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Question Paper Code : 11471

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2012.

Third Semester

Information Technology

IT 2201/142301 /IT 33/10144 IT 304/080250005 — DATA STRUCTURES AND
ALGORITHMS

(Regulation 2008)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   What is data structure? How is it classified?

2.   Define stack as a data structure and discuss its applications.

3.   List some applications of tree data-structure.

4.   Give example for max and min binary heap trees.

5.   What do you mean by hashing? Mention any one hash function.

6.   State the properties of equivalence relations.

7.   What is meant by indegree and outdegree of a Vertex?

8.   What is meant by articulation points?

9.   What are asymptotic notations and basic efficiency classes?

10. Define NP completeness.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What are circular queues? Write an ADT for a circular queue to perform insertion and deletion operations. (10)

  (ii) Write the deletion routine for cursor implementation of linked lists. (6)

Or

(b) (i) Write an algorithm to insert a node in the beginning and in the end of the linked list. (8)

  (ii) Write an algorithm to evaluate a postfix expression. Execute your algorithm using the following postfix expression as your input: $ab + cd + *f \uparrow$. (8)

12. (a) (i) Formulate an ADT to insert and delete a node in a binary search tree. (8)

  (ii) What are expression trees? Represent the following expression using a tree: $(a - b) / ((c * d) + e)$. Comment on the result that you get when this tree is traversed in Preorder, Inorder and postorder. (1+1+6)

Or

(b) (i) Construct an AVL tree with values, F, S, Q, K, C, L, H, T, V, W M, R, into an initially empty tree. Write the algorithm for inserting into an AVL tree. (10)

  (ii) Write a note on general trees with an example. (6)

13. (a) (i) The following values are to be stored in a hash table

    25, 42, 96, 101, 102, 162, 197

    Describe how the values are hashed by using division method of hashing with a table size of 7. Use chaining as the method of collision resolution. (8)

  (ii) What are the types of Collision Resolution Techniques and the methods used in each of the type? Explain the different types of collision Resolution techniques. (8)

Or

(b) Explain with code, the union operations that are performed: (4 × 4 = 16)

  (i) Arbitrarily

  (ii) Union by size

  (iii) Union by height

  (iv) Find with path compression.

14. (a) (i) Which are the two standard ways of traversing a graph? Explain each with an example. (10)

   (ii) What is minimum spanning tree? Execute Kruskal's algorithm to find the minimum spanning tree for a graph. (6)

Or

(b) (i) Explain Dijkstra's algorithm for finding the shortest path in a graph. (10)

   (ii) Consider the following specification of a graph G

   $V(G) = \{1, \ 2, \ 3, \ 4\}$

   $E(G) = \{(1, 2), \ (1, 3), \ (3, 3), \ (3, 4), \ (4, 1)\}$

   (1) Draw an undirected graph.

   (2) Draw its adjacency matrix. (6)

15. (a) (i) Explain how Divide and Conquer technique is applied in Merge Sort. (10)

   (ii) What does dynamic programming have in common with divide and conquer. Describe about it. (6)

Or

(b) (i) Explain greedy algorithm for the change making problem. (10)

   (ii) Describe about randomized algorithms. (6)

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