

**S. V. K. P. & Dr. K. S. RAJU ARTS &
SCIENCE COLLEGE (AUTONOMOUS)**

Accredited by NAAC with grade 'A'

Recognized by UGC as "College with Potential for Excellence"

PENUGONDA-534320, W. G. Dist., A.P.

(Affiliated to Adikavi Nannaya University)



SYLLABUS
of
Master of Computer Applications

DEPARTMENT OF COMPUTER SCIENCE(MCA PROGRAMME)

2020-21

SVKP & Dr K S RAJU A & S COLLEGE (A) :: PENUGONDA

Master of Computer Applications(w.e.f. 2020)

Course Structure & Syllabus for AB 2020-21

Semester I (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
20MCAT101	Discrete Mathematical Structures	75	25	100	4	-	4
20MCAT102	Management Accountancy	75	25	100	4	-	4
20MCAT103	C Programming & Data Structures	75	25	100	4	-	4
20MCAT104	Computer Organization	75	25	100	4	-	4
20MCAT105	Operating Systems	75	25	100	4	-	4
20MCAT106	Design & Analysis of Algorithms	75	25	100	4	-	4
20MCAP107	C Programming & Data Structures Lab	50	50	100	-	3	2
20MCAP108	Operating Systems and Computer Organization Lab	50	50	100	-	3	2
20MCAP109	Skill Development Course/ MOOCS	50	50	100	-	3	2
20MCAT110	Bridge Course* Fundamentals of Computers (For General B.Sc/B.A./B.Com Students)	75	25	100	4	-	4
20MCAP111	Bridge Course Lab* Fundamentals of Computers Lab (For General B.Sc/B.A./B.Com Students)	50	50	100	-	3	2
Total Credits							30

Note: All the General B.Sc/B.A./B.Com Students must pass the **Bridge Course(20MCAT110)** and **Bridge Course Lab (20MCAP111)** with minimum 50% marks, but the credits allotted for that courses will not be considered for SGPA calculation.


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20MCAT101 DISCRETE MATHEMATICAL STRUCTURES

Instruction: 4 Periods/week
Internal: 25 Marks

Time: 3 Hours
External: 75 Marks

Credits: 4
Total: 100 Marks

UNIT I

Introduction: Logic-Propositional Equivalences-Truth tables-Tautologies-Predicates and Quantifiers-Sets-Operations on sets-Sequences and Summations -Growth functions - relations and their properties- binary relations and their applications - Representation of relations- Closures of relations-Equivalence relations-Partial Orderings.

UNIT II

Counting Techniques: Basics of Counting- Pigeonhole Principle- Combinations and Permutations-Generalized Permutations and Combinations

Recurrence relations: Solving Recurrence Relations-Divide and Conquer relations-Inclusion and Exclusion-Applications of Inclusion-Exclusion.

UNIT III

Graphs: Introduction to Graphs-Terminology-Relations and Directed Graphs Representations of Graphs- Isomorphism-Connectivity- Euler and Hamiltonian Paths- Shortest Path problems- Planar Graphs- Graph Coloring.

Trees: Introduction to trees- Applications of trees- Traversals-Trees and sorting Spanning Trees-Minimum Spanning Trees.

UNIT IV

Boolean Algebra and Models of Computation: Boolean Functions- Representing Boolean Functions -Logic Gates-Minimizations of Circuits-Languages and Grammars- Finite State Machines with and with no output.

Text Book:

1. Discrete mathematics and its applications, Keneth. H. Rosen, Tata McGraw-Hill Publishing Company, New Delhi

Reference Books:

1. Discrete Mathematics for computer scientists & Mathematicians, Joe L.Mott, Abraham Kandel & T. P. Baker, Prentice Hall of India Ltd, New Delhi
2. Discrete mathematics, Richard Johnsonbaug, Pearson Education, New Delhi

***Note: Request to the Paper Setter to consider the students are Computer Science and set as per Computer related Questions.**

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20MCAT102 MANAGEMENT ACCOUNTANCY

Instruction: 4 Periods/week

Time: 3 Hours

Credits: 4

Internal: 25 Marks

External: 75 Marks

Total: 100 Marks

UNIT I

Principles of Accounting: Nature and Scope of Accounting, Double Entry System of accounting introduction to Basic Books of Accounts of Sole Proprietary Concern, closing of books of accounts and Preparation of Trial Balance.

Final Accounts: Trading, Profit and Loss Accounts and Balance Sheet of Sole Proprietary Concern with Normal Closing Entries (With numerical problems).

UNIT II

Ratio Analysis: Meaning, Advantages, Limitations, Types of Ratio and their usefulness. (Theory only) Fund Flow Statement: Meaning of the Term Fund, Flow of Fund, Working Capital Cycle, Preparation and Inter-preparation of Statement.

UNIT III

Costing: Nature, Importance and Basic Principles. Budget and Budgetary Control: Nature and Scope, Importance, Method of Finalization and Master Budget, Functional Budgets.

Marginal Costing: Nature, Scope, Importance, Construction of Break Even Chart, Limitations and uses of Break Even Chart, practical applications of marginal costing (with numerical problems).

UNIT IV

Introduction to Computerized Accounting System: Coding Logic and Codes Required, Master Files, Transaction Files, Introduction to documents used for data collection, processing of different files and outputs obtained.

TEXTBOOKS:

1. Introduction to Accountancy. T.S. Grewal.
2. Management Accountancy, S.P. Jain.

REFERENCE BOOK:

1. Introduction to Accounting, G. Agarwal.



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20MCAT103: C PROGRAMMING AND DATA STRUCTURES

Instruction: 4 Periods/week

Time: 3 Hours

Credits: 4

Internal: 25 Marks

External: 75 Marks

Total: 100 Marks

UNIT-I

Introduction to Computers, Algorithm, flowchart, program development steps, Structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation. Control structures such as if, go to, labels, and switch statements. Loops- while, do-while and for statements, break, continue.

UNIT-II

Arrays: Arrays - declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1- D arrays, 2-D arrays – 2-D and character arrays – Multidimensional arrays. **Functions:** basics, parameter passing, storage classes- scope rules, user defined functions, standard library functions, recursive functions, header files, C pre-processor.

Pointers: Concepts, initialization of pointer variables, pointers and Function arguments, passing by address –dangling memory, Character pointer s and functions, pointer s to pointer s, pointer s and multidimensional arrays, dynamic memory management functions, command line arguments.

UNIT-III

Derived types: structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typed of, bit-fields, Input and output – concept of a file, text files and binary files, Formatted I/o, file I/o operations.

Data Structures: Introduction to Data Structures – Stacks: Definition, Stack implementation one application; Queues: Definition, Queue implementation and types of Queues.

UNIT-IV

Linked Lists: Single Linked List- Definition, implementation; Double Linked List- Definition, implementation. **Trees:** Binary Trees- representation, traversals. **Graphs:** Introduction, representation, traversals. **Searching:** Linear Searching and Binary Searching. **Sorting:** Bubble Sort, Quick Sort and Merge Sort.

TEXT BOOKS:

1. C and Data Structures: A snapshot oriented treatise using live engineering examples, N B Venkateswarlu, E. V Prasad, S Chand &Co.
2. Let Us C, Yashwant Kanetkar, BPB Publications, 5th Edition.
3. Computer science, A structured programming approach using C, B.A. Forouzan and R.F.Gilberg, Third edition, Thomson.

REFERENCE BOOKS:

1. Fundamentals of Data Structures in C, Horowitz, Sahni, Anderson-Freed, 2nd ed, 2008.
2. The C Programming Language, B.W. Kernighan, Dennis M. Ritchie, PHI/Pearson.



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20MCAT104 COMPUTER ORGANIZATION

Instruction: 4 Periods/week

Internal: 25 Marks

Time: 3 Hours

External: 75 Marks

Credits: 4

Total: 100 Marks

UNIT-I

Digital Logic Circuits:

Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuit, Flip-flops Sequential Circuits.

Digital Components:

Integrated Circuits, Decoders, Multiplexes, Registers, Shift Registers, Counters, Memory Unit.

UNIT-II

Data Representation:

Data Types, Complements, Fixed-point Representation, Floating point Representation.

Register Transfer and Micro Operations:

Register Transfer Language, Register Transfer, Bus and Memory Transfer, Arithmetic Micro Operations, Assembly language Instructions, 8085 Microprocessor Instruction Set Architecture.

UNIT-III

Basic Computer Organization and Design:

Instruction Codes, Computer Register, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-Output, Interrupt.

Central Processing Unit:

Introduction, General Register Organization, Stack Organization, Instruction formats, addressing modes.

UNIT-IV

Input /Output Organization:

Peripherals Devices, I/O Interface, Asynchronous Data Transfer, Mode of Transfer, Priority Interrupt, Direct memory access, Input – Output Processor(IOP).

Memory Organization:

Memory Hierarchy, Main memory, Auxiliary Memory, Associate Memory, Cache Memory and Virtual Memory.

Text Books:

1.Computer System Architecture, M.Morris Mano, Prentice Hall of India Pvt.ltd. Third Edition, Sept. 2008.

Reference Books:

1. Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd. Eastern Economy Edition, Sixth Edition, 2003.
2. Computer System Architecture John P. Hayes.
3. Computer Architecture A Quantitative approach 3rd Edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elseveir)



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20MCAT105 OPERATING SYSTEMS

Instruction: 4 Periods/week
Internal: 25 Marks

Time: 3 Hours
External: 75 Marks

Credits: 4
Total: 100 Marks

UNIT I

Introduction: Definition of Operating System, Types Of Operating Systems, Operating System Structures, Operating-System Services, System Calls, Virtual Machines, Operating System Design and Implementation.

Process Management: Process Concepts, Operations on Processes, Cooperating Processes, Threads, Inter Process Communication, Process Scheduling, Scheduling Algorithms, Multiple - Processor Scheduling. Thread Scheduling.

UNIT II

Process Synchronization: The Critical Section Problem, Semaphores, And Classical Problems of Synchronization, Critical Regions, Monitors, Synchronization examples.

Deadlocks: Principles of Deadlocks, System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance, Detection & Recovery from Deadlocks.

UNIT III

Memory Management: Logical Versus Physical Address, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing

File System Implementation: Concept of a file, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free Space Management, Directory Management, Device Drivers.

Mass-storage structure: overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, swap-space management.

UNIT IV

Protection: Goals and Principles of Protection, Access matrix implementation, Access control, Revocation of access rights.

Case study: LINUX, Windows Operating Systems.

Text Book:

1. Operating System Principles by Abraham Silberschatz, Peter Galvin, Greg Gagne. Seventh Edition, Wiley Publication

Reference Books:

1. Operating Systems, William Stallings 5th Edition - PHI
2. Modern Operating Systems, Andrew S. Tanenbaum, 2nd edition, 1995, PHI.
3. Operating Systems - A concept based approach, Dhamdhare, 2nd Edition, TMH, 2006.
4. Understanding the Linux Kernel, Daniel P Bovet and Marco Cesati, 3rd Edition, Reilly, 2005.



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20MCAT106 DESIGN AND ANALYSIS OF ALGORITHMS

Instruction: 4Periods/week
Internal: 25Marks

Time: 3Hours
External: 75Marks

Credits: 4
Total: 100Marks

UNIT I

Introduction: Fundamentals of algorithmic problem solving, important problem types.

Fundamentals of analysis of algorithms and efficiency: Analysis framework, Asymptotic Notations and Basic Efficiency classes, Mathematical Analysis of Non-recursive Algorithms, Mathematical Analysis of recursive Algorithms, Empirical Analysis of Algorithms, Algorithm Visualization.

Brute Force: Selection Sort and Bubble sort, Sequential Search and Exhaustive Search.

UNIT II

Divide-and-Conquer: Merge Sort, Quick sort, Binary Search, Binary Tree Traversals and Related Properties.

Decrease-and-Conquer: Insertion Sort, Depth-First Search and Breadth-First Search- Topological Sorting, Decrease-by-a-Constant-Factor Algorithms.

Transform-and-Conquer: Balanced Search Trees, Heaps and Heap sort, Problem Reduction.

UNIT III

Dynamic Programming: Warshall's and Floyd's Algorithm, Optimal Binary Search Trees, The 0/1 Knapsack Problem and Memory Functions.

Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm

UNIT IV

Limitations of Algorithm Power: Decision Trees, P, NP and NP- complete problems.

Coping with the Limitations of Algorithms Power: Backtracking-n-queens problem, Hamiltonian circuit problem, Subset-sum problem. Branch-and-Bound- The Knapsack Problem, Travelling salesperson problem, Approximation Algorithms for NP-hard Problems.

Text Book:

1. Introduction to Design & Analysis of Algorithms by Anany Levitin, Pearson Education, New Delhi, 2003

Reference Books:

1. Introduction to Algorithms by Thomas H. Corman, Charles E. Leiserson, Ronald R. Rivest & Clifford Stein, Prentice Hall of India, New Delhi.
2. The Design and Analysis of computer Algorithms, Aho, Hopcroft & Ullman, Pearson Education, New Delhi, 2003
3. Fundamentals of algorithmics, Gilles Brassard & Paul Bratley, Prentice Hall of India, New Delhi

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20MCAP107: C PROGRAMMING AND DATA STRUCTURES LAB

Instruction: 3Hrs/week

Time: 3Hours

Credits: 2

Internal: 50 Marks

External: 50 Marks

Total: 100Marks

1. Write a C program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What is the output from your program if the three given points are in a straight line?
2. Write a C program which generates 100 random numbers in the range of 1 to 100. Store them in an array and then print the array. Write 3 versions of the program using different loop constructs (eg. for, while and do-while).
3. Write a program which determines the largest and the smallest number that can be stored in different data types like short, int, long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?
4. Write a C program which generates 100 random real numbers in the range of 10.0 to 20.0 and sort them in descending order.
5. Write a C function for transporting a square matrix in place (in place means that you are not allowed to have full temporary matrix).
6. Write a C function, which will invert a matrix.
7. Write a set of string manipulation functions eg. for getting a sub-string from a given position, copying one string to another, reversing a string and adding one string to another.
8. Write a C program for sorting a list using Bubble sort and then apply binary search.
9. Write a C program to implement the operations on stacks.
10. Write a C program to implement the operations on circular queues.
11. Write a C program for the representation of polynomials using circular linked list and for the addition of two such polynomials.
12. Write a C program for quick sort.
13. Write a C program for Merge sort.
14. Write a C program to create a binary search tree and for implementing the in order, preorder, Post order traversal using recursion.
15. Write a C program for finding the Depth First Search of a graph.
16. Write a C program for finding the Breadth First Search of a graph.

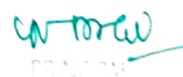
REFERENCE BOOKS:

1. Let Us C, Yashwant Kanetkar, BPB Publications, 5th Edition.
2. Computer Science, A structured programming approach using C", B.A.Forouzan and R.F.Gilberg, 3rd Edition, Thomson, 2007.
3. The C –Programming Language' B.W. Kernighan, Dennis M. Ritchie, PHI
4. Data Structures and Algorithms, 2008, G.A.V.Pai, TMH
5. Classic Data Structures, 2/e, Debasis, Samanta, PHI, 2009



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**20MCAP108 OPERATING SYSTEMS AND
COMPUTER ORGANIZATION LAB**

**Practical: 3 Periods /week
Internal: 50 Marks**

**Time: 3 Hours
External: 50 Marks**

**Credits: 2
Total: 100 Marks**

OPERATING SYSTEMS LAB

1. Basic UNIX commands
- Implement the following using Shell Programming**
2. Input number even or odd.
3. Count the number of lines in the input text.
- Implement the following using C/C++/JAVA**
4. FCFS CPU scheduling algorithm.
5. SJF CPU scheduling algorithm.
6. Round Robin CPU scheduling algorithm.
7. Priority CPU scheduling algorithm.
8. Implement Semaphores.

REFERENCE BOOKS:

1. Operating System Principles by Abraham Silberschatz, Peter Galvin, Greg Gagne. Seventh Edition, Wiley Publication
2. Understanding the Linux Kernel, Daniel P Bovet and Marco Cesati, 3rd Edition, Reilly, 2005.
3. Unix programming, Stevens, Pearson Education.
4. Shell programming, Yashwanth Kanetkar.

COMPUTER ORGANIZATION LAB

Digital Logic Design Experiments

1. TTL Characteristics and TTL IC Gates
2. Multiplexers & Decoders
3. Flip-Flops
4. Counters
5. Binary Adders & Subtractors

8085/86 Assembly Language Programming:

1. Addition of two 8 bit numbers.
2. Addition of two 16 bit numbers.
3. Sum of series of 8 bit numbers.
4. Subtraction of two 8 bit numbers.
5. Largest number in an array.

REFERENCE BOOKS:

1. Computer System Architecture: Morris Mano.
2. Advanced Micro Processor and Peripherals - Hall/ A K Ray.
3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
4. Structured Computer Organization and Design - Andrew S. Tanenbaum, 4th Edition PHI/Pearson.



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20MCAT110 - BRIDGE COURSE
(For General B.Sc/B.A./B.Com Students)
FUNDAMENTALS OF COMPUTERS

Theory: 3Hrs/Week

Credits: 4

Internal: 25 Marks

External: 75 Marks

Total: 100 Marks

UNIT I

Introduction to Computers: History of Computers, Central processing unit, Characteristics

and limitations of computer, Types of Computers, Types of memories. Block diagram of Computer, Peripheral Devices: Input, Output and storage, Input devices, Output devices, Secondary devices, Communication between the CPU and Input/ Output devices. Software: Types of software. Number Systems (Binary, Octal, Hexadecimal).

UNIT-II

Operating System: Introduction to OS, Types of OS, Functions of OS, Evolution of Operating Systems - Simple Batch, Multi programmed, time-shared, Parallel, Distributed Systems, Real-Time Systems. MSDOS Internal Commands: chdir, cls, path, prompt, label, ver, vol, echo, set. External Commands: scandisk, discopy, diskcomp, format, backup, restore, Operating System installation steps.

MS-Office Tools (Word, Excel & PowerPoint): Introduction of Word Processing, MSWord: Creating, Editing, printing, page formatting, inserting tables, pictures, Mail Merge. MS Excel: Introduction to spreadsheet, creating, formatting, printing, usage of formulae, Graphs of worksheets. MS PowerPoint: Creating a presentation with designs and animations.

UNIT III

Computer Networks: Introduction to computer Networks, Network topologies -Bus topology, star topology, Ring topology, Mesh topology, Hybrid topology. Types of Networks:Local area Network, Wide Area Networks, Metropolitan Networks, Campus/ Corporate Area Network, Personal Area Network. Network Devices: Hub, Repeater, Switch, Bridge, Router, Gateway, Network interface Card.

Introduction to Internet: Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails. Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails.

UNIT IV

Problem Solving and Programming: Algorithm development, Flowcharts, Looping, some programming features, Pseudo code, Structured Programming concepts.

Programming Languages: Machine Language and assembly language, high-level and low level languages, Assemblers, Compilers and Interpreters.

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TEXT BOOKS:

1. An Introduction to Computer studies –Noel Kalicharan-Cambridge.
2. Fundamentals of Computers –ReemaThareja-Oxford higher education.
3. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley.
4. Computer Networks: Tannenbaum.

REFERENCE BOOKS:

1. Peter Norton_s, Introduction to Computers, Tata McGraw Hill.
2. Computer Fundamentals, Anita Goel, Pearson Education, 2017.



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SVKP & Dr K S RAJU A & S COLLEGE (A) :: PENUGONDA**Master of Computer Applications(w.e.f. 2020)****Course Structure & Syllabus for AB 2020-21****Semester II (First Year) Curriculum**

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
20MCAT201	Computer Networks	75	25	100	4	-	4
20MCAT202	Object Oriented Programming through JAVA	75	25	100	4	-	4
20MCAT203	Database Management Systems	75	25	100	4	-	4
20MCAT204	Formal Languages and Automata Theory	75	25	100	4	-	4
20MCAT205	Data Mining Concepts and Techniques	75	25	100	4	-	4
20MCAT206	Elective-I 1. Artificial Intelligence and Expert Systems 2. Internet of Things 3. Image Processing	75	25	100	4	-	4
20MCAP207	Object Oriented Programming through JAVA Lab	50	50	100	-	3	2
20MCAP208	Database Management Systems Lab	50	50	100	-	3	2
20MCAP209	Skill Development Course with Python	50	50	100	1	2	2
Total Credits							30

Note: 2 lab Hrs and 1 Theory Hrs/Week or 2 Theory Hrs/ Week for Skill Development Course and only Lab Exam will be conducted.

Summer Internship (Mandatory) after First Year (to be evaluated during III Semester).



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20MCAT201 COMPUTER NETWORKS

Instruction: 4Hrs/week

Internal: 25Marks

Time: 3 Hours

External: 75Marks

Credits: 4

Total: 100Marks

UNIT I

Introduction to Computer Networks: Introduction, Network Hardware, Network Software, Reference Models, Data Communication Services & Network Examples, Internet Based Applications.

Data Communications: Transmission Media, Wireless Transmission, Multiplexing, Switching, Transmission in ISDN, Broad Band ISDN, ATM Networks

UNIT II

Data Link Control, Error Detection & Correction, Sliding Window Protocols, LANs & MANs: IEEE Standards for LANs & MANs-IEEE Standards 802.2, 802.3, 802.4, 802.5, 802.6, High Speed LANs.

Design Issues in Networks: Routing Algorithms, Congestion Control Algorithms, Network Layer in the Internet, IP Protocol, IP Address, Subnets, and Internetworking.

UNIT III

Internet Transport Protocols: Transport Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues. Over View of DNS, SNMP, Electronic Mail, FTP, TFTP, BOOTP, HTTP Protocols, World Wide Web, Firewalls.

UNIT IV

Network Devices: Over View of Repeaters, Bridges, Routers, Gateways, Multiprotocol Routers, Brouters, Hubs, Switches, Modems, Channel Service Unit CSU, Data Service Units DSU, NIC, Wireless Access Points, Transceivers, Firewalls, Proxies.

Overview of Cellular Networks, Ad-hoc Networks, Mobile Ad-hoc Networks, Sensor Networks

Text Books:

1. Computer Networks, Andrews S Tanenbaum, Edition 5, PHI, ISBN: -81-203- 1165-5
2. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw- Hill Co Ltd, Second Edition

Reference Books:

1. Computer Networks, Mayank Dave, Cengage.
2. Computer Networks, A System Approach, 5thed, Larry L Peterson and Bruce S Davie, Elsevier.
3. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
4. Understanding Communications and Networks, 3rd Edition, W.A. Shay, Thomson.



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20MCAT202 Object Oriented Programming through JAVA

Instruction: 4 Periods/week

Time: 3 Hours

Credits: 4

Internal: 25 Marks

External: 75 Marks

Total: 100 Marks

UNIT I

Introduction to OOP: Introduction, Principles of Object Oriented Languages, Applications of OOP, Programming Constructs: Variables, Primitive Data types, Identifiers- Naming Conventions, Keywords, Literals, Operators-Binary, Unary and ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of control- Branching, Conditional, loops. Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments.

Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class.

UNIT II

Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package.

Exceptions & Assertions – Introduction, Exception handling techniques- try... catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions.

UNIT III

MultiThreading: java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive () and join (), Synchronization, suspending and Resuming threads, Communication between Threads Input/Output: reading and writing data, java.io package, **Applets**– Applet class, Applet structure, An Example Applet Program, Applet : Life Cycle, paint(), update() and repaint().

UNIT IV

Event Handling -Introduction, Event Delegation Model, java.awt.event Description, Sources of Events, Event Listeners, Adapter classes, Inner classes.

Abstract Window Toolkit :Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar, **Swing**: Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box Pluggable Look and Feel.

Text Books:

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabhchoudhary, Oxford.

References:

1. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning
2. Introduction to Java programming, 7th ed, Y Daniel Liang, Pearson.



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20MCAT203 DATABASE MANAGEMENT SYSTEMS

Instruction: 4Periods/week

Time:3 Hours

Credits:4

Internal:25Marks

External:75Marks

Total: 100Marks

UNIT I

Database and Database Users: Data models, schemas, and instances, three-schemas architecture and data independence, database languages and interfaces, the database system environment, Centralized and client/server architectures for DBMSs, Classification of database management system.

Data Modeling Using the Entity-Relationship Model: Using High—Level Conceptual data model, Entity types, entity sets Attributes and keys, Relationship types, relationship sets, roles and structural constraints, Weak Entity types, ER diagrams Meaning conventions and design issues, Enhance Entity Relationship model,

Relational data model and relational database constraints: Relational model constraints and relational schemas, update operations.

UNIT II

Relational Algebra and Relational Calculus: Unary Relational operations, Relational Algebra operations, Binary Relational operation, Additional Relational operation, Examples of Queries in Relational Algebra, Domain Relational Calculus.

Relational database design by ER and EER Relational Mapping: Relational database design using ER to Relational Mapping, Mapping EER Model Construct to Relations,

Schema Definition, Basic Constraints and Queries: SQL Data definition, Specifying basic constraints in SQL, Schema change Statements in SQL, Basic queries in SQL, More complex SQL queries, INSERT DELETE UPDATE queries in SQL, Views in SQL, Data base stored Procedures

UNIT III

Relational Database Design: Informal design Guide lines for Relation Schema, Functional Dependences, Normal forms based on Primary keys, General definitions of Second and Third Normal form, BOYCE-CODE Normal form, Algorithm for Relational database schema design, Multi-valued dependencies and fourth Normal forms,

File Organization and Indexes: Introduction, Secondary Storage Devices, Buffering Blocks, placing file records on disk, Operations on Files, Hashing Techniques, Parallelizing Disk Access using RAID Technology, Indexing Structures for files.

UNIT IV

Algorithm for query processing and Optimization: Translating SQL Queries into Relational Algebra, Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and SET Operations,

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Process, Transaction and System Concepts, Characterizing Schedules, Concurrency Control Techniques, Database Recovery Concepts, Recovery Techniques.

Text Book:

1. Fundamentals of Database System, Elmasri, Navathe, Pearson Education.

References Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw- Hill.
2. Database Concepts, Abraham Silberschatz, Henry F Korth, S Sudarshan, McGraw-Hill



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20MCAT204 FORMAL LANGUAGES & AUTOMATA THEORY

Instruction: 4 Periods/week
Internal: 25 Marks

Time: 3 Hours
External: 75 Marks

Credits: 4
Total: 100 Marks

UNIT-I

Finite Automata and Regular Expressions: Basic Concepts of Finite State Systems, Chomsky Hierarchy of Languages, Deterministic and Non-Deterministic Finite Automata, Finite Automata with ϵ -moves, Regular Expressions.

Regular sets & Regular Grammars: Basic Definitions of Formal Languages and Grammars, Regular Sets and Regular Grammars, Closure Properties of Regular Sets, Pumping Lemma for Regular Sets, Decision Algorithm for Regular Sets, Minimization of Finite Automata.

UNIT-II

Context Free Grammars and Languages: Context Free Grammars and Languages, Derivation Trees, simplification of Context Free Grammars, Normal Forms, Pumping Lemma for CFL, Closure properties of CFL's.

Push down Automata: Informal Description, Definitions, Push-Down Automata and Context free Languages, Parsing and Push-Down Automata.

UNIT-III

Turing Machines: The Definition of Turing Machine, Design and Techniques for Construction of Turing Machines, Combining Turing Machines.

Universal Turing Machines and Undecidability: Universal Turing Machines. The Halting Problem, Decidable & Undecidable Problems - Post Correspondence Problem.

UNIT-IV

The Propositional calculus: The Propositional Calculus : Introduction – Syntax of the Propositional Calculus – Truth-Assignments – Validity and Satisfiability – Equivalence and Normal Forms – resolution in Propositional Calculus.

The Predicate calculus: Syntax of the Predicate Calculate Calculus – Structures and Satisfiability – Equivalence – Un-solvability and NP-Completeness.

TEXT BOOKS:

1. Introduction to Automata Theory, Languages and Computations – J.E. Hopcroft, & J.D. Ullman , Pearson Education Asia.
2. Elements of The Theory Of Computation, Harry R Lewis, Cristos h. Papadimitriou, Pearson Education / Prentice-Hall of India Private Limited.

REFERENCE BOOKS:

1. Introduction to languages and theory of computation – John C. Martin (MGH)
2. Theory of Computation, KLP Mishra and N. Chandra Sekhar, IV th Edition, PHI
3. Introduction to Theory of Computation – Michael Sipser (Thomson Nrools/Cole)



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20MCAT205 DATA MINING CONCEPTS AND TECHNIQUES

Instruction: 4 Periods/week

Time: 3 Hours

Credits: 4

Internal: 25 Marks

External: 75 Marks

Total: 100 Marks

UNIT I

Data Warehouse and OLAP Technology: An overview Data Warehouse Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Implementation Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization, From Data Warehousing to Data Mining

UNIT II

Introduction to Data Mining: Motivation and importance, what is Data Mining, Data Mining on what kind of data, what kinds of patterns can be mined, which technologies are used, which kinds of applications are targeted, Major issues in Data Mining. Getting to know your Data: Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity

UNIT III

Concept Description: Characterization and comparison What is Concept Description, Data Generalization by Attribute-Oriented Induction(AOI), AOI for Data Characterization, Efficient Implementation of AOI, AOI for Class comparisons. Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods: Apriori method, generating Association Rules, Improving the Efficiency of Apriori, Pattern-Growth Approach for mining Frequent Item sets, Mining Frequent Itemsets using vertical data format, Mining Closed and Max Patterns.

UNIT IV

Classification Basic Concepts: Basic Concepts, Decision Tree Induction: Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Bayes Classification Methods, Classification by Back Propagation, Support Vector Machines. Cluster Analysis: Cluster Analysis, Partitioning Methods, Hierarchical methods, Density based methods-DBSCAN and OPTICS.

Text Book:

1. Data Mining Concepts and Techniques—Jiawei Han, Micheline Kamber and Jian Pei, Morgan Kaufman Publications 3rd edition.

Reference Books:

1. Introduction to Data Mining –Pang-Ning Tan, Michael Steinbach, Vipin Kumar
2. Introduction to Data Mining, Adriaan, Addison Wesley Publication
3. Data Mining Techniques, A.K. Pujari, University Press.



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20MCAT206 INTERNET OF THINGS (Elective-I)

Instruction: 4 Periods/week
Internal: 25 Marks

Time: 3 Hours
External: 75 Marks

Credits: 4
Total: 100 Marks

UNIT-I

Introduction to Internet of Things: Definition & Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs: Home, Cities, Environment, Energy systems, Logistics, Agriculture, Health & Lifestyle.

UNIT-II

IOT & M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG, NETOPEER

UNIT-III

IoT Platforms Design Methodology: IoT Design Methodology, Case Study on IoT System for Weather Monitoring, Motivation for Using Python, IoT Systems - Logical Design using Python, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/Time Operations, Classes, Python Packages of Interest for IoT.

UNIT-IV

IoT Physical Devices & Endpoints: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python, Other IoT Devices, IoT Physical Servers & Cloud Offerings, Introduction to Cloud Storage Models & Communication APIs, WAMP - AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework - Django, Designing a RESTful Web API, Amazon Web Services for, SkyNetIoT Messaging Platform.

Text Book:

1. Internet of Things, A. Bahgya and V. Madiseti, Univesity Press, 2015

Reference Book:

1. Fundamentals of Python, K.A. Lambert and B.L. Juneja, Cengage Learning, 2012

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20MCAP207 Object Oriented Programming through JAVA Lab

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 2

Internal: 50 Marks

External: 50 Marks

Total:100 Marks

1. a) Write A Java Program to print Quadratic roots using command line arguments.
b) Write a java program to print multiplication table using arrays.
2. Write a java program to find the volume of a Box using method overloading with different number of parameters.
3. Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button is clicked.
4. Write a Java program that creates a user interface to perform integer divisions. If Num1 or Num2 is not an integer, the program would throw a Number Format Exception. If Num2 is Zero, program would throw an Arithmetic Exception. Display the exception in a message dialog box.
5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
6. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially, there is no message shown.
7. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
8. Write a java package for book class and then import and display the result.
9. Write a Java program to illustrate the multiple inheritance by using Interfaces.
10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

TEXT BOOKS

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.



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20MCAP208 DATABASE MANAGEMENT SYSTEMS LAB

Practical: 3Periods/week

Time: 3Hours

Credits: 2

Internal: 50Marks

External: 50Marks

Total: 100Marks

SQL

- 1) Simple queries to understand DDL, DML and DCL commands
- 2) Creation, altering and dropping of tables and inserting rows in to a table (use constraints while creating tables) examples using SELECT command.
- 3) Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
- 4) Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
- 5) Queries using Conversion functions like (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions like (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

PL/SQL

- 1) Simple programs to understand PL/SQL
- 2) Write a PL/SQL program to demonstrate exception-handling
- 3) Demonstrate the working of COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
- 4) Develop a program that includes the features NESTED IF, CASE and CASE expression.
- 5) Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT -IN Exceptions, USE defined Exceptions, RAISE-APPLICATIONERROR.
- 6) Programs using CURSORS
- 7) Programs development using creation of procedures and functions.
- 8) Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers

Text Books:

1. Oracle Database 11g, Jason Price, Oracle Press
2. Oracle PL/SQL for Dummies, Michael Rosenblum, Paul Dorsey, Wiley Publications.



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20MCAP209 SKILL DEVELOPMENT COURSE WITH PYTHON

Instruction: 3Hrs/week

Time: 3 Hours

Credits: 2

Internal: 50 Marks

External: 50 Marks

Total: 100 Marks

List of Experiments:

1. Write Python a program that takes input and prints its sum, multiplication, subtraction, division and remainder values.
2. Write a Python program to find the square root of a number by Newton's Method.
3. Write a Python program biggest of three numbers.
4. Write a Python program to find the sum of digits of a given number.
5. Write a Python program to find the GCD of two numbers.
6. Write a Python program to print the following pattern.

```
    1
   2 2
  3 3 3
 4 4 4 4
5 5 5 5 5
```

7. Write a Python program to find Factorial of a given number.
8. Write a Python program to print all the prime numbers below the given number.
9. Write a Python program to count the numbers of characters in the string using loop.
10. Write a Python program to read a string from the user and print lower case character in upper case and upper case character in lower case.
11. Write a Python program to perform Linear Search.
12. Write a Python program to perform Binary Search.
13. Write a Python program to sort perform bubble sort.
14. Write a Python program to perform selection sort.
15. Write a Python program to demonstrate try with multiple exception statements.

TEXTBOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Mark Lutz, "Learning Python", O Reily, 4th Edition, 2009.

REFERENCES:

1. Tim Hall and J-P Stacey, "Python 3 for Absolute Beginners", 2009.
2. Magnus Lie Hetland, "Beginning Python: From Novice to Professional", 2nd Edition, 2009.

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Master of Computer Applications(w.e.f. 2020)

Course Structure & Syllabus for AB 2020-21

Semester III & IV (MCA Second Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
20MCAT301	Information Security and Cryptography	75	25	100	4	-	4
20MCAT302	Big Data Analytics	75	25	100	4	-	4
20MCAT303	Object Oriented Software Engineering	75	25	100	4	-	4
20MCAT304	Web Technologies	75	25	100	4	-	4
20MCAT305	Elective II 1. Blockchain Technology 2. Cloud Computing 3. Machine Learning and Deep Learning	75	25	100	4	-	4
20MCAT306	Elective-III 1. Business Intelligence and Visualization 2. Robotics 3. Foundations of Data Science	75	25	100	4	-	4
20MCAP307	Web Technologies and Object Oriented Software Engineering Lab	50	50	100	-	3	2
20MCAP308	Big Data Analytics lab	50	50	100	-	3	2
20MCAP309	Innovation, Entrepreneurship and Intellectual Property Rights		50	50	2	-	0
20MCAP310	Summer Internship	50	50	100	-	-	2
Total Credits							30

Note: Summer Internship 2 Months (Mandatory) after First Year (to be evaluated during IIIrd semester).



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UNIT I

Introduction: The need for security-security approaches-principles of security-Plain Text and Cipher Text-substitution and Transposition Techniques-Encryption and Decryption-Symmetric and Asymmetric Cryptography-Stenography-key range and key size-types of attacks.

Number Theory: Introduction to number theory- Modular Arithmetic, Euclidean algorithm, Euler theorem, Fermat Theorem, Totient Function, Multiplicative and Additive Inverse.

UNIT II

Symmetric Key Cryptographic Algorithms: Algorithm types and modes-overview of symmetric key cryptography – DES – IDEA – Blowfish – AES-Differential and Linear Cryptanalysis.

Asymmetric Key Cryptographic Algorithms: Overview of asymmetric key cryptography-RSA algorithm-symmetric and asymmetric key cryptography together-digital signatures.

UNIT III

User Authentication Mechanisms: Introduction-Authentication basics – passwords-authentication tokens-certificate based authentication-biometrics authentication-Hash functions-SHA1.

System Security: Intruders, Viruses, Related Threats, Trusted Systems.

UNIT IV

Internet Security Protocols: Basic concepts-SSL-SHTTP-TSP-SET-SSL versus SET- 3D secure protocol-Electronic money-Email security-WAP security-security in GSM.

Network Security: Brief Introduction to TCP/IP -Firewalls -IP security-Virtual Private Networks.

Text Books:

1. Cryptography and Network security, AtulKahate, Tata McGraw-Hill Pub company Ltd., NewDelhi
2. Network Security Essentials Applications and Standards, William Stallings, Pearson Education, New Delhi

Reference Books:

1. Network Security Private Communication in a public world, Charlie Kaufman, Radia Perlman & Mike Speciner, Prentice Hall of India Private Ltd., NewDelhi
2. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes - Ousley, Keith Strass berg TataMcGraw-Hill.



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20MCAT302 BIG DATA ANALYTICS

Instruction: 4 Periods/week

Time: 3 Hours

Credits: 4

Internal: 25 Marks

External: 75 Marks

Total: 100 Marks

UNIT I

Introduction to Big Data: Big Data-definition, Characteristics of Big Data (Volume, Variety, Velocity, Veracity, Validity), Importance of Big Data , Patterns for Big Data Development, Data in the Warehouse and Data in Hadoop.

Introduction to Hadoop: Hadoop- definition, Understanding distributed systems and Hadoop, Comparing SQL databases and Hadoop, Starting Hadoop - The building blocks of Hadoop, NameNode, DataNode, Secondary NameNode, JobTracker and Task Tracker.

UNIT II

Real Time Analytics- Examples, What is Apache Spark, Why Spark when Hadoop is there, Spark Features, Getting started with Spark, Spark Eco System, Architecture and its working, Data Structures of Spark, Spark components, Using Spark with Hadoop, Usecase.

MapReduce Programming: Writing basic Map Reduce programs - Getting the patent data set, constructing the basic template of a Map Reduce program, Counting things.

UNIT III

Streaming in Spark, Streaming features, Streaming Fundamentals. Usecase on streaming. Machine Learning, Spark MLlib Overview, Tools, Algorithms-Classification, Regression, Clustering, Dimensionality Reduction, Feature Extraction.

MapReduce Advanced Programming- Chaining Map Reduce jobs, joining data from different sources. Usecase.

UNIT IV

Graph Representation in MapReduce: Modeling data and solving problems with graphs, Shortest Path Algorithm, Friends-of-Friends Algorithm, PageRank Algorithm, Bloom Filters. Graph Analytics in Spark, Spark GraphX, GraphX features, GraphX Examples, Usecase.

Programming with RDDs-Basics, Creating RDDs, Operations, Passing Functions to Spark, Common Transformations and Actions, Persistence, Adding Schemas to RDDs, RDDs as Relations, Creating Pairs in RDDs, Transformations and actions on RDDs.

Spark SQL, Overview, Libraries, Features, Querying using Spark SQL.

TEXT BOOKS:

1. Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data by Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, 1st Edition, TMH,2012.
2. LearningSpark:LearningBigDataAnalysis:Karauetc.,O'reillyPublications.Hadoopin Action by Chuck Lam, MANNINGPublishers.
3. Hadoop in Practice by Alex Holmes, MANNINGPublishers

REFERENCE BOOKS:

1. Hadoop: The Definitive Guide by Tom White, 3rd Edition,O'reilly
2. Big Java Fourth Edition Cay Horstmann Wiley, John Wiley & Sons
3. Mining of massive datasets, AnandRajaraman, Jeffrey D Ullman, WileyPublications.

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20MCAT303 OBJECT ORIENTED SOFTWARE ENGINEERING

Instruction: 4 Periods/week

Time: 3 Hours

Credits: 4

Internal: 25 Marks

External: 75 Marks

Total: 100 Marks

UNIT I

Introduction to Object Oriented Software Engineering: Nature of the Software, Types of Software, Software Engineering Activities, Software Quality.

Introduction to Object Orientation: Data Abstraction, Inheritance & Polymorphism, Reusability in Software Engineering, Examples: Postal Codes, Geometric Points.

Requirements Engineering: Domain Analysis, Problem Definition and Scope, Types of Requirements, Techniques for Gathering and Analyzing Requirements, Requirement Documents, Reviewing Requirements, Case Studies: GPS based Automobile Navigation System, Simple Chat Instant Messaging System.

UNIT II

Unified Modeling Language & Use Case Modelling: Introduction to UML, Modeling Concepts, Types of UML Diagrams with Examples; User-Centered Design, Characteristics of Users, Developing Use Case Models of Systems, Use Case Diagram, Use Case Descriptions, The Basics of User Interface Design, Usability Principles.

Class Design and Class Diagrams: Essentials of UML Class Diagrams, Associations and Multiplicity, Generalization, Instance Diagrams, Advanced Features of Class Diagrams, Process of Developing Class Diagrams, Interaction and Behavioural Diagrams: Interaction Diagrams, State Diagrams, Activity Diagrams, Component and Deployment Diagrams.

UNIT III

Software Design and Architecture: Design Process, Principles Leading to Good Design, Techniques for Making Good Design Decisions, Good Design Document, Software Architecture, Architectural Patterns: The Multilayer, Client-Server, Broker, Transaction Processing, Pipe & Filter And MVC Architectural Patterns.

Design Patterns: Abstraction-Occurrence, General Hierarchical, Play-Role, Singleton, Observer, Delegation, Adaptor, Façade, Immutable, Read-Only Interface and Proxy Patterns.

UNIT IV

Software Testing: Effective and Efficient Testing, Defects in Ordinary Algorithms, Numerical Algorithms, Timing and Co-ordination, Stress and Unusual Situations, Testing Strategies for Large Systems.

Software Project Management: Introduction to Software Project Management, Activities of Software Project Management, Software Engineering Teams, Software Cost Estimation, Project Scheduling, Tracking and Monitoring.

Software Process Models: Waterfall Model, The Phased Released Model, The Spiral Model, Evolutionary Model, The Concurrent Engineering Model, Rational Unified Process.

Text Book:

1. Object Oriented Software Engineering: Practical Software Development using UML and Java. Timothy C Lethbridge & Robert, Langaneire, Mc Graw Hill

Reference Books:

1. The Unified Modeling Language User Guide. Grady Booch, James Rumbaugh and Ivar Jacobson. Addison-Wesley.
2. Software Engineering; A Practitioner's Approach. Roger S Pressman.
3. Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson Education.



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20MCAT304 WEB TECHNOLOGIES

Instruction: 4 Periods/week

Time: 3 Hours

Credits: 4

Internal: 25 Marks

External: 75 Marks

Total: 100 Marks

UNIT I

Networking Protocols and OSI Model: Protocols in Computer Communications, the OSI Model, OSI Layer Functions

Internetworking Concepts, Devices, Basics, History and Architectures: Internetworking, Problems in Internetworking, Dealing with Incompatibility Issues, A Virtual Network, Internetworking Devices, Repeaters, Bridges, Routers, Gateways, A Brief History of the Internet, Growth of the Internet, Internet topology, Internal Architecture of an ISP

TCP/IP Part I (Introduction to TCP/IP, IP, ARP, RARP, ICMP) TCP/IP Basics, Why IP Addresses? Logical Addresses, TCP/IP Example, the Concept of IP Address, Address Resolution Protocol (ARP), Reverse ARP, Internet Control Message Protocol (ICMP), Datagram, Fragmentation and Reassembly.

UNIT II

TCP/IP Part II (TCP, UDP) Basics of TCP, Features of TCP, Relationship between TCP and IP, Ports and Sockets, Connections-Passive Open and Active Open, TCP connections, What Makes TCP Reliable? TCP Packet Format, Persistent TCP Connections, User Datagram Protocol, UDP Packet, Difference between UDP and TCP

TCP/IP Part III (DNS, Email, FTP, TFTP) Domain Name System (DNS), Electronic Mail (Email), File Transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP)

TCP/IP Part IV (WWW, HTTP, TELNET) A Brief History of WWW, Basics of WWW and Browsing, Locating Information on the Internet, HTML, Web Browser Architecture, Web Pages and Multimedia, Remote Login (TELNET)

An Introduction to Electronic Commerce: Aspects of Electronic Commerce, Types of E Commerce, Approaches for Developing E Commerce Solutions, Electronic Procurement, Phases in a Procurement Process, E-Procurement Models, E-Procurement Solutions, Trading Models, Buyer Side Purchasing, Supply Chain Management (SCM) and Customer Relationship Management (CRM)

UNIT III

Introduction to Web Technology: Features Required for Enabling e-commerce, Web pages-Types and Issues, Tiers, The Concept of a Tier, A Concept of Microsoft and Java Technologies, Web Pages, Static Web Pages, Plug-ins, Introduction to Frames and Forms.

Dynamic Web Pages: Need for Dynamic Web Pages, Magic of Dynamic Web Pages, Overview of Dynamic Web Page Technologies, Overview of Dynamic HTML (DHTML), Common Gateway Interface (CGI), Microsoft's Active Server Pages (ASP), Basics of ASP Technology, ASP Example, Modern Trends in ASP, Java and the Concept a Virtual Machine, Java Servlets and Java Server Pages (JSP), Java Servlets, Java Server pages (JSP).

Active Web Pages: Active Web pages is a Better Solution, Java Applets, Why are Active Web Pages Powerful? When not to use Active Web Pages, Lifecycle of Java Applets, Java Beans, Active X Controls.

UNIT IV

Middleware and Component-based E-commerce Architectures: CORBA, Java Remote Method Invocation (RMI), Microsoft's Distributed Component Object Model

Electronic Data Interchange (EDI): An Overview of EDI, the Origins of EDI, Understanding EDI, Data Exchange Standards, EDI Architecture, The Significance of EDI in International Trade, Financial EDI, EDI and the Internet.

Extensible Markup Language (XML): Standard Generalized Markup Language (SGML), Basics of XML, XML parsers, The Need for a Standard.

Wireless Application Protocol (WAP): Limitations of Mobile Devices, The emergence of WAP, WAP Architecture, The WAP Stack, Concerns about WAP and its Future, Alternatives to WAP.

Text Book:

Web Technologies: TCP/IP to Internet Application Architectures-TATA McGraw Hill Publications - Achyut S Godbole, Atul Kahate.



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20MCAT305 BLOCKCHAIN TECHNOLOGY (ELECTIVE-II)

Instruction: 4 Periods/week

Internal: 25 Marks

Time: 3 Hours

External: 75 Marks

Credits: 4

Total: 100 Marks

UNIT – I

CRYPTOGRAPHY IN BLOCKCHAIN: Blockchain Definitions – Blockchain versus Databases – History – Motivation – Characteristics – Types – Overview – Hashing in Blockchain – Linking blocks in blockchain – Linking blocks using SHA256 – Block structure – Blockchain functionality – Creating Blockchain – Byzantine failure problem in blockchain – Digital signatures in blockchain – Blockchain wallets

UNIT – II

BLOCKCHAIN DESIGN PRINCIPLES: Networked Integrity – Distributed Power- Value as Incentive – Security – Privacy – Rights Preserved – Inclusion – Centralized Regimes versus Distributed Ledgers – Public versus Private Ledgers – Transparency as a Strategic Risk – Transparency as a Strategic Asset – Zero Knowledge Proofs

UNIT – III

CONSENSUS ALGORITHMS: Proof of Work – Pure Stake Based Consensus – Proof of Stake – Leased Proof of Stake – Delegated Proof of Stake – Hybrid Form of PoS and PoW – Practical Byzantine Fault Tolerance – Ripple – Tendermint – Proof of Elapsed Time – Proof of Activity – Proof of Burn – Hyperledger Fabric.

UNIT – IV

BLOCKCHAIN OPTIMIZATIONS AND ENHANCEMENTS: Blockchain Optimizations – Transaction Exchange – Off-chain Transactions – Block size improvements – Blockchain enhancements – Sharding – Evolution of consensus algorithm – Proof of Stake – Proof of Activity – Byzantine Fault Tolerance Consensus Models – Proof of Elapsed Time – Cross-chain Protocol – Privacy Enhancement – Blockchain Security – Transaction Security Model – Decentralized Security Model – Attacks on Blockchain

Text Books:

1. Koshik Raj, "Foundations of Blockchain", Packt Publishers, 2019.
2. S. Shukla, M. Dhawan, S. Sharma and S. Venkatesan, "Blockchain Technology: Cryptocurrency and Applications", Oxford University Press, 2019.

Reference Books:

1. Josh Thompson, "Blockchain: The Blockchain for Beginners, Guide to Blockchain Technology and Blockchain Programming", Create Space Independent Publishing Platform, 2017.
2. Andreas M. Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reilly Media, 1st Edition, 2014.
3. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. "Bitcoin and cryptocurrency technologies: a comprehensive introduction", Princeton University Press, 2016.



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20MCAT305 CLOUD COMPUTING (ELECTIVE-II)

Instruction: 4 Periods/week

Time: 3 Hours

Credits: 4

Internal: 25 Marks

External: 75 Marks

Total: 100 Marks

UNIT I

Cloud Computing Basics - Cloud Computing Overview, Applications, Intranets and the Cloud, First Movers in the Cloud. The Business Case for Going to the Cloud - Cloud Computing Services, Business Applications, Deleting Your Datacenter, Salesforce.com, Thomson Reuters.

Organization and Cloud Computing - When You Can Use Cloud Computing, Benefits, Limitations, Security Concerns, Regulatory Issues, Cloud Computing with the Titans - Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM Partnerships.

UNIT II

Hardware and Infrastructure - Clients, Security, Network, Services. Accessing the Cloud - Platforms, Web Applications, Web APIs, Web Browsers. Cloud Storage - Overview, Cloud Storage Providers, Standards - Application, Client, Infrastructure, Service.

Software as a Service - Overview, Driving Forces, Company Offerings, Industries. Software plus Services - Overview, Mobile Device Integration, Providers, Microsoft Online.

UNIT III

Developing Applications - Google, Microsoft, Intuit QuickBase, Cast Iron Cloud, Bungee Connect, Development, Troubleshooting, Application Management.

Local Clouds and Thin Clients - Virtualization in Your Organization, Server Solutions, Thin Clients. Case Study: McNeilus Steel.

UNIT IV

Migrating to the Cloud - Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, Migration, Best Practices and the Future of Cloud Computing - Analyze Your Service, Best Practices, How Cloud Computing Might Evolve.

Text Books:

1. Cloud Computing-A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGrawHill.

Reference Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MKElsevier.
2. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madiseti, University Press

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20MCAT306 FOUNDATIONS OF DATA SCIENCE (ELECTIVE-III)

Instruction: 4 Periods/week

Time: 3 Hours

Credits: 4

Internal: 25 Marks

External: 75 Marks

Total: 100 Marks

UNIT I

INTRODUCTION TO DATA SCIENCE: Data science process – roles, stages in data science project, setting expectations, Loading data into R – working with data from files, working with relational databases. Exploring data – Using summary statistics to spot problems, spotting problems using graphics and visualization. Managing data – cleaning and sampling for modelling and validation.

UNIT II

MODELING METHODS: Choosing and evaluating models – mapping problems to machine learning tasks, evaluating models, validating models – cluster analysis – Kmeans algorithm, Naïve Bayes, Memorization Methods – KDD and KDD Cup 2009, building single variable models, building models using multi variable, Linear and logistic regression, unsupervised methods – cluster analysis, association rules.

UNIT III

INTRODUCTION TO R Language: Reading and getting data into R, viewing named objects, Types of Data items, the structure of data items, examining data structure, working with history commands, saving your work in R.

PROBABILITY DISTRIBUTIONS in R - Binomial, Poisson, Normal distributions. Manipulating objects - data distribution.

UNIT IV

DELIVERING RESULTS: Documentation and deployment–producing effective presentations –Introduction to graphical analysis – plot(function – displaying multivariate data– matrix plots – multiple plots in one window - exporting graph – using graphics parameters in R Language.

Text Books

1. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014.
2. Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2014.
3. Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley & Sons, Inc., 2012.

Reference Books

1. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013.
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd., 2014.
3. Nathan Yau, “Visualize This: The FlowingData Guide to Design, Visualization, and Statistics”, Wiley, 2011.
4. Boris Imlubinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.



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**20MCAP307 WEB TECHNOLOGIES AND OBJECT ORIENTED SOFTWARE
ENGINEERING LAB**

Instruction: 3 Periods/week
Internal: 50 Marks

Time: 3 Hours
External: 50 Marks

Credits: 2
Total: 100 Marks

Web Technologies Lab

1. Create web pages for an application demonstrating the working of different features of HTML and DHTML.

2. Demonstrate the use of CSS in organizing the layout of web pages

Implement at least two Java Script programs to demonstrate the working of

3. Conditional statements

6. Functions.

4. Looping statements.

7. Event handling

5. Arrays

8. Validation controls.

Develop simple applications for the following

9. Exercise client server programming using Java Script, Servlets, ASP, JSP

10. Create a web application with database connectivity and work on different queries for data manipulation.

REFERENCES:

1. Web Technologies, Godbole, Kahate, 2ndEd., TMH

2. Internet & World Wide Web How to program, Dietel&Deitel Fourth Edition, PHI

Object Oriented Software Engineering Lab

Document the Software Project Management and Software Engineering activities for any two of the following projects. Any other project of interest also can be chosen.

1. Student Result Management System

5. Railway Reservation System

2. Library Management System

6. Automatic Teller Machine

3. Payroll System

7. Hospital Management System

4. Bank Loan System

8. Online Shopping System

Software Project Management and Software Engineering activities specified below can be customized according to the features of the project.

- Problem Statement
- Feasibility Study
- Software Requirements Specification Document

- Estimation of Project Metrics
- Entity Relationship Diagram

- Use Case Diagrams
- Class Diagram
- Sequence Diagrams
- Activity Diagrams
- State Chart Diagrams
- Test coverage

REFERENCES:

1. The Unified Modeling Language User Guide. Grady Booch, James Rumbaugh and Ivar Jacobson. Addison-Wesley.

2. Object Oriented Software Engineering: Practical Software Development using UML and Java. Timothy C Lethbridge & Robert, Langaneire, Mc Graw Hill.



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20MCAP308 BIG DATA ANALYTICS LAB

Practical: 3Periods/week
Internal:50Marks

Time:3Hours
External:50Marks

Credits: 2
Total: 100Marks

List of Experiments:

1. Write a Java Program to implement Linked Lists, Stacks and Queues.
2. Write Java Program that implements Generic Types which collects pair of elements of different types.
3. Write a Java Program that uses object serialization and deserialization.
4. Know about setting up and Installing Hadoop in its three operating modes and implement in Standalone.
5. Implement the following file management tasks in Hadoop: Adding, Retrieving and deleting files.

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

6. Write a Map-Reduce Program to find average of numbers.
7. Implement Matrix Multiplication with Hadoop Map Reduce
8. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

REFERENCES:

1. Big Java Fourth Edition Cay Horstmann Wiley, John Wiley & Sons
2. www.hadoop.apache.org
3. www.gist.github.com

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**20MCAP309 INNOVATION, ENTREPRENEURSHIP AND INTELLECTUAL
PROPERTY RIGHTS**

**Instruction: 2 Periods/week
Internal: 50 Marks**

Time: 3 Hours

**Credits: 0
Total: 50 Marks**

UNIT I

Introduction - Role and importance - Technology developments – TLC - Diffusion and Growth of Technologies. Innovation and Creativity: An Introduction, Innovation in Current Environment, Types of Innovation, Idea Management System, Divergent Vs Convergent Thinking, Levers of Idea Management. Experimentation in Innovation Management: Idea Championship, Participation for Innovation, Co-creation for Innovation, Proto typing to Incubation.

UNIT II

Introduction to Entrepreneurship and Its Evolution – Roles of an Entrepreneur - Idea Generation, Screening, Selection and Managing Resources -Leading and Building the team in an enterprise - Forms of Ownership - Entrepreneurship in the era of Globalization - Entrepreneurship, Creativity and Innovation - Social entrepreneurship - Start- ups, early venture issues - Family business and entrepreneurship - Women entrepreneurship: issues, challenges - Financing the entrepreneurial business - Entrepreneurship Institutions in India

Unit III

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

Unit IV

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings - Valuation of Intellectual Property: Need for IP Valuation – Approaches of IP Valuation

Text Books:

1. Sunita K. Sreedharam , An Introduction to Intellectual Asset Management.
2. Patrick H. Sullivan, Profiting from Intellectual Capital: Extracting Value from Innovation
3. Tulika Rastogi, IP Audit: Your Way to Healthy Organisation.
3. Gordon V. Smith and Russell L. Parr, Valuation of Intellectual Property and Intangible Assets, 3rd Edition.
4. Bruce Berman, From Assets to Profits: Competing for IP Value and Return (Intellectual Property-General, Law, Accounting & Finance, Management, Licensing, Special Topics).

References:

5. Loganathan, E.T. “IPR” (IPRS), TPIPS Agreement and Indian Laws.
6. Ceserani. J & Greatwood. P: Innovation & Creativity, Kogan Page, London, 1995.
7. Ziman. J: Technological Innovation as an Evolutionary Process, Cambridge University Press, Cambridge, 2000
8. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning, New Delhi
9. PrabhuddhaGanguli: ‘Intellectual Property Rights’ Tata Mc-Graw – Hill, New Delhi



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Semester IV (Second Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
20MCAP401	Project	200	150	350	-	-	10
	Total Credits						10



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