

FACULTY OF ENGINEERING

B.E. 2/4 I-Semester (Supplementary) Examination, June/July, 2011

DATA STRUCTURES

Time : Three Hours]

[Maximum Marks : 75

- Note :— (1) Answer ALL questions from Part A.  
 (2) Answer any FIVE questions from Part B.

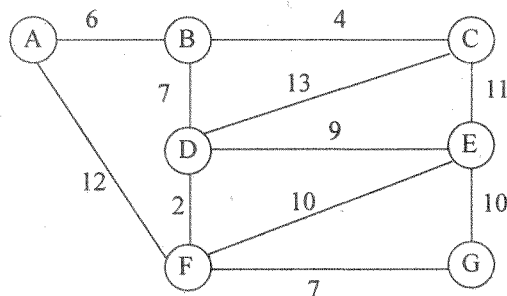
PART—A (Marks : 25)

1. Is the following argument valid ?  
 “an  $O(1)$  algorithm will be superior to an  $O(n^3)$  algorithm in every core.”
2. Suppose non-zero elements of long-triangular matrix of size  $10 \times 10$  are stored in a one dimensional array in row major order. What is location of the element (7, 5) ?
3. Suppose you are to sort a list L consisting of a sorted list followed by few random elements. Which sorting method would you prefer ?
4. Which of the following sorting techniques has more space complexity ?  
 (a) quick sort, (b) merge sort, (c) heap sort, (d) same space complements for all.
5. What is the height of a binary heap with N keys ?
6. Suppose a graph with 20 nodes and 20 edges is stored using adjacent list representation. If a node name requires one memory word and pointer requires one memory word, what is the total memory space required to store this graph ?
7. Convert the following infix expression to postfix form :  $A + B * C/D * (F - E)$ .
8. Suppose we are designing a B-tree for a database which will have large number of records and be stored on a disk. Why is it advantageous to make the order m of the B-tree be fairly large rather than just using a B-tree of order 3 ?
9. Which of the data structures—stack or queue are used for depth first traversal of a graph ?
10. Which is more efficient in terms of running time, the arrays or linked implementation of queue ? Why ?

PART—B (Marks : 50)

11. A doubly linked list is used to implement a text editor. Each line of text is stored in a separate note. Write a function to copy N lines from location (line) I to destination (line) D.

12. (a) Write a function to reverse top N elements of space.  
 (b) Using LZW compression encode the message/bababaababbaabaabbaab ! Assume the initial encodings are 0 for a, and 1 for b.
13. (a) Give the result of inserting the following keys PROBING into an empty linear providing hash table of size  $M = 7$  using the hash function  $f(x) = i \% 7$ , where X is the  $i^{\text{th}}$  letter of the alphabet.  
 (b) Write a function to delete  $i^{\text{th}}$  node in a linked list.
14. Suppose that you are sorting an array containing the following 7 equal keys (the sub-script is not part of the key—its purpose is to uniquely identify each of the equal keys) :  
 $A_0 A_1 A_2 A_3 A_4 A_5 A_6$ .  
 What is the result of running each of the following sorting algorithms ?  
 (a) Selection sort, (b) Insertion sort, (c) Merge sort, (d) Quick sort.
15. (a) Write a function which prints in sorted order all the keys in a binary search tree that fall between the two values (including the keys which are equal to those values) 'low' and 'high'.  
 (b) Construct AVL for the following input sequence :  
 8, 10, 15, 5, 9, 7, 2, 23, 17.
16. Use Prim's algorithms to find minimum spanning tree for the following graph :



17. Write short notes on :  
 (a) Circular array representation of queue  
 (b) Representation of sparse matrices using linked lists.