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.

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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().

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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

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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?

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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

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.

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

Course Name: Data Structures and Algorithms Lab **Semester: 2nd**
Code: MCA-26 **Max. Marks: 30**

Important Instructions

1. Attempt any six experiments/assignments.
1. All assignments are to be completed either in legible handwriting on plain white A4-size paper or typed in a Word file, along with appropriate screenshots of the output of the respective assignments. Practical file must be uploaded on the LMS portal.

List of experiments/assignments:

Q1. Two assignments related to creating and manipulating matrices and linear lists.

Q2. Two assignments associated with linked list, operations on linked lists and their applications.

Q3. Two assignments on array and linked implementation of stacks and queues.

Q4. Two assignments on trees and their applications.

Q5. Two assignments on graphs and their applications.

Q6. Two assignments on different searching and sorting methods with their complexity analysis.

Q7. One assignment on challenging problems on data structures to be given in groups.

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GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR

Course Name: Python Programming Lab. **Semester: 2nd**
Code: MCA-27 **Max. Marks: 30**

Important Instructions

1. Attempt any **Eight** experiments/assignments.
2. All assignments are to be completed either in legible handwriting on plain white A4-size paper or typed in a Word file, along with appropriate screenshots of the output of the respective assignments. Practical file must be uploaded on the LMS portal.

List of experiments/assignments:

1. Install Python and explore various popular IDE like IDLE, PyCharm, and Anaconda.
2. Assignments to perform various number operations like
   a. Find maximum from a list of numbers
   b. GCD of two number
   c. Square root of a number
   d. Check number is prime or not.
   e. Print first N prime numbers
   f. Remove duplicate numbers from list
   g. Print the Fibonacci series.
3. Assignments to perform various operations on Strings like creation, deletion, concatenation.
4. Create a List L = [10, 20, 30]. Write programs to perform following operations:
   a. Insert new numbers to list L.
   b. Delete numbers from list L.
   c. Sum all numbers in list L.
   d. Sum all prime numbers in list L.
   e. Delete the list L.
5. Create a Dictionary D= {‘Name’: ‘Rakesh’, ‘Age’: 27, 5:123456}.
   Write programs to perform following operations:

a. Insert new entry in D.
b. Delete an entry from D.
c. Check whether a key present in D.
d. Update the value of a key.
e. Clear dictionary D.

6. Two assignments on Sets to perform various operation like union, intersection, difference etc.
7. Two assignments related to searching operation like linear search, binary search.
8. Three assignments related to sorting like selection sort, bubble sort, insertion sort.
9. Demonstrate the use of dictionary for measuring student marks in five subjects and find the student having maximum and minimum average marks.
10. Two assignments on usage of different available packages like random package toper form
    a. Print N random numbers ranging from 100 to 500.
    b. Print 10 random strings whose length between 3 and 5.
11. Two assignments on usage of package such as NumPy, Pandas.
12. Implement and demonstrate the functions of a simple calculator.
13. One assignment on implementing object-oriented concept such as classes, inheritance, and polymorphism.
14. One assignment on file handling that how data is read and written to a file.

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Course Name: Artificial Intelligence Lab. **Semester: 2nd**
Code: MCA-28 **Max. Marks: 30**

Important Instructions

1. Attempt any **seven** experiments/assignments.
2. All assignments are to be completed either in legible handwriting on plain white A4-size paper or typed in a Word file, along with appropriate screenshots of the output of the respective assignments. Practical file must be uploaded on the LMS portal.

List of experiments/assignments:

1. Write a program to implement BFS/DFS Traversal?
2. Write simple facts for the statements and querying it.
3. Write a program for Family-tree.
4. Write Program for Monkey-banana Problem.
5. Write a program to implement Tic-Tac-Toe game.
6. Write programs for computation of recursive functions like factorial Fibonacci numbers, etc.
7. Write program to solve 5-queens problem.
8. Write a Program for water jug problem.
9. Write a program for travelling salesman problem.
10. Write a program to implement all set operations.

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