ROLL NO. _____

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

AMIETE – ET/CS/IT (Current Scheme)

Time: 3 Hours **June 2019** **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. Literal means

(A) A string **(B)** A string constant
(C) A character **(D)** An alphabet

b. The Breath First search uses which of the following data structure to hold the nodes?

(A) Stack **(B)** Queue
(C) Tree **(D)** None of these

c. Output of the following program fragment is

```
x = 5;
y = x++;
printf("%d%d", x, y);
```

(A) 5, 6 **(B)** 5, 5
(C) 6, 5 **(D)** 6, 6

d. Consider the following program

```
main ( )
{ float a = 0.5, b = 0.7;
if (b < 0.8)
if (a < 0.5) printf ("ABCD");
else printf ("PQR");
else printf ("JKLF);
}
```

The output is

(A) ABCD **(B)** PQR
(C) JKLF **(D)** None of these

e. The following program fragment

```
int *a;
*a = 7;
```

(A) Assigns 7 to a **(B)** Results in compilation error
(C) Assigns address of a as 7 **(D)** Segmentation fault

f. A pointer variable can be
(A) Passed to a function as argument **(B)** Changed within function
(C) Returned by a function **(D)** Assigned an integer value

g. A self-contained block of statements that perform a coherent task of some kind is called a
(A) Monitor **(B)** Function
(C) Program **(D)** Structure

h. The loop in which the statements within the loop are executed at least once is called
(A) Do-while **(B)** While
(C) For **(D)** Goto

i. The binary tree with n nodes can have maximum
(A) n-1 branches **(B)** n branches
(C) n/2 branches **(D)** $\log_2 n$ branches

j. Which of the following searching techniques is appropriate only for arrays in a particular order
(A) Linear Search **(B)** Binary Search
(C) Hashing **(D)** Tree Search

PART (A)
Answer at least TWO Questions from this part. Each question carries 16 marks.

Q.2 a. Write C statements to read the values of three variables of the type int, float and string and print them if correct data is entered otherwise print "error in input" **(4)**

b. Distinguish between the following:
(i)Syntactic error and semantic error **(2)**
(ii)Run time error and logical error **(2)**
(iii)Compiler and Interpreter **(2)**

c. Write a C function that returns 1 if the argument is a prime number and returns 0 otherwise. **(6)**

Q.3 a. Explain memory representation of an array. **(4)**

b. How is the address of an element calculated in an n- dimensional array arranged in row major order. **(4)**

c. Explain call by reference in parameter passing using a suitable example. **(8)**

Q.4 a. Write a switch statement that will examine the value of an integer variable flag and print the following messages: **(6)**
It is hot weather; if flag has value 1
It is a stormy weather; if flag has value 2
It is sticky weather; if flag has value 3
It is a pleasant weather; otherwise

b. (i) What is a function? **(2)**
(ii) List out the advantages & disadvantages of using functions in C. **(2)**
(iii) When passing parameters to functions, explain the difference between pass-by value and pass-by reference. **(2)**

c. Design an algorithm that accepts a positive integer and reverses the order of its digits. **(4)**

Q.5 a. Write a program to extract a portion of a character string and print the extracted string. Assume that "m'' characters are extracted. Starting with the "n'' th character. **(8)**

b. i. What is the difference between a structure and union? **(4)**
ii. Write a C function for searching an element in an array of size N. Assume that elements in array are stored in ascending order. **(4)**

PART (B)

Answer at least TWO Questions from this part. Each question carries 16 marks.

Q.6 a. i. Define a two dimensional array. **(2)**
ii. What are the applications of an array? **(2)**
iii. Write a program for 2-D Matrix Multiplication using arrays. **(2)**

b. i. Explain Stack with its example. **(2)**
ii. Define the various operation performed on Stack. **(1)**
iii. Explain application of Stack. **(1)**
iv. Write a pseudo code for implementing stack using linked list. **(2)**

c. Convert following infix expression to postfix expression:
i. ((a+b)/d-((e-f)+g) **(2)**
ii. 12/3*6+6-6+8/2 **(2)**

Q.7 a. Define circular linked list. **(2)**
What are the advantages and disadvantage of circular linked list? **(2)**
What is the node structure for circular linked list? **(3)**
What is the difference between circular linked list and linear linked list? **(2)**

b. Evaluate the postfix expression using stack. **(3)**
5 1 2 3 2 ^ * / —

c. Write pseudo code to add node at the end in single linked list**.** **(4)**

Q.8 a. Create a binary tree using inorder and preorder traversal **(5)**
Inorder: D B H E A I F J C G, Preorder: A B D E H C F I J G

b. Write down complexity of insertion sort. In which situation bubble sort should be used? **(5)**

c. Consider the following tree:

i. How many leaves does it have? **(1)**

ii. How many of the nodes have at least one sibling? **(1)**

iii. What is the value stored in the parent node of the node containing 30? **(1)**

iv. How many descendants does the root have? **(1)**

v. What is the depth of the tree? **(1)**

vi. How many children does the root have? **(1)**

Q.9 a. Write a C program for DFS traversal. **(4)**

Explain the same with the help of an example. **(3)**

What is the difference between DFS and BFS. **(2)**

b. Give difference between recursion and iteration with suitable example. **(2)**

c. What is a spanning Tree and what is minimum cost spanning Tree. Explain using example. **(5)**