BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA

ROURKELA

Curriculum and Syllabus

2 Yrs Master in Computer Application (MCA)

from the Admission Batch

2020-21

First Semester							
Theory							
Sl. No.	Category	Course Code	Course Title	L-T-P	Credit	University Marks	Internal Evaluation
1	BS	MCA01001	Discrete Mathematics	3-0-0	3	100	50
2	PC	MCA01002	Computer System Architecture	3-0-0	3	100	50
3	PC	MCA01003	C and Data Structure	3-0-0	3	100	50
4	PC	MCA01004	Operating System	3-0-0	3	100	50
5	PC	MCA01005	Database Engineering	3-0-0	3	100	50
				Total Credit (Theory)	**15**		
				Total Marks		**500**	**250**
Practical							
1	PC	MCA01006	Data Structure Using C Lab	0-0-3	2		100
2	PC	MCA01007	Operating System Lab	0-0-3	2		100
3	PC	MCA01008	Database Engineering Lab	0-0-3	2		100
				Total Credit (Practical)	**6**		
				Total Semester Credit	**21**		
				Total Marks			**300**

1st Semester	MCA01001	Discrete Mathematics	L-T-P 3-0-0	3 CREDITS

Module-I **(10 Hours)**

Logic: Propositional equivalence, predicates and quantifiers, Methods of proofs, proof strategy, sequences and summation, mathematical induction, recursive definitions and structural induction, program correctness, prepositional calculus.

Counting: The basics of counting, the pigeonhole principle, permutations and combinations, recurrence relations, solving recurrence relations, generating functions, inclusion-exclusion principle, application of inclusion-exclusion.

Module-II **(10 Hours)**

Relations: Relations and their properties, n-array relations and their applications, representing relations, closure of relations, Warshall's algorithm, equivalence of relations, partial orderings.

Graph theory: Introduction to graphs, graph terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamilton paths, planar graphs, graph coloring, introduction to trees, application of trees.

Module-III **(06 Hours)**

Group theory: Groups, subgroups, generators and evaluation of powers, cosets and Lagrange's theorem, permutation groups and Burnside's theorem, isomorphism, auto orphisms, homomorphism and normal subgroups, rings, integral domains and fields.

Module-IV **(08 Hours)**

Lattice theory: Lattices and algebras systems, principles of duality, basic properties of algebraic systems defined by lattices, distributive and complimented lattices, Boolean lattices and Boolean algebras, uniqueness of finite Boolean expressions.

Module-V **(06 Hours)**

Coding theory: Coding of binary information and error detection, decoding and error correction.

Books:

1. C. L. Liu, D.P. Mohapatra “Elements of Discrete Mathematics- A Computer-Oriented Approach”, 4th Edition, Tata McGraw Hill, 2013.
2. K.H. Rosen, “Discrete Mathematics and its application”, 5th edition, Tata McGraw Hill Publication
3. G. Shankar Rao, “Discrete Mathematical Structure”, New Age Publisher
4. D. P. Acharjaya, Sreekumar “Fundamental Approach to Discrete Mathematics”, New Age Publisher

1st Semester	MCA01002	Computer System Architecture	L-T-P 3-0-0	3 CREDITS

Module – I: (08 Hours)

Introduction: Review of basic computer architecture, Quantitative techniques in computer design, measuring and reporting performance.

Module – II: (08 Hours)

Pipelining: Basic concepts, Instruction and Arithmetic pipeline, Data hazards, Control hazards and Structural hazards, Techniques for handling hazards. Exception handling. Pipeline optimization techniques.

Module – III: (08 Hours)

Hierarchical memory technology: Inclusion, Coherence and locality properties, Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, Mapping and Management techniques, Memory replacement policies.

Module – IV: (08 Hours)

Instruction-level Parallelism: Basic concepts, Techniques for increasing ILP, Superscalar, Superpipelined and VLIW Processor architectures. Array and Vector processors

Module – V: (08 Hours)

Multiprocessor architecture: Taxonomy of Parallel Architectures, Centralized shared- memory architecture, Synchronization, Memory consistency, Interconnection networks. Distributed shared memory architecture. Cluster computers

Books:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, Fifth Edition, Tata McGraw Hill, 2002.
2. William Stallings, “Computer Organization and Architecture – Designingfor Performance”, Sixth Edition, Pearson Education, 2003.
3. Patterson, “Computer Organisation and Design”, Elsevier
4. John P Hayes, “Computer Organization”, McGraw Hill
5. Morris Mano,” Computer System Architecture”, PHI

1st Semester	MCA01003	C and Data Structure	L-T-P 3-0-0	3 CREDITS

MODULE – I **(10 Hours)**

C Language Fundamentals, Arrays and Strings

Character set, Identifiers, Keywords, Data Types, Constant and Variables, Statements, Expressions, Operators, Precedence of operators, Input – output Assignments, Control structures, Decision making and Branching, Decision making & looping. Declarations.

MODULE – II **(10 Hours)**

Monolithic vs Modular programs, User defined vs standard functions, formal vs Actual arguments, Functions category, function prototypes, parameter passing, Recursion, Storage Classes: Auto, Extern, Global, Static.Character handling in C. String handling functions. Pointers, Structures, Union & File handling

MODULE – III **(10 Hours)**

Pointer variable and its importance, Pointer Arithmetic passing parameters, Declaration of structures, pointer to pointer, pointer to structure, pointer to function, unions dynamic memory allocations, unions, file handling in C.

MODULE – IV **(10 Hours)**

Development of Algorithms: Notations and Analysis, Storage structures for arrays-sparse matrices, Stacks and Queues: Applications of Stack: Prefix, Postfix and Infix expressions. Circular queue, Double ended queue.

Books:

1. E. Balagurusamy, Programming in ANSI ‘C’, 8th Edition, Tata McGraw Hill, 2019.
2. Reema Thareja, Data Structures Using C, 2nd Edition ,Oxford University Press, 2014.
3. M. Tanenbaum, “Data Structures using C & C++”, Prentice-Hall of India Pvt. Ltd.
4. A.K.Rath and A. K. Jagadev, “Data Structures and Program Design using C”, 2nd Edition, Scitech Publications, 2011.
5. Bruno R Preiss, “Data Structures and Algorithms with Object Oriented Design Pattern in C++”, John Wiley & Sons, Inc., 1999.
6. Horowitz and Sahani, “Fundamentals of data Structures”,Galgotia Publication Pvt. Ltd.

1st Semester	MCA01004	Operating System	L-T-P 3-0-0	3 CREDITS

MODULE-I **(08 Hours)**

Overview of Operating Systems: Introduction, how OS takes System Control, Why OS is essential, Functions of the Operating Systems, Evolution of Operating Systems, Generations of OS.

MODULE-II **(08 Hours)**

Operating System Structure & Processes: Introduction, System Components, Operating System Structure, Operating System Services, System Calls, System Programs, Process, Process States, Process Control.

MODULE-III **(08 Hours)**

Operating System Services for Process Management & Scheduling: Introduction, Process Creation, Termination & Other Issues, Threads, Multithreading, Types of Threads, Schedulers, Types of Schedulers, Types of Scheduling, Scheduling Algorithms, Types of Scheduling Algorithms.

MODULE-IV **(08 Hours)**

Process Synchronization, Interprocess Communication & Deadlock: Introduction, Data Access and Control Synchronization, Critical Sections, Race Condition, Classical Problems & Solutions of Process Synchronization, Semaphores, Message Passing, Deadlock, Conditions for Deadlock, Resource Allocation Graph, Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlocks.

MODULE-V **(08 Hours)**

Memory Management & Virtual Memory: Introduction, Memory Management Schemes, Sharing and Protection in Paging, Sharing and Protection in Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing

Books:

1. Silberschatz and Galvin, “Operating System Concepts”, John Wiley Publishing
2. William Stallings, “Operating Systems Internals & Design Principles”, Pearson Education
3. Naresh Chauhan, “Principles of Operating Systems”, Oxford India Publications
4. Pabitra Pal Choudhury, “Operating System Principles and Design”, PHI Publication
5. Sibsankar Halder and Alex A. Aravind, “Operating System”, Pearson Education

1st Semester	MCA01005	Database Engineering	L-T-P 3-0-0	3 CREDITS

Module -I **(06 Hours)**

Introduction to DBMS: concept and overview of DBMS, data models, DB languages, DB users and Administrator, 3-schema architecture of DBMS, data independence, EF Codd Rule.

Module -I I **(06 Hours)**

ER Model: basic concepts, design issues, keys, ER diagram, Weak entity sets, Extended ER features. Relational model: structure of relational model, Relational algebra, Extended relational algebra Operations.

Module – III **(08 Hours)**

Relational database design: FDs, Anamolies in designing DB, Normalization using FDs, various Normal forms-1NF, 2NF, 3NF, BCNF, 4NF, 5NF.

Module-IV **(10 Hours)**

SQL and Integrity Constraints: Concepts of DDL, DML, DCL, various SQL operations: set operations, aggregate functions, constraints, view, nested sub queries, PL/SQL, cursor, trigger.

Module – V **(10 Hours)**

Internals of RDBMS: Query optimization, various optimization algorithms, Transaction processing, concurrency control and recovery management. Advanced Database: OODB, WEB based DB, Data warehousing and Data mining.

Books:

1) Korth, Silverschatz, Abraham,” Database system concepts”, Tata McGraw Hill Publication

2) R.Elmasri, S.B Navathe, “Fundamentals of Database System”, Adision Wesley Publishing

3) Er.Rajiv chopra, “Database management systems, A Practical Approach”, S.Chand Publishing

4) Ramkrishna, “Database management systems”, Tata McGraw Hill Publication

1st Semester	MCA01006	Data Structure Using C Lab	L-T-P 0-0-3	2 CREDITS

LIST OF EXPERIMENTS:

1. Implementation of Stack Using Array.
2. Implementation of Queue Using Array.
3. Implementation of Infix to Postfix Conversion using Stack.
4. Evaluation of Postfix Expression using Stack.
5. Implementation of Singly Linked List.
6. Implementation of Doubly Linked List.
7. Implementation of Stack Using Linked List.
8. Implementation of Queue Using Linked List.
9. Implementation of Binary Tree Traversal : Preorder, Inorder and Postorder.
10. Implementation of Binary Search Tree.
11. Implementation of sorting algorithms : Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort and Heap sort.
12. Implementation of Searching Algorithms : Linear Search and Binary Search
13. Implementation of Breadth First Search (BFS) in a Graph.
14. Implementation of Depth First Search (DFS) in a Graph.
15. Implementation of Hashing using hash functions.

1st Semester	**MCA01007**	**Operating System Lab**	**L-T-P 0-0-3**	**2 CREDITS**

LIST OF EXPERIMENTS:

1. Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time.

a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority

2. Write a C program to simulate Multi-level Feedback Queue Scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – System processes and User processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue.

3. Write a C program to simulate the MVT and MFT memory management techniques.

4. Write a C program to simulate the following Contiguous Memory allocation techniques

a) Worst-fit b) Best-fit c) First-fit

5. Write a C program to simulate Paging technique of Memory management.

6. Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.

7. Write a C program to simulate Disk scheduling algorithms a) FCFS b) SCAN c) C-SCAN

8. Write a C program to simulate Page replacement algorithms a) FIFO b) LRU c) LFU

9. Write a C program to simulate Page replacement algorithms a) Optimal

10. Write a C program to simulate Producer-Consumer problem using semaphores.

11. Write a C program to simulate the concept of Dining-Philosophers problem.

1st Semester	MCA01008	Database Engineering Lab	L-T-P 0-0-3	2 CREDITS

LIST OF EXPERIMENTS:

1. Execute a single line and group functions for a table.
2. Execute DCL and TCL Commands.
3. Create and manipulate various DB objects for a table.
4. Create views, partitions and locks for a particular DB
5. Write PL/SQL procedure for an application using exception handling
6. Write PL/SQL procedure for an application using cursors.
7. Write a DBMS program to prepare reports for an application using functions.
8. Write a PL/SQL block for transaction operations of a typical application using triggers.
9. Write a PL/SQL block for transaction operations of a typical application using package.
10. Design and develop an application using any front end and back end tool (make use of ER diagram and DFD).
11. Create table for various relation.
12. Implement the query in sql for a) insertion b) retrieval c) updating d) deletion.
13. Creating Views
14. Writing Assertion
15. Writing Triggers
16. Implementing operation on relation using PL/SQL
17. Creating Forms
18. Generating Reports

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Theory							
Sl. No.	Category	Course Code	Course Title	L-T-P	Credit	University Marks	Internal Evaluation
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2	PC	MCA01002	Computer System Architecture	3-0-0	3	100	50
3	PC	MCA01003	C and Data Structure	3-0-0	3	100	50
4	PC	MCA01004	Operating System	3-0-0	3	100	50
5	PC	MCA01005	Database Engineering	3-0-0	3	100	50
				Total Credit (Theory)	**15**		
				Total Marks		**500**	**250**
Practical							
1	PC	MCA01006	Data Structure Using C Lab	0-0-3	2		100
2	PC	MCA01007	Operating System Lab	0-0-3	2		100
3	PC	MCA01008	Database Engineering Lab	0-0-3	2		100
				Total Credit (Practical)	**6**		
				Total Semester Credit	**21**		
				Total Marks			**300**

Second Semester							
Theory							
Sl. No.	Category	Course Code	Course Title	L-T-P	Credit	University Marks	Internal Evaluation
1	PC	MCA02001	Computer Networks	3-0-0	3	100	50
2	PC	MCA02002	Analysis and Design of Algorithms	3-0-0	3	100	50
3	PC	MCA02003	Object Oriented Programming Using Java	3-0-0	3	100	50
4	PC	MCA02004	Object Oriented Analysis & Design	3-0-0	3	100	50
5	PC	MCA02005	Internet and Web Programming	3-0-0	3	100	50
				Total Credit (Theory)	**15**		
				Total Marks		**500**	**250**
Practical							
1	PC	MCA02006	Java and Python Programming Lab	0-0-3	2		100
2	PC	MCA02007	Computer Networks Lab	0-0-3	2		100
3	PC	MCA02008	Algorithm Design Lab	0-0-3	2		100
				Total Credit (Practical)	**6**		
				Total Semester Credit	**21**		
				Total Marks			**300**

2nd Semester	MCA02001	Computer Networks	L-T-P 3-0-0	3 CREDITS

Module-I (12 Periods)

Overview of the Internet: introduction to data communication, computer networks, Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history, standards and administration; Comparison of the OSI and TCP/IP reference model. **Physical Layer:** data and signals: analog and digital, periodic analog signals, digital signals, transmission impairments, data rate limit, Guided transmission media, unguided transmission media.

Module– II (08 Periods)

Data Link Layer: error detection and correction design issues, CRC codes, Elementary Data Link Layer Protocols, sliding window protocols, noisy and noiseless channels.

Multiple Access Protocols: random access, controlled access, channelization**,** ALOHA, CSMA,

Module – III (06 Periods)

Connecting devices: learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways, definition of multiplexing and types.

Network Layer: Network Layer Design issues, store and forward packet switching, connection less and connection oriented networks-routing algorithms-optimality principle, circuit and packet switching, definition of flooding and multicast**.**

Module – IV (05 Periods)

Routing protocols: Shortest Path, Routing uni-cast Distance Vector Routing, RIP, link state protocols, path vector routing. **Internetworking:** logical addressing, internet protocols**,** IP address, CIDR, IPv4 addressing, IPv6 Protocol addressing, addresses mapping, ICMP, IGMP, ARP, RARP, DHCP.

Module -- V (09 Periods)

Transport Protocols: process to process delivery**,** UDP, TCP, TCP Service Model, TCP Sliding Window, TCP Congestion Control, congestion control and quality of service.

Application Layer- Introduction, providing services, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS.

Books:

1. Behrouz A. Forouzan, "**Data Communications and Networking**", McGraw Hill Publication
2. Andrew S Tanenbaum, "**Computer Networks**", Pearson Education

3. L. L. Peterson and B. S. Davie, "**Computer Networks**", Elsevier.

1. James F. Kurose, K. W. Ross, "**Computer Networking: A Top-Down Approach Featuring the Internet**", Pearson Education.

2nd Semester	MCA02002	Analysis and Design of Algorithms	L-T-P 3-0-0	3 CREDITS

Module-I: (8 Periods)
Notion of Algorithm : Growth of functions, Recurrences: The Master method, The Substitution method, The Iteration method, Asymptotic Notations and Basic Efficiency Classes (Use of Big O, θ, etc.) in analysis of algorithms, Mathematical Analysis of few Non-Recursive and Recursive Algorithms.

Module-II: (8 Periods)
Sorting and Searching Techniques : Selection Sort, Bubble Sort, Insertion Sort, Sequential Search, Binary Search, Depth First Search and Breadth First Search, Balanced Search Trees, AVL Trees, Red-Black Trees, Heaps and Heap Sort, Disjoint Set and their Implementation, Divide and Conquer Paradigm of problem solving, Complexity analysis and understanding of Merge Sort, Quick Sort, Binary Search Trees.

Module-III: (8 Periods)
Greedy Techniques: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's and Bellman Ford Algorithm, Huffman Trees, Knapsack problem.
Dynamic Programming Paradigm : Floyd-Warshall Algorithm, Optimal Binary Search trees, Matrix Chain Multiplication Problem, Longest Common Subsequence Problem, 0/1 Knapsack Problem, Maximum Network Flow Problem.

Module-IV: (8 Periods)
String Matching Algorithms: Naive string matching algorithm, The Rabin-Karp Algorithm, string matching with Finite Automata, Knuth Morris Pratt string matching algorithm.
Backtracking: n-Queen's problem, Hamiltonian Circuit problem, Subset-Sum problem, State Space Search Tree for these problems

Module-V: (8 Periods)
Branch and Bound: Travelling Salesman Problem and its State Space Search Tree.
Introduction to Computability: Polynomial-time verification, NP-Completeness and Reducibility, NP-Complete problems.
Approximation Algorithms: Vertex Cover Problem.

Books:

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "**Introduction to Algorithms**", PHI Publication.
2. A.V. Aho, J. E. Hopcroft and J.D.Ullman, "**The Design and Analysis of Computer Algorithms**", Pearson Education.
3. R. S. Salaria, Khanna, "**Data Structure & Algorithms**", Khanna Book Publishing Co. (P) Ltd.

2^{nd} Semester	MCA02003	Object Oriented Programming Using Java	L-T-P 3-0-0	3 CREDITS

Module-I (08 Periods)

JAVA BASICS: Review of Object oriented concepts, History of Java, Java buzzwords, JVM architecture, Data types, Variables, Scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program, constructors, methods, Static block, Static Data, Static Method String and String Buffer Classes, Using Java API Document.

Module-II (08 Periods)
INHERITANCE AND POLYMORPHISM: Basic concepts, Types of inheritance, Member access rules, Usage of this and Super key word, Method Overloading, Method overriding, Abstract classes, Dynamic method dispatch, Usage of final keyword. PACKAGES AND INTERFACES: Defining package, Access protection, importing packages, Defining and Implementing interfaces, and Extending interfaces. I / O STREAMS: Concepts of streams, Stream classes- Byte and Character stream, Reading console Input and Writing Console output, File Handling.

Module-III (08 Periods)
EXCEPTION HANDLING: Exception types, Usage of Try, Catch, Throw, Throws and Finally keywords, Built-in Exceptions, Creating own Exception classes. MULTI THREADING: Concepts of Thread, Thread life cycle, creating threads using Thread class and Runnable interface, Synchronization, Thread priorities, Inter Thread communication.

Module-IV (08 Periods)
AWT CONTROLS: The AWT class hierarchy, user interface components- Labels, Button, Text Components, Check Box, Check Box Group, Choice, List Box, Panels – Scroll Pane, Menu, Scroll Bar. Working with Frame class, Colour, Fonts and layout managers. EVENT HANDLING: Events, Event sources, Event Listeners, Event Delegation Model (EDM), Handling Mouse and Keyboard Events, Adapter classes, Inner classes.

Module-V (08 Periods)
SWINGS: Introduction to Swings, Hierarchy of swing components. Containers, Top level containers -JFrame, JWindow, JDialog, JPanel, JButton, JToggleButton, JCheckBox, JRadioButton, JLabel,JTextField, JTextArea, JList, JComboBox, JScrollPane. APPLETS: Life cycle of an Applet, Differences between Applets and Applications, Developing applets, simple applet.
Books:

1. Herbert schildt (2010), The complete reference, 7th edition, Tata Mc graw Hill, New Delhi
2. Programming with Java, E. Balagurusamy, McGraw-Hill Education, 6th Edition.
3. Head First Java, O'rielly publications 2. T. Budd (2009), An Introduction to Object Oriented Programming, 3rd edition, Pearson Education, India.
4. J. Nino, F. A. Hosch (2002), An Introduction to programming and OO design using Java, John Wiley & sons, New Jersey.

5. Y. Daniel Liang (2010), Introduction to Java programming, 7th edition, Pearson education, India.

2nd Semester	MCA02004	Object Oriented Analysis & Design	L-T-P 3-0-0	3 CREDITS

Module-I: (5 Periods)
Introduction:
Basic concepts, abstraction, encapsulation, information hiding, inheritance, dynamic binding, polymorphism, overview of OOAD.

Module-II: (10 Periods)
Unified modelling language (UML):
UML views and diagrams, Use case modeling, actors and use cases, factoring use cases; Class diagrams, class relations, association, inheritance, aggregation/composition, inheritance, dependency; object diagram, Packages, Interaction diagrams, sequence diagrams, fragments, Communication diagram; State diagram, events, guards, composite states, concurrent states, history state; activity diagram, swim lanes, events, messages, object flow, Component diagram, Deployment diagram.

Module-III: (5 Periods)
Object-oriented design process:
Overview of the design process, Domain modelling, identifying objects, boundary objects, control objects, entity objects, CRC cards, CASE support.

Module-IV: (10 Periods)
Basic principles:
SOLID principles, Single Responsibility Principle (SRP), Open-Closed Principle (OCP), Liskov Substitution principle (LSP), Interface segregation Principle (ISP), Dependency Inversion Principle (DIP), Martin's Package metrics, CK metrics, O-O metrics.

Module-V: (10 Periods)
Design Patterns:
Overview of patterns, Architectural, design, and code patterns, GRASP and GoF patterns, Expert, Creator, Law of Demeter, Controller, Singleton, Model View Separation patterns, Observer, MVC, Publish-Subscribe, Singleton, State, Composite, Façade, Decorator, Proxy, Bridge, Strategy, Mediator, Visitor, Iterator, Flyweight, Template, Memento.

Books:

1. Grady Booch, Object-Oriented Analysis and Design with Applications (Third Edition), Addison-Wesley.
2. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, (First Edition), Addison-Wesley.
3. Robert C. Martin, UML for Java Programmers, Prentice Hall.
4. RUMBAUGH and BLAHA, Object-Oriented Modeling and Design with UML, Pearson.
5. Bernd Bruegge and, Allen H. Dutoit, Object-Oriented Software Engineering Using UML, Patterns, and Java, Pearson.
6. Bernd Oestereich, Developing Software with UML: Object-Oriented Analysis and Design in Practice, Addison Wesley.

7. Rajib Mall, Fundamentals of Software Engineering, (Fifth Edition), PHI Learning Pvt Ltd.

2nd Semester	**MCA02005**	**Internet and Web Programming**	**L-T-P 3-0-0**	**3 CREDITS**

Module I (8 Periods)

Internet Architecture: Internet overview, evolution of internet. Internet components: Local Area Networks, Access Networks, Core Networks, Routers, Transmission infrastructure, ISPs. TCP/IP model, TCP/IP vs OSI model. HTML: HTML Overview, Structure of HTML Documents, Document Types, HTML Elements and attributes. Anchor Attributes, Image Tag and its attributes, Image and Anchors, Table.

Module II (8 Periods)

Image Map: Attributes, Client Side Image Maps and Server Side Maps.
HTML Layout: Background, colors and text, Tables, Frames, Layers, Page content Division <Div>, <SPAN>. CSS: Style Sheet Basic, Properties, Positioning with Style Sheet.
Forms: <FORM> Elements, Form controls. Dynamic HTML.

Module III (8 Periods)

Java Script: Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security. Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, Increment, Decrement, Unary Negation, Logical Operators, String Operators, Special Operators, Conditional operator, Comma operator, delete, new, this, void.
Statements: Break, comment, continue, delete, do … while, export, for, for…in, function, if…else, import, labelled, return, switch, var, while.

Module IV (8 Periods)

JavaScript (Properties and Methods of Each) :Array, Boolean, Date, Function, Math, Number, Object, String, regExp. Document and its associated objects, document, Link, Area, Anchor, Image, Applet, Layer.
Events and Event Handlers: General Information about Events, Defining Event Handlers, event.

Module V (8 Periods)

Server Side Programming: Common Gateway Interface (CGI), Active Server Pages.
Internet applications: FTP, Telnet, Email, Chat. World Wide Web: HTTP protocol. Search Engines. E-commerce and security issues including symmetric and asymmetric key, encryption and digital signature, and authentication. Emerging trends, Internet telephony, and virtual reality over the web, etc. Intranet and extranet, firewall.

Books:

1. Computer Networking: A Top-Down Approach Featuring the Internet by Kurose and Ross, Pearson.
2. Web Design the Complete Reference by Thomas Powell, Tata McGrawHill.
3. HTML The Complete Reference by Thomas Powell, Tata McGrawHill.

4. JavaScript the Complete Reference, Second Edition by Thomas Powell, Fritz Schneider. Tata McGrawHill.

2nd Semester	**MCA02006**	**Java and Python Programming Lab**	**L-T-P 0-0-3**	**2 CREDITS**

Java Programming

1. Write a program in Java to find the set of prime numbers from 1 to 100.
2. Write a program to compare two objects. Create two objects representing twocomplex number and find the larger one.
3. Write a Java Program to convert a Number to Word.
4. Write a Java Program to copy all elements of one array into another array
5. Write a Java Program to sort the elements of an array in ascending order
6. Write a Java Program to find the frequency of odd & even numbers in the given matrix
7. Write a Java Program to determine whether a given string is palindrome
8. Write a Java program to draw a pattern such as

	000*000*
2 4	0*00*00*0
3 6 9	00*0*0*00
4 8 12 16	000***000

9. Write a Java program to convert Decimal to Binary in Java
10. Write a program to add two times given in hour minutes and seconds using class and object.
11. Write a Java program to find the combination c(n,r) by inheriting from a class that computes the factorial of a number.
12. Write a Java program to find the area of different geometrical shapes using polymorphism.
13. Write a Java program to create a user defined package that finds the largest among an array of *n* numbers. Use this package to sort an array of *n* numbers using insertion/selection sort.
14. Create three threads and print 1 to 10 in each thread.
15. Write a Java program to illustrate the concept of some exceptions such as divide by zero or array index out of bound etc.

Python Programming

1. Write a Program to read and print values of variables of different data types.
2. Write a program to perform addition, subtraction, multiplication, division and modulo division on two integers.
3. Write a program to input two numbers and check whether they are equal or not.
4. Write a program that prompts user to enter a character (O, A, B, C, F). Then using if-elseif-else construct display Outstanding, Very Good, Good, Average and Fail respectively.
5. Write a program to print Fibonacci series using recursion.
6. Write a program that prints absolute value, square root and cube root of a number. (import math package).
7. Write a program that finds the greatest of three given numbers using functions. Pass three arguments.
8. Write a program to get a string made of the first 2 and last 2 characters from a given string. If the string length is less than 2, return empty string.
9. Write a program that fetches data from a specified url and writes it in a file.

10. Write a program to find the resolution of an image.

2nd Semester	**MCA02007**	**Computer Networks Lab**	**L-T-P 0-0-3**	**2 CREDITS**

Simulate the following using any programming language

1. Error detection in a packet using Checksum
2. Simplex stop-and-wait protocol with positive acknowledgement and retransmission
3. Error detection using CRC-CCITT (16-bits)
4. Token-Bus medium access scheme
5. Selective repeat sliding window protocol
6. Congestion control using leaky bucket algorithm.
7. Find all pair shortest path between vertices using bellman-ford algorithm
8. Client/Server message passing, where a client1 send a character to a server, which on receiving the character increment it to the next letter in the alphabet, and sends the character to client2. The client2 on receiving the value from server, print it and all process terminates.
9. Client/Server message passing, where a client1 send a message that is structure containing values of type character, integer and float to the server. The server should print the message using the format "char value %c integer value %d float value %f" before passing it to the next client. The server should change the value of each element of the structure before passing it to client2. The client2 should print the structure values it receives from the server using the above format.

2nd Semester	MCA02008	Algorithm Design Lab	L-T-P 0-0-3	2 CREDITS

LIST OF PROGRAMS:

1. Implementation of Stack and Queue – Operations and Applications.
2. Implementation of different searching algorithms.
3. Implementation of different sorting algorithms.
4. Problem solving using Divide and Conquer technique.
5. Problem solving using Dynamic Programming technique.
6. Problem solving using Greedy technique.
7. Problem solving using Backtracking technique.
8. Problem solving using disjoint-set data structure operations.
9. Problem solving using Branch and Bound technique.
10. Problem solving for the Maximum Flow problem.
11. Implementation of Graph Traversal algorithms – Breadth-First-Search (BFS) and Depth-First-Search (DFS).
12. Implementation of Minimum Spanning Tree construction algorithms – Kruskal and Prim.
13. Implementation of different String-Matching algorithms.
14. Problem solving for the Shortest Path problem using different algorithms.
15. Problem solving using Approximation algorithms.