**Oxford College of Engineering and Managements**

First Assignments

1. What do you know about data structure? Explain about recursion with the help of Tower of Hanoi (TOH) problem.
2. Why data structures are needed? Write any data structure as ADT. Write applications of stacks.
3. Write an algorithm for postfix evaluation. Evaluate the following postfix expression using stack.

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1. Write an algorithm for inserting and deleting data from circular queue
2. What is stack? Write a program in C/C++ to implement primitive stack operations push and pop on stack.
3. Construct an AVL tree by inserting the following elements into an empty AVL tree: 3, 5, 11, 8, 4, 1, 12, 7, 2, 6, 10.
4. Construct a B-tree on inserting the following elements into an initially empty B-tree of order 5: 8, 14, 2, 15, 3, 1, 16, 6, 5, 27, 37, 18, 25, 7, 13, 20, 22, 23, 24.
5. Write infix to post fix conversion algorithm. Convert the following infix expression into postfix expression:

x – y \* z + ( u \* v –w)/g

1. What is linked list? Write an algorithm or C/C++ function to append a new node in a linked list.
2. Given input {1, 16, 49, 36, 64, 0, 81, 4, 9} and a hash function h(x) = x mod 10, show the resulting:
   1. Hash table using quadratic probing
   2. Hash table using second hash function h2(x) = (7 + new hash value)%10
   3. Open Hash table by chaining
3. Define Hashing. What are the collision resolving techniques in hashing? Explain about separate chaining and open addressing in detail.
4. What is collision in hashing? How can we solve the problem of collision in hashing?
5. Explain the statement "***Circular queue is better than linear queue***".
6. Write an algorithm to insert a node after first node in a linked list

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Second Assignments

* + 1. Define Binary Heap? How an element can be inserted into a Heap? Explain giving an example.
    2. Define leftist heap. Show the merging process of two leftist heaps giving an example.
    3. Sort the following data using Bucket sort.

348, 143, 361, 423, 538, 128, 321, 543, 36

* + 1. What is graph? Explain topological sort with an example.
    2. Trace the quick sort algorithm for the following data: 42, 23, 74, 11, 65, 58, 94, 36, 99, 87 and analyze the best case, worst case and average case analysis of this algorithm.
    3. Define heap and binomial queue. Show the creation of a heap of size 8 from the data: 20, 62, 98, 47, 45, 35, 56, 74.
    4. What is graph? Explain topological sort with an example.
    5. Using Dijkstra's algorithm, calculate the shortest distance from node 1 to all other vertices.
    6. What do you mean by Worst case, Average case and Best case analysis of an algorithm? Give example of sorting algorithms.
    7. Define heap and binomial queue. Show the creation of a heap of size 8 from the data: 20, 62, 98, 47, 45, 35, 56, 74.
    8. What is minimum spanning tree? Find minimum spanning tree with example using Prim’s or Kruskal's algorithm.
    9. Trace the steps to sort the following list of elements through merge sort.
    10. Describe the terms strongly connected graph, Degree of a node, Loop and Cycle in reference with Graph as ADT
    11. What is the difference between the depth first search (DFS) and breadth first search (BFS).
    12. Write the short notes on

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| * Extendible hashing * Skew heaps * 2-3 and 2-3-4 trees. * Randomized algorithms * Leftist heaps * TOH (Tower of Hanoi) Problem | * AVL trees * Binary searching. * Splay tree * MST * BST |