(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
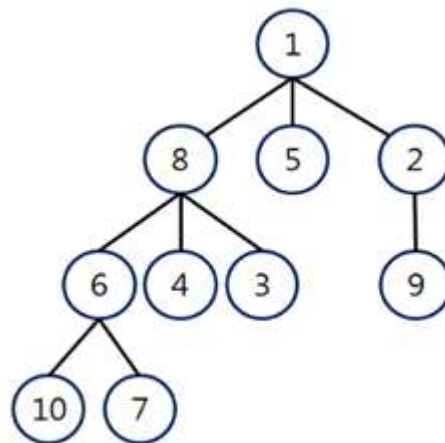using BFS. (10)

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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