GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-III   Remedial Examination March 2010

Subject code: 130702
Subject Name: Data and file structure

Date: 10 / 03 / 2010   Time: 11.00 am – 01.30 pm
                                                        Total Marks: 70

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q 1 **A** Write an algorithm for push, pop and empty operations on stack. Using above functions write an algorithm to determine if an input character string is of the form
$a^i b^i$ where i>=1 i.e. no of a should be equal to no of b   **07**

B Transform the following expression to postfix(reverse polish)and evaluate postfix expression by assuming A=1,B=2,C=3,D=4,E=6,F=6,G=1,I=3 and J=3   **03**

A +B-C*D/E +F$G/(I+J)

C What are the advantages and disadvantages of stack and queue implemented using linked list over array?   **04**

Q2 **A** Write an algorithm to perform each of the following operations on Circular singly linked list using header node   **07**
  1. add node at the end
  2. add node at beginning
  3. delete a node which contain element x
  4. insert a node containing x after node having address p

B Write an algorithm to implement ascending priority queue using singular linear linked list which has insert() function such that queue remains ordered list. Also implement remove() function   **07**

OR

B Write a c/c++ program to add two polynomials represented using doubly linear linked list. Also write necessary functions to represent polynomial using doubly linear link list.   **07**

Q 3 **A** Define following terms related to tree with example   **04**
  (1) Binary tree
  (2) Binary search tree
  (3) Strictly binary tree
  (4) Complete binary tree

	B	Construct a tree for the given inorder and postorder traversals Inorder DGBAHEICF Postorder GDBHIEFCA	**05**
	C	Why is Threaded binary tree required? Draw a right in threaded binary tree for the given tree in **Fig. 1**	**05**

<div align="center">OR</div>

Q 3	**A**	Construct binary search tree for the following data 10,3,15,22,6,45,65,23,78,34,5 Find its inorder, preorder and postorder travesal	**07**
	B	Define height of the binary tree. Define height balanced tree with its advantages. Construct a height balanced binary tree (AVL tree) for the following data 42,06,54,62,88,50,22,32,12,33	**07**
Q 4	**A**	Consider the graph shown in **Fig 2.** Find depth-first and breadth first traversals of this graph starting at A	**07**
	B	Define spanning tree and minimum spanning tree. Find the minimum spanning tree of the graph shown in **Fig 3.**	**07**

<div align="center">OR</div>

Q 4	**A**	Give example and applications of directed and undirected graphs. Find the adjacency matrix for the graph shown in **Fig 4**.	**07**
	B	Apply Dijkstra's algorithm to find shortest path between vertex A and vertex F5 for the graph shown in **Fig 5.**	**07**
Q 5	**A**	What are the advantages of Multiway search tree in disc access? Construct B tree of order 5 for the following data 1,7,6,2,11,5,10,13,12,20,16,24,3,4,18,19,14,25	**07**
	B	What are the advantages of Hashing? Discuss problem of collision in Hashing. Also discuss collision resolution techniques.	**07**

<div align="center">OR</div>

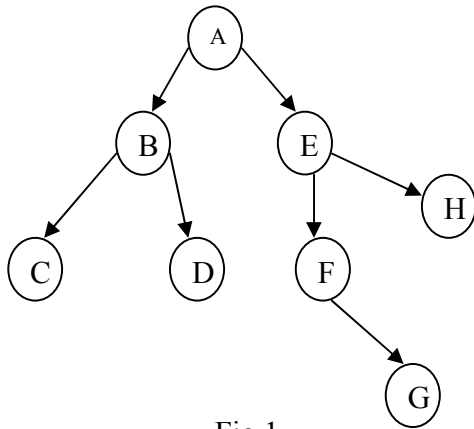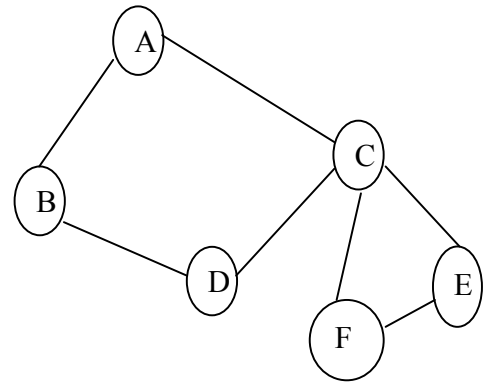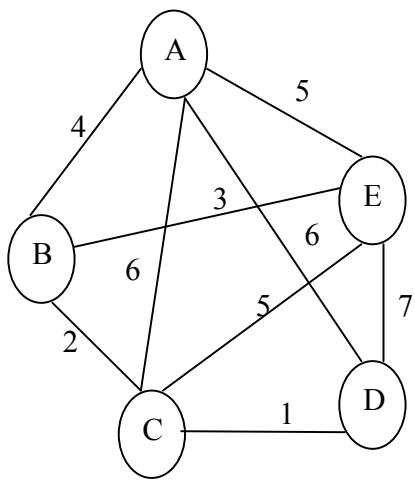|			
Q 5	**A**	The integers given below are to be inserted in a hash table with 5 locations using chaining to resolve collisions. Construct hash table and use simplest hash function. 1,2,3,4,5,10,21,22,33,34,15,32,31,48,49,50	**07**
	B	Define following terms (1) Time and space complexity of an algorithm (2) Sparse matrix (3) Sequential , direct and Index sequential access of files	**07**

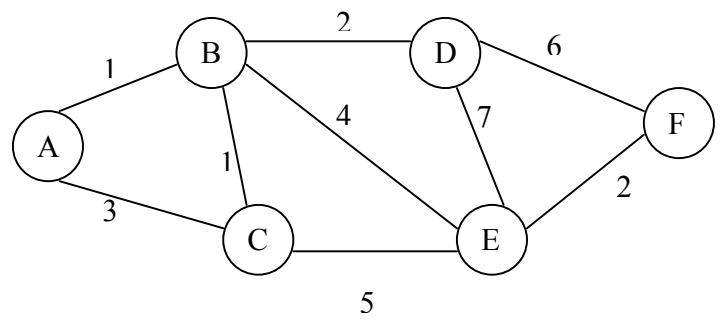<div align="center">*****</div>

Fig 1

Fig 2

Fig 3

Fig 5

Fig 4