PMM/KS/15/7017

Faculty of Engineering & Technology

Fourth Semester B.E. (Infor. Tech.) (C.B.S.) Examination

ALGORITHM AND DATA STRUCTURE

ime : Three Hours] [Maximum Marks : 80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Solve Question 1 **OR** Question No. 2

(3) Solve Question 3 **OR** Question No. 4

(4) Solve Question 5 **OR** Question No. 6

(5) Solve Question 7 **OR** Question No. 8

(6) Solve Question 9 **OR** Question No. 10

(7) Solve Question 11 **OR** Question No. 12

(8) Due credit will be given to neatness and adequate dimensions.

(9) Assume suitable data wherever necessary.

(10) Diagrams should be given wherever necessary.

1. (a) What are data structures ? Explain different data structures with their proper classification. 8

(b) Explain algorithms. Write properties of algorithm. 6

OR

2. (a) Explain different asymptotic notations. Explain the complexity of merge sort. 7

(b) Explain Recursion with the help of Tower of Hanoi problem. 7

3. (a) Explain stacks. Write C functions for the following w.r.t stacks :

(i) push

(ii) pop

(iii) traverse. 8

(b) Write a short note on circular queue. 6

OR

4. (a) Convert the following into postfix expressions :

(i) (A * B) + C/D 1

(ii) (A + B) * C/D 1

(iii) (A + B) * (C/D) + E ∧ F/G 2

(iv) (A + [(B + C) + (D + E) * F])/g 2

(v) (A + (B * C – (D/E ∧ F) * G) * H). 2

(b) Explain Priority Queues. 6

5. (a) Write a short note on doubly linked list. Also give C functions for the following w.r.t. singly linked list :

(i) Create a singly linked list of n nodes.

(ii) Count the number of nodes in a singly linked list. 8

(b) Explain sparse matrix with suitable example. 5

OR

6. (a) Explain Generalized list. Represent the polynomial p(x, y, z) using generalized list notation :

$$p(x, y, z) = x^{10}y^3z^2 + 2\,x^8y^3z^2 + 3\,x^8y^2z^2 + x^4y^4z + 6x^3y^4z + 2yz.$$ 8

(b) Write application of singly linked list. 5

7. (a) Explain binary search tree. Draw a BST for the following nodes :

(19 10 8 2 5 11 23 16 30). 6

(b) Write preorder, postorder and inorder C functions for tree traversals. 7

OR

8. (a) Explain Threaded Binary tree and its types. 7

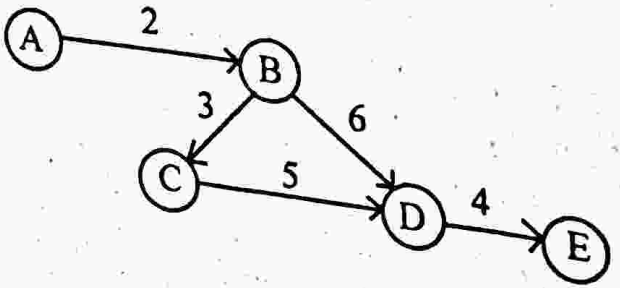
(b) Write a short note on B^+ Tree. 6

9. (a) For the following graph write :

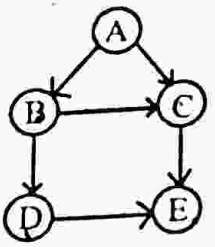
(i) Adjacency list

(ii) Adjacency matrix

(iii) Adjacency multilist representation. 6



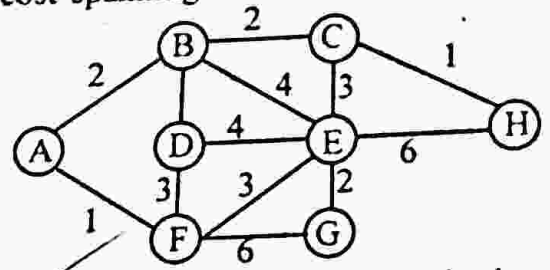
(b) Write down BFS and DFS traversals starting at node A for the given graph. Also draw BFS tree : 7



A B C E D BFS
BFS A B C D E
DFS:- A B D E C
A B C E D

OR

10. (a) What is shortest path problem ? Draw a minimum cost spanning tree for the following graph : 7



(b) Discuss Dijkstra's shortest path algorithm. 6

11. (a) What is Hashing ? Explain various hashing techniques. 6

(b) Sort the following list using Bubble Sort :

(25, 42, 96, 101, 102, 162, 197, 201) 7

OR

12. (a) Write C program for linear search. 7

(b) Show step by step tracing of following data by using quick sort :

42, 53, 13, 19, 26, 37, 33, 23, 14, 30

Also write C function for quick sort. 6