Total No. of Questions : 4]

SEAT No. :

PE-556

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S.E. (Information Technology) (Insem.)

DATA STRUCTURE AND ALGORITHMS

(2019 Pattern) (Semester - III) (214443)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Answers Q. 1 or Q.2 and Q.3 or Q. 4,***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Could you categorize various forms of data structures and provide an illustration for each type? **[5]**

b) Illustrate the concepts below using examples? Data, Data Object, Data Structure. **[5]**

c) Implement the insertion operation for adding a node at the end of a doubly linked list. Provide the algorithm and code. **[5]**

OR

Q2) a) Explain the concept of a linked organization in data structures. What are the advantages of using linked data structures over arrays? **[5]**

b) What is a circular linked list, and how does it differ from a regular (singly or doubly) linked list? Give an example scenario where a circular linked list is useful. **[5]**

c) Explain Row major and Column major representation of matrix with example? **[5]**

Q3) a) Analyzing the Time and Space Complexity. Provide an illustration along with a description of the time and space complexity. **[5]**

b) What is Quick Sort, and how does it work? Explain the basic algorithm and its key steps with example. **[5]**

c) Describe the concept of hashing in data structures. Analyse the best-case, worst- case, and average-case time complexities for hash table operations such as insertion, retrieval, and deletion. **[5]**

OR

P.T.O.

Q4) a) Arrange the given list in ascending order using the bubble sort algorithm. Display all the iterations. List : 9, 7, –2, 4, 5, 3, –6, 2, 1, 8. **[5]**

b) Can you explain the significance of the Fibonacci sequence in nature or art? Give examples. **[5]**

c) For binary search, explain the best-case, worst-case, and average-case scenarios. Provide the time complexity analysis for each of these cases. **[5]**