Total No. of Questions—**12**] [Total No. of Printed Pages—**7**

[3562]-207

S.E. (Comp. Engg.) (Second Semester) EXAMINATION, 2009

DATA STRUCTURES

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

***N.B.* :—** (*i*) Answer *three* questions from each Section.

(*ii*) Answers to the two Sections should be written in separate answer books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Write pseudo 'C' code to perform addition of two polynomials using circular linked list. [6]

(*b*) Write a node structure to represent GLL in 'C'. Give graphical representation of the following :

(A, B, (C, (D, (E, (F)), (G), ( )), H)) [6]

(*c*) Write a short note on Garbage collection and compaction. [4]

Or

2. (*a*) Write a pseudo 'C' code to copy one GLL to another. [4]

(*b*) Write a short note on available space list in CLL. [4]

(*c*) Write a node structure to represent sparse matrix in 'C'. Give graphical representation of the following using linked organization : [8]

$$\begin{bmatrix} 0 & 10 & 0 & 30 & 0 & 0 \\ 0 & 0 & 0 & 13 & 0 & 0 \\ 0 & 0 & 0 & 0 & 24 & 25 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 44 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

3. (*a*) Write pseudo 'C' code to delete a node in a given Binary Search Tree. [6]

(*b*) Construct inorder threaded binary tree for the following data :

Inorder — D – E + C $ B * A – G * F

Postorder — DE – C + B $ A * GF * –

Write its preorder traversal. Represent stepwise construction. [8]

(c) Write recursive function to find mirror image of a given binary tree. Show the contents of stack stepwise. [4]

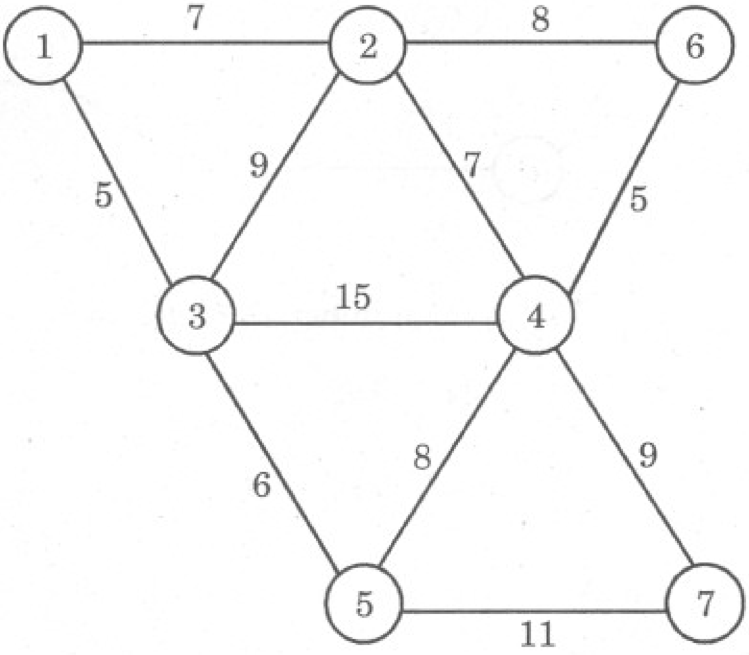
Or

4. (a) Write a pseudo 'C' code to create a inorder Threaded Binary Tree. [8]

(b) Write an algorithm to create a binary tree when its inorder and preporder traversal is given. [6]

(c) "Is it worthwhile to use threaded binary trees to avoid recursive postorder or preorder traversal." Justify your answer. [4]

5. (a) For a given graph below draw adjacency list and show minimum spanning tree using Prim's algorithm. Show step by step result. Start vertex is 1. [8]



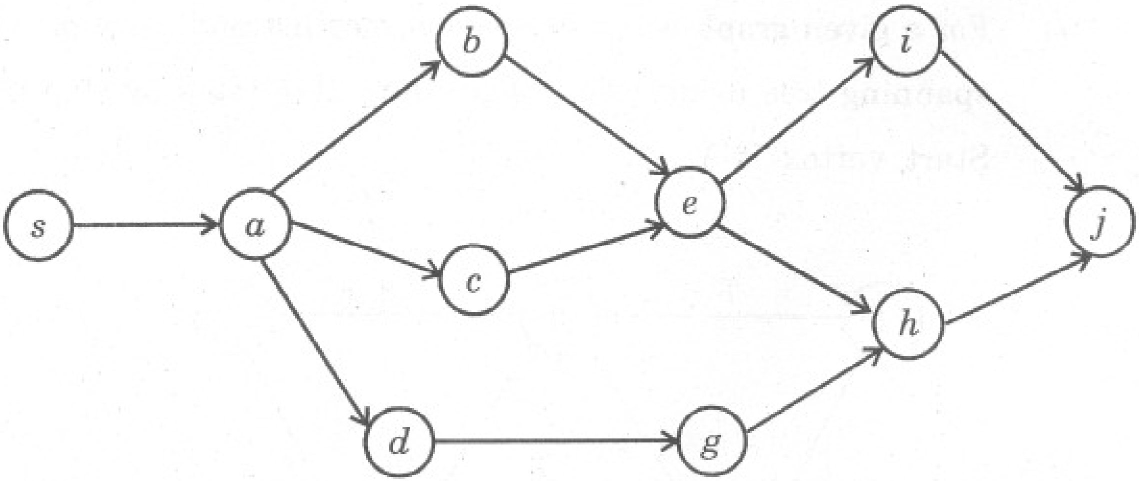
(*b*) Write a short note on Topological sort. [4]

(*c*) Write pseudo 'C' code for non-recursive depth first search traversal in a graph. [4]

Or

6. (*a*) Write a pseudo 'C' code to find minimum spanning tree using Kruskal's algorithm. [6]

(*b*) Find a topological ordering of given graph. [5]



(*c*) Prove that maximum number of edges in a complete graph of nodes 'N' is N * (N – 1)/2. [5]

SECTION II

7. (*a*) Create an AVL tree for the following data :

78, 21, 14, 11, 97, 85, 74, 63, 42, 45, 57, 16, 20, 19, 52. [8]

(*b*) Write short notes on :

(1) OBST

(2) Extendible Hashing. [10]

Or

8. (*a*) Explain linear probing with and without replacement using the following data :

12, 01, 04, 03, 07, 08, 10, 02, 05, 14, 06, 28.

Assume buckets from 0 to 9 and each bucket has one slot. Calculate average cost/No. of comparison for both. [10]

(*b*) Explain all rotations in AVL tree with example. [8]

9. (*a*) Construct B+ tree for the following data :

30, 31, 23, 32, 22, 28, 24, 29, 15, 26, 27, 34, 39, 36. [6]

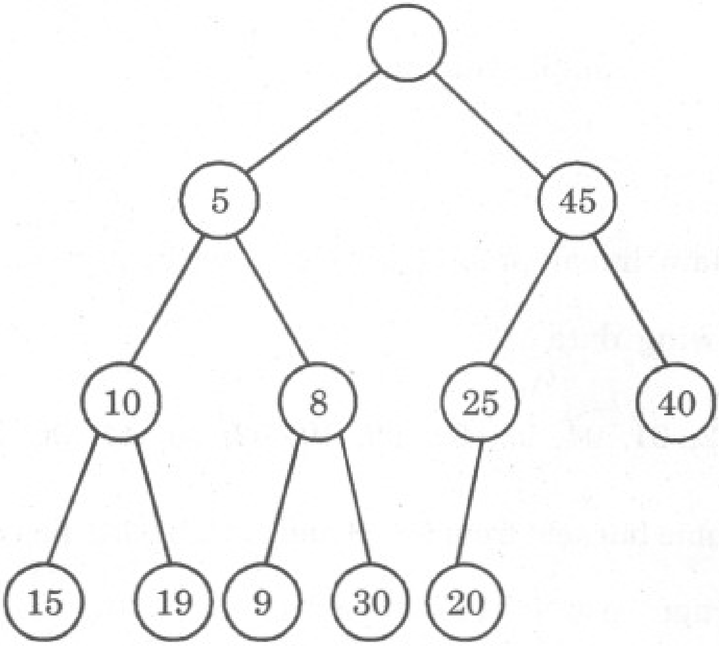
(*b*) Write a function to insert a node in a binary heap. Give an example. [6]

(*c*) Write a short note on red-black tree. [4]

Or

10. (*a*) What do you mean by Min-Max Heap ? [4]

(*b*) Consider the following D Heap : [6]



(1) Insert 18 and repair Heap after insertion.

(2) Delete min element and repair Heap after deletion.

(*c*) What is splay tree ? What are its applications ? Explain all the rotations in splay tree with pictorial representation. [6]

11. (*a*) Write short notes on : [8]

(1) Inverted files

(2) Cellular partition.

(*b*) Explain how records are logically deleted from a file. [4]

(*c*) Write 'C' implementation of the primitives for sequential file organization. [4]

Or

12. (*a*) Write short notes on : [12]

(1) Index sequential file

(2) Direct access file

(3) Factors affecting file organization.

(*b*) What are indices ? What are different characteristics of the index file organization ? [4]