



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1065

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

B.Tech.

THIRD SEMESTER EXAMINATION, 2005-2006

DATA STRUCTURES USING - C

Time : 3 Hours

Total Marks : 100

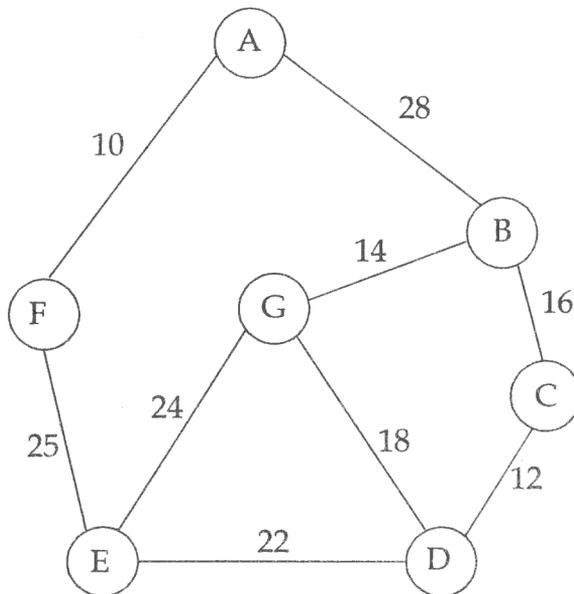
- Note :**
- (i) Answer *ALL* questions.
 - (ii) All questions carry equal marks.
 - (iii) In case of numerical problems assume data wherever not provided.
 - (iv) Be precise in your answer.

1. Attempt *any four* parts of the following : (5x4=20)
- (a) What is data structure ? Discuss the various implementations of data structures.
 - (b) Explain sparse matrix. Obtain the indexing formula for lower left triangular matrix using row-major order, consider the case of square matrix of order $n \times n$.
 - (c) Give array implementation of stack data structure. Write functions to implement Push and Pop operations on stack.
 - (d) Give the data structure to implement two stacks in same array. Write functions to implement PUSH operation on both the stacks.
 - (e) What is TAIL Recursion ? Discuss with example.
 - (f) Write a C program to find the position of string with in another string.

2. Attempt *any two* parts of the following : (10x2=20)
- (a) A double ended queue (deque) is a linear list in which additions and deletions may be made at either end. Obtain a data representation mapping a deque into one-dimensional array. Write C functions to add and delete elements from either end of deque.
 - (b) Discuss the implementation of singly-linked list. Write C functions to implement following operations on singly-linked list.
 - (i) to count the number of nodes.
 - (ii) to reverse the direction of links.
 - (iii) to delete alternate nodes that is first, third, fifth and so on.
 - (c) Discuss the representation of polynomial of single variable using linked list. Write C function to add two such polynomials, represented by linked list.
3. Attempt *any four* parts of the following : (5x4=20)
- (a) Prove that, for any nonempty binary tree, if n_0 is number of leaf nodes and n_2 is the number of nodes with degree 2 then $n_0 = n_2 + 1$.
 - (b) Write a C function to count the number of leaf nodes in a binary tree.
 - (c) Construct Binary tree if its inorder and post-order traversals are as under.
inorder : c b d a f e
post-order : c d b f e a
 - (d) Discuss the threaded binary trees. Explain its memory representation with suitable example.
 - (e) Give Binary Search algorithm. Discuss the average behaviour of the algorithm.
 - (f) Discuss various collision resolution strategies for Hash table.

4. Attempt *any two* parts of the following : (10x2=20)
- (a) Discuss the Quick sort algorithm. Give its average case analysis.
 - (b) Define AVL trees. Show the steps to build an AVL tree for following sequence of node.
A Z B Y C X D U E
 - (c) Define B-tree of order m. Consider the following sequence of nodes and show the growth of the B-tree of order-4.
Z,U,A,I,W,L,P,X,C,J,D,M,T,B,Q,E,H,S,K,N,R,G,Y,F,O,V.

5. Attempt *any two* parts of the following : (10x2=20)
- (a) Discuss the Depth-first and Breadth-first traversals algorithm of a graph with examples.
 - (b) Give Kruskal Algorithm Find a minimum cost spanning tree, of the following graph.



) Write a brief notes on the following file organization techniques :

- (i) Sequential file Organization.
- (ii) Index Sequential file Organization.
- (iii) Direct file Organization.

- o O o -