Reg. No. : | | | | | | | | | | |

V 4545

B.E/B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Third Semester

(Regulation 2004)

Electrical and Electronics Engineering

CS 1211 – DATA STRUCTURES AND ALGORITHMS

(Common to Electronics and Instrumentation Engineering and Instrumentation and Control Engineering)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What are the basic operations performed on an array? Give examples.

2. Compare union and structure.

3. What is stack? How it can be represented in "C" using arrays?

4. What is circular linked list? Give example.

5. Prove that a binary tree with n nodes has exactly n+1 null branches.

6. Differentiate between complete binary tree and full binary tree.

7. List down the different types of sorting techniques.

8. State the complexity of bubble Sort.

9. Write down any two differences between a graph and a tree?

10. State the function of round robin algorithm.

PART B — (5 × 16 = 80 marks)

11. (a) (i) State the difference between call–by–value and call-by-reference method of passing parameters. Give suitable examples. (8)

(ii) Write a recursive and non-recursive function to compute Fib (n). (8)

Or

(b) (i) State the steps involved for adding and deleting an element from an array. What are the major drawbacks in array handling? (8)

(ii) Write a program to find the number of times that a given word (i.e. a short string) occurs in a sentence (i.e. a long string!). (8)

12. (a) (i) Write the algorithms for the insertion and deletion operations performed on the circular queue. (8)

(ii) Given an integer K, write a procedure which deletes the Kth element from a doubly linked list. (8)

Or

(b) (i) Explain in detail the different applications of queue data structure. (6)

(ii) Explain the different operation that can be performed on Stacks? Write the algorithm for each operation. (10)

13. (a) (i) Write the algorithms for each of the following for binary trees. (6)

(1) Inorder traversal

(2) Preorder traversal

(3) Postorder traversal

(ii) What are the different Storage representations for a binary tree? Explain with examples. (10)

Or

(b) (i) Create a binary search tree for the following numbers. Start from an empty BST. (8)

45, 26, 10, 60, 70, 30,40

Delete keys 10, 60 and 45 one after the other and show the trees at each stage.

(ii) What are threaded binary trees? Write an algorithm for inserting a node in a threaded binary tree. (8).

14. (a) (i) Explain the two phases of Heap Sort. (5)

(ii) Sort the following elements using Heap Sort. (11)

25 55 46 35 10 90 84 31

Or

(b) Enumerate different searching techniques? Explain any two of searching techniques with examples.

15. (a) (i) Define the following terms with examples. (8)

(1) weakly connected graph

(2) strongly connected graph

(ii) State the various graph traversal algorithms. Explain each in detail with example. (8)

Or

(b) (i) What are the different representations of graph? State an application. (7)

(ii) For an undirected graph G with n vertices prove that the following are equivalent. (9)

(1) G is a tree ;

(2) G contains no cycles and has n–1 edges

(3) G is connected and has n–1 edges

(4) For any distinct vertices $u \in V(G)$ and $v \in V(G)$ there is exactly one simple path from u to v;