keyword selection (Keyword planner),Display Planner,Ad Extensions,Different types of extensions,Creating location extensions,Creating call extensions,Create Review extensions,Ad creation process,Keyword Grouping,Bidding techniques – Manual / Auto,Site Targeting,Keyword targeting,Demographic Targeting / Bidding,CPC-based, CPA-based & CPM-based accounts

UNIT IV

Mobile Ads:What is mobile ads?,Creating mobile ads?,What are the types of mobile ads?,AdWords for mobile
Click to Call Campaigns:Create click to call campaign,Analyze the campaigns,Optimize the ads for mobile
Youtube Advertising:What is youtube advertising?,Why should one advertise on youtube?,Creating youtube campaigns,Choose the audience for video ads,Instream ads,In-video ads,In-search ads,In-display ads,Measuring your YouTube ad performance,Drive leads and sales from YouTube ads
Facebook Marketing:Facebook Paid Marketing,Running paid campaigns,Managing interests,Create custom audiences,Create multiple adverts,Power editor
Billing in AdWords:Different types of billing,Postpay and Prepay [Automatic and Manual],Billing issues,Retry card,Troubleshooting issues,Primary card and back up card,Promo codes and working with them.
Content Marketing:Blog Marketing,Article Marketing,Cross promotions,How to effectively market content,Call to action via content,Guest blogging,Content Marketing tools (Around 30 of them)

Email Marketing:Importance of email marketing,email Marketing platforms,Creating e-mailers,Tracking emailers,Open rates and CTR of emailers,Drive leads from emailers,What is opt-in lists,Create forms
Social Media Marketing:Social Media, Social networking & Social Media Marketing Defined,Blogging and microblogging,Social networking,Video Sharing
Social Shopping & Opinions:Social News and Social Bookmarking,Social events,wikis,Social Media Strategy

UNIT V

Remarketing Campaigns:What is remarketing?,How do I create a remarketing campaign?,Remarketing campaigns,Creating custom combinations,Creating URL rule,Creating a remarketing tag
AdWords Editor: AdWords Editor,Creating optimized campaigns,Understanding AdWords Editor options,Easy optimization of accounts,Analysis of accounts using AdWords Editor, AdWords Editor shortcuts,Analysing existing accounts,Exporting accounts into different formats.
Getting Your Company Ready for Social Media: Content Management, Scheduling & Creating content, Managing content programs,Trademark Implications, Working with Tumblr
Influencers: Who are they? How to find them, How to use them to benefit your brand.

Books

1. Big Book of Digital Marketing, Publisher: Digital Firefly Marketing
2. Fifty Shades of Digital Marketing, Francesca James, Hannan Durham
3. Understanding Digital Marketing, Damian Ryan, Calvin Jones, Publisher: Kogan Page
4. Understanding Digital Marketing- Basics and Actions, Teresa Pineiro-Otero and Xabier Martinez-Rolan, Publisher: Springer International Publishing
5. Internet Marketing, Alex Trengove Jones, Anna Malczyk and Justin Beneke, Publisher: GetSmarter

Elective –VI 6IMCA403 (1) Information Security

UNIT 1

Introduction : What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT 2

Security Investigation : Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues, An Overview of Computer Security, Access Control Matrix, Security Policies, Integrity Policies and Hybrid Policies.

UNIT 3

Security Analysis : Risk Management : Identifying and accessing Risk, Accessing and Controlling Risk. Systems : Access Control Mechanism, Information Flow and Confinement Problem.

UNIT 4

Logical Design : Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.

UNIT 5

Physical Design : Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

References -

1. Michael E Whitman and Herbert J Mattord, —Principles of Information Security, Vikas Publishing House, New Delhi, 2003

2. Micki Krause, Harold F. Tipton, — Handbook of Information Security Management, Vol 1-3 CRCPress LLC, 2004.

3. Stuart McClure, Joel Scrambray, George Kurtz, —Hacking Exposed, Tata McGraw- Hill, 2003

4. Matt Bishop, — Computer Security Art and Science, Pearson/PHI, 2002.

Elective –VI 6IMCA403 (2) Block Chain And Cryptocurrency

UNIT – I OVERVIEW OF BLOCKCHAIN:

Why Blockchain - The Structure of Blockchain - Data Structure of Blockchain - Data Distribution in Blockchain - Block Validation. Block Validators: Proof of Work – Proof of Stake - Proof of Activity - Proof of Elapsed Time - Proof of Burn.

UNIT – II CRYPTOCURRENCY

Overview. Bitcoin: Bitcoin Working - Bitcoin Transactions - Bitcoin Mining - Value of Bitcoin - Community, Politics and Regulations – Advantages – Disadvantages. Ethereum: Overview – Decentralized Application. Components of Ethereum: Smart contracts – Ether - Ethereum Clients - Ethereum Virtual Machine – Etherscripter.

UNIT – III- HYPERLEDGER

Introduction. Digital Tokens: Overview - Initial Coin Offering – OmiseGO – EOS – Tether. MetaMask: Wallet Seed - MetaMask Transactions. Mist: Overview - Mist wallet. Truffle: Features of Truffle – Development Truffle boxes - Community truffle box.

UNIT – IV SOLIDITY

Smart Contracts - Contract and Interfaces - Hyperledger Fabric: Introduction - Fabric v/s Ethereum - HyperledgerIroha - Features of Iroha. HyperledgerSawtooth: Components of sawtooth - Proof of Elapsed time.

UNIT – V BLOCKCHAIN PLATFORMS

Multichain - HydraChain. Future Blockchain: IOTA – Corda - Chain Core.Blockchain Framework: CoCo Framework – Tierion – BigchainDB

REFERENCES:

1. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
3. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015.
4. https: / / www.blockchainexpert.uk / book / blockchain-book.pdf

MOOC Website references (Example website references are only given; it's not an exhaustive list)

1. www.coursera.org
    a. Blockchain and cryptocurrency explained
    b. Blockchain revolution
    c. Bitcoin and Cryptocurrency technologies
    d. Blockchain basics
    e. Introduction to Blockchain

    f. Introduction to Blockchain technologies
    g. Blockchain foundations and use cases
2. www.udemy.com
    a. Build a blockchain and cryptocurrency from scratch
    b. The Basics of Blockchain
    c. Blockchain advanced level

Elective –VI 6IMCA403 (3) Mobile Computing

UNIT I: WIRELESS COMMUNICATION FUNDAMENTALS

Introduction to Mobile Computing- Mobile Computing V/S Wireless Computing –Mobile Computing Applications- Characteristics of Mobile Computing- Structure of Mobile Computing Applications.

Generations of Mobile Communication Technologies- Multiplexing – Spread spectrum- MAC Protocols –SDMA- TDMA- FDMA- CDMA

UNIT II: TELECOMMUNICATION SYSTEMS

Introduction to Cellular Systems-GSM – System Architecture – Protocols – Connection Establishment – Frequency Allocation Routing – Mobility Management – Security – GPRS- Architecture - Handover

UNIT III: MOBILE NETWORK LAYER

Mobile IP – DHCP – Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV , Hybrid routing –ZRP, Wireless LAN – IEEE 802.11 Standards – Architecture – services – HIPERLAN – Ad- Hoc Network – Blue Tooth.

UNIT IV: Mobile AD-HOC Networks9 AD- HOC Basics

Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.

UNIT V: MOBILE PLATFORMS AND APPLICATIONS 9 Mobile

Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: Ios, Android, BlackBerry, Windows Phone – M Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Second Edition, Prentice Hall of India / Pearson Education, 2003.
2. William Stallings, "Wireless Communications and Networks", SecondEdition, Prentice Hall of India / Pearson Education, 2004.