Hall Ticket No | | | | | | | | | | | Question Paper Code: ACS002

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech I Semester Supplementary Examinations - July, 2018

Regulation: IARE – R16

DATA STRUCTURES

Time: 3 Hours **(Common to CSE | IT | ECE | EEE)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Write an algorithm for finding solution to the Tower's of Hanoi problem. Explain the working of your algorithm (with 4 disks) with diagrams. **[7M]**

   (b) What is an algorithm? How do you find the complexity of an algorithm? **[7M]**

2. (a) Compare and contrast sorting techniques of Insertion Sort, Heap Sort, Merge Sort and Quick Sort with respect to memory space and computing time. **[7M]**

   (b) Execute quick sort algorithm on the following data till two key values are placed in their position 12,34,45,15,4,11,7,8,5,14,35,89,43,21. **[7M]**

UNIT – II

3. (a) Devise a representation for a list where insertions and deletions can be made at either end. Such a structure is called Deque (Double ended queue). Write functions for inserting and deleting at either end. **[7M]**

   (b) What is the difference between circular queue and linear queue. Write a function to insert an element in to a circular queue **[7M]**

4. (a) What are circular queues? Write down routines for inserting and deleting elements from a circular queue implemented using arrays. **[7M]**

   (b) Illustrate the steps for converting an infix expression into a postfix expression for the following expression $(a+b)*(c+d)/(e+f)$ĝ **[7M]**

UNIT – III

5. (a) Write a function to reverse the links in a linked list such that the last node becomes the first and the first becomes the last by traversing the linked list only once. **[7M]**

   (b) Consider a linked list to store a polynomial, that is, every node of the linked list has coefficient, exponent and pointer to the next node in the list.

   (i) Define a structure for node of such a list. (ii)Write a function to subtract two such polynomials. The function should accept pointers to the two polynomials as arguments and return the pointer to the resultant polynomial. Assume that the polynomials passed to the function are in decreasing order on the exponents. **[7M]**

6. (a) Define a sparse metrics. Explain the representation of a 4X4 matrix using linked list. **[7M]**

(b) Write a procedure to reverse a singly linked list with an example. **[7M]**

UNIT – IV

7. (a) What are priority Queues? How can priority queues be implemented? Explain in brief. **[7M]**

(b) Consider the following undirected graph shown in Figure 1 and answer the following questions. Assume that the edges are ordered alphabetically (i.e. when facing with alternatives, choose the edges in alphabetical order) **[7M]**

(i) List the nodes (cities) of the graph by depth first search starting from Varanasi.

(ii) List the nodes (cities) of the graph by breadth first search starting from Calcutta.

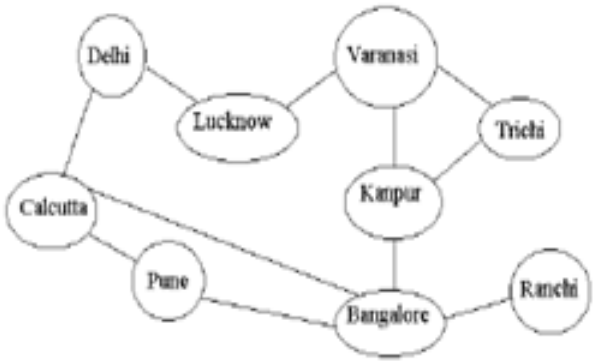

Figure 1

8. (a) Differentiate BFS and DFS. **[7M]**

(b) Show the result of running Bredth First Search and Depth First Search on the directed graph shown in Figure 2 given below using vertex 3 as source. Show the status of the data structure used at each stage. **[7M]**

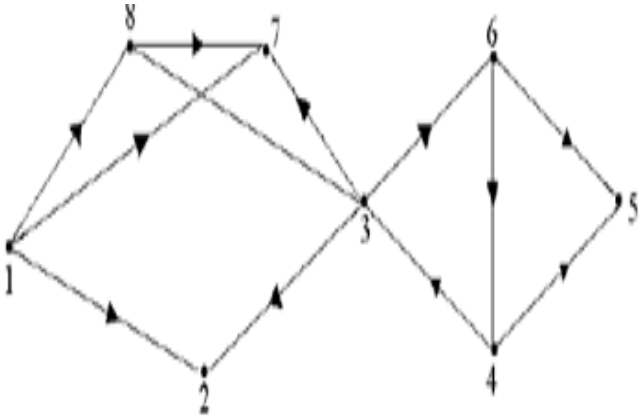

Figure 2

UNIT – V

9. (a) How many AVL trees of 7 nodes with keys 1, 2, 3, 4, 5, 6, 7 are there? Explain your answer. **[7M]**

   (b) The following values are to be stored in a hash table 25, 42, 96, 101, 102, 162, 197, 201 Use division method of hashing with a table size of 11. Use sequential method of resolving collision. Give the contents of array. **[7M]**

10. (a) Explain Hash Tables, Hash function and Hashing Techniques? **[7M]**

    (b) What are B-trees? Construct a B-Tree of order 3 for the following set of Input data: 69, 19, 43, 16, 25, 40, 132, 100, 145, 7, 15, 18 **[7M]**