MASTER OF COMPUTER APPLICATION

ASSIGNMENTS

MCA – 2nd SEMESTER

(SESSON 2024-2025)

Directorate of Distance Education
Guru Jambheshwar University of Science & Technology
Hisar - 125001

GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR

DIRECTORATE OF DISTANCE EDUCATION

Programme: MCA 2-Year **Course: Data Structures and Algorithms**
Sem.: 2nd **Code: MCA-21**

Important Instructions:

1) Attempt all questions from each assignment given below.
2) Each assignment carries 15 marks.
3) All questions are to be attempted in legible handwriting on plane white A-4 size paper and same is uploaded through login your account.

ASSIGNMENT-I

Q1. Define linked list. Also write an algorithm for inserting a new node into a linked list and explain with example.

Q2. What is stack. Write an algorithm/function to convert an expression from infix to postfix using stack with example.

Q3. Consider the following data and construct a binary tree using in-order and pre-order traversal.
In-order traversal: 15, 25, 10, 30, 20, 35, 40, 50, 45
Pre-order traversal: 30, 10, 25, 15, 20, 35, 40, 50, 45

ASSIGNMENT-II

Q1. Write a function to perform heap sort on a given array of integers. Show how the array changes step by step.

Q2. Define Warshall's algorithms with example.

Q3. Explain Quick Sort. Discuss how its average and worst-case time complexities differ. Write an algorithm to implement Quick Sort.

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Programme: MCA 2-Year **Course: Python Programming**
Sem.: 2nd **Code: MCA-22**

Important Instructions:

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2) Each assignment carries 15 marks.
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ASSIGNMENT-I

Q1. What are identifiers in Python? State the rules for naming identifiers.

Q2. What are the different types of operators in Python? Write expressions using each type of operator and explain the output.

Q3. Explain the syntax and working of the while loop in Python. Write a Python program using a while loop to print the first 10 natural numbers.

ASSIGNMENT-2

Q1. What is inheritance? Write a program that demonstrates inheritance in Python.

Q2. Write SQL queries for Create, Insert, Select, Update, and Delete operations and explain how to execute them in Python.

Q3. Explain with functions like plot(), bar(), pie(), hist(), xlabel(), ylabel(), title(), and legend().

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GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR

Programme: MCA 2-Year **Course: Artificial Intelligence**
Sem.: 2nd **Code: MCA-23**

Important Instructions:

1) Attempt all questions from each assignment given below.
2) Each assignment carries 15 marks.
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ASSIGNMENT-1

Q1. Define Artificial Intelligence. Explain the techniques of artificial intelligence. Also describe the characteristics of Artificial Intelligence.

Q2. What are various heuristics search techniques? Explain how they are different from the search techniques.

Q3. Differentiate between Rule-based architecture and non-production system architecture.

ASSIGNMENT-2

Q1. Define uncertain knowledge, prior probability and conditional probability. State the Baye's Theorem. How is it useful in decision making under uncertainty?

Q2. What is Natural Language Processing (NLP)? Explain various phases involved in NLP process with suitable example.

Q3. Explain the following:

a) Production System
b) Neural Network
c) Fuzzy Logic

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GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR

Programme: MCA 2-Year **Course: Computer System Architecture**
Sem.: 2nd **Paper Code: MCA-24**

Important Instructions:

1) Attempt all questions from each assignment given below.
2) Each assignment carries 15 marks.
3) All questions are to be attempted in legible handwriting on plane white A-4 size paper and same is uploaded through login your account.

ASSIGNMENT-I

1. Explain how Flynn's classification helps in understanding parallel computing architectures.
2. With a neat diagram, explain how control signals are generated using a timing and control unit in a basic computer.
3. What is control memory? Draw and explain the block diagram of a micro-programmed control unit.

ASSIGNMENT-II

1. Draw and explain a typical instruction format including opcode, address, and mode fields.
2. Explain the register, direct, indirect, and indexed addressing modes with proper examples.
3. Explain the concept of a memory hierarchy with a neat diagram

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Programme: MCA 2-Year **Course: Discrete Mathematics and Optimization**
Sem.: 2nd **Code: MCA-25**

Important Instructions:
1) Attempt all questions from each assignment given below.
2) Each assignment carries 15 marks.
3) All questions are to be attempted in legible handwriting on plane white A-4 size paper and same is uploaded through login your account.

ASSIGNMENT I

1. Let X = {a, b, c, d} and Y = {1, 2, 3, 4}. Determine which of the following are functions. Give reasons if it is not. Find range if it is a function.
   f = {(a, 1), (b, 2), (c, 3), (d, 4)
   g = {(a, 1), (b, 1), (d, 4)
   h = {(a, 1), (a, 2), (a, 3), (a, 4)
   I = {(a, 1), (b, 1), (c, 1), (d, 1)}
   d = {(a, 1), (b, 2), (b, 3), (c, 4), (d, 4)}.

2. Consider an algebraic system (A, .). Write the properties for the system to satisfy to be a monoid with example.

3. In a group of students, there are 9 boys and 6 girls. Out of 15 students, 6 students have to be selected. Find out how many different ways the students can be selected such that at least one boy should be selected?

ASSIGNMENT II

1. A graph has 26 vertices and 58 edges. There are five vertices of degree 4, six vertices of degree 5, and seven vertices of degree 6. If the remaining vertices all have the same degree, what is this degree?

2. Draw all non-isomorphic graphs with n vertices for
   (a) n = 3 (Hint: there are four such graphs.)
   (b) n = 4 (Hint: there are 11 such graphs.)
   (c) n = 5 and connected (Hint: There are 21 such graphs)

3. Maximize the following given equation

$$z=2x1+3x2$$

Constraints: $5x1+x2=20$

$x1+5x2=25$

Non-negativity: $x1\geq 0, x2\geq 0$

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