Question Paper

Exam Date & Time: 07-Jan-2019 (10:00 AM - 01:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SCHOOL OF INFORMATION SCIENCES

FIRST SEMESTER MASTER OF ENGINEERING - ME (EMBEDDED SYSTEMS & INSTRUMENTATION / COMPUTING TECHNOLOGIES AND VIRTUALIZATION) DEGREE EXAMINATION (MAKE-UP) - JANUARY 2019

Data Structures and Algorithms [ESI 601]

Marks: 100

Duration: 180 mins.

MAKEUP - JAN 2019

Answer all the questions.

- ¹⁾ Write the data structures required to implement single ⁽¹⁰⁾ linked list. Write functions to add an element in O(1) time and search the given element in the list.
- ²⁾ What is a stack? Giving the required data structures, write $^{(10)}$ functions to push and pop into array based stack. (1+3+3+3)
- ³⁾ Define queue data structure. List any four applications of ⁽¹⁰⁾ queue. Write functions to add and delete elements from linked list based queue. (2+2+3+3)
- i) Write a function to insert an element in a binary (10) search tree.
 (6)

ii) Write a function to search an element in a binary search tree. (4)

- ⁵⁾ What is a minimum heap? Given a list 25 8 65 45 15 38 ⁽¹⁰⁾ 72 81 5 28 build minimum heap. Draw all the stages of building heap. Show the steps of sorting in descending order. (2+4+4)
- ⁶⁾ What is hashing? What is collision in hashing? How do you ⁽¹⁰⁾ overcome collision in hashing? Explain with an example.
- ⁷⁾ Write a function for building adjacency list of a Graph. ⁽¹⁰⁾ Draw a graph G with 6 vertex. Display the elements using DFS. (6+4)

Write the following algorithm (10)A. Consider a weighted graph G with 6 vertex, find minimum spanning tree using Prims algorithm B. NQueens problem using Backtracking method. (5+5)Solve the following with greedy algorithm (10)(i). Consider an instance of knapsack problem: n = 3, m = 20, (p1, p2, p3) =(25,24,15), and (w1, w2, w3) = (18, 15, 10). Generate at least 3 feasible solutions which include an optimal solution. (5) (ii). Let n = 4, (p1, p2, p3, p4) = (100, 10, 15, 27) and (d1, d2, d3, d4) = (2,1,2,1).Generate the list of feasible solutions, processing sequence and profit earned. Give the Optimal solution. (5) (10)Given two linked A and B. Create another list C = A

Given two linked A and B. Create another list C = Aintersection B. For Eg. Elements in A = 1 - 2 - 2 - 4 - 5 and B = 2 - 2 - 4 - 6 - 9. Then, C = 2 - 4. (10)

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8)

9)

10)