DEPARTMENT OF COMPUTER SCIENCE, INSTITUTE OF ENGINEERING & TECHNOLOGY, KHANDARI CAMPUS
DR BHIMRAO AMBEDKAR UNIVERSITY, AGRA

Department of Computer Science

Institute of Engineering & Technology , Khandari Campus

Dr Bhimrao Ambedkar University, Agra

Programme, Programme Specific and Course Outcomes

(PO, PSO & CO)

MCA

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Khandari Campus Agra-282002

DEPARTMENT OF COMPUTER SCIENCE, INSTITUTE OF ENGINEERING & TECHNOLOGY, KHANDARI CAMPUS
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ORDINANCES

Master of Computer Applications (MCA)- Two Year Course

Ordinances:

1. Master of Computer Applications (MCA) is a Two Year Degree Course divided into four semesters.
2. Each Academic session shall be divided into two semester viz. the autumn semester and the spring semester. Each semester shall consist of minimum 90 working days as per UGC (MHRD) norms.
3. First, Second and Third semesters shall have six courses each and Fourth semester shall consist of five courses. Additionally, each semester will consist of practical, seminar, tutorial/group discussion and the extracurricular activities.
4. For internal assessment of each course, there shall be three periodical tests during the semester concerned and best two tests shall be taken into consideration; the time allowed for each test shall be one hour and the interval between any two consecutive tests shall not be less than 15 days.
5. The periodical tests shall be conducted by the internal teacher concerned with the course during the semester concerned and the answer books shall be shown to the examinees.
6. The division of marks for internal assessment shall be as under:
   (a) First periodical test 20 Marks
   (b) Second periodical test 20 Marks
   (c) Third periodical test 20 Marks
   (d) Regularity/Seminar/Class Performance/Discipline/Extra Curricular Activities 10 Marks
7. MCA third semester Re-Exam can be conducted with the term examination of Fourth semester i.e. in the month of May/June of the academic session.
8. If the candidate fails to appear in any internal assessment test due to authorized medical ground, the Department/concerned subject teacher may re-conduct the particular test for that candidate.
9. At the end of each semester, there shall be a term examination of three hours duration of each course and the same shall carry 50 marks

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10. There shall be a practical examination at the end of each semester carrying 200 Marks.
11. Prior to the commencement of each term Examination there shall be preparation leave for not less than 7 days and not more than 10 days.
12. For each semester at least 50 percent of theory papers shall be set by the external examiner outside of the department. The remaining papers shall be set by the internal faculty of the department.
13. There shall be a project work after the end of terminal examination of second semester i.e. during the summer vacation. The project shall be completed under the guidance of an internal teacher of the department. The Viva-Voce of the project after summer vacation will be conducted by one external examiner jointly with the internal supervisor(teacher) who will act as internal examiner and another project during the fourth semester. The Viva-Voce of the project completed during the fourth semester will be conducted by internal teachers only.

14. The minimum qualifications for admission in MCA course shall be as under:

(i) Passed BCA/Bachelor degree in computer science/Engineering or Equivalent degrees.

OR

Passed B.Sc./B.Com./B.A. with mathematics at 10+2 label or at graduation label (with additional bridge course as per the norms of concerned university).

(ii) The candidate must have at least 50% marks (45% marks in case of candidates belonging reserve category as per university norms) in the qualifying examination.

15. A candidate who has been admitted to MCA course shall be required to attend and participate in all four semester examinations to be organized by the department.

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16.The marks shall be assigned as under:

Semester	Particulars	Marks	Courses	Total Marks
I	Internal Marks	50	06	300
I	External Marks	50	06	300
I	Practical	200	01	200
II	Internal Marks	50	06	300
II	External Marks	50	06	300
II	Practical	200	01	200
II	Project	200	01	200
III	Internal Marks	50	06	300
III	External Marks	50	06	300
III	Practical	200	01	200
IV	Internal Marks	50	05	250
IV	External Marks	50	05	250
IV	Practical	200	01	200
IV	Project	200	01	200
			Grand Total	3500

17. To pass a course, a candidate shall be required to secure, in each semester at least 40% marks in the examination of each courses, internal assessment and practical examination with an overall aggregate of 50% marks provided that a candidate shall not be entitled to be declared successful at the MCA examination unless he/she has secured at least 50% marks in the aggregate of all four semesters.

18. (a) If a candidate fails in more than 50% of theory papers of external examination of a year he/she has to re-appear in all the papers of that year.

(b) A Candidate who has been declared successful in the MCA examination shall be awarded MCA degree. If the candidate has secured 60% or more marks he/she awarded first division otherwise he/she shall be placed in second division. If a candidate has secured 75% or more marks in the aggregate of four semester it shall be mentioned in the degree that he/she has passed MCA examination with Distinction

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DEPARTMENT OF COMPUTER SCIENCE, I.E.T., KHANDARI, AGRA
DR. BHIMRAO AMBEDKAR UNIVERSITY, AGRA

MINUTES OF MEETING OF DEPARTMENTAL COMMITTEE

A meeting of Academic Committee of Department of Computer Science, I. E.T. Khandari Campus, Agra was held (online mode) on 24-06-2020 at 11.00 AM. The following members were present.

1.	Prof. Manu Pratap Singh, Head	Convener
2.	Prof. V. K. Saraswat, Director	Internal Member
3.	Prof. M. K. Upadhyay	Internal Member
4.	Dr. S. K. Jain	Internal Member
5.	Prof. K. V. Arya, IIITM, Gwalior	External Expert
6.	Prof. M. P. Dhore, RTM, Nagpur	External Expert

The academic committee has taken the following decision unanimously:

1. The committee approved two years MCA course consisting of four semesters as per AICTE norms.
2. The committee also approved CBCS (Choice Based Credit System) for two year MCA course.
3. The committee also approved the ordinances and syllabus in the perspective of two year MCA course from the session of 2020-2021 onwards.
4. The committee proposed the fee of Rs. 45,000/- (Forty five thousand only) per year for MCA course subject to the approval of Finance Committee and Executive Council of the university.
5. The committee proposed the fee of Rs. 30,000/- (Thirty thousand only) per year for M.Sc. (Computer Science) course subject to the approval of Finance Committee and Executive Council of the university.
6. The committee also proposed the fee of Rs. 10,000/- (Ten thousand only) per year for PGDCA course subject to the approval Finance Committee and Executive Council of the university.

(V. K. Saraswat)
Member

(M. K. Upadhyay)
Member

(S. K. Jain)
Member
24/6/20.

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24.06.2020
(K. V. Arya)
External Expert

(M. P. Dhore)
External Expert

(Manu Pratap Singh)
Convener
24/06/2020

19 (a) If a candidate fails in a course in either internal assessment or external exam in any course of any semester, he/she may have the option to re-appear in the respective exam of that course:

(b) He/she may have the option to re-appear in external examination of that course and maximum up to three more attempts shall be permitted for a candidate.

(c) He/she may have the option to re-appear in the internal tests examination (periodical tests) and only one chance shall be given to him/her. He can give internal tests with the immediate next internal examination of the corresponding semester.

20. A candidate shall have to complete MCA within maximum period of four years. After four years he/she is not entitled to re-appear in any examination of the course.

21. A Candidate must pass internal examinations and possess 75% attendance to appear in the term semester examination.

22. All types of the fee payable by MCA student shall be as per the university rules/norms.

23. Each semester will consist of the following course and each of the course is allotted the credits under **CBCS (Choice Based Credit System)** as given below:

S.No.		Course	Nature	Credit			Tot. Credit	Sem. Credit
1.		**First Semester**			I			
			Core/Op.El	L	T	P		
	C-101	COA	Core	03	01	00	04	
	C-102	C programming and Data Structure	Core	03	01	00	04	
	C-103	Human Values, Professional Ethics and soft skills	Core	04	00	00	04	25
	C-104	Software Engineering	Core	03	01	00	04	
	C-105	Operating System Concepts	Core	03	01	00	04	
	C-106	Discrete Mathematics	Core	03	00	00	03	
	C-107	Practical		00	00	02	02	
2.		**Second Semester**			II			
	C- 201	Computer Communication Network	Core	02	01	00	03	
	C- 202	OOPS Concepts	Core	02	01	00	03	
	C- 203	Artificial Intelligence	Core	03	01	00	04	
	C- 204	Theory of Computation	Core	03	01	00	04	25
	C- 205	Open Elective-1	O.E.	03	00	00	03	
	C- 206	DBMS	Core	03	00	00	03	
	C- 207	Project (Summer Training)		00	00	02	02	
	C- 208	Practical		00	00	03	03	

3.		**Third Semester**	**III**					
	C- 301	Computer Graphics & Image Processing	Core	03	01	00	04	25
	C- 302	Open Elective-2	O.E.	02	01	00	03	
	C- 303	Open Elective-3	O.E.	02	01	00	03	
	C- 304	Data ware Housing & Data Mining	Core	03	00	00	03	
	C- 305	Design and Analysis of Algorithm	Core	03	00	00	03	
	C- 306	Optimization Techniques	Core	02	01	00	03	
	C- 307	Mini Project		00	00	02	02	
	C- 308	Practical		00	00	04	04	
4.		**Fourth Semester**	**IV**					
	C- 401	Soft Computing	Core	03	00	00	03	25
	C- 402	Compiler Design	Core	03	00	00	03	
	C- 403	Open Elective-4	O.E.	02	01	00	03	
	C- 404	Mobile Computing	Core	03	00	00	03	
	C- 405	Open Elective-5	O.E.	02	01	00	03	
	C- 406	Practical		00	00	04	04	
	C- 407	Project		00	00	06	06	
							Total	**100**

List of Open Electives Subjects:

(i) Statistical Computing
(ii) Net Technology using C # / PHP
(iii) Python Programming
(iv) Network Security
(v) Advanced Computing Techniques
(vi) Java and PHP
(vii) Parallel Processing
(viii) Distributed System
(ix) Bio-informatics
(x) Quantum Computing
(xi) Machine Learning
(xii) Cloud Computing

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Course Outcomes (Cos)

C- 101Computer Organization & Architecture (COA)

Subject Code: C101	Computer Organization & Architecture (COA)	L.T.P Model	CREDIT- 4

Course outcomes (CO's)-After the completion of this course students will be able to

CO1: Recall land describe computer organization and architecture concepts, Explain number systems, coding schemes, and basic computer components.
CO2: Understand digital information representation, binary signals, and Boolean algebra principles. Interpret memory organization, hierarchy, and different memory technologies.
CO3: Apply arithmetic operations, complements, and Boolean algebra to solve problems. Design and analyze digital combinational and sequential circuits.
CO4: Analyze coding schemes, error detection, and combinational/sequential circuit behavior. Evaluate CPU control unit designs, pipelining impact, and RISC/CISC architectures.
CO5: Evaluate memory organization, I/O subsystems, and data transfer techniques.

Syllabus

Unit I

Discrete Information, Digital Information, Binary Signal, Basic Computer Architecture, Number System (Binary, Octal, Decimal, Hexadecimal), Arithmetic, Compliments, subtraction with 1's and 2's Compliments, Binary coded decimal repetition, Expl-3.2, 4.2, 1.8,-2, -1, legions coding, prairie code, error detection & correction, reflected codes, hamming distance, logic Gates(AND, OR, NOT). Boolean Algebra, Postulates, theorems, duality, De-Morgan's theorem, Boolean Functions and their implementation using logic gates, Min-term, Max-term, Standard form , Algebraic manipulations, different lines operators(X-OR, NOR etc.), Simplification methods, k-map, Don't care conditions, Logical implementation 4s in 3 NAND, NOR, AND, OR, Gates, Dogmatic from a tabular method.

Unit II

Digital Combinational Circuit design, syndication problem simulation, Half Adder, Full Adder, Subtractor, Code Conversion Circuit, Multilevel NAND & NOR implementation, circuit analysis, conversion of the circuit, EX-OR equivalence, Parity generator & Checker circuit. LSI & MSI circuit design, Binary Parallel Adder, BCD Adder, Magnitude Comparator, Decoder, BCD Decoder, Encoder, and Use of LSI & MSI for the Boolean Function implementation

Unit III

Introduction to Sequential Logic Circuit, Synchronous Sequential Circuit, Flip-Flops(S-R, D,T, J-K), edge Trigger, Master slave flip flop, FFS conversion, timing sequential diagram, analysis as sequential circuit, state table, state diagram & state equation, design as sequential circuit, unused states, self-starter circuit design as count ion, design with state equation, register, parallel loading in registers, implementation of Boolean function with registers, Shift registers, Ripple Counters, BCD counter, ICs of Ripples asynchronous as counters, Johnson counter, Ring counter.

Unit IV

Basic functional blocks of a computer: *CPU, Memory, I/O subsystems, Control unit*, Instruction set codes, format, Direct & Indirect Addressing, Instruction cycle, Interpretation of instructions, Registers, Common bus system.

Unit V

CPU Control Unit Design: Hardwired vs Micro programmed approaches, RISC vs CISC, Pipelining, Memory System Design: Memory technologies, memory organization, memory hierarchy, Peripheral Devices: I/O sub systems, Data Transfer Techniques (Programmed I/O, Interrupt Driven, DMA), Handshaking

List of Referenced Books:

1. Computer System Architecture by Morris Mano
2. Digital Logic Design by Morris Mano
3. Computer Architecture: Principles and Practice" by William Stallings and David O. Peterson.

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C- 102 C- Programming & Data Structure

Subject Code:C-102	**C- Programming & Data Structure**	L.T.P Model	CREDIT-4

Course outcomes (CO's)-After the completion of this course students will be able to

CO1: Recall and describe the fundamental concepts of programming, flowcharts, and data structures. Explain the review of C programming, including data types, input/output statements, and control structures.
CO2: Understand the logic behind flowcharts and the fundamentals of data structures and algorithms. Interpret the concepts of pointers, arrays, and different types of linked lists.
CO3: Apply programming concepts to solve problems using control structures, loops, functions, and parameters. Implement and manipulate arrays, stacks, queues, and priority queues using different data structures.
CO4: Analyze and evaluate the efficiency and performance of different data structures and algorithms. Evaluate the use of recursion and loop nesting in problem-solving.
CO5: Critically evaluate the advantages, disadvantages, and trade-offs of different data structures and algorithms. Evaluate and compare the efficiency and effectiveness of different sorting and searching algorithms..

Syllabus

Unit I

Introduction to program, Flow chart, Data Structures and Algorithms. Review of C Programming, Data Types, Input andOutput statements. If statements, switch statements.

Unit II

Recursion, looping statements, for, while and do while statements. Loop nesting. Block statements, functions, return data type and parameters. Pointers concepts. Arrays Operations, single and Multi-dimensional array Representation in memory.

Unit III

Stacks: Stack as an Abstract Data Type, Primitive Operationsand Implementing Stack Operations using Arrays, Infix, Postfix and Prefix: Definitions, Evaluation and Conversions. Queues: Queue as an Abstract Data Type, Operations, Implementation using Arrays, Types of Queues, circular Queue applications, priority queue.

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Unit IV

Linked List: singly linked list, Circular Lists: Insertion, Deletion and Concatenation Operations, Doubly Linked Lists, Multiply linked lists, applications, Implementation of Stacks, Queues and priority Queues using Linked Lists, Concepts of Trees and Binary Trees - Definitions and Terminology, representation of Trees, Binary Tree, tree traversals, binary search tree.

Unit V

Sorting: General Background: Bubble Sort, Selection Sorting, Insertion sort, Shell Sort and Quick Sort, Heap Sort.

Searching: Linear and Binary Searching, graph and its representation.

List of Referenced Books

1. Data Structures and Algorithms – Concepts, Techniques and Algorithms by G.A.V.Pai , Tata McGraw Hill Publishing

2. Data Structures Using C by YaddishLangsam, Moshe J. Augenstein and Aaron M.Tanenbaum, Prentice Hall Of India (Low priced Edition)

3. Data Structures using C by E. Balagurusamy, McGraw Hill Education India Pvt Limited

4. Data Structures, Algorithms and Applications with C++, Sahani Mc-Graw Hill.

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C–103: Human Values, Professional Ethics & Soft Skills

Subject Code: C-103	**Human Values, Professional Ethics & Soft Skills**	L.T.P Model	CREDIT-4

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Recall and describe concepts: professional ethics, corporate social responsibility, MIS, and entrepreneurship. Define and explain: ethics-corporate excellence relationship, Indian workplace values, and entrepreneurship.
CO2: Understand: nature of professional ethics, effective communication principles, and different types of information systems.
CO3: Apply: effective communication principles, decision-making tools, and entrepreneurship knowledge.
CO4: Analyze arguments for and against social responsibility of business. Evaluate the role of MIS, decision support systems, and artificial intelligence systems.
CO5: Synthesize: traits of entrepreneurs and navigate different types of business organizations.

Syllabus

Unit –I

Professional Ethics: - An Overview-Concept, Nature, Indian values for the workplace, work-life balance, Relation between Ethics and corporate Excellence, Corporate Social Responsibility – Social Responsibility of business with respect to different stakeholders, Arguments for and against social responsibility of business.

Unit-II

Soft Skills: - Meaning and objective of business communication, communication models and process, Modern forms of communication, Principles of effective communication, Group discussion, Mock Interviews, Seminar, Individual and group Presentation, interviewing skills, writing resume and Letter or application.

Unit-III

Human Values: - Need Basic Guideline and process for Vales Education, Understand Harmony in the Human being, Harmony in myself understanding human being as a co-existence of the sentiments 'I' and the material 'Body', understanding Harmony in the family and society, harmony in human-human relationship, understand the harmony in the nature, Interconnectivity and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature. Holistic perception of Harmony at all levels of existence.

Unit-IV

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MIS (Information System): - Concept and definition, Role of MIS, MIS-Business Planning, Decision making concept, Method, tools and procedures, organizational Decision making, Management of quality in the MIS, organization development and implementation of the MIS, Decision Support System (DSS) concept and Philosophy, DSS Deterministic System, Artificial Intelligence (AI) system, Knowledge based expert system (KBES), Transaction Processing system(TPS), Enterprise Resources Planning (ERP) system.

Unit -V

Entrepreneurship-Meaning and Concept of entrepreneurship, Traits of Entrepreneur, Entrepreneurial Development, Search for business idea, transformation of business idea into reality, plant layout and plant location, Significance and role of environment infrastructural network, types of organization-sole proprietorship, partnership, joint stock company, co-operative organization, their merits.

List of Reference Books:

1. Management Information System by A. O Bryan
2. ERP by U. Nag
3. Human Values and Professional Ethics" by R.S. Naagarazan

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C-104: Software Engineering (Open Elective)

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Course Outcomes (CO's): After the completion of this course the students will be able to

Subject Code: C-104	**Software Engineering (Open Elective)**	L.T.P Model	CREDIT-4
CO1: Understand software engineering concepts, components, characteristics, and SDLC models. Identify software engineering processes, quality attributes, and their importance in software development.			
CO2: Interpret and explain software requirement specifications (SRS) and requirement engineering processes.			
CO3: Apply software design concepts, architectural principles, and strategies for software development. Utilize software measurement and metrics techniques, testing strategies, and techniques for software quality.			
CO4: Analyze software maintenance categories, cost considerations, and estimation methods.			
CO5: Evaluate the importance of software maintenance, cost considerations, and the role of CASE tools.			

Syllabus

Unit-I:

Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

Unit-II:

Software Requirement Specifications (SRS) Requirement Engineering Process: Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

Unit-III:

Software Design Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs, UML Diagrams

Unit-IV:

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Software Testing, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Software Reliability Models, Basic Concept of Goel-Okumoto Model

Unit-V:

Software Maintenance,Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering, Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO).

List of Referenced Books:

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
4. Pankaj Jalote, Software Engineering, Wiley.
5. Ian Sommerville, Software Engineering, Addison Wesley.

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C–105: Operating System Concepts

Subject Code: C-105	Operating System Concepts	L.T.P Model	CREDIT-4

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Understand operating system evolution, types, process management, scheduling, memory allocation, and secondary memory management.
CO2: Comprehend different views of operating systems, process states, thread mapping, and memory allocation schemes
CO3: Apply scheduling algorithms to evaluate performance, apply memory management techniques like paging and segmentation, and implement disk scheduling algorithms.
CO4: Analyze process management, memory fragmentation, deadlock detection, prevention, and avoidance strategies. Analyze disk scheduling algorithms based on seek time, rotational delay, and evaluate file system attributes.
CO5: Evaluate scheduling algorithm performance, analyze memory utilization, and evaluate deadlock prevention strategies.

Syllabus

UNIT I-

Introduction: Evolution Of Operating System, Types Of Operating System, Distributed Operating Systems, Network Operating Systems, Real Time Operating Systems (Hard & Soft), Different Views of Operating System: User's View, System's View, System Calls, Command Interpreter.

Unit II-

Processes: Process Concept, Process Management, PCB, Different States Of a Process, Scheduling Algorithms: Preemptive and Non Preemptive Algorithms, (FCFS, SJF, Priority, Round Robin, SRTF, Second Chance, Clock), Multilevel priority, Performance Evaluation, Threads: Introduction, User Level, Kernel Level, Mapping, Thread Library, Inter Process Communication And Synchronization, Classical IPC Problems, Mutual Exclusion, Critical Section, Concurrency, Semaphores, Monitors, Messages.

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Unit III-

Memory Management: Introduction, Memory Allocation Schemes: Contiguous & Non Contiguous, Swapping, Fragmentation: External & Internal, Compaction, Virtual Memory Management, Paging, Hit, Miss, Evaluate Effective Access Time, Page Replacement Algorithms (FIFO, Optimal, LRU, NRU), Demand Paging, Inverted Page Table, Segmentation, Thrashing.

Unit IV-

Secondary Memory Management: Disks, Hardware, Seek Time, Rotational Delay, Data Transfer Time, Disks Scheduling Algorithms (FCFS, SSTF, Scan, C-Scan, C-Look), Track-At-A-Time. Deadlock: Detection, Prevention, Avoidance, Banker's Algorithm.

Unit V-

File Systems: Files, Attributes, Operations, Directories: Operations, Structure, Security & Protection Mechanism, Input /Output, I/O Hardware, Devices, Device Controllers, DMA, I/O Software (User Level, Kernel Level, Hardware Level), Interrupt Service Routine.

List of Referenced Books

1. Operating System by Peterson, PHI
2. Operating System by William Stallings
3. Operating System Concepts" by Abraham Silberschatz, Greg Gagne, and Peter B. Galvin.

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C-106: Discrete Mathematics

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Subject Code: C-106	**Discrete Mathematics**	L.T.P Model	CREDIT- 3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Understand the principles and concepts of mathematical logic, relations, functions, matrices, recurrence relations, and graph theory.
CO2: Apply mathematical logic to solve problems and prove theorems using techniques like normal forms, quantifiers, and automatic theorem proving.
CO3: Analyze and evaluate the properties and characteristics of different types of matrices, recurrence relations, and graph structures.
CO4: Design and develop solutions for problems involving relations, functions, matrices, recurrence relations, and graph theory.
CO5: Assess and evaluate the validity and consistency of logical statements, proofs, and solutions.

Syllabus

UNIT I

Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers. Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

UNIT II

Relations: Properties of binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Hesse diagram. Functions: Inverse Function, Composition of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.

UNIT III

Linear Algebra & Matrices

Matrices: Types of matrices, Elementary Transformation, Rank, Eigen Values & Eigen Vectors, Vector Space.

UNIT IV

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Recurrence Relations: Generating Functions, Function of Sequences, Calculating Coefficients of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, solution of non homogeneous Recurrence Relations.

UNIT V

Graph Theory: Representation of Graphs, DFS, BFS, Spanning Trees, Planar Graphs. Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

List of Referenced Books

1. Mathematical Foundation of Computer Science – ShahnazBathul, PHI.

2. Elements of Discrete Mathematics- A Computer Oriented Approach,C.L.Liu, D.P. Mohapatra,3edition,TMH.

3.Discrete Mathematics for Computer Scientists & Mathematicians, second edition, J.L.Mott, A. Kandel, T.P. Baker, PHI

4. Discrete and Combinatorial Mathematics- An Applied Introduction-5th Edition– Ralph. P.Grimaldi, Pearson Education.

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C-107: Practical -Lab based on C & Data Structure

Subject Code: C-107	**Lab based on C & Data Structure**	Practical	CREDIT-2

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Write, compile, debug and execute programs in a C programming environment.
CO2: Write programs that incorporate use of variables, operators and expressions along with data types.
CO3: Write programs for solving problems involving use of decision control structures and loops.
CO4: Write programs that involve the use of arrays, structures and user defined functions.
CO5: Write programs using graphics and file handling operations.

List of Lab Practicals

1. Linked List implementation using C program
2. C program to display a Linked List in Reverse
3. C program to Reverse only First N Elements of a Linked List
4. Merge sort for single linked lists
5. Delete keys in a Linked list using C program
6. Reverse a Linked List in groups of given size using C program
7. Pair wise swap elements in a linked list using C program
8. C program to find Union of two single Linked Lists
9. Find intersection of two linked lists using C program
10. Append Last N Nodes to First in the Linked List
11. Eliminate duplicates from Linked List using C program
12. Find a Node in Linked List using C program
13. C program to convert a Binary Tree into a Singly Linked List by Traversing Level by Level
14. Count the number of occurrences of an element in a linked list using recursion
15. Count the number of occurrences of an element in a linked list without using recursion

16. Find the length of a linked list using recursion
17. Find the length of a linked list without using recursion
18. Print the Alternate Nodes in a Linked List using Recursion
19. Print the Alternate Nodes in a Linked List without using Recursion
20. Implement Circular Doubly Linked List in C program
21. Convert a given singly linked list to a circular list in C program
22. Find the largest element in a doubly linked list in C program
23. Interchange the two adjacent nodes in a given circular linked list in C program
24. Convert a given binary Tree to Doubly Linked List (DLL)
25. Clone a linked list with next and random pointer using C program
26. C program to implement a STACK using array
27. STACK implementation using with Linked List using C program
28. STACK implementation using Array with PUSH, POP, and TRAVERSE operations using C program
29. STACK implementation using C structure with more than one item
30. STACK implementation using C class with PUSH, POP and TRAVERSE operations
31. C program to reverse a string using stack
32. Check for balanced parentheses by using Stacks (C program)

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MCA II SEMESTER

C-201: Computer Communication Network

Subject Code: C-201	**Computer Communication Network**	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Understand computer network concepts, advantages, topologies, and transmission modes. Explain layered protocols, OSI model, LAN attributes, and protocols.
CO2: Apply multiplexing concepts and analyze switching, routing, and signals.
CO3: Analyze IP, TCP, UDP, and application layer protocols' features and functionality.
CO4: Identify and troubleshoot network-related issues and solve problems in switching, routing, and signal transmission.
CO5: Recognize and implement security and privacy best practices in computer networks.

Syllabus

Unit I

Introduction to Computer network, Distributed System, Advantages of Networks, Point to Point and Multi Drop Circuit, Network Topologies- Star, Ring, Tree, Bus, Mesh, Synchronous & Asynchronous Transmission, Serial & Parallel Transmission, Simplex, Half Duplex, Full Duplex Transmission Modes.

Unit II

Wide Area network, Local Area Network, Multiplexing: Time Division Multiple Aces, Time Division Multiplexing (TDM), Frequency Division Multiplexing (FDM), Connection Oriented and Connection Less Networks, Goals of Layered Protocols, Communication between Layers, Introduction to the OSI Reference Model, Data transmission in the OSI model.

Unit III

LANs, Primary attributes of LANs, Broad band and base band LANs, LAN Topologies and protocols CSMA/CD, Token Ring, Token Bus, Metropolitan Area Network & ANSI (FDDI) Fiber Distributed Data Interface, and Aloha Protocol- Pure & Slotted

Unit IV

Switching: Message, Packet, Circuit, Routing: Centralized, Distributed, Static, Adaptive, Signals: Analog & Digital, Bit Rate & Baud Rate.

Unit V

Polling And Selection .Protocols: The meaning of polling selection protocols, Character and Bit Oriented protocols binary synchronous high level Data Link Control (HDLC), HDLC Frame format code transparency and synchronization, Sliding Window Protocol, Frame Format, Go-Back-n- Protocol selective repeat protocol.

Unit VI

TCP\IP and Internetworking concept of ports and sockets IP address structure Major features of IP, IP data gram major IP Services TCP Major features of TCP, TCP Segment UDP (User Data gram Protocol), Application Layer Protocol- TELNET, TFTP, FTP.

List of Referenced Books

a) Computer Network by Tannenbaum
b) Computer Network by Frozen

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C-202: OOPS Concept's

Subject Code: C-202	**OOPS Concept's**	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Understand the concepts and principles of object-oriented programming (OOP) and Java fundamentals.
CO2: Apply OOP concepts to solve programming problems using Java, including class and object concepts, inheritance, interfaces, and inner classes.
CO3: Evaluate the usefulness of OOP development and Java programming for software design and development.
CO4: Collaborate with peers on programming tasks, sharing knowledge and best practices, and participating in code reviews..
CO5: Demonstrate ethical conduct and professionalism in software development, adhering to coding standards and best practices..

Syllabus

Unit I

Introduction: Modelling Concepts and Class Modelling: What is Object orientation? What is OO development? OO Themes; Evidence for usefulness of OO development; OO modelling history. Modelling as Design technique: Modelling; abstraction; The Three models. Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived Data; Packages.

Unit II

Basic programming in C++ using Class & Object, Inheritance, Polymorphism and Templates and Exception Handling,Class Modelling: Object and Class Concept; Link and associations concepts.

Unit III

Introduction to OOP and java fundamentals:OOP in Java – Characteristics of Java – The Java Environment – Java Source File Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers – static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages.

Inheritance: Super classes, sub classes, protected members, constructors in sub classes- the Object class, abstract classes and methods, final methods and classes. Interfaces, defining an

interface, implementing interface, differences between classes and interfaces and extending interfaces, Object cloning, inner classes, ArrayLists, Strings.

Unit IV

Event driven programming: Graphics programming, Frame Components, working with 2D shapes, Using color, fonts, and images, Basics of event handling, event handlers, adapter classes, actions, mouse events, AWT event hierarchy,**Multithreading and generic programming:** Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups, Generalization and Inheritance; A sample class model; Navigation of class models; Advanced Class Modelling.

Unit V

Introduction to Swing, layout management, Swing Components ,Text Fields , Text Areas, Buttons, Check Boxes – Radio Buttons Lists- choices, Scrollbars, Windows Menus ,Dialog Boxes. JDBC Introduction.

List of Referenced Books

1. Michael Blaha, James Rumbaugh: Object Oriented Modelling and Design with UML,2nd Edition, Pearson Education,2005
2. Balaguriswami : OOPs Programming PHI publication.

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C–203: Artificial Intelligence

Subject Code: C-203	**Artificial Intelligence**	L.T.P Model	CREDIT-4

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Recall and recognize the fundamental concepts and terminology of Artificial Intelligence. Identify the different techniques and applications of AI, such as game playing, robotics, and expert systems.
CO2: Understand the knowledge representation models, including semantic nets, frame structures, and clause form representation.
CO3: Apply search algorithms like BFS, DFS, and heuristic search methods to solve problems. Utilize backward reasoning, resolution, and rules of inference for problem-solving in AI.
CO4: Analyze the characteristics and limitations of different AI techniques and algorithms.
CO5: Design AI systems or components using appropriate techniques and algorithms. Develop rule-based deduction systems and knowledge representation models for specific problem domains.

Syllabus

Unit I

Introduction, problem domain of AI, AI techniques, task, game playing, theorem proving, robotics, reception and speech recognition, NLP, expert system, criteria of success, level of modelling, state space representation, problem description.

Unit II

Search space problem, state space, water jug problem, 8-puzzle problem, travelling salesman problem, production system, control strategy, BFS, DFS, iterative problem, characteristics, commutative production system, heuristic search method, A* problem, and –or graphs, hill climbing, constraint satisfaction, mean max search, alpha-beta cut off.

Unit III

Knowledge representation issues and characteristic, model, representation mapping, types of knowledge representation model, first order predicate logic, WFF, predicate logic in AI, back ward reasoning method, resolution, rules of inference, modus pones, clause form representation, unification, questioning and answering.

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Unit IV

Natural deduction and weak slot, filler structure, rule base system, deficiency in clause form representation, forward rule base deduction system, representation of fact, rule and goal, wff in AND – OR graph representation, unify composition and answer extraction, instance representation, class inclusion and membership, property inheritance, semantic nets, partition semantic nets, presentation of wffs of predicate logic in semantic net, frame structure, regular class and media classes, property inheritance algorithms.

Unit V

Handling uncertainty and fuzzy logic, probabilistic reasoning, methods of handling uncertainty, reasoning of AI , fuzzy logic characteristic, its properties and operations, fuzzy sets and fuzzy systems, fuzzy rules and fuzzy inference system, Case study: Mycin

List of Text Book Recommended:

(i) Artificial Intelligence by Ritch and Knight
(ii) Artificial Intelligence by Elen

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C-204: Theory of Computation (TOC)

Subject Code: C-204	**Theory of Computation (TOC)**	L.T.P Model	CREDIT-4

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Recall the theory of automation, including DFA, NFA, regular expressions, and finite automata. Remember the formal languages, phrase structured grammars, and Chomsky classification of languages.
CO2: Understand the concepts and descriptions of automation, formal languages, and context-free grammars. Grasp the equivalence of different automata models and regular expressions.
CO3: Apply the concepts of finite automata and regular expressions to solve problems in automation. Use pushdown automata for parsing and language recognition tasks.
CO4: Analyze the properties and closure properties of formal languages and regular sets.
CO5: Evaluate the efficiency and effectiveness of different automaton models for language recognition.. Evaluate the complexity and decidability of problems in automata theory.

Syllabus

UNIT-I

Theory of Automation : Definition, description, DFA,NFA, Transition systems,2DFA, equivalence of DFA & NDFA, Regular expressions, regular grammar, FSM with output (Mealy and Moore models), Minimization of finite automata.

UNIT-II

Formal Languages : Definition & description, Phrase structured grammars & their classification, Chomsky classification of languages, closure properties of families of language, regular grammar, regular set & their closure properties, finite automata, equivalence of FA and regular expression, equivalence of two way finite automata, equivalence of regular expressions.

UNIT-III

Context-Free Grammar & PDA : Properties unrestricted grammar & their equivalence, derivation tree simplifying CFG, unambiguous CFG, Productions, normal forms for CFG, Pushdown automata, 2 way PDA, relation of PDA with CFG, Determinism & Non determinism in PDA & related theorems, Parsing and pushdown automata.

UNIT-IV

Turing Machine : Model, design, representation of TM, language accepted by TM, universal Turing machine, determine & non-determinism in TM, TM as acceptor/generator/algorithms, multi- dimensional, multi-tracks, multi-tape, Two way infinite tape, multi-head, Halting problems of TM.

UNIT-V

Computability: Concepts, Introduction to complexity theory, Introduction to un-decidability, recursively enumerable sets, primitive recursive functions, recursive set, partial recursive sets, concepts of linear bounded Automata, context sensitive grammars & their equivalence.

List of Referenced Books:

1. Hopcroft & Ullman "Introduction to Automata theory, languages & Computation",NaroshaPublishing house.
2. LewishPapadimutrau "Theory of Computation" , Prentice Hall of India, NewDelhi.
3. Marvin L. Minskay "Computation : Finite & Infinite Machines", PHI.
4. Mishra &ChanderShekhar "Theory of Computer Science (Automate, Language & Computations), PHI.

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C–205: Statistical Computing (Open Elective 1)

Subject Code: C-205	Statistical Computing (Open Elective 1)	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Recall the measures of central tendency (arithmetic mean, median, mode) and their calculation methods. Remember the measures of skewness, moments, and kurtosis and their properties.
CO2: Understand the concepts and calculations of measures of central tendency, skewness, moments, and kurtosis. Grasp the principles and applications of permutations, combinations, and probability laws.
CO3: Apply the formulas and methods to calculate measures of central tendency and skewness. Apply permutation and combination principles to solve problems.
CO4: Analyze the relationships between different measures of central tendency and their graphical representations. Analyze the effects of skewness, moments, and kurtosis on data distributions.
CO5: Evaluate the accuracy and precision of different approximation methods for function regression. Assess the efficiency and reliability of different methods for solving simultaneous linear equations.

Syllabus

Unit I

Measures of central tendency: Arithmetic mean, median and mode, methods of calculating relation between them, properties, graphical representation and problems on application of arithmetic, geometric and harmonic mean.

Skewness, Moments and Kurtosis: Measures of Skewness, Absolute moments, Sheppard's Correction for Moments, Charlier Checks, Pearson's Beta & Gamma Coefficient, Kurtosis.

Unit II

Permutations: Permutations with repetition of objects, circular and restricted permutations

Combinations: Restricted combinations, combinations of objects not all different.

Probability: Additive law of probability, compound events, conditional probability, multiplicative law, multiplication theorem, use of binomial theorem, inverse probability, Bayes theorem, continuous probability.

Unit III

Computes algorithms, computer arithmetic, floating point representation of numbers, floating point arithmetic, errors in numbers and control of errors.

Least square methods of approximation of functions, regression algorithm for linear, polynomial, hyperbolic, trigonometric regression method.

Unit IV

Solution of simultaneous set of linear equation: Gauss's elimination method, Pivoting , Gausses-Seidal , Gausses Jordan method, To calculate matrix inverse, tri-diagonal set of equations, the Eigen value problem, house holder's method.

Unit V

Interpolation : LaGrange's interpolation, Newton's forward interpolation, back word difference , central difference, Piece-wise linearpolation, Stripling Formulae, Bessel's Formulae.

List of Referenced Books:

1. Numerical Analysis, Shastri, PHI
2. Numerical Analysis, S. Ali Mollah
3. Numerical Analysis, James B. Scarbarough
4. Numerical Methods for Mathematics ,Science &Engg., Mathews, PHI 5.Numerical Analysis,G.S.Rao,New Age International
5. Programmed Statistics (Questions – Answers),G.S.Rao,New Age International
6. Numerical Analysis & Algorithms, Pradeep Niyogi, TMH
7. Computer Oriented Numerical Mathematics, N. Dutta, VIKAS 9.Numerical Methods,Arumugam,Scitech
8. Probability and Statisics for Engineers,Rao,Scitech 11.Numerical Methods in Computer Application,Wayse,EPH

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C-206: Database Management System (DBMS)

Subject Code: C-206	Database Management System (DBMS)	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Recall the fundamental concepts of database management systems (DBMS) and their architecture. Remember the components of data modeling using the Entity-Relationship (E-R) model.
CO2: Understand the differences between a database system and a file system. Grasp the concepts of data modeling, including constraints, keys, and E-R diagrams.
CO3: Apply SQL queries and commands for data manipulation and control. Apply normalization techniques (1NF, 2NF, 3NF, BCNF) to eliminate anomalies in a relational database.
CO4: Analyze the properties of transactions and different types of schedules. Analyze concurrency problems in a database and understand concurrency control protocols.
CO5: Evaluate the effectiveness of different normalization levels in achieving data integrity. Assess the efficiency and correctness of concurrency control protocols.

Syllabus

UNIT I

Introduction- An overview of database management system, DataBase Users, database system Vs file system, Database system concept and architecture, data model schema and instances, Database Structure, data independence and database language and interfaces, Data Modeling using the Entity Relationship Model – Basic Concepts, Constraints, Keys, E-R Diagram, Weak Entity Sets, Extended E-R Features, Design of an E-R Database Schema, Reduction of an E-R Schema to table.

UNIT II

Relational Model- Structure of Relational Database, integrity 8 constraints, entity integrity, referential integrity, Keys constraints, Domain constraints ,The Relational Algebra,The Tuple Relational Calculus, The Domain Relational Calculus; SQL- Concepts of SQL, Importance of SQL, Data Definition Language(DDL),Data Manipulation Language(DML), Data Control Language(DCL), Transactional Control Language(TCL), Aggregate Functions, Joined Relations, View, Trigger.

UNIT III

Relational Database Design: Dependencies in DBMS-Functional, Trasitive, Multivalued, Normalization-Aim of Normalization, Anomolies, Decomposition, First Normal Form(1NF), Second Normal Form(2NF), Third Normal Form(3NF), Boyce-Codd Normal Form(BCNF), Fourth Normal Form(4NF).

UNIT IV

Trasaction Processing- Key notations in transaction management,Transaction properties, Database Transaction, States of Transactions; Schedule -Serial Schedule, Non-serial Schedule; Serializable schedule,, Conflict and View serializable schedule, Blind Write, Recoverable Schedule; Distributed Database- Distributed trasaction, Concurrency Control in Distributed Database.

UNIT V

Concurrency Problems, Concurrency control, Concurrency Control Protocols(Lock-Based Protocols,2-phase locking Protocols,Timestamp-Based Protocols, validation based protocol. Recovery – Recovery Concepts, Database Recovery Techniques (Log based recovery, Shadow paging), checkpoints, deadlock handling; Database Security concepts. Data Warehouse and Data Mining Concepts.

List of Reference Books:

1. "Database System Concepts" by Korth
2. "Fundamentals of Database Systems" by R Elmasri and S Navathe.
3. "An Introduction to Database Systems" by Bipin Desai.
4. "Database Management Systems" by Raghu Ramakrishnan.
5. "DATA WAREHOUSING, DATA MINING, & OLAP" by Alex Berson, Stephen Smith

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C-207: Project (Summer Training)

Subject Code: C-207	**Project (Summer Training)**		CREDIT-2

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C-208:Practical based on OOPS Concept & DBMS

Subject Code: C-208	**Practical based on OOPS Concept & DBMS**	L.T.P Model	CREDIT-3

List of Lab Practicals

1. C++ program to create a simple class and object.
2. C++ | Create an object of a class and access class attributes
3. C++ | Create multiple objects of a class
4. C++ | Create class methods
5. C++ | Define a class method outside the class definition
6. C++ | Assign values to the private data members without using constructor
7. C++ | Create an empty class (a class without data members and member functions)
8. C++ | Create a class with setter and getter methods
9. C++ program to create a class to read and add two distance.
10. C++ program to create a class for student to get and print details of a student.
11. C++ program to create a class for student to get and print details of N students. / C++ program to demonstrate example of array of objects.
12. C++ program to create class to read and add two times.
13. C++ program to create class to read time in seconds and convert into time in (HH:MM:SS) format.
14. C++ program to create class to read time in HH:MM:SS format and display into seconds.
15. C++ program to demonstrate example of friend function with class.
16. Count the created objects using static member function in C++.
17. Create an object of a class inside another class declaration in C++.
18. Example of private member function in C++.
19. Local Class with Example in C++.
20. Structure with private members in C++.
21. Const Member Functions in C++.

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22. Demonstrate Example of public data members in C++.
23. Create a class Point having X and Y Axis with getter and setter functions in C++.
24. Passing an object to a Non-Member function in C++.
25. Accessing Member Function by pointer in C++.
26. Access the address of an object using 'this' pointer in C++.
27. Create a class with public data members only in C++
28. C++ program Input list of candidates and find winner of the Election based on received votes
29. C++ program for Banking Management System using class inheritance

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MCA-III Semester

C-301 Computer Graphics &Image Processing

Subject Code: C-301	Computer Graphics & Image Processing	L.T.P Model	CREDIT-4

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Recall the fundamental concepts of database management systems (DBMS) and their architecture. Remember the components of data modeling using the Entity-Relationship (E-R) model.
CO2: Understand the differences between a database system and a file system. Grasp the concepts of data modeling, including constraints, keys, and E-R diagrams.
CO3: Apply SQL queries and commands for data manipulation and control. Apply normalization techniques (1NF, 2NF, 3NF, BCNF) to eliminate anomalies in a relational database.
CO4: Analyze the properties of transactions and different types of schedules. Analyze concurrency problems in a database and understand concurrency control protocols.
CO5: Evaluate the effectiveness of different normalization levels in achieving data integrity. Assess the efficiency and correctness of concurrency control protocols.

Syllabus

UNIT-I

Introduction and Line Generation: Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Mid-point circle generating algorithm, and parallel version of these algorithms.

UNIT-II

Transformations: Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing.

Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms Line clipping algorithms such as Cohen Sutherland line clipping algorithm, clip windows; Polygon clipping – Sutherland Hodgeman polygon clipping.

UNIT-III

Three Dimensional: 3-D Geometric Primitives, 3-D Object representation, 3-D Transformation, 3- D viewing, projections, 3-D Clipping.

Curves and Surfaces: Quadric surfaces, Spheres, Ellipsoid, Blobby objects, introductory concepts of Spline, B-spline and Bezier curves and surfaces.

UNIT-IV

Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A- buffer method, Scan line method, basic illumination models, Color consideration, Transparency and Shadows.

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UNIT-V

Digital Image Fundamentals: Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition

Image Enrichment: Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening, Color image enhancement.

Image Re-storation : Image Restoration – degradation model, Properties, Noise models

List of Referenced Books

1. Donald Hearn and M Pauline Baker, "Computer Graphics C Version", Pearson Education
2. Foley, Vandam, Feiner, Hughes – "Computer Graphics principle", Pearson Education.
3. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
4. W. M. Newman, R. F. Sproull – "Principles of Interactive computer Graphics" – Tata MCGrawHill.
5. Amrendra N Sinha and Arun D Udai," Computer Graphics", Tata MCGraw Hill.
6. R.K. Maurya, "Computer Graphics " Wiley Dreamtech Publication.
4. K.C. Kapur, and L.R. Lamberson, "Reliability in Engineering Design", John Wiley, New York.

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C-302: .NET Technology using C#/PHP (Open Elective 2)

Subject Code: C-302	.NET Technology using C#/PHP (Open Elective 2)	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Demonstrate understanding of the .NET framework, C# language, and web development concepts in HTML, DHTML, CSS, JavaScript, PHP, and MySQL.
CO2: Apply C# programming skills to develop console applications, Windows Forms, ASP.NET web forms, and distributed applications.
CO3: Analyze and troubleshoot common issues related to exception handling, multi-threading, networking, and database connectivity in C#.
CO4: Design and implement interactive web interfaces using HTML, CSS, DHTML, and JavaScript to create dynamic and visually appealing web pages.
CO5: Evaluate and utilize PHP and MySQL to develop dynamic web applications with database integration, including data manipulation and retrieval operations.

Syllabus

Unit-I

The .Net framework: Introduction, The Origin of .Net Technology, Common Language Runtime)CLR(, Common Type System)CTS(, Common Language Specification)CLS(, Microsoft Intermediate Language)MSIL(, Just-In –Time Compilation, Framework Base Classes .

C -Sharp Language)C#:(Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces, Delegates and Events .Type conversion .

Unit-II

C# Using Libraries: Namespaces, Exception Handling, Multi-Threading, Networking and Socket Programming, Managing Console based I/O Operations, Windows Forms) WPF & WCF(, Asp.net Web Form Controls, and ADO.Net .Distributed Application in C#, Unsafe Mode, Graphical Device interface with C# and Connection with MS- SQL Server.

Unit-III

.Net Assemblies and Attribute. : Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute .Introduction about generic.

Unit -IV

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HTML, DHTML, CSS: Introduction to HTML, HTML fonts Styles, Links, images, Tables ,Static V/S Dynamic Websites ,HTML, attributes, Headings , Paragraphs, Formatting, Lists, Colors, Forms, Links on a same page, Tags DHTML Introduction, Marquee Tag Effects ,CSS Introduction, CSS Id & Class Styling Backgrounds, Fonts, Links, CSS Border Margin, Cell padding.

JAVASCRIPT: JS Introduction, JS client Validations (Null and Password validations) ,JS events.

Unit-V

PHP & MY SQL: PHP installation and Introduction, Loops, String Functions in PHP,PHP Basics, Variables, Arrays in PHP with Attributes, Date & Time, Image Uploading, File handling in PHP, Functions in PHP, Reading data in Web Pages.

MY SQL: Create Database & tables, fields Alter table Insert, Update and where condition Delete, Import and Export Database.

List of Referenced Books:

1 .Wiley, "Beginning Visual C# 2008",Wrox

2 .Fergal Grimes, "Microsoft .Net for Programmers) ."SPI (

3 .Balagurusamy, "Programming with C#",)TMH (

4 .Mark Michaelis, "Essential C# 3.0 :For .NET Framework 3.

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C-303: Python Programming (Open Elective 3)

Subject Code: C-303	Python Programming	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Demonstrate knowledge of Python programming language, including syntax, data types, decision-making statements, loops, functions, strings, lists, tuples, dictionaries, file handling, exceptions, object-oriented programming, and regular expressions.
CO2: Understand the fundamental concepts and principles of Python programming, including data manipulation, file handling, error handling, and object-oriented programming.
CO3: Apply Python programming skills to solve problems, create and manipulate strings, lists, tuples, dictionaries, and files.
CO4: Analyze and evaluate different Python constructs and techniques, including decision-making statements, loops, functions, and object-oriented programming concepts
CO5: Evaluate and assess the efficiency and effectiveness of Python solutions, including code readability, reusability, and error handling.

Syllabus

Unit I

Introduction of python- History, Version, Applications, installation on Windows plateform; Basic Python Syntax-Comments, Triple, Double and Single Quotes, Python back slash, String inside the quotes, Escape Sequence, String Contetination, Formatted output, Intendention; Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types;

Unit II

Decision Making Statements- If Statement, IF..ELIF..ELSE Statement, Nested IF Statement; Loops- while, for, nested loops, break, continue; Functions- Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Parameters, Arguments, Command Line Arguments; String - Creating and Storing Strings, Accessing value in string, String Slicing and Joining, String Library, String Methods; Lists- Accessing values in Lists, Updating Lists, Delete Lists Elements.

UNIT III

List Operations, indexing, Slicing, Buit-in Lists Functions and Methods; Tuple - Accessing values in Tuple, Updating Tuple, Delete Tuple Elements, Tuple Operations, indexing, Slicing,

Buit-in Tuple Functions and Methods; Dictionory - Accessing values in Dictionory, Updating Dictionory, Delete Dictionory Elements, Buit-in Functions and Methods.

UNIT IV

File Handling and Exceptions- Reading text from a file, Writing text to a file, Pickling, Unpickling, Try and Except clause. Object – Oriented Programming Overview- instace variables, the __init_method, Class Variables, Class inheritance, Overrriding methods, Operator overloading, The class method, The static method. Regular Expression- match search function, search and replace, regular expresssion modifiers, regular expression patterns.

UNIT V

Introduction of Data Science with python - Data Science Overview, Python Environment Setup and Essentials, Anaconda, Mathematical Computing with Python (NumPy), Scientific computing with Python (Scipy), Data Manipulation with Pandas,Data Visualization in Python using matplotlib,Machine Learning with Scikit–Learn, Introduction to the Python Deep Learning Library TensorFlow.

List of Reference books:

1. John M. Sewart, "Python for Scientist", Cambridge Universities Press.

2. Reema Thareja, "Python Programming" Oxford Higher Education.

3. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python" Pearson

5. "Python 3 Standard Library By Example 2017" Edition by Doug Hellmann, PEARSON INDIA.

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C-304 Data Warehousing & Data Mining

Subject Code:C-304	**Data Warehousing & Data Mining**	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Demonstrate understanding of the fundamentals of data warehousing, data mining systems, data preprocessing, data mining primitives, and data mining query languages.
CO2: Explain the concepts and principles of data warehousing, including multidimensional database structures, data integration and transformation, online data storage, and metadata..
CO3: Apply data preprocessing techniques to clean, integrate, transform, and reduce data for data mining purposes
CO4: Analyze and evaluate different data mining algorithms and methods, such as association rule mining, classification, prediction, and clustering.
CO5: Evaluate the accuracy and effectiveness of data mining models and techniques, considering factors such as classifier accuracy, data quality, and clustering methods.

Syllabus

UNIT-I

Introduction: Fundamentals of data warehousing, Data mark, Concept of Data ware housing, multi-dimensional database structure, client-server model, component of data ware housing, building Data ware house, Functionalities, Classification of Data Mining systems, Major issues in Data Mining, Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture.

UNIT-II

Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation, Online Data Storage, mapping data ware house schema, Meta data, dimension table and fact table.

UNIT-III

Data Mining Primitives, Languages, and System Architectures: Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems,

UNIT-IV

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Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT-V

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy, Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods.

List of Reference Books:

1. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY.PearsonAsia.
2. Data Mining Techniques – ARUN K PUJARI, University Press Building the DataWarehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd..

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C-305 Design and Analysis of Algorithm

Subject Code: C-305	**C-305 Design and Analysis of Algorithm**	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Demonstrate knowledge of various data structures, algorithms, and asymptotic notations used in algorithm analysis and design.
CO2: Understand the concepts and principles of greedy methods, dynamic programming, advanced data structures, and NP completeness.
CO3: Apply data structures and algorithms to solve problems, including knapsack problems, spanning trees, optimal storage, matrix multiplications, and binary search trees.
CO4: Analyze and evaluate the efficiency and complexity of algorithms using asymptotic behavior, time and space complexity, and worst-case analysis.
CO5: Evaluate the complexity and feasibility of problems and algorithms in terms of NP completeness, polynomial time, and verification.

Syllabus

Unit I

Review of data review of data structures, linked list, stack, queue, tree, binary tree and graph, Divide & Conquere methods, binary search and its time-complexity, Quick sort, Merge sort, Heap sort, analysis of algorithms, asymptotic behavior of algorithm, asymptotic notations(Big O, Big omaga and Big Theta Notations) time ans space complexity of algorithms, average and worse case analysis of algorithms, Finding asymptotic Complexities.

Unit II

Greedy Method: General method, Knapsack problems, Spanning trees, prime's algorithms, Kruskal algorithms, Dijk Stra algorithms, Optimal storage on tapes, Huffman Codes.

Unit III

Dynamic programming, general methods, matrix multiplications, Single source shoetest path algoritms, Dijk Stra's algorithms, Basic search and traversal techniques, Techniques for binary tree, Depth first search, Breath first search, Adjecancy matrix, and link list representation of graphs, Bi-connected Components.

Unit IV

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Advance data structure, Binary search tree, Red- Black tree, insertion, delition in binary search tree, B-tree, Basic operation on B- tree, Binomial Heaps, Binomianl trees.

Unit V

NP Completeness: Basic concepts, polinomial time, abstract problems, Encoding, Formal languages, polinomial time verification, The time complexity class, P, NP and NP Completeness, permeability,
Hermite domain cycle.

List of Reference Books:

(i) Analysis and Desisn of Algorithms by Horowitz Sahani, PHI publication
(ii) Analysis and design of algorithms by Schaum's

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C-306 Optimization Techniques

Subject Code:C-**306**	**Optimization Techniques**	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Demonstrate knowledge of various data structures, algorithms, and asymptotic notations used in algorithm analysis and design.
CO2: Understand the concepts and principles of greedy methods, dynamic programming, advanced data structures, and NP completeness.
CO3: Apply data structures and algorithms to solve problems, including knapsack problems, spanning trees, optimal storage, matrix multiplications, and binary search trees.
CO4: Analyze and evaluate the efficiency and complexity of algorithms using asymptotic behavior, time and space complexity, and worst-case analysis.
CO5: Evaluate the complexity and feasibility of problems and algorithms in terms of NP completeness, polynomial time, and verification.

Syllabus

Unit I
Introduction of Optimization Techniques, Linear Programming, Mathematical Formulation, Graphical Methods for two dimensional problems.Simplex Method,Big-M Method & Two Phase Methods, Assignment Problem, Transportation Problem, Sequencing Problem & its Solution's.

Unit II
Integer Programming-Cutting Plane, Branch & Bound Methods
Game Theory-Two person Zero Sum game, saddle point determination, algebraic method, graphical method etc.

Unit III
Replacement Problem: Replacement theory of items, the deteriorate- replacement of items that fail. Group and Individual replacement.

Unit IV

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Inventory Control- Determination of EOQ, Components, Deterministic Continuous & Deterministic Periodic Review Models, Stochastic Continuous & Stochastic Periodic Review Models.

Unit V

Optimization Models- The shortest path problem, Minimum Spanning Tree Algorithm, Maximal Flow Algorithms, PERT/ CPM.

List of Referenced Books:

1. Operation Research, KantiSwaroop
2. Operation Research,V.K. Kapoor
3. Operation Research,PaneerSelvam,PHI
4. Operations Research, Hillier & Lieberman, TMH

C-307 Mini Project

Subject Code:C-307	**Mini Project**		CREDIT-2

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C-308 Practical

Subject Code:C-308	C-308 Practical	L.T.P Model	CREDIT-4

List of Lab practicals

1. Program to Draw a Line using DDA Algorithm
2. Program to Draw a Line using Bresenhams Algorithm
3. Program to draw a line using Cartesian Slope-Intercept Equation
4. Program to Draw a Circle using Mid-Point Algorithm
5. Program to Draw a Circle using Bresenham's Algorithm
6. Program to Draw Circle (Simple Program)
7. Program to draw a Circle having Changing its Color and Design
8. Program to draw a Circle using Direct Algorithm
9. Program to draw an Ellipse using Mid-Point Ellipse Algorithm
10. Program to draw an Ellipse with Different Colors
11. Program to draw Polar Ellipse
12. Program to draw an Ellipse Showing Two Axis
13. Program to plot Bezier curve in C.
14. Program to plot B spline curve in C.
15. Program to shift an object,
16. Program to rotate an object.
17. Program to reflect an object.
18. Program to scale up and scale down an object.
19. Program to get the projection of an object.
20. Program to create blobby objects.

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MCA IV Semester

C- 401 Soft Computing

Subject Code:C-401	**Soft Computing**	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Demonstrate knowledge of basic concepts and models of artificial neural networks, learning processes, signal layer perceptrons, fuzzy set theory, and genetic algorithms.
CO2: Understand the characteristics, architectures, and learning tasks associated with neural networks, as well as the principles and algorithms of signal layer perceptrons, fuzzy logic, and genetic algorithms.
CO3: Apply neural network models, learning algorithms, and optimization techniques to solve problems in adaptive filtering, feature detection, and fuzzy systems.
CO4: Analyze the convergence, performance, and decision-making capabilities of multi-layer perceptrons, fuzzy rule-based systems, and genetic algorithms.
CO5: Evaluate the effectiveness and efficiency of neural network models, fuzzy systems, and genetic algorithms in solving complex problems, considering convergence, mutation rates, and decision-making accuracy.

C-401 Soft Computing

Syllabus

Unit-1

Neural Network: Basic Concepts of Neural Network, Models of artificial Neural Network, Characteristics of Neural Networks Network Architectures, Artificial intelligence and Neural Networks Learning Processes: Introduction, Error-Correction Learning, Memory-Based Learning, Memory-Based learning, Hebbian Learning. Competitive Learning, Boltzmann Learning, Credit Assignment Problem, Learning with a Teacher, Leaning Tasks, Statistical Nature of the Learning Process, Statistical Learning Theory, Probably Approximately Correct Model of Learning.

Unit-II

Singal Layer Perceptrons: Adaptive Filtering Problem, Unconstrained Uptimization techniques, Linear Least Squares Filters, Learning Curves, Learning Rate Annealing Techniques, Perceptron, Perceptron Convergence Theorem Multi Layer Perceptrons: Some Preliminiaries, Back-Propagation Algorithm, Summary of the Back- Propagation Algorithm, XOR Problem, Heuristics for Making the Back-Propagation Algorithm Perform Better,

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Output Representation and Decision Rule, Computer Experiment, Feature Detection, Back-Propagation and Differentiation

Unit-III

Fuzzy Logic: Fuzzy Set Theory: Fuzzy Verses crisp, Crisp Sets, Fuzzy Sets, Crisp Relations, Fuzzy Systems: Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy rule based system, De Fuzzification Systems,

Unit-IV

Genetic Algorithms: Fundamental of Genetic algorithm, Genetic algorithms, basic concept of genetic algorithm, creation of rings, working principal, encoding, fitness function, reproduction.

Unit-V

Inheritance operators, cross over, inversion and deletion, mutation operation, Genetic Modeling: bitwise operators, bitwise operators used in genetic algorithm, generational cycle, convergence of genetic algorithm.

Test Books and References:

1. Neural Network, Fuzzy Logic and genetic algorithm by S. Rajshekharan, G.A. Vijaylaxmi Pal, Publication PHI
2. Introduction to neural network By ANDERSON, JAMES A. Publication PHI
3. Introduction to genetic algorithm by Melanie Mitchell
4. Genetic algorithm by Goldberg

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C-402 Compiler Design

Subject Code:C-402	**Compiler Design**	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Demonstrate knowledge of the structure of compilers, lexical analysis, syntax analysis, and the role of lexical analysis in the compilation process.
CO2: Understand the principles and techniques of parsing, including shift-reduce parsing, predictive parsing, and L-R parsing. Comprehend the concept of symbol tables and their role in compiler design.
CO3: Apply lexical analysis and parsing techniques to implement a compiler, perform optimization, and generate efficient object code.
CO4: Analyze the principles and sources of optimization, including loop optimization and code optimization. Analyze the flow graph and determine loop invariants for optimization.
CO5: Evaluate the effectiveness of code optimization techniques, object program generation, and register allocation strategies. Assess the challenges and potential problems in code generation.

Syllabus

Unit I

Compiler & translator, Structure of Compiler, Lexical analysis, Syntax analysis, Bootstrapping, Cross Compiler, Unicity Tools

Unit II

The role of Lexical analysis, regular information, finite automata, Implementation to a lexical analysis, Context free Grammar, Derivation tree and Parse tree

Unit III

Parser, Shift reduce parsing, Predictive parsing, L-R parsing, Symbol table, Context and Data Symbol table

Unit IV

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Principle of sources of optimization, Loop optimization, DAG, Base Block, Determination, Reducible flow graph, Loop in variant computation.

Unit V

Code optimization, principles of optimization, source of optimization, DAG, DAG representation of basic block, domain reducible flow graph, Code optimization, Object program, Problems in code generation, machine Model, Register allocation and Assignment.

List of Reference Books:

(i) Principle of Compiler Design by Aho and Ullman PHI publication

(ii) Compiler Design by Aho, Ullmann &n Sethi PHI Publication

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C-403 Network Security (Open Elective 4)

Subject Code: C-403	Network Security	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Demonstrate knowledge of network security concepts, including confidentiality, data integrity, authentication, and non-repudiation. Understand classical encryption techniques and their cryptanalysis.
CO2: Understand modern encryption techniques, such as Simplified DES, DES, Triple DES, and IDEA. Comprehend the security issues associated with these methods.
CO3: Apply conventional encryption techniques for achieving confidentiality, including encryption placement, traffic confidentiality, key distribution, and random number generation.
CO4: Analyze the principles of public key cryptography, specifically the RSA algorithm. Analyze message authentication, hash functions, and MAC algorithms. Evaluate the security and authentication protocols.
CO5: Evaluate the effectiveness of various security measures and protocols in ensuring network security. Assess the vulnerabilities and risks associated with different security systems.

Syllabus

Unit I

Network Security Introduction:Confidentiality, Data Integrity, Authentication, Non-Repudiation, Overview of Issues involved, Classical Encryption Techniques: Mono alphabetic, Substitution Methods, Poly alphabetic Substation Methods, Permutation Methods, Cryptanalysis of these Methods.

Unit II

Modern Encryption Techniques: Simplified DES, DES, Triple DES, Block Cipher, Design Principles, Block Cipher Modes of Operation. IDEA Security Issues Involved with these methods.

Unit III

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Confidentiality Using Conventional Encryption: Placement of Encryption, Traffic Confidentiality, Key Distribution, RandomNumber, Generation.

Unit IV

Introduction to Number Theory: (Basics Pertaining to Security Related Algorithms). 6. Public Key Cryptography: Principles -- RSA Algorithm. Message Authentication and Hash Functions, Hash an MAC Algorithms. Digi Signatures and Authentication Protocols, Authentication Applications.

Unit V

Overview of Electronic Mail Security, IP Security, WEB Security, System Security: Intruders, Viruses and Worms, Firewalls, Kerberos.

List of Referenced Book:

1. Cryptography and Network Security, William Stallings. (Second Edition) Pearson Education Asia
2. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes-Ousley, Keith Strassberg Tata Mcgraw-Hill
3. Handbook of Applied Cryptography

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C-404 Mobile Computing

Subject Code:C-404	**Mobile Computing**	L.T.P Model	CREDIT-3

(CO's): After the completion of this course the students will be able to

CO1: Understand the fundamental concepts of mobile computing, including issues, wireless telephony, cellular concepts, GSM, CDMA, and GPRS..
CO2: Grasp the principles of wireless networking, including wireless LAN, multiple access protocols, TCP over wireless, Mobile IP, and WAP architecture.
CO3: Apply data management techniques in mobile computing, including data replication, adaptive clustering, file systems, and disconnected operations.
CO4: Analyze the concepts of mobile agent computing, security, fault tolerance, and transaction processing in a mobile computing environment.
CO5: Evaluate the effectiveness of different techniques and protocols in mobile computing, considering their advantages, limitations, and applicability in various scenarios.

Syllabus

Unit - I

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Unit - II

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Unit – III

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, file system, disconnected operations.

Unit - IV

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Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit – V

Adhoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Text Books:

1. J. Schiller, "Mobile Communications", Addison Wesley.
2. Charles Perkins, "Mobile IP", Addison Wesley.
3. Charles Perkins, "Ad hoc Networks", Addison Wesley.
4. Upadhyaya, "Mobile Computing", Springer New York.

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C-405 Advanced Computing Techniques (Open Elective 5)

Subject Code:C-405	**Advanced Computing Techniques**	L.T.P Model	CREDIT-3

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Understand the theoretical basis of quantum computing, including qubits, quantum entanglement, density matrix, and maximally entangled states (MES).
CO2: Grasp the concepts and architecture of cloud computing, including service models (IaaS, PaaS, SaaS), deployment models (public, private, hybrid, community), and the role of open standards.
CO3: Apply the principles of the Internet of Things (IoT) by understanding sensing, actuation, networking basics, communication protocols, IoT architecture, and the physical and logical design of IoT systems.
CO4: Analyze big data analytics, including the challenges of conventional systems, the importance of big data, technologies for handling big data, and the applications of big data analytics.
CO5: Evaluate the advantages and limitations of quantum computing, cloud computing, IoT, big data analytics, and machine learning in various contexts, considering their potential impact and ethical considerations..

Syllabus

UNIT I

Quantum Computing- Theoretical Basis of Quantum Computing; Coherent state, q-bits, 2-qubits and 3–qubits System. Quantum Entanglement, Hamming Spaces, Maximally Entangled States (MES), Density Matrix, Bell's MES.

UNIT II:

Cloud Computing - Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Pros and Cons of Cloud Computing, Role of Open Standards,Cloud Computing Architecture, Introduction of Service Models (XaaS), Infrastructure as a Service(IaaS),Platform as a Service(PaaS), Software as a Service(SaaS).Deployment Models: Public cloud,Private cloud, Hybrid cloud,Community cloud.

UNIT III:

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Internet of Things(IoT): Introduction to Internet of Things(IoT), Sensing, Actuation, Networking basics, Communication Protocols, Sensor Networks, Machine-to-Machine Communications, IoT Definition, Characteristics. IoT Functional Blocks, Physical design of IoT, Logical design of IoT, Communication models & APIs. IoT Architecture.

UNIT IV:

Big Data analytics: Overview of Big Data, Big Data in Businesses, Challenges of Conventional Systems, Big Data and its importance, Big data analytics, Big data applications, Technologies for Handling Big Data, Understanding Hadoop Ecosystem.

UNIT V:

Machine Learning: Introduction and Basic Concepts of Machine Learning, Applications of ML, Taxonomy of Machine Learning: Supervised, Unsupervised, Reinforcement learning, Linear Vs Non Linear, Regression vs. Classification, Bias-variance trade-off, Overfitting, Under fitting, Decision trees, Gradient descent, Support Vector Machine (SVM), ML algorithms: Logistic regression, Naïve Bayes, K-Nearest Neighbors, K mean Clustering.

List of Reference Books:

1. Quantum Computing, Quantum Mechanics By Prof. B. S. Rajput
2. Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security, CRC Press, 2017.
3. Raj KumarBuyya, Christian Vecchiola, S. ThamaraiSelvi, —Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
4. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
5. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI

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C-406 Practical

Subject Code:C-406	**Practical**	L.T.P Model	CREDIT-4

List of Lab Practicals

1. To perform Union, Intersection and Complement operations.
2. To implement De-Morgan's Law.
3. To plot various membership functions.
4. To implement FIS Editor. Use Fuzzy toolbox to model tip value that is given after a dinner based on quality and service.
5. To implement FIS Editor.
6. Generate ANDNOT function using McCulloch-Pitts neural net.
7. Generate XOR function using McCulloch-Pitts neural net.
8. Hebb Net to classify two dimensional input patterns in bipolar with given targets.
9. Perceptron net for an AND function with bipolar inputs and targets.
10. To calculate the weights for given patterns using hetero-associative neural net.
11. To store vector in an auto-associative net-Find weight matrix & test the net with input
12. To store the vector, find the weight matrix with no self-connection. Test this using a discrete Hopfield net.

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C-407 Project

Subject Code:C-407	**Project**	L.T.P Model	CREDIT-6

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Detailed Syllabus for Elective Papers:

Java & PHP (Open Elective 7)

Open Elective 7	Java & PHP	L.T.P Model	CREDIT-4

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Acquire knowledge of Java programming language, including its syntax, data types, control statements, object-oriented concepts, exception handling, multithreading, I/O operations, networking, and event handling.
CO2: Understand the concepts of applets, AWT controls, Swing applications, Java Beans, Enterprise Java Beans (EJB), RMI (Remote Method Invocation), servlets, and JSP (JavaServer Pages).
CO3: Apply the concepts of HTML and CSS to create static and dynamic websites, including formatting text, working with links, images, tables, forms, and applying CSS styles.
CO4: Analyze and manipulate data using PHP, including variables, arrays, loops, string functions, date and time, image uploading, file handling, and web page data reading. Understand the basics of MySQL database, including creating tables, performing CRUD operations, and importing/exporting data.
CO5: Evaluate the efficiency and effectiveness of different programming concepts and technologies in web development, considering factors such as performance, security, scalability, and usability.

Unit-1

Java: Introduction, Concept of JVM, JRE & JDK, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance,Package and Interface, Exception Handling, Multithread programming, I/O,String handling, Networking, Event handling, Layout managers, images.

Unit-2

Introduction of Applet and Applications, Introduction of AWT &AWT controls,Labels, Textfields, Buttons,Checkboxes, Radio Buttons, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, JDBC: The connectivity Model, JDBC/ODBC Bridge. Sql Connectivity with database.Introduction of Swing Applications.

Unit-3

Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean,using Bound properties, The Java Beans API, Session Beans, Entity Beans, Introduction to Enterprise Java beans (EJB),

RMI: Introduction to RMI (Remote Method Invocation): A simple client-server application using RMI. Introduction of Servlet, Introduction & JSP.

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Unit- 4

HTML, CSS: Introduction to HTML, HTML fonts Styles, Links, images, Tables ,Static V/S Dynamic Websites ,HTML, attributes, Headings , Paragraphs, Formatting, Lists, Colors, Forms, Links on a same page, Tags

CSS:CSS Introduction, CSS Id & Class Styling Backgrounds, Fonts, Links, CSS Border Margin, Cell padding.

JAVASCRIPT: JS Introduction, JS client Validations (Null and Password validations), JS events.

XML– Introduction-Form Navigation-XML Documents- XSL – XSLT- Web services-UDDI-WSDL-java web services – Web resources.

Unit-5

PHP & MY SQL:PHP installation and Introduction, Loops, String Functions in PHP,PHP Basics, Variables, Arrays in PHP with Attributes, Date & Time, Image Uploading, File handling in PHP, Functions in PHP, Reading data in Web Pages.

MY SQL: Create Database & tables, fields Alter table Insert, Update and where condition Delete, Import and Export Database.

List of Reference Books:

1. Margaret Levine Young, "The Complete Reference", Tata McGraw-Hill Education Pvt. Ltd.
2. Thampi, "Object Oriented Programming in JAVA" Wiley Dreamtech Publication.
3. Balagurusamy E, "Programming in JAVA", Tata McGraw-Hill Education Pvt. Ltd.
4. Dustin R. Callway, "Inside Servlets", Addison Wesley.

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Parallel Processing (Open Elective 6)

Open Elective 6	Parallel Processing	L.T.P Model	CREDIT-4

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Acquire knowledge about parallel computing, including the basic concepts, levels of parallel processing, dataflow computing, and classification of parallel computers based on various criteria.
CO2: Understand the interconnection network in parallel computing, including its importance, bandwidth, nodal degree, diameter, bisection bandwidth, and different types of static and dynamic interconnection networks.
CO3: Apply the principles of parallel computer architecture, including pipeline processing, vector/array processing, VLIW and superscalar architectures, associative architectures, and multi-threaded architectures.
CO4: Analyze and evaluate the performance and efficiency of parallel algorithms, including their design, analysis, and implementation in different models of computation. Understand the concepts of combinational circuits, permutation circuits, sorting circuits, and matrix computations.
CO5: Evaluate the suitability and effectiveness of different parallel computing models, architectures, and interconnection networks for specific computational tasks, considering factors such as scalability, speedup, and communication overhead.

Unit 1

Introduction to Parallel Computing, Basic concepts about program/process/ thread concurrent Execution Parallel Execution, granularity, Potential of Parallelism, Need of Parallel Computation, Levels of parallel processing Parallel processing Vs. Parallel computing, Dataflow Computing concepts.

Unit 2

Classification of Parallel Computers, Types of Classification, Flynn's/ Handler classification, UMA / NUMA /COMA, Loosely coupled / tightly couple, Classification based grain size and Instruction level parallelism

Unit 3

Interconnection Network, Need of Interconnection Network, Concept Bandwidth Nod degree diameter bisection bandwidth, In degree and Out degree , Static and Dynamic

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Interconnection network, Omega, Parallel Shifter, Bens, permutation, hypercube, butterfly, Shuffle exchange Network

Unit 4

Parallel Computer Architecture, Introduction to various computer architecture, Pipeline processing, Vector / Array, processing, VLIW and Super scalar architecture, Associative architecture, Multi-threaded, architecture

Unit 5

Parallel Algorithm, Introduction to Parallel Algorithm, Analysis of Parallel Algorithms, Different models of computation, Combinational circuit, Permutation Circuit, Sorting circuit, Matrixcomputation.

List of Referenced Books:

1. Programming Massively Processors : David Kirk third edition
2. Applied Parallel Computing :Yefaun Deng
3. Parallel Computing : Wang's& Briggs

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CLOUD COMPUTING (Open Elective 8)

Open Elective 6	**Cloud Computing**	L.T.P Model	CREDIT-4

Course Outcomes (CO's): After the completion of this course the students will be able to

CO1: Acquire knowledge about cloud computing, including its definition, benefits, usage scenarios, major players, and issues associated with cloud environments. Understand different types of clouds and cloud architectures.
CO2: Understand the various types of cloud services, such as Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), and their applications. Comprehend the role of major cloud service providers and their offerings.
CO3: Apply cloud services for collaboration purposes, including email communication, CRM management, project management, event management, task management, word processing, presentation creation, spreadsheet handling, databases, and social networks.
CO4: Analyze the need for virtualization in cloud computing, understand the pros and cons of virtualization, and differentiate between different types of virtualization technologies and hypervisors. Evaluate the properties and capabilities of virtual machines.
CO5: Evaluate the suitability and effectiveness of different cloud service providers, architectures, and standards for specific business requirements. Assess the advantages and challenges associated with cloud computing, and propose solutions to address potential issues.

UNIT I

Introduction: Cloud-definition, benefits, usage scenarios, History of Cloud Computing - Cloud Architecture - Types of Clouds - Business models around Clouds – Major Players in Cloud Computing- issues in Clouds - Eucalyptus - Nimbus - Open Nebula, Cloud Sim.

UNIT II

Cloud Services: Types of Cloud services: Software as a Service-Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service –Communication as services. Service providers- Google, Amazon, Microsoft Azure, IBM, Sales force.

UNIT III

Collaborating Using Cloud Services: Email Communication over the Cloud - CRM Management - Project Management-Event Management - Task Management – Calendar - Schedules - Word Processing – Presentation – Spreadsheet - Databases – Desktop - Social Networks and Groupware.

UNIT IV

Virtualization For Cloud: Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization –System VM, Process VM, Virtual Machine monitor – Virtual machine

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properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

UNIT V

Security, Standards and Applications: Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

TEXT BOOKS:

1. John Rittinghouse& James Ransome, Cloud Computing, Implementation, Management and Strategy, CRC Press, 2010.

2. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Que Publishing, August 2008.

3. James E Smith, Ravi Nair, Virtual Machines, Morgan Kaufmann Publishers, 2006.

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5	2009015251005	ARUN PRAKASH	CHHEDI PRASAD	SC
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