ROLL NO. _____

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

AMIETE – ET/CS/IT

Time: 3 Hours **JUNE 2014** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **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 any 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. You may explicitly indicate the exceptions that a function may throw by writing an exception

(A) specification **(B)** header
(C) template **(D)** statement

b. To expose a data member to the program, you must declare the data member in the _____ section of the class.

(A) common **(B)** exposed
(C) public **(D)** unrestricted

c. The declaration section holds _____

(A) data members
(B) data members and function prototypes
(C) data members, function prototypes, and the functions themselves
(D) all of the above

d. A variable *w* with *a* value 67 may be defined with _____

(A) int w = 67; **(B)** int w(67);
(C) int 67 (w); **(D)** both **(A)** and **(B)**, but not **(C)**

e. The extraction operator >> is a (*n*) _____

(A) overloaded function **(B)** C ++ class
(C) C ++ object **(D)** static reference variable

f. Comma operator (,) is primarily used in conjunction with

(A) 'for' statement **(B)** 'if-else' statement
(C) 'do-while' statement **(D)** all of the above

g. Arrays that do not have their dimensions explicitly specified are called

(A) unsized arrays **(B)** undimensional arrays
(C) initialized arrays **(D)** no size arrays

h. main () is an example of

(A) library function
(B) user-defined function
(C) header
(D) statement

i. The statement *i** = 3 is equivalent to

(A) *i* = 3* **(B)** i = i + 3
(C) i = 3 **(D)** i = *i* * 3

j. A variable can be declared static using the keyword

(A) extern **(B)** static
(C) register **(D)** auto

PART (A)

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

Q.2 a. Write a program to add two numbers using a temporary variable. **(8)**

b. Explain the basic data types that the C language supports. **(4)**

c. Explain Bitwise AND operator and Bitwise OR operator in C. **(4)**

Q.3 a. Differentiate between while loop and do-while loop. Also give the syntax of both the loops. **(5)**

b. What is the difference between signed and unsigned variables? **(4)**

c. Write a program to sum the series 1/2 + 2/3 + ---- + n/n +1) **(7)**

Q.4 a. Explain the concept of (system) stack. **(4)**

b. Explain briefly different pros and cons of recursion. **(4)**

c. Consider the linear arrays AAA (5:50), BBB (-5:10) and CCC (18)
(i) Find the number of elements in each array.
(ii) Suppose Base (AAA) = 300 and W=4 words per memory cell for AAA. Find the address of AAA [15] and AAA[35]. **(8)**

Q.5 a. Write a program to extract the first N characters of a string. **(8)**

b. What are structures? Illustrate a complex structure with an example. **(8)**

PART (B)

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

Q.6 a. Write a program to read and display the values of an integer array. Allocate space dynamically for the array. **(8)**

b. Write the basic steps of a merge sort algorithm. What is the complexity of merge sort? **(8)**

Q.7 a. How can the polynomial $6x^3 + 9x^2 + 7x + 1$ be represented in the memory using a linked list? **(5)**

b. Write an algorithm to insert an element in a queue. **(6)**

c. List few applications of stack. **(5)**

Q.8 a. Define the following terms with respect to a binary tree:
(i) Degree of a node
(ii) In- order traversal
(iii) Depth of the tree
(iv) Full binary tree. **(8)**

b. Given the expression, Exp = a+b/c*d-e, construct the corresponding binary tree. **(4)**

c. Write a C routine to find the height of a binary tree. **(4)**

Q.9 a. Explain the concept of DAG with an example. **(4)**

b. Define the following terms with respect of a graph:
(i) Incident edge
(ii) Degree of vertex
(iii) Directed edge
(iv) Undirected edge
(v) Path **(2×5)**

c. What is a spanning tree? **(2)**