(3 Hours)   **[Marks: 80]**

N.B.: 1) Question No. 1 is compulsory.
     2) Answer any three out of remaining questions.
     3) Assume suitable data if necessary.
     4) Figures to the right indicate full marks.

Q1. (a) Define directed and undirected graph with example.   **(5)**
   (b) Explain first fit, best fit and worst fit method with example.   **(5)**
   (c) Explain threaded binary tree.   **(5)**
   (d) Briefly explain memory fragmentation.   **(5)**

Q2. (a) Design an algorithm to perform the following operations on stack using link list: **(10)**
        i)   Push
        ii)   Pop
        iii)   Display

Q2. (b)Explain merge sort by giving its algorithm and sort the following data using merge sort.   **(10)**

38, 27, 43, 3, 9, 82, 10

Q3. (a) Evaluate the following expression using stack-   **(10)**
(2-3+4) * (5+6*7)

Q3.(b) Explain Double Ended Queue and variants of Double Ended Queue.   **(10)**

Q4. (a) Construct a minimum spanning tree for the graph shown in figure 1 using Kruskal's and Prim's Algorithm and find out the cost with all intermediate steps.   **(10)**
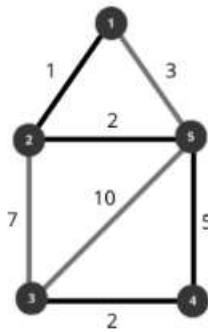

Figure 1: Graph

Q4. (b) Define AVL tree. Step by step construct an AVL tree for the following data: **(10)**
30,20,10,25,40,50,55,22,23

Q5. (a) Explain different hash functions. Assume a table has 8 slots (m=8). Using Linear probing, insert the following elements into the hash table. 36, 18, 72, 43, 6, 10, 5, and 15 are inserted in the order.   **(10)**

Q5.(b) Define Binary Search Tree. Construct the binary search tree from following traversal: **(10)**

In-order: D B H E A I F J C G

Pre-order: A B D E H C F I J G

Determine the post-order of the tree drawn.

Q6. Solve **any Four**: **(20)**

    a) Graph Traversal Algorithm
    b) Game Tree
    c) Radix Sort
    d) B-tree
    e) Round Robin Scheduling

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