ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA

Branch/Course: Master of Computer Applications (w.e.f. 2024)

Course Structure

Semester I (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-24101	Discrete Mathematical Structures	75	25	100	4	-	4
MCA-24102	Management Accountancy	75	25	100	4	-	4
MCA-24103	C Programming & DataStructures	75	25	100	4	-	4
MCA-24104	Computer Organization	75	25	100	4	-	4
MCA-24105	Operating Systems	75	25	100	4	-	4
MCA-24106	Design & Analysis ofAlgorithms	75	25	100	4	-	4
MCA-24107	C Programming & DataStructures Lab	50	50	100	-	3	2
MCA-24108	Operating Systems and Computer Organization Lab	50	50	100	-	3	2
MCA-24109	Skill Development Course/MOOCS	50	50	100	-	3	2
MCA-24110	**Bridge Course*** Fundamentals of Computers (For General B.Sc/B.A./B.ComStudents)	75	25	100	4	-	4
MCA-24111	**Bridge Course Lab*** Fundamentals of ComputersLab (For General B.Sc/B.A./B.ComStudents)	50	50	100	-	3	2
	Total Credits						30

Note: All the General B.Sc/B.A./B.Com Students must pass the **Bridge Course(MCA-24110) and Bridge Course Lab (MCA-24111)** with minimum 50% marks, but the credits allotted for that courseswill not be considered for SGPA calculation.

Semester II (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-24201	Computer Networks	75	25	100	4	-	4
MCA-24202	Object Oriented Programming through JAVA	75	25	100	4	-	4
MCA-24203	Database Management Systems	75	25	100	4	-	4
MCA-24204	Formal Languages and Automata Theory	75	25	100	4	-	4
MCA-24205	Data Mining Concepts and Techniques	75	25	100	4	-	4
MCA-24206	Elective-I 1. Artificial Intelligence and Expert Systems 2. Internet of Things 3. Image Processing	75	25	100	4	-	4
MCA-24207	Object Oriented Programming through JAVA Lab	50	50	100	-	3	2
MCA-24208	Database Management Systems Lab	50	50	100	-	3	2
MCA-24209	Skill Development Course with Python	50	50	100	1	2	2
	Total Credits						30

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

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

Semester I (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-24101	Discrete Mathematical Structures	75	25	100	4	-	4
MCA-24102	Management Accountancy	75	25	100	4	-	4
MCA-24103	C Programming & DataStructures	75	25	100	4	-	4
MCA-24104	Computer Organization	75	25	100	4	-	4
MCA-24105	Operating Systems	75	25	100	4	-	4
MCA-24106	Design & Analysis ofAlgorithms	75	25	100	4	-	4
MCA-24107	C Programming & DataStructures Lab	50	50	100	-	3	2
MCA-24108	Operating Systems and Computer Organization Lab	50	50	100	-	3	2
MCA-24109	Skill Development Course/MOOCS	50	50	100	-	3	2
MCA-24110	**Bridge Course*** Fundamentals of Computers (For General B.Sc/B.A./B.ComStudents)	75	25	100	4	-	4
MCA-24111	**Bridge Course Lab*** Fundamentals of ComputersLab (For General B.Sc/B.A./B.ComStudents)	50	50	100	-	3	2
	Total Credits						30

Course Code &Title: MCA-24101 DISCRETE MATHEMATICAL STRUCTURES
Semester: I
Course Index: C101

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn about introduction of discrete mathematical structures.
Learn the Counting Techniques and Recurrence relations.
Learn about in detail about Graphs and Trees.
Learn about Boolean Algebra and Models of Computation.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C101.1	Understand about introduction of discrete mathematical structures.
C101.2	Understand the Counting Techniques and Recurrence relations.
C101.3	Understand about in detail about Graphs and Trees.
C101.4	Understand about Boolean Algebra and Models of Computation.

MCA-24101 DISCRETE MATHEMATICAL STRUCTURES

Instruction: 4 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT I

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

UNIT II

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

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

UNIT III

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

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

UNIT IV

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

Text Book:

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

Reference Books:

1. Discrete Mathematics for Computer Scientists & Mathematicians, Joe L.Mott, Abraham Kandel& T. P. Baker,Prentice Hall of India Ltd, New Delhi

2. Discrete mathematics, Richard Johnsonbaug, Pearson Education, New Delhi

Course Code &Title: MCA-24102 MANAGEMENT ACCOUNTANCY
Semester: I
Course Index: C102

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the basic concept of Principles Of Accounting and Final Accounts.
Learn about in detail about Ratio Analysis.
Learn about the concepts of Costing, Budget and Budgetary Control, Marginal Costing.
Learning the Introduction To Computerized Accounting System.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C102.1	Understand the basic concept of Principles Of Accounting and Final Accounts.
C102.2	Understand about in detail about Ratio Analysis.
C102.3	Understand about the concepts of Costing, Budget and Budgetary Control, Marginal Costing.
C102.4	Understanding the Introduction To Computerized Accounting System.

MCA-24102 MANAGEMENT ACCOUNTANCY

Instruction: 4 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT I

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

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

UNIT II

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

UNIT III

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

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

UNIT IV

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

TEXTBOOKS:

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

REFERENCE BOOK:

1. Introduction to Accounting,G.Agarwal.

Course Code &Title: MCA-24103 C PROGRAMMING AND DATA STRUCTURES
Semester: I
Course Index: C103

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the Fundamentals and Basic concepts of C Programming.
Learn about in detail about Arrays, Functions and Pointers.
Learn the concepts of Derived Data Types and Data Structures.
Learn the concepts of Linked Lists, Trees, Graphs, Searching and Sorting.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C103.1	Understand the Fundamentals and Basic concepts of C Programming.
C103.2	Understand about in detail about Arrays, Functions and Pointers.
C103.3	Understand the concepts of Derived Data Types and Data Structures.
C103.4	Understand the concepts of Linked Lists, Trees, Graphs, Searching and Sorting.

MCA-24103: C PROGRAMMING AND DATA STRUCTURES

Instruction: 4 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT-I

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

UNIT-II

Arrays: Arrays - declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1- D arrays, 2-D arrays – 2-D and character arrays – Multidimensional arrays.
Functions: basics, parameter passing, storage classes- scope rules, user defined functions, standard library functions, recursive functions, header files, C pre-processor.
Pointers: Concepts, initialization of pointer variables, pointers and Function arguments, passing by address –dangling memory, Character pointer s and functions, pointer s to pointer s,pointer s and multidimensional arrays, dynamic memory management functions, command line arguments.

UNIT-III

Derived types: structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typed of, bit-fields, Input and output – concept ofa file, text files and binary files, Formatted I/o, file I/o operations.
Data Structures: Introduction to Data Structures – Stacks: Definition, Stack implementation one application; Queues: Definition, Queue implementation and types of Queues.

UNIT-IV

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

TEXT BOOKS:

1.C and Data Structures: A snapshot oriented treatise using live engineering examples, N B Venkateswarlu, E. V Prasad, S Chand &Co.

2 .Let Us C, YashwantKanetkar, BPB Publications, 5th Edition.

3. Computer science, A structured programming approach using C, B.A. Forouzan and R.F.Gilberg, Third edition, Thomson.

REFERENCE BOOKS:

1. Fundamentals of Data Structures in C, Horowitz, Sahni, Anderson-Freed, 2nd ed,2008.

2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearso

Web Resources :

1. **https://archive.nptel.ac.in/courses/106/102/106102064/**
2. **https://www.cs.usfca.edu/~galles/visualization/Algorithms.html**
3. **https://visualgo.net/en**
4. **https://elearn.daffodilvarsity.edu.bd/course/view.php?id=11771**

Course Code &Title: MCA-24104 COMPUTER ORGANIZATION
Semester: I
Course Index: C104

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the basics of Digital Logic Circuits and Digital Components.
Learn about the Concepts of Data Representation, Register Transfer and Micro Operations.
Learn the concept of Basic Computer Organization and Design and Central Processing Unit.
Learn about the concept of Input /Output Organization and Memory Organization.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C104.1	Understand the basics of Digital Logic Circuits and Digital Components.
C104.2	Understand about the Concepts of Data Representation, Register Transfer and Micro Operations.
C104.3	Understand the concept of Basic Computer Organization and Design and Central Processing Unit.
C104.4	Understand about the concept of Input /Output Organization and Memory Organization.

MCA-24104 COMPUTER ORGANIZATION

Instruction: 4 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT-I

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuit,Flip-flops Sequential Circuits.
Digital Components: Integrated Circuits, Decoders, Multiplexes, Registers, Shift Registers, Counters, Memory Unit.

UNIT-II

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

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

UNIT-III

Basic Computer Organization and Design: Instruction Codes, Computer Register, Computer Instructions, Timing and Control, InstructionCycle, Memory Reference Instructions, Input-Output, Interrupt.
Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction formats,addressing modes.

UNIT-IV

Input /Output Organization: Peripherals Devices, I/O Interface, Asynchronous Data Transfer, Mode of Transfer, PriorityInterrupt, Direct memory access, Input – Output Processor(IOP).
Memory Organization: Memory Hierarchy, Main memory, Auxiliary Memory, Associate Memory, Cache Memoryand Virtual Memory.

Text Books:

1. Computer System Architecture, M.Morris Mano, Prentice Hall of India Pvt.ltd. Third Edition, Sept. 2008.
2. B. Ram, "Fundamentals of Microprocessors and Microcomputers", Dhanpat Rai Publications.

Reference Books:

1. Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd. Eastern Economy Edition, Sixth Edition, 2003.
2. Computer System Architecture John P. Hayes.

Web Resources :

1. https://nptelvideos.com/course.php?id=396
2. https://onlinecourses.nptel.ac.in/noc20_cs64/preview
3. https://www.learncomputerscienceonline.com/computer architecture/
4. http://williamstallings.com/COA/COA8e

Course Code &Title: MCA-24105 OPERATING SYSTEMS
Semester: I
Course Index: C105

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the concept of Introduction to Operating Systems and Process Management.
Learn about Process Synchronization and Deadlocks in detail.
Learn about the concept of Memory Management, File System Implementation, Mass-storage structure.
Learn the concept of Protection and Case Study.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C105.1	Understand the concept of Introduction to Operating Systems and Process Management.
C105.2	Understand about Process Synchronization and Deadlocks in detail.
C105.3	Understand about the concept of Memory Management, File System Implementation, Mass-storage structure.
C105.4	Understand the concept of Protection and Case Study.

MCA-24105 OPERATING SYSTEMS

Instruction: 4 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT I

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

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

Case Study : 1. Understanding and listing the basic differences between UNIX OS and Windows OS in usage, user interface, features etc.

Case Study : 2. Present your understanding on how CPU Scheduling is different in WINDOWS compared to UNIX/LINUX.

UNIT II

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

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

Case Study : 3. Present your understanding of Deadlocks and new methodologies available in new Operating Systems released in the market.

UNIT III

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

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

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

Case Study 4. Present a paper on new methods used in Memory management in the present day Operating Systems .

UNIT IV

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

Case study: Implementation of protection in LINUX and Windows Operating Systems.

Text Book:

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

Reference Books:

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

Web References:

1. https://onlinecourses.swayam2.ac.in/cec20_cs06/preview
2. https://www.cse.iitb.ac.in/~mythili/os/
3. https://onlinecourses.nptel.ac.in/noc21_cs72/preview
4. https://web.stanford.edu/~ouster/cgi spring20/lectures.php
5. https://oscourse.org/
6. https://www.cs.jhu.edu/~huang/cs318/fall21/schedule.html

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Course Code &Title: MCA-24106 DESIGN AND ANALYSIS OF ALGORITHMS
Semester: I
Course Index: C106

Course Objectives:
The learning objectives of this course are:

Course Objectives

To learn about the Asymptotic Notations, Mathematical Analysis of Non-recursive and recursive Algorithms and sorting techniques.
To learn about the Divide-and-Conquer technique, Decrease-and-Conquer and Transform-and-Conquer techniques.
To learn about the Dynamic Programming and Greedy Technique
To learn about the Decision Trees, P, NP and NP- complete problems, Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.

Course Outcomes:
By the end of the course, the student will be

C106.1	Understand about the Asymptotic Notations, Mathematical Analysis of Non-recursive and recursive Algorithms and Selection Sort and Bubble sort, Sequential Search and Exhaustive Search.
C106.2	Understand about the Divide-and-Conquer technique, Decrease-and-Conquer and Transform-and-Conquer techniques.
C106.3	Understand the Optimal Binary Search Trees, The Knapsack Problem Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.
C106.4	Understand about the Decision Trees, P, NP and NP- complete problems, Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.

MCA-24106 DESIGN AND ANALYSIS OF ALGORITHMS

Instruction: 4Periods/week	**Time: 3Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

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

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

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

UNIT II

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

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

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

UNIT III

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

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

UNIT IV

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

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

Text Book:

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

Reference Books:

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

Web Resources:

1. https://nptel.ac.in/courses/106106131
2. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms
3. https://ocw.mit.edu/courses/6algorithms-spring
4. https://aofa.cs.princeton.edu/home/

Course Code &Title: MCA-24107 C PROGRAMMING AND DATA STRUCTURES LAB
Semester: I
Course Index: C107

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to write code for different types of programs using C Programming.
Learn how to write code programs of Data Structures.
Learn how to write/code and own programs using C Programming.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C107.1	Able to write code for different types of programs using C Programming.
C107.2	Able to write code programs of Data Structures.
C107.3	The students are able to write/code and own programs using C Programming.

MCA-24107: C PROGRAMMING AND DATA STRUCTURES LAB

Instruction: 3Hrs/week **Time: 3Hours** **Credits: 2**
Internal: 50 Marks **External: 50 Marks** **Total: 100Marks**

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

REFERENCE BOOKS:

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

Course Code &Title: MCA-24108 OPERATING SYSTEMS AND COMPUTER ORGANIZATION LAB
Semester: I
Course Index: C108

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to write code in UNIX operating system using some basic commands.
Learn how to write code some basic programs using Shell Programming.
Learn how to write/code different types of algorithms using C
Learn how to do Digital Logic Design Experiments
Learn how to do 8085/86Assembly Language Programs

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C108.1	The students able to write code in UNIX operating system using some basic commands.
C108.2	The students able to write code some basic programs using Shell Programming.
C108.3	The students are able to write/code different types of algorithms using C
C108.4	The students able to do Digital Logic Design Experiments
C108.5	The students able to write 8085/86 Assembly Language Programs

MCA-24108 OPERATING SYSTEMS AND COMPUTER ORGANIZATION LAB

Practical: 3 Periods /week **Time: 3 Hours** **Credits: 2**
Internal: 50 Marks **External: 50 Marks** **Total: 100 Marks**

OPERATING SYSTEMS LAB

1. Basic UNIX commands

Implement the following using Shell Programming

1. Input number even or odd.
2. Count the number of lines in the input text.
3. Calculate the sum of integers from 1 to N using a loop.
4. Search for a specific word in a file and counts its occurrences

Implement the following using C

2. FCFS CPU scheduling algorithm.
3. SJF CPU scheduling algorithm.
4. Round Robin CPU scheduling algorithm.
5. Priority CPU scheduling algorithm.
6. Implement Semaphores.
7. Bankers Algorithm for Deadlock Avoidance
8. FIFO Page Replacement Algorithm

REFERENCE BOOKS:

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

COMPUTER ORGANIZATION LAB

Digital Logic Design Experiments

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

8085/86AssemblyLanguageProgramming:

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

REFERENCE BOOKS:

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

Course &Title: MCA-24110 BRIDGE COURSE (FUNDAMENTALS OF COMPUTERS) (For General B.Sc/B.A./B.Com Students)
Course Index: C110

Course Objectives:
The learning objectives of this course are:

Course Objectives
Explain the concepts of computers and classify based on type and generation
Demonstrate the techniques of writing algorithms pseudo codes & schematic flow of logic in software development process.
Teach about Operating Systems and its concepts.
Teach about the purpose of networks and types of networks and media to connect the computers and learn about introduction to internet and email

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C110.1	Explain the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming
C110.2	Able to develop techniques of writing algorithms pseudo codes and logic
C110.3	Summarize the concepts of Operating Systems
C110.4	Recognize the Computer networks, types of networks and topologies, network devices and get introduction to internet and email.

MCA-24110 - BRIDGE COURSE

(For General B.Sc/B.A./B.Com Students)

FUNDAMENTALS OF COMPUTERS

Theory: 3Hrs/Week **Credits: 4**

Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT I

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

UNIT-II

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

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

UNIT III

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

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

UNIT IV

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

Course & Title: MCA-24111 BRIDGE COURSE LAB (FUNDAMENTALS OF COMPUTERS LAB) (For General B.Sc/B.A./B.Com Students)
Course Index: C111

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn about the internal parts of a computer, peripherals, I/O ports, connecting cables
Learn how to install Operating System, Demonstrate basic command line interface commands on MSDOS
Learn about Internet, Browsing, Email
Demonstrate Office Tools such as Word processors, Spreadsheets and Presentation tools
Writing Algorithms, Flow Charts for simple programs in C

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C111.1	Understand about the internal parts of a computer, peripherals, I/O ports, connecting cables
C111.2	Able to install Operating System, able to write basic command line interface commands on MSDOS
C111.3	Know about Internet, Browsing, Email
C111.4	Able to work on Office Tools such as Word processors, Spreadsheets and Presentation tools
C111.5	Able to Write Algorithms, Flow Charts for simple programs in C

MCA-24111-BRIDGE COURSE LAB

(For General B.Sc/B.A./B.Com Students)

FUNDAMENTALS OF COMPUTERS LAB

Lab: 3Hrs/Week **Credits: 4**

Internal: 50 Marks **External: 50 Marks** **Total: 100 Marks**

Computer Hardware:

Experiment 1: Identification of peripherals of a PC, Laptop, Server and Smart Phones

Experiment 2: Prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/ Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Operating Systems:

Experiment 3: Operating System installation: Installing an Operating System such as Windows on Computer hardware.

Experiment 4: MSDOS Operating System Internal Commands: chdir, cls, path, prompt, label, ver, vol, echo, set.

Experiment 5: MSDOS Operating System External Commands: scandisk, discopy, diskcomp, format, backup, restore

Introduction of Internet:

Experiment 6: Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails.

Office Tools:

Experiment 7: Office Tools: Demonstration and practice on Microsoft Word.

Experiment 8: Demonstration and practice on Microsoft Excel.

Experiment 9: Demonstration and practice on Power Point.

Introduction to Programming:

Experiment 10: Write simple C Programs with Algorithms and Flow Charts.

TEXT BOOKS:

1. Computer Fundamentals, Anita Goel, Pearson Education, 2017
2. PC Hardware Trouble Shooting Made Easy, TMH
3. C & Data Structures (A practical approach) - by G.S. Baluja and G.K.baluja, Dhanapatrai& Co publishers.

Semester II (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-24201	Computer Networks	75	25	100	4	-	4
MCA-24202	Object Oriented Programming through JAVA	75	25	100	4	-	4
MCA-24203	Database Management Systems	75	25	100	4	-	4
MCA-24204	Formal Languages and Automata Theory	75	25	100	4	-	4
MCA-24205	Data Mining Concepts and Techniques	75	25	100	4	-	4
MCA-24206	Elective-I 1. Artificial Intelligence and Expert Systems 2. Internet of Things 3. Image Processing	75	25	100	4	-	4
MCA-24207	Object Oriented Programming through JAVA Lab	50	50	100	-	3	2
MCA-24208	Database Management Systems Lab	50	50	100	-	3	2
MCA-24209	Skill Development Course with Python	50	50	100	1	2	2
	Total Credits						30

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

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

Course Code &Title: MCA-24201 COMPUTER NETWORKS
Semester: II
Course Index: C201

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the basics of computer networks and Data Communication.
To learn about Data Link Layer, IEEE Standards, design issues in networks.
To learn about Internet Transport Protocols and different types of protocols.
To learn about various types of Network Devices and different types of Networks

Course Outcomes:
By the end of the course, the student will be

C201.1	Understand the basics of computer networks and Data Communication.
C201.2	Understand about Data Link Layer, IEEE Standards, design issues in networks.
C201.3	Understand Internet Transport Protocols and different types of protocols.
C201.4	Overview of various types of Network Devices and different types of Networks

MCA-24201 COMPUTER NETWORKS

Instruction:4Hrs/week **Time:3 Hours** **Credits:4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT I

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

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

UNIT II

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

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

UNIT III

Internet Transport Protocols: Transport Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues.

Over View of DNS, SNMP, Electronic Mail, FTP, TFTP, BOOTP, HTTP Protocols, World Wide Web, Firewalls.

UNIT IV

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

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

Text Books:

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

Reference Books:

1. Computer Networks, Mayank Dave, Cengage.

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

Web Resources:

1. https://onlinecourses.swayam2.ac.in/cec23_cs07/preview2.
2. https://onlinecourses.nptel.ac.in/noc21_cs18/preview
3. https://www.sanfoundry.com/computer
4. https://www.cisco.com/c/en_in/solutions/enterprise computer-networking.html
5. https://www.cs.vu.nl/~ast/CN5/

Course Code & Title: MCA-24202 Object Oriented Programming through JAVA

Semester: II

Course Index: C202

Course Objectives:

The learning objectives of this course are:

Course Objectives
Learn Introduction to OOP and concept of Inheritance.
Learn about Interfaces, Packages and Enumeration, Exceptions & Assertions.
Learn about MultiThreading and Applets.
Learn the concept of Event Handling and Abstract Window Toolkit.

Course Outcomes:

By the end of the course, the student will be

Course Index	Course Outcomes
C202.1	Understand Introduction to OOP and concept of Inheritance.
C202.2	Understand about Interfaces, Packages and Enumeration, Exceptions & Assertions.
C202.3	Understand about Multi Threading and Applets.
C202.4	Understand the concept of Event Handling and Abstract Window Toolkit.

MCA-24202 Object Oriented Programming through JAVA

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

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

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

UNIT II

Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package. **Exceptions & Assertions** – Introduction, Exception handling techniques- try… catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions.

UNIT III

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

UNIT IV

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

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

Text Books:

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

References:

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

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc20_cs58/preview2.
2. https://www.iitk.ac.in/esc101/05Aug/tutorial/information/resources.html
3. https://docs.oracle.com/javas
4. https://www.javacodegeeks.com/best

Course Code &Title: MCA-24203 DATABASE MANAGEMENT SYSTEMS
Semester: II
Course Index: C203

Course Objectives:
The learning objectives of this course are:

Course Objectives

To learn about the Introduction of Database System, Data Modeling Using the Entity-Relationship Model
To learn about Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries
To learn about Relational Database Design, Indexing Structures for files
To learn about Transaction Processing, Concurrency Control Techniques

Course Outcomes:
By the end of the course, the student will be

C203.1	Able to understand the Introduction of Database System, Data Modeling Using the Entity-Relationship Model
C203.2	Able to understand Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries
C203.3	Able to understand Relational Database Design, Indexing Structures for files
C203.4	Able to understand Transaction Processing, Concurrency Control Techniques

MCA-24203 DATABASE MANAGEMENT SYSTEM

Instruction:4Periods/week **Time:3 Hours** **Credits:4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT I

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

Data Modeling Using the Entity-Relationship Model: Using High—Level Conceptual data model,Entitytypes,entitysetsAttributesandkeys,Relationshipstypes,relationshipsets,roles and structural constraints, Weak Entity types, ER diagrams Meaning conventions and design issues, Enhance Entity Relationship model,

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

UNIT II

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

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

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

UNIT III

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

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

UNIT IV

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

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

Text Book:

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

References Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw- Hill.

2. Database Concepts, Abraham Silberschatz, Henry F Korth, S Sudarshan, McGraw-Hill

Web Resources:

1. https://nptel.ac.in/courses/106105175

2. https://onlinecourses.swayam2.ac.in/cec22_cs18/preview

3. https://cs186berkeley.net/

4. https://www.youtube.com/playlist?list=PL52484DF04A264E59

Course Code & Title: MCA-24204 FORMAL LANGUAGES & AUTOMATA THEORY
Semester: II
Course Index: C204

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the concept of Finite Automata and Regular Expressions, Regular sets &Regular Grammars.
Learn the concept of Context Free Grammars and Languages, Push down Automata
Learn about Turing Machines, Universal Turing Machines and Undecidability in detail.
Learn the concept of The Propositional calculus and The Predicate calculus.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C204.1	Understand the concept of Finite Automata and Regular Expressions, Regular sets &Regular Grammars.
C204.2	Understand the concept of Context Free Grammars and Languages, Push down Automata
C204.3	Understand about Turing Machines, Universal Turing Machines and Undecidability in detail.
C204.4	Understand the concept of The Propositional calculus and The Predicate calculus.

MCA-24204 FORMAL LANGUAGES & AUTOMATA THEORY

Instruction: 4 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT-I

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

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

UNIT-II

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

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

UNIT-III

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

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

UNIT-IV

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

Course Code &Title: MCA-24205 DATA MINING CONCEPTS AND TECHNIQUES
Semester: II
Course Index: C205

Course Objectives:
The learning objectives of this course are:

Course Objectives

To learn about the overview of Data Warehouse Basic Concepts, Data Warehouse Modelling, Pre-processing

To learn about the Introduction to Data Mining, Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity

To learn about the Concept Description, Generalization by AOI, Mining Frequent Patterns, Associations and Correlations, Mining Frequent Itemset

To learn about the Basic Concepts of Classification, Different Methods of Classification

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C205.1	Able to understand about the overview of Data Warehouse Basic Concepts, Data Warehouse Modelling, Pre-processing
C205.2	Able to understand about the Introduction to Data Mining, Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity
C205.3	Able to understand about the Concept Description, Generalization by AOI, Mining Frequent Patterns, Associations and Correlations, Mining Frequent Item set
C205.4	Able to understand about the Basic Concepts of Classification, Different Methods of Classification

MCA-24205 DATA MINING CONCEPTS AND TECHNIQUES

Instruction:4Periods/week **Time:3Hours** **Credits: 4**

Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

Text Book:

1. Data Mining Concepts and Techniques—JiaweiHan, MichelineKamber and Jian Pei,Morgan Kaufman Publications 3rd edition.

Reference Books:

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

Web Resources:

https://nptel.ac.in/courses/106/105/106105174/

https://www.saedsayad.com/data_mining.html

https://www2.cs.uh.edu/~arjun/courses/dm/

https://www.rdatamining.com/resources/onlinetutorials

https://dataminingbook.inf

Course Code &Title: MCA-24206 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS (Elective-I)
Semester: II
Course Index: C206

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the basic concept of Artificial Intelligence.
To learn about the algorithms and logics in Artificial Intelligence.
To learn about the theories and functions related to Artificial Intelligence.
To learn about the concept, characteristics and applications of Expert Systems.

Course Outcomes:
By the end of the course, the student will be

C206.1	Understand the basic concept of Artificial Intelligence.
C206.2	Understand the algorithms and logics in Artificial Intelligence.
C206.3	Understand about the theories and functions related to Artificial Intelligence.
C206.4	Understanding the concept, characteristics and applications of Expert Systems.

MCA-24206 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS (Elective-I)

Instruction:4Periods/week **Time:3Hours** **Credits: 4**

Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT- I

Problems and Search: What is Artificial Intelligence, The AI Problems, and Underlying Assumption, what is an AI Technique?

Problems, Problems Spaces, and Search: Defining the problem as a state space search, production systems, problems characteristics, issues in the design of search programs.

UNIT- II

Heuristic Search Techniques: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Means-Ends Analysis, Genetic Algorithms; Constraint Satisfaction Problems, Backtracking Search for CSPs, Games, Optimal Decisions in Games.

Knowledge Representation Issues: Representations and Mapping, Approaches to Knowledge Representation, The frame problem, The Wumpus World.

UNIT- III

Representing Knowledge using Rules: Procedural Vs Declarative knowledge, Logic Programming, Forward Vs Backward Reasoning, Matching, Control Knowledge

Symbolic Reasoning under Uncertainty: Introduction to Nonmonotonic Reasoning, Logics for Non-monotonic Reasoning, Implementation issues, Augmenting a Problem solver, implementation: DFS, BFS.

Statistical Reasoning: Probability and Bayes Theorem, Certainty Factors and Rule-Based Systems. Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic.

UNIT- IV

Expert System, Concepts and Characteristics, Applications and Domains of Expert System, Elements of an Expert System, Stages in the Development of an Expert System, Semantic Nets, Frames.

Speech Recognition, Forms of Learning, Inductive learning, Learning Decision Trees, Single Layer Feed Forward, Multi-Layer Feed Forward Neural Networks.

TEXT BOOKS

1. Artificial Intelligence, Second Edition, Elaine Rich, Kevin Knight, Tata McGraw-Hill Edition.
2. Expert Systems: Principles and Programming, Joseph C Giarratano, Gary D Riley Thomson Publication, 4th Edition.

Reference Books:

1. Artificial Intelligence: A Modern Approach, Stuart Russell, Peter Norvig, Pearson Education 2nd Edition.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc22_cs56/preview
2. https://cse.iitk.ac.in/users/cs365/2015/resources.html
3. https://artint.info/3e/resources/index.html
4. https://web.dev/explore/ai

Course Code &Title: MCA-24206 INTERNET OF THINGS (Elective-I)
Semester: II
Course Index: C206

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Introduction to Internet of Things, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs
To learn about the IOT & M2M, SNMP
To learn about the IoT Platforms Design Methodology
To learn about the IoT Physical Devices & Endpoints

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C206.1	Able to understand about the Introduction to Internet of Things, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs
C206.2	Able to understand about the IOT & M2M, SNMP
C206.3	Able to understand about the IoT Platforms Design Methodology
C206.4	Able to understand about the IoT Physical Devices & Endpoints

MCA-24206 INTERNET OF THINGS(Elective-I)

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

Text Book:

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

Reference Book:

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

Web Resources :

https://onlinecourses.nptel.ac.in/noc22_cs53/preview
http://digimat.in/nptel/courses/video/106105166/L02.html
https://www.oracle.com/in/internet-of-things/
https://onlinecourses.nptel.ac.in/noc24_cs95/preview

Course Code &Title: MCA-24206 IMAGE PROCESSING (Elective-I)
Semester: II
Course Index: C206

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Fundamentals of Image Processing, Basics of Histogram , Definition and Algorithm of Histogram Equalization
To learn about the Image Transforms**:** A Detail Discussion On Fourier Transform, DFT,FFT, Image Enhancement
To learn about the EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters, Image Compression
To learn about the Image Segmentation, Morphology

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C206.1	Able to understand about the Fundamentals of Image Processing, Basics of Histogram, Definition and Algorithm of Histogram Equalization
C206.2	Able to understand about the Image Transforms**:** A Detail Discussion on Fourier Transform, DFT, FFT, Image Enhancement
C206.3	Able to understand about the EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters, Image Compression
C206.4	Able to understand about the Image Segmentation, Morphology

MCA-24206 IMAGE PROCESSING (Elective-I)

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT I

Fundamentals of Image Processing: Image Acquisition, Image Model, Sampling, Quantization, Relationship between Pixels, Distance Measures, Connectivity, Image Geometry, Photographic Film.

Histogram: Definition, Decision of Contrast Basing On Histogram, Operations Basing on Histograms Like Image Stretching, Image Sliding, Image Classification. Definition and Algorithm of Histogram Equalization.

UNIT II

Image Transforms: A Detail Discussion on Fourier Transform, DFT, FFT.

Image Enhancement:

a) Arithmetic and Logical Operations, Pixel or Point Operations, Size Operations.
b) Smoothing Filters-Mean, Median, Mode Filters – Comparative Study.
c) Edge Enhancement Filters – Directorial Filters, Sobel, Laplacian, Robert, KIRSCH Homogeneity.
d) Low Pass Filters, High Pass Filters, Sharpening Filters. – Comparative Study.

UNIT III

Image Enhancement: Design of Low Pass, High Pass, EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters in Frequency Domain Advantages of Filters in Frequency Domain, Comparative Study of Filters in Frequency, Domain and Spatial Domain.

Image Compression: Run Length Encoding, Contour Coding, Huffman Code, Compression Due to Change in Domain, Compression Due to Quantization Compression at the Time of Image Transmission. Brief Discussion on: -Image Compression Standards.

UNIT IV

Image Segmentation: Characteristics of Segmentation, Detection of Discontinuities, Thresholding Pixel Based Segmentation Method. Region Based Segmentation Methods, Segmentation by Pixel Aggregation, Segmentation by Sub Region Aggregation, Histogram Based Segmentation, Spilt and Merge Technique, Motion in Segmentation.

Morphology: Dilation, Erosion, Opening, Closing, Hit-And-Miss Transform, Boundary Extraction, Region Filling, Connected Components, Thinning, Thickening, Skeletons, Pruning Extensions to Gray – Scale Images, Application of Morphology inIP.

Text Book:

1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, Addison Wesley

Reference Books:

1. Fundamentals Of Electronic Image Processing By Arthyr– R – Weeks,Jr.(PHI)
2. Image Processing, Analysis and Machine Vision by Milan SonkaVaclanHalavaRoger Boyle, Vikas Publishing House.
3. Digital Image Processing, S. Jayaraman, S. Esakkirajan & T. VeeraKumar, TMH.
4. Fundamentals of Digital Image Processing, Chris Solomon, Tobi Breckon, Wiley-Blackwell.

Web References :

https://archive.nptel.ac.in/courses/106/105/106105216/
https://www.mathworks.com/discovery/image-segmentation.html
https://www.analyticsvidhya.com/blog/2019/04/introduction-image-segmentation-techniques-python/

Course Code & Title: MCA-20207 Object Oriented Programming through JAVA Lab
Semester: II
Course Index: C207

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to write programs in Java using OOP.
Learn how to write programs related to real life scenario.
Learn how to write programs in Java using Inheritance and using Adapter classes.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C207.1	Students can able to write programs in Java using OOP.
C207.2	Students can able to code programs related to real life scenario.
C207.3	Students can able to code programs in Java using Inheritance and using Adapter classes.

MCA-24207 Object Oriented Programming through JAVA Lab

Instruction: 3 Periods/week **Time: 3 Hours** **Credits: 2**

Internal: 50 Marks **External: 50 Marks** **Total:100 Marks**

1. 1.Write a java program to print quadratic roots using command line arguments.
2. Write a java program to print multiplication table using arrays.
3. Write a java program to demonstrate method overloading concept.
4. Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
5. Write a java program to implement hierarchical inheritance.
6. Write a java program to demonstrate multiple inheritance by using Interface.
7. Write a java package for book class and then import and display the result.
8. Write a java program to implement the concept of exception handling by creating user defined exception.
9. Write a java program to show multi-threaded application.
10. Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button is clicked.
11. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).
12. Write a java program using swing components.

TEXT BOOKS

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education Pvt. Ltd.

2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

Course Code &Title: MCA-24208 DATABASE MANAGEMENT SYSTEMS LAB
Semester: II
Course Index: C208

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to write SQL queries using DDL, DML, DCL commands
Learn how to write SQL queries on aggregate and conversion functions
Learn how to write PL/SQL programs on exception handling, control structures
Learn how to write PL/SQL programs on cursors, procedures, triggers.

Course Outcomes:
By the end of the course, the student will be

C208.1	Able to write SQL queries using DDL, DML, DCL commands
C208.2	Able to write SQL queries on aggregate and conversion functions
C208.3	Able to write PL/SQL programs on exception handling, control structures
C208.4	Able to write PL/SQL programs on cursors, procedures, triggers.

MCA-24208 DATABASE MANAGEMENT SYSTEMS LAB

Practical: 3Periods/week **Time:3Hours** **Credits: 2**
Internal:50Marks **External:50Marks** **Total: 100Marks**

SQL

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

PL/SQL

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

Text Books:

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

Course Code &Title: SKILL DEVELOPMENT COURSE WITH PYTHON
Semester: II
Course Index: C209

Course Objectives:
The learning objectives of this course are:

Course Objectives
To introduce to the basics of Python Programming language
To discuss various functions and methods of Python Programming
To learn about Multithread Programming and GUI Programming
To study Web Programming and Database Programming

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C209.1	Able to understand the basics of Python Programming language
C209.2	Able to use various functions and methods of Python Programming
C209.3	Able to comprehend Multithread Programming and GUI Programming
C209.4	Able to understand Web Programming and Database Programming

MCA-24209 SKILL DEVELOPMENT COURSE WITH PYTHON

Instruction: 3Hrs/week **Time: 3 Hours** **Credits: 2 Internal: 50 Marks** **External: 50 Marks** **Total: 100 Marks**

List of Experiments:

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

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

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

TEXTBOOKS:

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

REFERENCES:

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

MODEL QUESTION PAPERS

ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA
MCA I Semester
MCA-24101 DISCRETE MATHEMATICAL STRUCTURES
MODEL QUESTION PAPER

Time:3 hrs. **Max.Marks: 75**

SECTION- A (4 X 15 = 60 M)
Answer ALL Questions

1(a) Show that $p \to q$ and $\neg q \to \neg p$are logically equivalent. (7 M)

(b) Show that the relation ≤(less than or equal to) defined on the set of positive integers Z^+ is a partialorder relation. (8M)

(or)

(c) S.T $R \wedge (P \vee Q)$ is a valid conclusion from the premises $P \vee Q$, $Q \Rightarrow R$, $P \Rightarrow M$ and $\neg M$. (7M)

(d) If R be a relation in the set of integers z defined by R = {(x,y)/:x$\in z, y \in z$, (x-y) is divisible by 6}. (8M)

2(a) Solve the recurrence relation $a_n = a_{n-1} + 2,\ n \geq 2$ subject to initial condition $a_1 = 3$ (7M)

(b) How many ways are there to assign five different jobs to four different employees if every employee isassigned atleast one job? (8M)

(or)

(c) Applyingpegion hole principle show that of any 14 integers are selected from the set

S= {1,2,3,….,25} there are atleast two whose seem is 26.Also write a statement that generalizes thisresult. (7M)

(d) In a class of 25 students, 12 have taken mathematics. 8 have taken mathematics but not biology.Find the number of students who have taken mathematics and biology and those who have taken biology but not mathematics. (8M)

3(a) If G= (V,E) be a directed graph with e edges , then $\sum_{v \in V} \underset{G}{deg^+}(V) = \sum_{v \in V} \underset{G}{deg^-}(V)$ = e (7M)

(b) Show that C_6 is a bipartite graph. (8M)

(or)

(c) Show that the complete graph K_n has a Hamiltonian cycle. (7M)

(d) Prove that a tree with n vertices has n-1 edges. (8M)

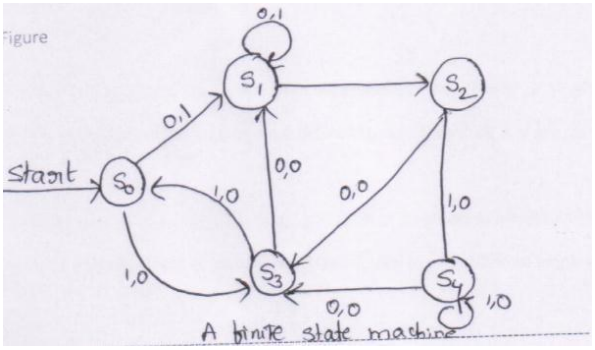
4. (a)Find the sum of products expansion for the function $F(x, y, z) = (x + y)\bar{z}$ (7M)

(b) Construct circuits that produce the following outputs (i)$(x + y)\bar{}\,x$(ii)$\bar{x}(\bar{\bar{y}}+y)$ (8M)

(or)

(c) Show that distributive law $x(y + z) = xy + xz$ is valid (7)

(d)Construct the state table for the finite state machine with the state diagram shown in the following Figure (8)



SECTION-B(5*3=15M)

5. **Answer any Five Questions of the following**

a. Construct the truth table for $p \mathsf{A} (\sim q \vee q)$

b. Write the following in symbolic form

Every person is precious.

c. Compute $\frac{20!}{18!}$

d. Prove $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

e. State and prove Hand shaking theorm

f. Define Hamilton circuit Hamiltonian graph give examples to each

g. Find the duals of $x(y + 0)$ and $\bar{x}.1 + (\bar{y} + z)$

h. Let A= {1,00} , find A^n for n= 0,1,2 and 3

ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA
MCA I Semester
MCA-24102 MANAGEMENT ACCOUNTANCY
MODEL QUESTION PAPER

Time:3Hrs **Max Marks: 75**

SECTION- A(4 X 15 = 60 M)

Answer ALL Questions

1. a) Define Accounting Process? Explain various Branches of Accounting. [15]

(OR)

b) Give detailed proforma for Trading A/C, P&L A/C and Balance Sheet. [15]

2. a) What do you mean by financial statement analysis? Explain the importance ofRatio analysis in analyzing the financial strength ofanorganization? [15]

(OR)

b) Distinguish between Funds flow and cash flow analysis [15]

3. a) Explain the nature and importance of budgets and budgetary control in planningand coordinating the functional activities ofanorganization? [15]

(OR)

b) Calculate P/V ratio, BEP and Margin of Safety from the following data of a manufacturing Enterprise.

Selling price	10 Rs
Variable Cost	6 Rs
Fixed Cost	40,000 Rs
Actual Sales	16,500 Units

[15]

4. a) What are the various types of documents used for data collection in computerized accounting system? [15]

(OR)

b) Explain the importance of coding logics in computerized accounting system? [15]

SECTION – B (5×3=15 Marks)

Answer any five Questions

5. a) Double entry system
   b) Closing entities
   C) Liquidity ratios
   d) Working Capital Cycle
   e) Master Budget
   f) Assumptions of Break even analysis
   g) Transaction files
   h) Flexibility budget

ADITYA DEGREE & PG COLLEGE (A):: KAKINADA

MCA I Semester

MCA-24103 C Programming and Data Structures

MODEL QUESTION PAPER

Time:3 Hrs. **Max Marks:75**

SECTION- A(4 X 15 = 60 M)

Answer ALL Questions

1. a) Explain the structure of a C program with example. [15M]

(Or)

b) List and explain loop control statements in C. [15M]

2. a) Write a C program to find the kth smallest in the given array. [15M]

(Or)

b) Explain in detail about Character pointers and functions [15M]

3. a) Discuss Robin Karp Algorithm [15M]

(Or)

b) Explain about Formatted I/o, file I/O operations [15M]

4. a) Write an algorithm for infix to postfix conversion. [15M]

(Or)

b) Describe operation on a stack with examples [15M]

SECTION – B (5 X 3 = 15 M)

Answer any FIVE of the following

5.

(a) What are the various basic data types in C?

(b) Write the syntax for conditional operator.

(c) Differentiate between putchar( ) and puts ( ).

(d) Describe the steps in writing a function in a C program.

(e) List the four storage classes in C.

(f) How do you declare a two dimensional array? Give its memory representation.

(g) Compare structures and unions.

(h) What are the uses of Pointers?

ADITYA DEGREE & PG COLLEGE (A):: KAKINADA

MCA I-Semester

MCA-24104 COMPUTER ORGANIZATION

MODEL QUESTION PAPER

Time:3Hrs **Max Marks: 75**

SECTION- A(4 X 15 = 60 M)

Answer ALL Questions

1. a) What is Flip-Flop? Explain various types of Flip-Flop. 15M

(Or)

b) Write about Decoder and Multiplixers and also Construct 8 to 1 Line multiplexers 15M

2. a) Explain Data types, Complements and fixed –point representation. 15M

(Or)

b) Draw and Explain 8085 microprocessor Architecture. 15M

3. a) Describe the mechanism of an instruction cycle and memory reference instructions. 15M

(Or)

b) Explain instruction formats and addressing modes 15M

4. a) Write about Asynchronous data transfer methods and Explain DMA transfer with block diagram. 15M

(Or)

b) What is the difference between main memory and Auxiliary memory and Explain the mapping process of Cache memory.

SECTION – B(5 X 3 = 15 M)

Answer any FIVE of the following

5. a) Logic Gates.
b) Registers and memoryunit.
c) Floating point representation.
d) Arithmetic microoperations.
e) Timing andControl.
f) Stackorganization.
g) I/Ointerface.
h) Virtualmemory

ADITYA DEGREE & PG COLLEGE (A):: KAKINADA

MCA I Semester

MCA-24105 OPERATING SYSTEMS

MODEL QUESTION PAPER

Time:3Hrs **Max marks: 75**

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. Write short note on (5*3=15)
   a) i)Main frame Systems ii) Multiprocessor Systems
   iii)Distributed Systems iv) Real Time Systems
   v) Functions of OS
   (OR)
   b) i) Write short notes on System calls.
   ii) Explain System Structure. [8+7]
2. a) i) Explain Interprocess Communications.
   ii) Write short notes on communication in Client-Server Systems. [9+6]
   (OR)
   b) Compare and Construct preemptive and non-preemtive scheduling algorithms.

3. a) Write a short notes on Demand Paging and Segmentation.
   (OR)
   b) i) Explain various Page Replacement Algorithms.
   ii) Write a short notes on Disk Management and Disk Scheduling. [8+7]
4. a) Describe protections concepts and mechanisms provided by an operating system.
   (OR)
   b) Explain OS Concepts with respect to LINUX.

SECTION– B (5X3=15Marks)

Answer any FIVE Questions

5. a)Threads
   b) Dining Philosophers Problem
   c) Paging
   d) File Operations
   e) Process
   f) Methods for Handling Deadlocks
   g) Directory Structure
   h) User Authentication

ADITYA DEGREE & PG COLLEGE (A):: KAKINADA

MCA-I -Semester

MCA-24106 Design and Analysis of Algorithms

MODEL QUESTION PAPER

Time:3Hrs **Max marks: 75**

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) Define Algorithm. Explain fundamentals of Algorithmic problem solving.

(OR)

b) Define space and time complexity. Explain different types of Asymptotic notations.

2. a) Explain divide and conquer solution for quick sort. Illustrate with examples.

(OR)

b) Explain DFS and BFS search using decrease and conquer technique with examples.

3. a) Explain Floyd's algorithm for all-pairs shortest path problem with an example.

(OR)

b) Explain Greedy method .Discuss Krushkal's algorithm for minimum spanning tree.

4. a) Explain NP-Complete and NP-Hard problems.

(OR)

b) Explain n-queen problem using backtracking technique.

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5. a). Analysis of recursive algorithm.

b) Strassen's matrix multiplication

c) Binary search algorithm.

d) Horner's rule.

e) Horspool's algorithm.

f) Dijkstra's algorithm.

g) Decision tree.

h) Hamiltonian circuit problem.

ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA

MCA-I -Semester

MCA-24110 Bridge Course (Fundamentals of Computers)

MODEL QUESTION PAPER

Time:3Hrs **Max marks: 75**

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) Draw the Block Diagram of Computer and explain the functioning of Computer units.

(OR)

b) Convert the decimal number $(985647)_{10}$ in to Binary, Octal and Hexadecimal Systems.

2. a) Explain about different types of Operating Systems.

(OR)

b) Explain about the process of Mail Merge in MS Word with example.

3. a) Explain about types of Network Topologies.

(OR)

b) Explain about Email management.

4. a) Explain about algorithm and flowchart with examples.

(OR)

b) Explain about Assemblers, Compilers and Interpreters.

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5. a) Types of Memories.

b) Functions of Operating System

c) Define any three network devices

d) Types of Programming Languages

e) Types of Software

f) What are the effects in Custom Animation

g) Types of networks

h) Programming Features

ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA

MCA-II -Semester

MCA-24201 Computer Networks

MODEL QUESTION PAPER

Time:3Hrs **Max marks: 75**

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a)With a neat block diagram explain the TCP/IP reference model. List out the limitations of the model. [15]

(OR)

(b) What are the functions of the physical layer?

(c) Give the physical description, characteristics, and uses of all the guide transmission media. [5+10]

2 (a) Explain Sliding Window Protocol

(b) Differentiate Error detection and Correction Codes [8+7]

(OR)

(c) Explain Link State Routing Protocol

(d) What are the methods of congestion control in datagram subnets [10+5]

3 (a) what is TCP protocol? How is connection management done by TCP?

(b) Explain how TCP controls congestion [8+7]

(OR)

(c) Explain SMTP and MIME [15]

4(a) Compare the different network devices [15]

(OR)

(b) Write brief notes on Mobile Adhoc Networks and Sensor networks [15]

SECTION – B (5X3=15 Marks)

Answer any FIVE Questions

5. (a) ATM Reference Model
   (b) Explain Frequency Division Multiplexing
   (c) Give the format of IPv4 header
   (d) IPv4 Address Classes
   (e) What are the various timers used by TCP and what are their purposes?
   (f) Difference between TCP and UDP
   (g) Short Notes on Firewalls
   (h) Wireless Access Points

ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA
MCA-II Semester
MCA-24202 OBJECT ORIENTED PROGRAMMING THROUGH JAVA
MODEL QUESTION PAPER

Time:3 Hrs. **Max Marks:75**

SECTION- A(4 X 15 = 60 M)

Answer ALL Questions

1. a) Explain about Principles of Object Oriented Languages. [15M]

(Or)

a) What is the purpose of constructor in Java programming [15M]

2. a) Define inheritance. What are the benefits of inheritance? What costs are associated with inheritance? How to prevent a class from inheritance? [15M]

(Or)

b) Write a program to demonstrate hierarchical and multiple inheritance using interfaces. [15M]

3. a) Explain in details about Thread. [15M]

(Or)

b) Discuss about Applet Life Cycle. [15M]

4. a) Write a program with nested try statements for handling exception. [15M]

(Or)

b) How to move/drag a component placed in Swing Container? Explain. [15M]

SECTION– B (5X3=15Marks)

Answer any FIVE Questions

5.

a. Differentiate between print() and println() methods in Java.
b. What are symbolic constants? Explain with examples.
c. What are the methods available in the character streams?
d. What is the significance of the CLASSPATH environment variable in creating/using a package?
e. What is the difference between error and an exception?
f. What is synchronization and why is it important?
g. What is the significance of Legacy class? Give example.
h. What is an adapter class? Explain with an example.

ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA
MCA-II Semester
MCA-24203 DATABASE MANAGEMENT SYSTEMS
MODEL QUESTION PAPER

Time:3 Hrs. **Max Marks:75**

SECTION- A(4 X 15 = 60 M)
Answer ALL Questions

1. a) Write a brief note on advantages and applications of DBMS [8M]
b) Briefly explain about Three-Schema Architecture with neat diagram [7M]

Or

c.) Briefly discuss about Database System Environment with neat diagram [15M]

2. a) Explain in detail about various key constraints used in database system with examples [10M]
b) Explain about Relational Algebra Set Operations with examples [5M]

Or

c) Explain in detail about Tuple and Domain Relational Calculus with examples [15M]

3. a) What is Normalization? Briefly explain the types of normal forms with an example [15M]

Or

b) Explain how a dynamic multi level indexes can be created using B Trees and B+Trees with example. [15M]

4. a) What is Serializability? Briefly explain the different types of Serializability [15M]

Or

b) Briefly explain the following Concurrency Control Techniques
i) Two Phase Locking Protocol [8M]
ii) Validation Concurrency Control [7M]

SECTION– B (5X3=15Marks)
Answer any FIVE Questions

5. a) Define DBMS, Schema, Instance. What is weak entity? Explain with example
b) What is Data Independence? Specify the classification
c) Give a brief note on Insert, Delete, and Update Queries in SQL with examples
d) What is View in SQL? Create a view and perform DML operations on it
e) What is Functional Dependency? Classify.
f) Give a brief note on Buffering Blocks
g) What is Transaction? Discuss Characteristics of Transaction
h) Give a brief note on Shadow Paging technique.

ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA

MCA-II Semester

MCA-24204 Formal Languages and Automata Theory

MODEL QUESTION PAPER

Time:3 Hrs. **Max Marks:75**

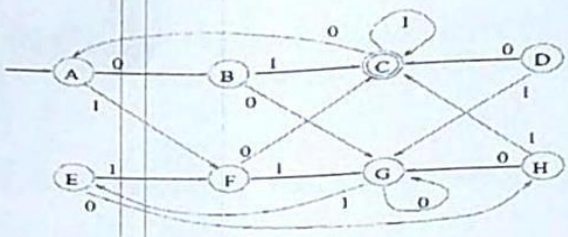
SECTION-A

Answer ALL Questions (4 x 15 = 60)

1. a) Let r be a regular expression. Then there exists some NFA with e-transitions that accepts $L(r)$?

   (OR)

   b) What is the use of Membership algorithm and construct the minimum state automaton equivalent to the transition diagram given below



2. a) State and prove pumping lemma for CFL's? 8M
   b) Explain any five closure properties of Regular sets? 7M

   (OR)

   c) Construct a PDA to accept L={WW^R/ W in (0+1)*} ?

3. a) Copstruct a TM to accept L={$a^n b^n c^n$/ n>=1}?

   (OR)

   b) Briefly discuss combining Turing Machines? 8M
   c) Discuss the halting problem of Turing machine? 7M

4. a) Syntax of predicate calculus? 7M
   b) Explain truth assignment? 8M

   (OR)

   c) Explain validity and Satisfiability?

SECTION-B

Answer any FIVE Questions (5 x 3 = 15)

5. a) What is transition system?
   b) What are the differences between DFA and Non-DFA?
   c) Explain any three closure properties of regular sets?
   d) Briefly discuss simplification of CFL's ?
   e) Define Turing machine?
   f) What is Post Correspondence Problem?
   g) Explain Normal forms?
   h) Discuss NP-completeness

ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA
MCA-II Semester
MCA-24205 Data Mining Concepts and Techniques
MODEL QUESTION PAPER

Time:3 Hrs. **Max Marks:75**

SECTION- A(4 X 15 = 60 M)
Answer ALL Questions

1.a) Explain with a neat diagram the three-tier architecture of a Data Warehouse 7M
b) Explain the OLAP operations in a Multidimensional data. 8M

Or

c) Why do we pre-process data? Explain different techniques in data cleaning, integration and transformation 15M

2. a) Data Mining should be applicable to any kind of data repositories, including data streams. What are the different kinds of data on which mining can be applied? 10M

b) Mention different issues in Data Mining. 5M

Or

c) Explain in detail how the data is measured differently in statistical descriptions 8M
d) Where can data mining be applied? Explain different domains of applications 7M

3. a) Explain FP-Growth Algorithm with an example. 8M
b) Explain AOI Algorithm. 7M

Or

c) Explain Apriori property and explain the algorithm associated with it 8M
d) How to generate Closed and Max patterns 7M

4. a) What is the difference between classification and Prediction? How a decision tree is Constructed 10M
b) Explain Support Vector Machines concept 5M

Or

c) Explain Bayesian Classification Methods. How Classification by back propagation is Obtained 7M
d) Explain k-means Clustering and compare that with k-medoids algorithm 8M

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5. Write a Short note on
a) DBSCAN Algorithm
b) Tree Pruning
c) Concept Description.
d) Frequent Item sets using vertical data format
e) Multilevel Association Rules
f) Data Visualization
g) Similarity and Dissimilarity of data
h) Data Cube Technology

ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA
MCA-II Semester
MCA-24206 Artificial Intelligence and Expert Systems (Elective-I)
MODEL QUESTION PAPER

Time:3 Hrs. **Max Marks:75**

SECTION- A(4 X 15 = 60 M)
Answer ALL Questions

1. a) Describe any one informed search strategy and uninformed search strategy.
   (OR)
   b) Explain four basic kinds of agents that underlie almost all intelligent systems.
2. a) Explain how optimal strategies lead to optimal decisions in games.
   (OR)
   b) Describe resolution and unification
3. a) Explain different approaches to uncertain reasoning. (OR)
   b) Describe multi attribute utility functions
4. a) Explain the stages in the development of an expert system.
   (OR)
   b) Briefly explain the concept of neural networks.

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5.

a) Define AI. What is Turing Test?

b) Specify the basic components of a problem.

c) Write a short notes on CSP.

d) Give the BNF of sentences in propositional logic.

e) Axioms of probability.

f) Axioms of utility theory.

g) Applications of expert systems

h) Frames

ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA
MCA-II Semester
MCA-24206 Internet of Things (Elective-I)
MODEL QUESTION PAPER

Time:3 Hrs. **Max Marks:75**

SECTION- A(4 X 15 = 60 M)
Answer ALL Questions

1. **a)** What is the IoT? Explain Design guidelines for IoT **(15M)**

Or

b) Explain in detail application of Internet of Things in Smart Cities **(15M)**

2. **a)** Explain M2M. Distinguish between IoT and M2M **(8M)**

b) Explain SDN and NFV for IoT **(7M)**

Or

c) Explain IoT System Management with NETCONF-YANG **(8M)**

d) Explain limitations of SNMP **(7M)**

3. **a)** Explain Design Methodology for IoT **(15M)**

Or

b) Explain Logical Design of IoT suing Python. Explain various python packages used for IoT **(15M)**

4. a) What is Raspberry Pi. Explain Raspberry Pi Board and various interfaces in Raspberry pi. **(15M)**

Or

b) What is Cloud? Explain various Cloud Storage Models using in IoT **(15M)**

Section-B (5 X 3 =15 Marks)

5. **Write a Short Note on any FIVE of the following**

a) Explain Wireless Sensor Networks

b) Explain IoT in Environment

c) Explain Need for IoT Systems Management

d) Explain NETOPEER

e) Explain various data types used in Python

f) Explain basic building blocks of IoT Device

g) Explain Amazon Web Services for IoT

h) Explain Django Architecture.

ADITYA DEGREE & PG COLLEGE (A) :: KAKINADA
MCA-II Semester
MCA-24206 Image Processing (Elective-I)MODEL QUESTION PAPER

Time:3 Hrs. **Max Marks:75**

SECTION- A(4 X 15 = 60 M)

Answer ALL Questions

1. a) Explain the elements of Digital Image Processing System with a neat diagram. (15M)

OR

b)Explain terms: Neighbours of a Pixel **,** Adjacency, Connectivity, Regions, and Boundaries **,** Distance measures **,** Image Operations on a Pixel Basis. (15M)

2. a) Define and explain low pass filters and high pass filters in brief. (7M)

b) Define and edge. Explain various edge enhancement filters. (8M)

OR

c) Discuss histogram techniques for Image enhancement: Histogram specification (Matching.**,**Histogram Equalization , Local enhancement. (15M)

3. a) Explain Lossy compression and Lossy predictive coding

OR

b) Explain the Morphological Algorithms: Boundary Extraction, Region Filling. (15M)

4. a) Distinguish Global Processing via the Hough Transform and via the Graph-TheoreticTechniques.
(15M)

OR

b) What is Thresholding? Explain about Global Thresholding. (15M)

SECTION-B (5 X 3 =15 MARKS)

5. Write a Short Note on any FIVE of the following

- **a)** How do you acquire an image? Explain in detail
- **b)** What is Image Sampling and Quantization?
- **c)** Compare one dimension and two dimension DFT
- **d)** Distinguish between spatial domain techniques and frequency domain techniquesof Image enhancement
- **e)** Explain about the Dilation and Erosion
- **f)** Draw the relevant diagram for source encoder and source decoder
- **g)** Explain the Detection of Discontinuities: Point Detection, Line Detection, Edge Detection
- **h)** Explain about Region-Based Segmentation

EXTERNAL & INTERNAL EVALUATION PATTERN

Allotment of Marks:

Theory 100 Marks

External Evaluation : 75Marks

Internal Evaluation : 25 Marks

Practicals 100 Marks

External Evaluation : 50Marks

Internal Evaluation : 50 Marks

Theory:

All papers carry 100 Marks.

75 Marks are allotted to Semester End written examination.

25 Marks are allotted for internal examinations, Two midterm tests will be conducted for 25 marks each and average mark will be taken.

Practical Papers are:

All papers carry 50 Marks.

1. Documentation/Practical Writing : 10 Marks
2. Practical Execution : 20 Marks
3. Observation & Record : 10 Marks
4. Viva : 10 Marks