D 70385 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, NOVEMBER 2014

IT/CS 09 303/PTCS 09 302—DATA STRUCTURES

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Write a short note on scalar types.
2. What is the significance of space matrices ?
3. Distinguish between a stack and a queue.
4. Mention two practical applications of circular linked lists.
5. Write the worst case, best case and average case time complexity of Quick and Merge sorts.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Define time complexity. Explain the concept behind Big Oh(O) notation.
2. Write an algorithm for deleting duplicate numbers from a linear array.
3. Given the following arithmetic expression in infix notation as 10/(7 – 3) + 2 * (3 + 8) – 7. Translate this expression into postfix and then evaluate it.
4. Write a program to add two polynominals in single variables.
5. Write an algorithm to merge two singly linked lists whose elements are sorted in ascending order to produce a single single linked list sorted in ascending order.
6. Write an algorithm for sorting a set of integers using Quick sort procedure. Also compute the average case complexity of your algorithm.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

1. (a) Define Stack as an abstract data type. Specify domain, functions and axioms of stack.

Or

Turn over

(b) Write a recursive algorithm to compute the Fibonacci series. Also give the procedure to analyse the algorithm.

12. (a) Write an algorithm for matching different parenthesis such as {, [, (in an algebraic expression.

Or

(b) Write an algorithm which reverses the order of elements on stack using one additional stack and some additional variables at your choice.

13. (a) Write functions to implement recursing versions of pre-order, in-order and post-order traversals of a binary tree. Design an algorithm to sort a list of n elements using merge sort. Hand simulate on the data set (98, 67, 83, 08, 18, 104, 07). Give its time complexity.

Or

(b) Explain the Kruskal's algorithm with relevant example in detail.

14. (a) Explain the following searching techniques with their algorithms and example for each :

(i) Linear search.

(ii) Binary search.

State the time complexity of each above searching technique.

Or

(b) Sort the following elements using quick sort, merge sort and heap sort 25, 55, 46, 35, 10, 90, 84, 31. Derive the complexity of each sorting technique.

(4 × 10 = 40 marks)