

AMIETE – ET/CS/IT (NEW SCHEME)

Time: 3 Hours

DECEMBER 2011

Max. Marks: 100

NOTE: There are 9 Questions in all.

- Please write your Roll No. at the space provided on each page immediately after receiving the Question Paper.
- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer FIVE Questions, selecting at least TWO questions from each part. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

a. The number of swappings needed to sort the numbers 8, 22, 7, 9, 31, 19, 5, 13 in ascending order, using bubble sort is

- (A) 11 (B) 12
(C) 13 (D) 14

b. Preorder is same as

- (A) depth- first order (B) breadth –first order
(C) topological order (D) linear order

c. The depth of a complete binary tree with ‘n’ nodes is (log is to base two)

- (A) $\log(n+1) - 1$ (B) $\log(n)$
(C) $\log(n-1) + 1$ (D) $\log(n) + 1$

d. The number of possible binary trees with 3 nodes is

- (A) 12 (B) 13
(C) 5 (D) 15

e. The postfix equivalent of the prefix $* + a b - c d$ is

- (A) $a b + c d - *$ (B) $a b c d + - *$
(C) $a b + c d * -$ (D) $a b + - c d *$

f. The minimum number of edges in a connected cyclic graph on n vertices is

- (A) $n - 1$ (B) n
(C) $n + 1$ (D) none of the above

g. Which of the following is useful in implementing quick sort?

- (A) Stack (B) Set
(C) List (D) Queue

Code: AE52/AC52/AT52 Subject: C & DATA STRUCTURES

- h. The concatenation of two lists is to be performed in $O(1)$ time. Which of the following implementations of a list could be used?
- (A) Singly linked list (B) Doubly linked list
(C) Circular doubly linked list (D) Array implementation of list
- i. The average number of comparisons performed by the merge sort algorithm, in merging two sorted lists of length 2 is
- (A) $8/3$ (B) $8/5$
(C) $11/7$ (D) $11/6$
- j. For merging two sorted lists of sizes m and n into a sorted list of size $m+n$, we require comparisons of
- (A) $O(m)$ (B) $O(n)$
(C) $O(m+n)$ (D) $O(\log(m) + \log(n))$

PART (A)

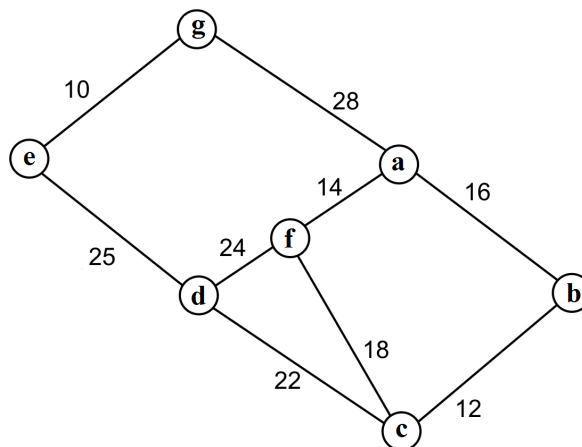
Answer at least any TWO Questions. Each question carries 16 marks.

- Q.2** a. Perform the following conversions:
- (i) $(4822.2)_{10} = (?)_2$
(ii) $(7541.45)_8 = (?)_{10}$ (5)
- b. List the different data types in C. (5)
- c. Write a C program to read any two floating point numbers from the keyboard and display their sum, difference, product and division. (6)
- Q.3** a. Write a C program to find the largest value from four numbers. (6)
- b. Explain the for-loop as used in C. Write a C program to display numbers from 0 to 10 using for loop. (6)
- c. Explain the break statement in C with its syntax and example. (4)
- Q.4** a. What is a recursive function? Write a C program to find the factorial of a given number using recursive function. (6)
- b. A two dimensional array defined as $A[3:7, -1:4]$ requires 4 words per memory cell. Find the location of $A[5, 2]$ if the array is implemented in row major order. The base address is given as 200. (6)
- c. Write a C program for traversing the elements of an array. (4)
- Q.5** a. Explain the following string functions. (6)
- (i) `strcat ( )`
(ii) `strcpy ( )`
(iii) `strrev ( )`

- b. What is a file? Explain any two file operations. (4)
- c. Write a C program to declare a member of a union as a structure data type and to display the contents of the union. (6)

PART (B)**Answer at least any TWO Questions. Each question carries 16 marks.**

- Q.6** a. Write down Bubble sort algorithm. Sort the following list using Bubble sort and find its complexity.
15, 10, 20, 25, 5 (8)
- b. Write an algorithm to delete the root of a heap. (8)
- Q.7** a. Write an algorithm to insert a node at a specified position in a singly link list (8)
- b. Convert the following infix expression into postfix expression using stack.
 $A + (B * C - (D/E \wedge F) * G) * H$ (8)
- Q.8** a. The following sequence gives the preorder and inorder traversals of a binary tree T :
Preorder: A B D G C E H I F
Inorder : D G B A H E I C F
Draw the tree. Also find the postorder of the tree. (8)
- b. What is a binary search tree? Insert the following numbers in to an empty binary search tree: 40, 60, 50, 33, 55, 11. (8)
- Q.9** a. Generate minimum cost spanning tree for the following graph using prim's algorithm. (8)



- b. Write a program in C to implement depth first search algorithm. (8)