

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## 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  $a^i b^j$  where  $i \geq 1$  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 **05**  
 Inorder DGBAHEICF  
 Postorder GDBHIEFCA
- C** Why is Threaded binary tree required? Draw a right in threaded binary tree for the given tree in **Fig. 1** **05**
- OR**
- Q 3** **A** Construct binary search tree for the following data **07**  
 10,3,15,22,6,45,65,23,78,34,5  
 Find its inorder, preorder and postorder traversal
- 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 **07**  
 42,06,54,62,88,50,22,32,12,33
- 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**
- OR**
- 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? **07**  
 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
- B** What are the advantages of Hashing? Discuss problem of collision in Hashing. Also discuss collision resolution techniques. **07**
- OR**
- 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. **07**  
 1,2,3,4,5,10,21,22,33,34,15,32,31,48,49,50
- B** Define following terms **07**  
 (1) Time and space complexity of an algorithm  
 (2) Sparse matrix  
 (3) Sequential, direct and Index sequential access of files

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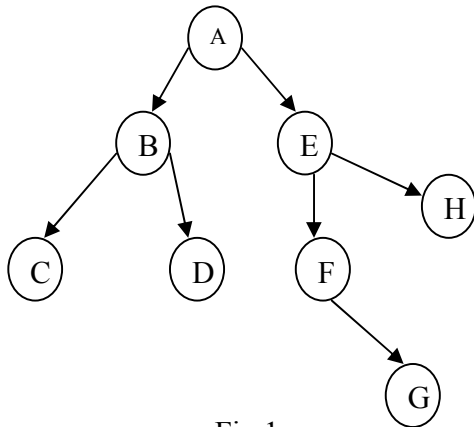


Fig 1

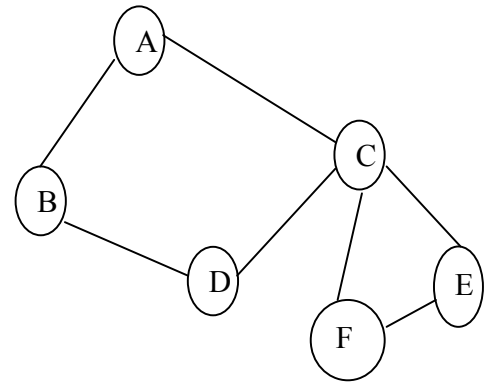


Fig 2

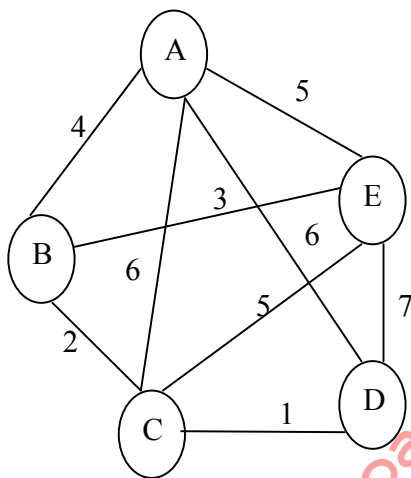


Fig 3

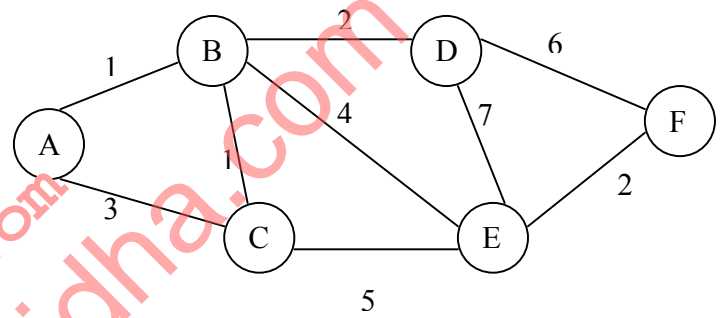


Fig 5

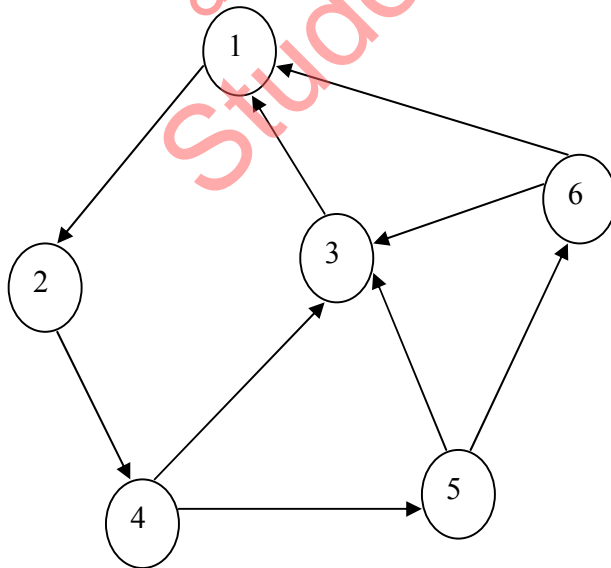


Fig 4