Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 21507

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Third Semester

Information Technology

IT 2201/ IT 33/10144 IT 304/080250005 – DATA STRUCTURES AND ALGORITHMS

(Regulation 2008/2010)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is abstract data types? Give example.

2. What are the applications of stack and queue?

3. Show that in a binary tree of N nodes, there are N + 1 NULL pointer.

4. Show the result of inserting 2; 1; 4; 5; 9; 3; 6; 7 into an initially empty AVL-tree.

5. What is rehashing?

6. Write code for disjoint set find.

7. Does either prim's or Kruskal's algorithm work if there are negative edge weights?

8. List out the applications of graph.

9. Compare and contrast greedy algorithm and dynamic programming.

10. Draw the solution for the 4-queen problem.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain how stack is used to convert the following infix expression into postfix form a + b* c+ (d* e + f)* g. (8)

    (ii) Give the linked list implementation of stack. (8)

Or

    (b) Explain and write the routine for insertion, deletion and finding element in the cursor based linked list. (16)

12. (a) (i) Construct an expression tree for the expression ab + cde +** (10)

    (ii) Give a precise expression for the minimum number of nodes in an AVL tree of height h and what is the minimum number of nodes in an AVL tree of height 15? (6)

Or

    (b) (i) Write function to perform delete min in a binary heap. (8)

    (ii) Show the result of inserting 3; 1; 4; 6; 9; 2; 5; 7 into an initially empty binary search tree. (8)

13. (a) Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function h(x) = x mod 10, show the resulting:

    (i) Separate chaining hash table.

    (ii) Open addressing hash table using linear probing.

    (iii) Open addressing hash table using quadratic probing.

    (iv) Open addressing hash table with second hash function h2(x) = 7-(x mod 7). (16)

Or

    (b) Give short note on:

    (i) Dynamic equivalence problem. (8)

    (ii) Smart union algorithm. (8)

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14. (a) (i) Find the shortest weighted path from A to all other vertices for the graph in given below figure.

(ii) Find the shortest unweighted path from B to all other vertices for the graph in given below figure. (16)
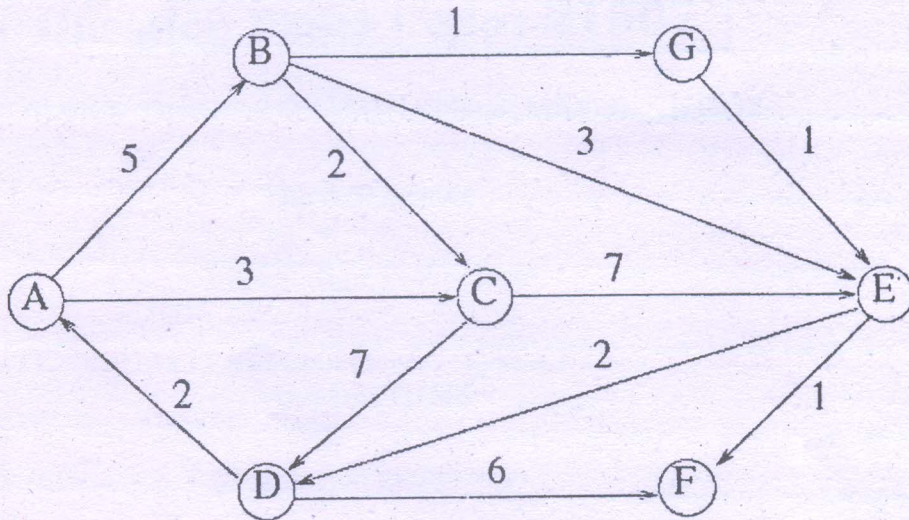
Or

(b) (i) Write a routine to implement Kruskal's algorithm. (8)

(ii) Discuss in detail about bi connectivity. (8)

15. (a) (i) Explain in detail about branch and found algorithm design technique with an example. (10)

(ii) Write a routine for random number generator algorithm. (6)

Or

(b) (i) Explain in detail about asymptotic notation. (6)

(ii) Discuss in detail about NP-complete problem with example. (10)

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