Printed Page:- Subject Code:- ACSIOT0301

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B,Tech.

SEM: III - THEORY EXAMINATION (2022 - 2023)

Subject: Data Structures and Algorithms Design

Time: 3 Hours Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A 20

1. Attempt all parts:-

1-a. What are the advantages of arrays in Data Structure?[CO1] 1

(a) Objects of mixed data types can be stored

(b) Elements in an array cannot be sorted

(c) Index of first element of an array is 1

(d) Easier to store elements of same data type

1-b. Which of the following is not the correct statement for a stack data structure?[CO1] 1

(a) Arrays can be used to implement the stack

(b) Stack follows FIFO

(c) Elements are stored in a sequential manner

(d) Top of the stack contains the last inserted element

1-c. Which of the following method is used for sorting in merge sort?[CO2] 1

(a) merging

(b) partitioning

(c) selection

(d) exchanging

1-d. Where is the n-queens problem implemented?[CO2] 1

(a) carom

(b) chess

(c) ludo

(d) cards

1-e. Which data structure is required to convert the infix to prefix notation?[CO3] 1

(a) Stack

(b) Linked list

(c) Binary tree

(d) Queue

1-f. If the size of the stack is 10 and we try to add the 11th element in the stack then the condition is known as___ . [CO3] 1

(a) Underflow

(b) Garbage collection

(c) Overflow

(d) None of the above

1-g. In which traversal root node in visited at the last [CO4] 1

(a) Post-order traversal

(b) Pre-order traversal

(c) In-order traversal

(d) None

1-h. The preorder traversal sequence of a binary search tree is 30, 20, 10, 15, 25, 23, 39, 35, 42. Which one of the following is the postorder traversal sequence of the same tree?[CO4] 1

(a) 10, 20, 15, 23, 25, 35, 42, 39, 30

(b) 15, 10, 25, 23, 20, 42, 35, 39, 30

(c) 15, 20, 10, 23, 25, 42, 35, 39, 30

(d) 15, 10, 23, 25, 20, 35, 42, 39, 30

1-i. Which of the following properties does a simple graph not hold?[CO5] 1

(a) Must be connected

(b) Must be unweighted

(c) Must have no loops or multiple edges

(d) Must have no multiple edges

1-j. Full form of MST is [CO5] 1

(a) Minimum spanning tree

(b) Maximum sparse tree

(c) Minimum sparse tree

(d) Maximum spanning tree

2. Attempt all parts:-

2.a. What are the Asymptotic Notations?[CO1] 2

2.b. List out the implementation procedure of Backtracking.[CO2] 2

2.c. State the difference between queues and linked lists.[CO3] 2

2.d. What is a binary tree?[CO4] 2

2.e. What is a cycle or a circuit?[CO5] 2

SECTION B 30

3. Answer any five of the following:-

3-a. How does bubble sort works?Explain.[CO1] 6

3-b. Differentiate between stack and queue data structures.[CO1] 6

3-c. Define searching and mention the types of searching.[CO2] 6

3-d. Explain the divide and conquer strategy with examples.[CO2] 6

3.e. Describe queue operation.[CO3] 6

3.f. What is meant by traversing? What are the different types of traversing?[CO4] 6

3.g. What is Graph? Explain matrix and linked list representation of a graph. Also give the application of Graph.[CO5] 6

SECTION C 50

4. Answer any one of the following:-

4-a. What is queue? Why it is known as FIFO? Write an algorithm to insert and delete an element from a simple queue with Example.[CO1] 10

4-b. Explain Selection Sort and Sort the sequence 15,20,10,30,50,18,5,45 using Selection sort prepare the required steps. [CO1] 10

5. Answer any one of the following:-

5-a. Explain how the merge sort can be viewed as a recursive application of the Divide and conquer methodology. Suggest a pseudo code for merge sort and analyze its complexities. 10

Trace its application to the following data set 5,2,4,7,1,3,2,6.[CO2]

5-b. Explain in detail about Backtracking with examples and apply Backtracking to solve graph colouring problem.[CO2] 10

6. Answer any one of the following:-

6-a. Convert the following infix expression into postfix expression using stack.[CO3] 10

A*(B+D)/E-F*(G+H/K).

6-b. What is doubly linked list? What are its applications? Explain how an element can be deleted from doubly linked list using algorithm.[CO3] 10

7. Answer any one of the following:-

7-a. What is binary search tree? Explain its searching complexities. Write a function to implement the binary search tree.[CO4] 10

7-b. Define an AVL Tree . Starting with an empty tree, bulid the AVL tree by following sequence of insertion : D, J, A, M, J, O, F, N. Also label the rotation according to their types.[CO4] 10

8. Answer any one of the following:-

8-a. Differentiate depth-first search and breadth-first search traversal of a graph with suitable examples.[CO5] 10

8-b. Write the algorithm of floyd warshall. Also explain it with example.[CO5] 10