MASTER OF COMPUTER APPLICATION

ASSIGNMENTS

MCA – 2nd SEMESTER

(SESSON 2025-2026)

Directorate of Distance 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

i. **Attempt all questions from each assignment given below.**
ii. **Each assignment carries 15 marks.**
iii. **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.

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

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

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 the history and evolution of Python. Also Describe the key features of Python.

Q2. Explain modules and packages in Python. Describe how to create and import your own module with examples.

Q3. Explain loop control statements in Python. Discuss the while loop, for loop, and the use of the range() function with suitable examples.

ASSIGNMENT-2

Q1. Explain the concept of Object-Oriented Programming (OOP) in Python. Discuss its key features and advantages.

Q2. What is polymorphism in Python? Explain operator overloading and method overloading with examples.

Q3. Explain how to establish a database connection in Python. Explain CRUD operations (Create, Read, Update, Delete) in Python with databases. Illustrate each operation with examples.

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CENTRE FOR DISTANCE AND ONLINE EDUCATION (CDOE)

GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR

Programme: MCA 2-Year **Course: Artificial Intelligence**

Semester: 2nd

Paper Code: MCA-23

Important Instructions

Attempt all questions from each assignment given below.

i. **Each assignment carries 15 marks.**

ii. **All questions are to be attempted in legible handwriting on plane white A-4size paper and same is uploaded through login your account.**

ASSIGNMENT-I

Q1. Define Artificial Intelligence. Explain the techniques of artificial intelligence. Alsodescribe 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-II

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

Q2. Explain various phases involved in Natural Language Processing.

Q3. Explain the following:

a. Production System
b. Neural Network
c. Bayesian Networks

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

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

Important Instructions

i. Attempt all questions from each assignment given below.
ii. Each assignment carries 15 marks.
iii. 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. Define K-Maps (Karnaugh Maps) and explain their role in simplifying Boolean expressions compared to algebraic manipulation.
2. Provide a detailed explanation of Flynn's Classification of computer architectures.
3. Explain how the Control Unit uses a hardware-based (Hardwired) approach to decode instructions.

ASSIGNMENT-II

1. State and explain Amdahl's Law.
2. What is addressing mode? Explain the significance of Addressing Modes in reducing instruction length and providing programming flexibility.
3. Provide a detailed explanation of the DMA (Direct Memory Access) transfer process.

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

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

Important Instructions

i. **Attempt all questions from each assignment given below.**
ii. **Each assignment carries 15 marks.**
iii. **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.

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