2019

(October)

COMPUTER SCIENCE

(Elective/Honours)

(CS–101 T)

(Introduction to Data Structure Using C)

Marks : 37

Time : 2 hours

The figures in the margin indicate full marks for the questions

Answer **one** question from each Unit

UNIT—I

1. *(a)* What is an algorithm? Explain the different approaches to develop algorithms. 1+3=4

   (b) What is a variable? Summarize the rules for naming variables in C. 1+2=3

   (c) Compare the use of the switch statement with the use of nested if-else statements. Which is more convenient? 2½

2. (a) Write a program to find the factorial of a number using recursion. 4½

(b) How is a pointer variable declared? What kind of information is represented by a pointer variable? 1+1=2

(c) What is a self-referential structure? For what kinds of applications are self-referential structures useful? 2+1=3

UNIT—II

3. (a) What is big-O notation? Write a note on space-time trade-off. 1+2=3

(b) List the different characteristics of a linked list. 3

4. (a) Write an algorithm to evaluate a postfix expression. 3

(b) What is a circular queue? What is the advantage of a circular queue over a linear queue? 1+2=3

UNIT—III

5. (a) What is a complete binary tree? How does it differ from a strictly binary tree? 2+2=4

(b) Explain linked list representation of a binary tree. 2

(Continued)

(c) Define a binary search tree. Write down the structure for defining a binary search tree in C. 1½+1=2½

6. (a) Briefly explain the binary tree traversal methods. 5

(b) Define a B-tree. Mention the different characteristics of a B-tree. 1+2½=3½

UNIT—IV

7. (a) State the difference between the breadth-first search and depth-first search traversal methods of a graph. 4

(b) Explain with example the adjacency list representation of a graph. 2½

8. (a) Explain the working of Dijkstra's algorithm for finding the shortest path. 4½

(b) What is a minimal spanning tree? 2

UNIT—V

9. (a) What are the advantages and disadvantages of linear search over binary search? Write down the time complexity of both the algorithms. 3+2=5

(b) Define hashing. 1½

(Turn Over)

10. *(a)* Explain in brief the open addressing methods of collision resolution techniques. 5

(b) Mention the average-case and the worst-case complexity of quick-sort algorithm. 1½

★★★