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Question Paper Code	12917
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B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Third Semester

Electronics and Instrumentation Engineering

(Common to Instrumentation and Control Engineering)

20ESIT301 - DATA STRUCTURES AND ALGORITHMS

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks</i> | <i>K-
Level</i> | <i>CO</i> |
|--|--------------|---------------------|-----------|
| 1. Show the postfix expression for the given prefix $*+abc/ef-g/hi$. | 2 | K2 | CO1 |
| 2. Define a double ended queue. | 2 | K1 | CO1 |
| 3. Draw the Circular Linked List and state how it is used. | 2 | K2 | CO2 |
| 4. When a doubly linked list can be represented as a circular linked list? | 2 | K2 | CO2 |
| 5. Give the various types of rotations in AVL tree during the insertion of a node. | 2 | K2 | CO3 |
| 6. Define a heap. How can it be used to represent a priority queue? | 2 | K2 | CO3 |
| 7. Define weighted, unweighted, directed, path, cyclic and acyclic in a graph. | 2 | K1 | CO4 |
| 8. Define graph and its representation. Give two applications of graphs. | 2 | K1 | CO4 |
| 9. Sort the following elements 3,1,4,1,5,9,2,6,5 using insertion sort. | 2 | K2 | CO5 |
| 10. Give the routine for linear search. | 2 | K2 | CO5 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

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|---|----|----|-----|
| 11. a) Explain how to evaluate arithmetic expressions using stacks with an example. | 13 | K2 | CO1 |
|---|----|----|-----|

OR

- | | | | |
|--|----|----|-----|
| b) Explain the insertion and deletion operations performed on a circular queue with algorithm. | 13 | K2 | CO1 |
| 12. a) Identify the array implementation of list and Discuss the various operations of the list ADT with examples. | 13 | K2 | CO2 |

OR

- | | | | |
|---|----|----|-----|
| b) How polynomial manipulations are performed with lists? Explain the operations with an example. | 13 | K2 | CO2 |
|---|----|----|-----|

13. a) What are expression trees? Represent the following expression using tree: $(a-b) / ((c*d)+e)$. Perform Tree Traversals. 13 K2 CO3

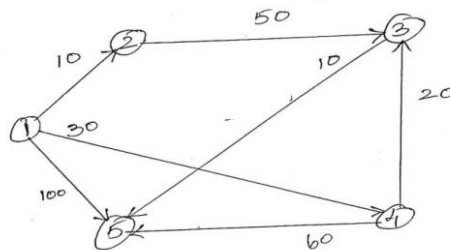
OR

- b) Explain B tree and B+ tree ADT in detail. 13 K2 CO3

14. a) Explain an algorithm for all pair's shortest path problem with an example. 13 K2 CO4

OR

- b) Illustrate Dijkstra's algorithm for finding the shortest path with the following graph. 13 K2 CO4



15. a) Write an algorithm to sort a set of 'N' numbers using bubble sort and demonstrate the sorting steps for the following set of numbers: 30, 52, 29, 87, 63, 27, 19, and 54. 13 K2 CO5

OR

- b) Write an algorithm to sort the following numbers using shellsort: 39, 9, 81, 45, 90, 27, 72, 18. 13 K2 CO5

PART - C (1 × 15 = 15 Marks)

16. a) Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function $h(x) = x \text{ mod } 10$. Prepare the resulting for the following: K3 CO6
- (i) Open a hash table. 3
 - (ii) Open addressing hash table using linear probing. 4
 - (iii) Open addressing hash table using quadratic probing. 4
 - (iv) Open addressing hash table with second hash $h_2(x) = 7 - (x \text{ mod } 7)$. 4

OR

- b) Explain in detail about extendible hashing with example. 15 K2 CO6