7237

BOARD DIPLOMA EXAMINATION, (C-20)

JUNE/JULY—2022

DCME - THIRD SEMESTER EXAMINATION

DATA STRUCTURES THROUGH C

Time : 3 hours]   [*Total Marks* : 80

PART—A   3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Define the term 'data structure'.

2. Given the list 3, 6, 7, 8, 34 and 56. How many comparisons are required to search for the element 7?

3. Explain the terms non-linear data structures and linear data structures with examples.

4. Define the term 'Linked list'.

5. Demonstrate the concept of creation of a sample node using malloc().

6. Define the terms 'overflow' and 'underflow' in stack.

7. Which data structure follows last in first out order in processing elements? Name the two operations of respective data structure.

8. What is the principle followed by a queue for insertion and deletion?

9. Define the terms root, leaf and depth of the tree.

10. Consider a binary tree with at least 5 nodes and give it's post-order traversal.

Instructions : (1) Answer **all** questions.

(2) Each question carries **eight** marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. *(a)* Apply the quicksort technique on (34, 15, 67, 89 and 24) elements and show the output of each iteration.

(OR)

(b) Apply the concept of recursion to write a C program for non-sorted sequence using binary search.

12. *(a)* Construct a single linked list with 7 nodes and perform delete and display operations.

(OR)

(b) Use linear search technique to write a C program to find an element in a linked list.

13. *(a)* Build an equivalent postfix expression of the given infix expression $(a * b) + (c + d)/e * f$.

(OR)

(b) Use stack to evaluate the given postfix expression "6 9 + 4 2 ^ +".

14. *(a)* Apply the concept of an array to perform all the queue operations.

(OR)

(b) Use linked list to write a C program to implement circular queues.

15. *(a)* Construct a binary search tree for the given nodes :

(10, 20, 34, 56, 68, 98, 33, 45) and give the in order, pre-order and post-order traversals.

* **(OR)**

(b) Construct a binary tree if the in-order and post-order travels are given as

IN-ORDER : 4 2 5 1 3 6

POST-ORDER : 4 5 2 6 3 1

PART—C

10×1=10

Instructions : (1) Answer the following question.

(2) Question carries **ten** marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

16. Assume a queue data structure with a capacity of 5 elements and the data available to be processed by queue is 10, 30, 20, 40, 50, 60, 80, 90, 78, 99. Show the status of queue for each operation to perform consecutively 5 enqueue and 4 dequeue operations followed by 6 enqueue operations. What will be the length of the at the end? Is here any overflow or underflow situation occurs? Justify your answer.

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