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**Question Paper Code: U4410**

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Electronics and Communication Engineering

**21UEC410 DATA STRUCTURES AND PROGRAMMING TECHNIQUES**

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. A Linked list is considered as an example of \_\_\_\_\_ type of memory allocation CO1- U  
(a) Dynamic                      (b) Static                      (c) Compile time                      (d) None of the above
2. Given pointer to a node X in a singly linked list. Only one pointer is given, pointer to head node is not given, can we delete the node X from given linked list? CO2- App  
(a) Possible if X is not last node.  
(b) Possible if size of linked list is even.  
(c) Possible if size of linked list is odd.  
(d) Possible if X is not first node.
3. A binary search tree is generated by inserting in order the following integers: 50,15,62,5,20,58,91,3,8,37,60,24. The number of nodes in the left subtree and right subtree of the root respectively is \_\_\_\_\_. CO3-App  
(a) (4,7)                      (b) (7,4)                      (c) (8,3)                      (d) (3,8)
4. B- Tree restricts the number of keys in a node between \_\_\_\_\_. CO1- U  
(a) m to 2m                      (b) m/2 to m-1                      (c) m/2 to m+1                      (d) m/2 to m
5. How a stack can be implemented? CO1- U  
(a) Using arrays                      (b) Using linked lists                      (c) Both (a) & (b)                      (d) None of the above

PART – B (5 x 3= 15 Marks)

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|-----|--|---------|
| 6.  | Write the routine for insertion operation of singly linked list.   | CO2-App |
| 7.  | Infer the operations that can be done with queue data structure?   | CO1-U   |
| 8.  | List some applications of graph.                                   | CO1-U   |
| 9.  | Outline the routine to delete a element from a queue               | CO2-App |
| 10. | Write the routine for counting the number of elements in the list. | CO3-App |

PART – C (5 x 16= 80 Marks)

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|-----|---|---------|------|
| 11. | (a) Explain the various operations for array implementation of lists  | CO1-U   | (16) |
|     | Or  |         |      |
|     | (b) Differentiate doubly linked list and circular linked List with an example.  | CO1-U   | (16) |
| 12. | (a) Describe the insertion and deletion operations performed on stack.  | CO1-U   | (16) |
|     | Or  |         |      |
|     | (b) Explain the routines used to insert and delete an element in a circular queue.  | CO1-U   | (16) |
| 13. | (a) Explain the tree traversals with algorithms and examples  | CO1-U   | (16) |
|     | Or  |         |      |
|     | (b) Explain binary search tree ADT in detail.   | CO1-U   | (16) |
| 14. | (a) Apply Enqueue and Dequeue operations on Circular Queue.   | CO2-App | (16) |
|     | Or  |         |      |
|     | (b) Write an ADT to implement QUEUE of size N using an array. The elements in the queue are to be integers. The operations to be supported are Enqueue, Dequeue and DISPLAY. Take into account the exceptions of queue overflow and queue Underflow.                      | CO2-App | (16) |
| 15. | (a) Given a list 10,20,30,40 generalize the steps along with the routine and pictorial representation to insert a node from the beginning of the singly linked list, deletion of last node in the list, searching the second node in a list and traversing the whole list | CO2-App | (16) |
|     | Or  |         |      |
|     | (b) Write a Routine for the following operations using singly linked list   | CO2-App | (16) |
|     | (i) Insert an element in the beginning (21,7,16,34,81,2,99,55)  |         |      |
|     | (ii) Routine to delete an element from the beginning  |         |      |



