Reg. No. : | E | N | G | G | T | R | E | E | . | C | O | M |

Question Paper Code : 70003

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Second Semester

Artificial Intelligence and Data Science

AD 3251 — DATA STRUCTURES DESIGN

(Common to: B.Tech. Computer Science and Business Systems)

(Regulations 2021)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define ADT (Abstract Data Type)

2. Mention the features of ADT.

3. Define List ADT.

4. What are the ways of implementing linked list?

5. What is the need for hashing?

6. What is insertion sort? How many passes are required for the elements to be sorted?

7. Convert the infix expression (A-B/C)*(D/E-F) into a postfix.

8. What are the application of binary tree?.

9. Explain the topological sort

10. Define shortest path problem.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the various operations of the list ADT with examples.

Or

(b) Difference and explain in detail about the shallow and Deep copy of a class with suitable example.

12. (a) Explain the following in detail

(i) When singly linked list can be represented as circular linked list?

(ii) When doubly linked list can be represented as circular linked list?

Or

(b) List and explain in detail about the operations performed in list?

13. (a) Write a program to sort the elements using bubble sort, insertion sort and Selection sort.

Or

(b) Write a program to perform searching operations using linear and binary search.

14. (a) (i) Explain in detail about the steps involved in converting a general tree into binary tree?

(ii) Give the pre and postfix form of the expression (a+((b*(c-e))/f).

Or

(b) Construct an expression tree for the expression (a+b*c)+((d*e+1)*g). Give the outputs when you apply preorder, inorder and postorder traversals.

15. (a) (i) Prove that the maximum number of edges that a graph with n Vertices is n*(n-1)/2.

(ii) Write the algorithm to compute lengths of shortest path.

Or

(b) Explain the various representation of graph with example in detail?

PART C — (1 × 15 = 15 marks)

16. (a) Discuss in detail about topological ordering with examples.

Or

(b) Give the importance of shortest paths in programming and explain the role of minimum spanning tree.

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