Printed Page:- Subject Code:- AMTCSE0101

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute)

Affiliated to Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow

M.Tech

SEM: I - THEORY EXAMINATION (2021 - 2022)

Subject: Advance Data Structures and Algorithms

Time: 03:00 Hours Max. Marks: 70

General Instructions:

1. All questions are compulsory. It comprises of three Sections A, B and C.

- Section A - Question No- 1 is objective type question carrying 1 mark each & Question No- 2 is very short type questions carrying 2 marks each.
- Section B - Question No- 3 is Long answer type - I questions carrying 4 marks each.
- Section C - Question No- 4 to 8 are Long answer type - II questions carrying 7 marks each.
- No sheet should be left blank. Any written material after a Blank sheet will not be evaluated/checked.

SECTION A 15

1. Attempt all parts:-

1-a. Pushing an element into stack already having five elements and stack size of 5, then stack becomes ____(CO1) 1

1. Overflow
2. Crash
3. Underflow
4. User flow

1-b. What are the children for node ‘w’ of a complete-binary tree in an array representation? (CO2) 1

1. 2w and 2w+1
2. 2+w and 2-w
3. w+1/2 and w/2
4. w-1/2 and w+1/2

1-c. Which of the following is false about Prim’s algorithm? (CO3) 1

1. It is a greedy algorithm
2. It constructs MST by selecting edges in increasing order of their weights
3. It never accepts cycles in the MST
4. It can be implemented using the Fibonacci heap

1-d. Find the pivot element from the given input using median-of-three partitioning method. (CO4) 1
8, 1, 4, 9, 6, 3, 5, 2, 7, 0.

1. 8
2. 7
3. 9
4. 6

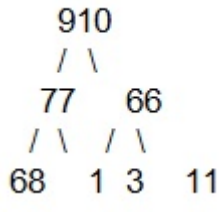
1-e. A node is said to be_____ if it has a possibility of reaching a complete solution. (CO5) 1

1. Non-promising
2. Promising
3. Succeeding
4. Preceding

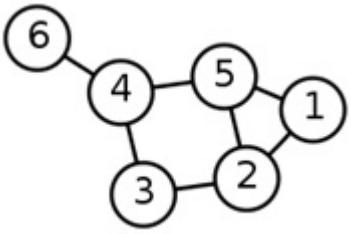
2. Attempt all parts:-

2-a. Explain stack as static data structure. (CO1) 2

2-b. Draw a new heap that is created by inserting 82 into the following heap: (CO2) 2



2-c. Write adjacency matrix for the graph shown below. (CO3) 2



2-d. Differentiate between greedy method and dynamic programming? (CO4) 2

2-e. State the applications of backtracking? (CO5) 2

SECTION B 20

3. Answer any five of the following:-

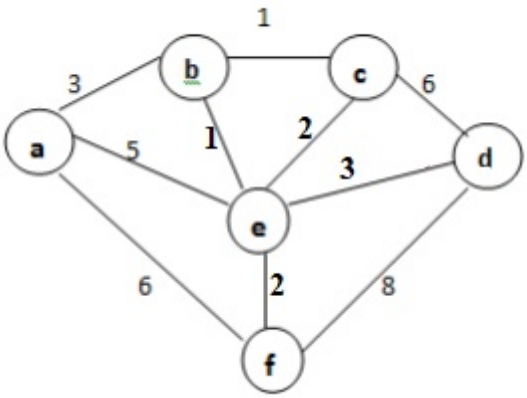
3-a. Write the prefix and postfix form for: A+B*(C-D)/(E-F) (CO1) 4

3-b. What is queue? Why it is known as FIFO? Write algorithm of Dequeue and Enqueue operation on stack. (CO1) 4

3-c. Write the non-recursive algorithm to traverse a tree in preorder. (CO2) 4

3-d. Construct a binary tree whose nodes in inorder and preorder are given as follows: (CO2) 4
Inorder : 10, 15, 17, 18, 20, 25, 30, 35, 38, 40, 50
Preorder: 20, 15, 10, 18, 17, 30, 25, 40, 35, 38, 50

3-e. Using Prim's algorithm, determine minimum cost spanning tree for the weighted graph shown below. (CO3) 4



3-f. Give a detailed note on Divide and Conquer techniques? (CO4) 4

3-g. Explain NP complete problems with example? (CO5) 4

SECTION C 35

4. Answer any one of the following:-

4-a. Write algorithm to implement insertion and deletion in a Doubly Linked List. (CO1) 7

4-b. How to represent a polynomial using linked list? Add two polynomials using linked list. (CO1) 7

Answer any one of the following:-

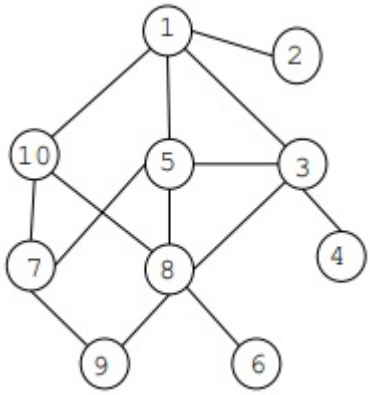
5-a. Construct AVL Tree for the following sequence of numbers- (CO2) 7
50 , 20 , 60 , 10 , 8 , 15 , 32 , 46 , 11 , 48

5-b. Draw the 11 item hash table resulting from hashing the keys: 12, 44, 13, 88, 23, 94, 11, 39, 20, 16 and 5 using the hash function h(i) = (2i+5) mod 11. (CO2) 7

6. Answer any one of the following:-

6-a. Explain the Floyd Warshall algorithm with example. (CO3) 7

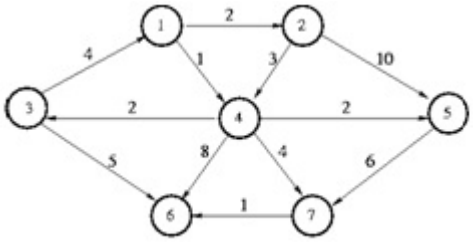
6-b. Apply BFS traversal on the following graph starting from vertex#1. (CO3) 7



7. Answer any one of the following:-

7-a. Describe the Travelling salesman problem & discuss how to solve it using Dynamic Programming? (CO4) 7

7-b. Apply all-pairs shortest path algorithm on the following graph. (CO4) 7



8. Answer any one of the following:-

8-a. Compare Backtracking & Branch and Bound techniques in detail with an example? (CO5) 7

8-b. Discuss aggregate analysis and accounting method for amortised analysis by taking the example of stack operations (PUSH,POP, Multipop). (CO5) 7