Code: AC05/AT05 **Subject: PROG. & PROBLEM SOLVING THROUGH 'C'**

AMIETE – CS/IT (OLD SCHEME)

Time: 3 Hours | **OCTOBER 2012** | **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. 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 global variables by default belong to

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

b. What will be the output of the following program?
```
# include <stdio.h>

int main() {

     int i=5 ,j;

     j=++i+++i+++i;

     printf("%d    %d" ,i ,j);

     return 0;

}
```
  (A) 7   21 **(B)** 8   21
  (C) 7   24 **(D)** 8   24

c. What will be the output of the following C code?
```
# include <stdio.h>
int main() {
int  check =2
switch ( check)  {
        case 1: printf (" Car");
        case 2 : printf (" Aeroplane");
        case 3 : printf (" Train");
        default : printf (" Auto");
        }
return 0;
}
```
  (A) Aeroplane **(B)** Auto
  (C) Aeroplane Train Auto **(D)** Aeroplane Train

d. What will be the output of the following program?
```
# include <stdio.h>
   int main() {
   int i=1;
   i=2+2*i++;
   printf("%d ",i);
   return 0;
   }
```

(A) 4   (B) 5
(C) 6   (D) 7

e. What will be output of following C code?
```
#include <stdio.h>
int main(){
int  x = 011;
for (int i =0; i<x; i+=3) {
        printf("Start");
        continue;
        printf("End");
        }
   return 0;
}
```

(A) Start End Start End Start End   (B) Start Start Start
(C) Start End Start   (D) Start Start Start Start

f. Following are complexity of sorting algorithms. Which algorithm will you prefer?

(A) O(n)   (B) $O(n^2)$
(C) O(n log n)   (D) O(log n)

g. Which of the following is not a keyword in C?

(A) goto   (B) constant
(C) continue   (D) All of these are C keywords

h. What is the value of the expression a - b / 3 + c * 2 - 1, given a = 9, b = 12 and c = 3?

(A) 10   (B) 3
(C) - 4   (D) 2

i. Which of the following is not a preprocessor statement in C?

(A) # ifdef   (B) # ifndef
(C) #elseif   (D) # endif

j. What is the value assigned to address by the following statements, when input is NEW YORK?
    char address [10];
    scanf("%s", address);

    (A) NEW YORK   **(B)** NEWYORK
    (C) NEW   **(D)** YORK

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Describe the function of the following software: **(10)**
        (i)   assembler   (ii) compiler
        (iii) interpreter   (iv) linker
        (v)   loader

        b. Explain top–down approach of program design with an example. What are its advantages?   **(6)**

Q.3 a. How is upper bound time complexity of an algorithm measured? Give an example.   **(4)**

        b. Write an algorithm to find whether a given year is a leap year or not.   **(6)**

        c. What is a recursive function? What are its basic properties? Write a function which finds the sum of first n integers; where n is the argument to the function.   **(6)**

Q.4 a. Write any four format codes that are used in scanf statement. Write a scanf statement to read age(int) , sex(char), grade (float), and name (string).   **(4)**

        b. Give the syntax of 'for' statement and describe the control flow in that statement. Write a for statement to print the multiplication table of 2, 3 and 4.   **(6)**

        c. Write a program to find the largest element and its position in an array.   **(6)**

Q.5 a. Explain call by value and call by reference approach of passing arguments to a function. Write a simple function to swap two values and illustrate call by value and call by approach.   **(6)**

        b. Differentiate structure and union by giving suitable examples.   **(4)**

        c. Explain with example, the syntax and usage of the following in C program.
            (i) Nested Structure Definition
            (ii) Array of structures   **(6)**

Q.6   a.   Give the meaning of the following declarations:
    (i)   char *c;   (ii)   int *fptr();
    (iii) float *aptr[20];   (iv)   int (*ptrf)(int);
    (v)   float (*ptra)[10];   (vi)   int y = *p1 + *p2;
    (vii) int larger(int *, int *);   (viii) char *p = (char *) &x;   **(4)**

     b.   Write a function to copy a string to another, without using library function. **(6)**

     c.   Explain with an example program the following operations on a file-open, read and close.   **(6)**

Q.7   a.   Write a C program that accept name and marks scored by students in five subjects. Use functions
    (i) ADD to add records with student names and marks to a file
    (ii) CALCULATE to read the records from the file, calculate the result and display.   **(10)**

     b.   Write a C function to insert an element into a sorted linked list. Assume each node has an integer value and a pointer to the next element.   **(6)**

Q.8   a.   Define macros for finding:
    (i)   Sum   (ii)   Max of two values.   **(6)**

     b.   What are the guidelines for construction of statements and guidelines for input/ output formats during coding?   **(6)**

     c.   Write an algorithm to reverse the digits of an integer.   **(4)**

Q.9   a.   What is dynamic memory allocation? How does it help in building complex programs? What is the task of following memory allocation functions?
    (i) malloc   (ii)   calloc
    (iii) free   (iv)   realloc   **(8)**

     b.   Differentiate the use of break and continue statements with an example.   **(4)**

     c.   Indicate how the output is displayed with the following statements?   **(4)**
    printf("%6d",12345);
    printf("%4d",12345);
    printf("%-6",12345);
    printf("%06d",12345);