There are SIX questions. Answer any FOUR. Figures in the right-hand margin indicate full marks.

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1. A. Suppose you have a double linked list which starting node is pointed by a pointer named "head" and ending node is pointed by another pointer named "tail". Now develop an algorithm that finds the middle node of the list. You can't use more than one loop in your code. [3]
    B. List two real life scenarios where we can apply circular linked list and doubly linked list. [1.5]
    C. Construct a code segment that swaps any two nodes of a double linked list. [3.5]
    D. Design a code segment that can convert a linear linked list into doubly linked list. [2]

2. A. Show the simulation of Tower of Hanoi using STACK for number of disks n = 4 and the starting position is A, destination position is C and auxiliary position is B. [3.5]
    B. Design an algorithm using QUEUE to check whether the given string "MADAM'' is palindrome or not. [1.5]
    C. Convert the infix expression: (a+b-c*d)/a^(e-f/b*e)-f*g into corresponding postfix expression using stack. Also compute the result of that expression for the given value: a = 1, b = 2, c = 2, d = 1, e = 3, f = 2, g = 2. [5]

3. A. Build a complete binary tree using the value 4, 12, 15, 40, 50, 60, 70, 100, 120, 140. [2]
    B. Develop the algorithm for Inorder traversing technique for binary tree using STACK. [3]
    C. Construct the binary search tree for the following traversal sequence. [3]
                    Pre-order: AFBCDGEF
                    In-order: BFDCAGFE
    D. Construct a recursive algorithm to compute height of a binary tree. [2]

4. Consider the values: 500, 20, 1, 50, 2, 60, 60, 60, 0, 10.
    A. Now develop a binary search tree (BST) using those values. [2.5]
    B. Write the pre-order, in-order and post-order traversal for the BST in question 4(a). [3]
    C. Show the tree after deleting the value: 500, 50 and 10 (each deletion is applied on successive Resultant tree). [2.5]
    D. Construct an algorithm that search a particular value in the constructed BST. [2]

5. A. Design two functions QUEUE_PUSH and QUEUE_POP for pop and push operation of Queue using linked list. [3]
    B. Write the importance of hashing. Show an real-life example where hashing is applicable. [2]
    C. Suppose you are waiting at the admission office to get admission form in the university. The admission officer advise you to take position in the line. Answer the following questions based on

this scenario. Also write reason to select the your chosen answer. [3]

      i. Which data structure are appropriate for maintaining the line?
     ii. Implement the line using your selected data structure.
    iii. How will you track the start and end position of the line?

D. Consider the following situations. Select data structure that will be more appropriate to hold them in memory? Also write reason to select the your chosen answer. [2]
     i) Storing data like university names, location, ranking etc.
     ii) Managing hierarchical relation like tree structure.

6. Consider the following graph.
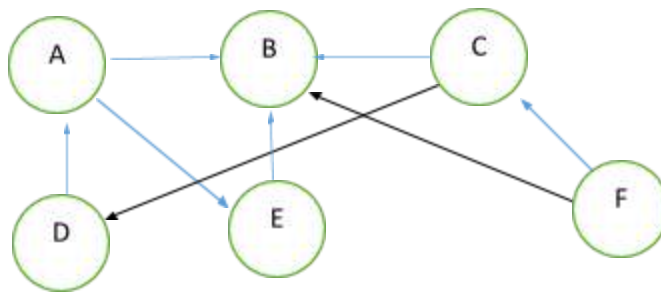
a. Simulate traversing sequence of the above graph using BFS. Show each and every steps in details using QUEUE. [3]
b. Represent the above graph using adjacency list and matrix. [2]
c. Show the step by step mechanism of topological ordering algorithm for the above directed acyclic graph. [3]
d. Design an algorithm for DFS graph traversing method. [2]