(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 Graph. List down the applications of graph. (5)
(b) Explain winding and unwinding phase of recursion. (5)
(c) Explain the concept of Buddy system. (5)
(d) Explain different types of link list. (5)

Q2. (a) Design an algorithm to perform the following operations on circular link list: (10)
i) Insert node at the end
ii) Delete the first node
iii)Count number of nodes

Q2. (b)Explain selection sort with example by giving its algorithm and comment on its complexity. (10)

Q3. (a) Construct a B-tree of order 5 for the following set of data: (10)
1,12,8,2,25,6,14,28,17,7,52,16,48,68,3,26,29,53,55,45,67

Q3. (b) Write an algorithm for Breadth First Search (BFS) and traverse the graph shown in figure 1 using BFS. (10)

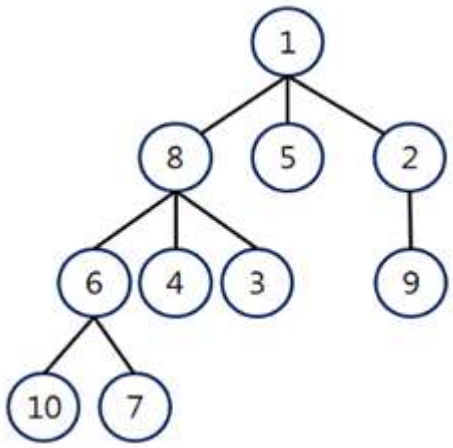

Figure 1

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Q.4. (a) Write a program to implement Stack ADT using Linked list. (10)

Q.4. (b) Explain in brief: - (10)

i. Directed Graph
ii. Weighted Graph
iii. Minimum Spanning Tree
iv. Adjacency Matrix Representation
v. Adjacency list Representation.

Q.5 (a) Write a program to implement queue using array. (10)

Q.5 (b) Sort the following data in ascending order using Heap Sort. 20,14,50,3,5,7,11,8,12,15. Show all the steps. Write an algorithm for Heap Sort.

Q.6.Write Short note on any four: - (20)

i. AVL Tree
ii. Circular Queue
iii. Binary Search
iv. Hashing Techniques
v. Dijkstra's Algorithm

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