

DiplETE – CS (Current & New Scheme)

Time: 3 Hours

June 2019

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- Assuming int is of 4bytes, what is the size of int arr[15];?
 (A) 15 (B) 19
 (C) 11 (D) 60
- In a stack, if a user tries to remove an element from empty stack, _____ occurs.
 (A) Underflow (B) Empty collection
 (C) Overflow (D) Garbage Collection
- What is the complexity of adding an element to the heap (n is number of elements and h is height of Heap)?
 (A) $O(n)$ (B) $O(n^2)$
 (C) $O(\log n)$ or $O(h)$ (D) None of these
- Stack follows the Principle
 (A) LIFO (B) FIFO
 (C) Random (D) Direct
- A Binary Tree with 0 or 2 child in each node can be termed as
 (A) Complete Binary Tree (B) Almost Complete Binary Tree
 (C) Strictly Binary Tree (D) Heap
- Which among the following Sorting is slowest?
 (A) Bubble Sort (B) Merge Sort
 (C) Heap Sort (D) Quick Sort
- What is the worst case complexity of QuickSort?
 (A) $O(n \log n)$ (B) $O(\log n)$
 (C) $O(n)$ (D) $O(n^2)$
- Which of the following is the Linear Data Structure?
 (A) Tree (B) Graph
 (C) DAG (D) Queue

- i. What is the output of the following function?
- ```
function(int x, int y)
{
 if(y==0)
 return 1
 else
 return (x * function(x,y-1));
}
```
- (A)  $x*y$  (B)  $x^y$   
 (C)  $x/y$  (D)  $x\%y$
- j. Postfix equivalent of  $A*B\uparrow C\uparrow D-E$  is  
 (A)  $ABCD\uparrow\uparrow *E-$  (B)  $ABC\uparrow D\uparrow *E-$   
 (C)  $AB*C\uparrow D\uparrow E-$  (D) None of these

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**Answer any FIVE Questions out of EIGHT Questions.**  
**Each question carries 16 marks.**

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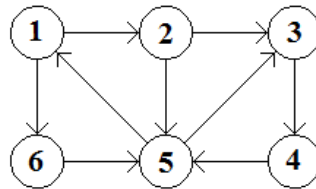
- Q.2** a. Explain the following terms. Use suitable examples to illustrate each (8)  
 (i) Static Storage class (ii) External References class  
 (iii) Automatic Storage class (iv) Recursion
- b. Write a program for finding sum of the digit of a number using recursion. (8)
- Q.3** a. What is the difference between structure and union? Explain with examples. (8)  
 b. What do you mean by a file? What are various types of files? (8)
- Q.4** a. Write an algorithm to find transpose of a matrix. (8)  
 b. Write the quick sort algorithm to sort an unsorted array of n elements in ascending order. (8)
- Q.5** a. Write a method to add, delete and search an item in queues. (8)  
 b. Write the two basic operations performed with a stack. Write the operation as a function in C language. (8)
- Q.6** a. What is linked-list? What are the advantages of linked-list over array? (8)  
 b. How can a Polynomial be represented using linked list? Show with example. (8)
- Q.7** a. Write short notes on the following: (4+4)  
 (i) Circular linked lists (ii) Doubly linked lists  
 b. Write a program in C to concatenate two circular linked lists. (8)

**Q.8** a. Define a Binary Tree. What are various methods of traversal in Binary Tree? (8)

b. Design a Binary Search Tree by inserting following keys in sequence (8)  
100, 50, 150, 200, 30, 10, 90, 80, 210, 130

**Q.9** a. Explain Depth First traversal of a graph (8)

b. Explain the representation of following graph using (8)



(i) Adjacency Matrix

(ii) Adjacency List