**MASTER OF COMPUTER APPLICATION**

# ASSIGNMENTS

## MCA – 2nd SEMESTER

**(SESSON 2026-2027)**

**Centre for Distance and Online Education**
**Guru Jambheshwar University of Science & Technology, Hisar - 125001**

**CENTRE FOR DISTANCE AND ONLINE EDUCATION**
**GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR**

**Course: Data Structures and Algorithms** **Paper Code: MCA-21**
**Semester: 2nd** **Total Marks: 30**

**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. Explain linked list and its types. Also write an algorithm for deleting a node from a linked list and explain with example.
Q2. What is stack. Write an algorithm to evaluate a postfix expression using stack and explain it with example also.
Q3. Consider the following data and construct a binary tree using in-order and pre-ordertraversal.
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. What is heap. 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 Merge Sort. Discuss its average and worst-case time complexities. Write an algorithm to implement Merge Sort.

Prepared By:
Dr. Kapila Devi
Assistant Professor (CS)
CDOE, GJUS&T, Hisar

**CENTRE FOR DISTANCE AND ONLINE EDUCATION**
**GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR**
## Programme: Master of Computer Application

**Course Name: Python Programming** **Semester: 2nd**
**Paper Code: MCA-22** **Total Marks: 30**

**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 upload the scanned copy of the assignments on student's portal.

### 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().

**Prepared By:**
Dr. Neeraj Verma
Assistant Professor (CS)
CDOE, GJUS&T, Hisar

**GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR**

**CENTRE FOR DISTANCE AND ONLINE EDUCATION**

**Programme: Master of Computer Applications**

**Course Name:** Artificial Intelligence **Semester: 2nd**

**Code: MCA-**23 **Total Marks: 30**

## 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 upload the scanned copy of the assignments on student's portal.

### ASSIGNMENT-I

Q1. Describe the main areas in which Artificial Intelligence is used today. Explain any four applications with suitable examples. 5

Q2. Explain uninformed and informed search strategies. How does the use of additional problem information make a search more effective? 5

Q3. What is knowledge representation in Artificial Intelligence? Explain the role of facts and rules in representing knowledge in a simple AI system. 5

### ASSIGNMENT-II

Q1. What is probabilistic reasoning in Artificial Intelligence? Explain how probability helps an intelligent system make decisions when complete information is not available. 5

Q2. Explain the importance of Natural Language Processing in Artificial Intelligence. Describe any four common applications of NLP in real-life systems. 5

Q3. Explain the following concepts briefly and highlight one key feature of each: 5
(a) Expert Systems
(b) Artificial Neural Networks
(c) Bayesian Networks

**Prepared By:**
Dr. Ritu
Assistant Professor (CS)
CDOE, GJUS&T, Hisar

**CENTRE FOR DISTANCE AND ONLINE EDUCATION**
**GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR**
## Programme: Master of Computer Application

**Course Name: Computer System Architecture** **Semester: 2nd**
**Paper Code: MCA-24** **Total Marks: 30**

**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 upload the scanned copy of the assignments on student's portal.

### ASSIGNMENT-I

1. Explain digital logic gates (AND, OR, NOT, NAND, NOR, XOR) operations, symbols and interconnection.
2. Discuss the concept of sum-of-products (SOP), product-of-sums (POS) and the use of "don't-care" condition.
3. How does JK flip-flop work? Why JK flip flop is called universal flip-flop?

### ASSIGNMENT-II

1. What are computer registers? Draw and explain the computer registers organization.
2. What is addressing mode? How many addressing modes are there? Use particular cases to explain the concept of the addressing modes.
3. Define pipelining. What is the benefit of having many pipeline stages in processor? What is difference between superscalar processing and simple pipelining processing?

**Prepared By:**
Dr. Neeraj Verma
Assistant Professor (CS)
CDOE, GJUS&T, Hisar

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**Course: Discrete Mathematics and Optimization** **Paper Code: MCA-25**
**Semester: 2nd** **Total Marks: 30**

**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. Explain set operations with the help of Venn Diagram. Also prove the Distributive and de Morgan's laws of algebra of sets.

Q2. Define a relation. Explain different types of relations (reflexive, symmetric, transitive). Also explain Equivalence Relation with suitable example.

Q3. Construct truth tables to verify whether the following is a tautology or contradiction: $(p \rightarrow q) \leftrightarrow (\neg q \rightarrow \neg p)$ Also explain logical equivalence.

## ASSIGNMENT - II

Q1. Define a group and explain its properties. Prove Lagrange's Theorem with an example.

Q2. Explain any three different types of graphs. Also explain Dijkstra's Algorithm with an example

Q3. Formulate a Linear Programming Problem and solve it using the graphical method. Also explain the steps of the Simplex method.

Prepared By:
Dr. Ritu
Assistant Professor (CS)
CDOE, GJUS&T, Hisar