**(Time: 3 Hours)**   **Total Marks 80**

N.B.   (1) Question 1 is compulsory
   (2) Attempt any 3 from the from remaining 5 question
   (3) Use of Scientific calculator is not allowed.
   (4) Figures to right indicate full marks.

Q.1   (a)   Write an algorithm of binary search. For the following elements search 39   **(10)**
         using binary   search . Also trace the steps. 16   25   39   71   79   80   92
         110   126   155

   (b)   What is graph? Explain Graph storage structure. Perform depth first   **(10)**
   search(DFS) for following graph
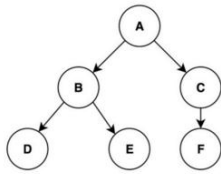
Q.2   (a)   A binary tree has 10 nodes. The inorder and preorder traversal are shown   **(10)**
         below.
         Inorder: A B C E D F J G I H
         Preorder: J C B A D E F I G H
         Show a step-wise reconstruction of the binary tree along with its postorder
         traversal.

   (b)   What is Linear Queue? Write an algorithm for insert and delete element in   **(10)**
         linear queue.

Q.3   (a)   Using modulo division and linear probe method hash the following keys in   **(10)**
         an array   of 13 elements. How many collisions occurred and what is
         density of list after the keys are inserted. 846 , 780, 431, 28 , 87, 613,
         876, 34, 82

   (b)   Explain the stack data structure with example   .Give algorithm for push ,   **(10)**
         pop , stackfull and stack empty functions

Q.4   (a)   Explain the concept of sorting. Sort the following set of elements using   **(10)**
         Quick Sort
         44 ,78, 22 ,7, 98 , 56, 34, 2 ,38 , 35 , 45

   (b)   What is analysis of an algorithm? Explain the asymptotic notations (Big   **(10)**
         O,Omega and Theta) used while analysis of an algorithm.

Q.5   (a)   What is Heap tree? Create an Max Heap for following data   **(10)**
          29 , 8 , 27 , 99 , 19 , 32, 51, 4   Also perform one deletion .

   (b)   Create B tree of order 3 with Create B tree of order 3 with 13 , 34, 30   **(10)**
         ,23,67,29,27,100,76,38,10

Q.6 (a) Define minimum spanning tree. Find minimum spanning path &cost for **(10)**
following graph using kruskal algoirthm
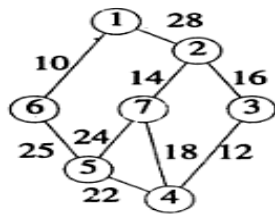
(b) What is linked list write an algorithm for **(10)**
   i.   Insert an element in singly linked list
   ii. Display the number of elements in singly linked list

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