ROLL NO. _____

Code: AC05/AT05 Subject: PROGRAMMING & PROBLEM SOLVING THROUGH 'C'

AMIETE – CS/IT (OLD SCHEME)

Time: 3 Hours **JUNE 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. Which of the following is / are not the keyword(s) of C?

(A) if **(B)** then
(C) volatile **(D)** both **(B)** and **(C)**

b. Which of the following is not a translator?

(A) Assembler **(B)** Compiler
(C) Interpreter **(D)** Linker

c. Let $f(n) = 4n^2 + 3n + 2$. Which of the following is / are not correct?

(A) $f(n) = O(n^2)$ **(B)** $f(n) = O(n)$
(C) $f(n) = O(n^3)$ **(D)** both **(B)** and **(C)**

d. What is the value assigned to a and b by statement scanf("%d %*d %d", &a, &b) on the input 123 456 789?

(A) a = 123 b = 456 **(B)** a = 123 b = 789
(C) a = 123 b = 123 **(D)** Syntax error in the statement

e. Which of the statement is used to skip a portion of an iteration in a looping statement?

(A) goto **(B)** exit
(C) continue **(D)** break

f. Consider a two dimensional array $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$. Which of the following is correct declaration?

(A) int array[ ] [3] = { { 1, 2, 3}, { 4, 5, 6} };
(B) int array[2][ ] = { { 1, 2, 3}, { 4, 5, 6} };
(C) int array[ ] [ ] = { { 1, 2, 3}, { 4, 5, 6} };
(D) int array [3][2] ={ { 1, 2, 3}, { 4, 5, 6} };

g. Which of the following is not correct with respect to pointers?

(A) A numeric constant can be assigned to a pointer
(B) Pointer can be incremented
(C) Pointer can be passed as an argument to a function
(D) Name of an array can be used as a pointer

h. Consider the following declarations:

```
double a[10];

double *pa;
```

Which of the following declaration is wrong?

(A) pa = a; **(B)** pa = &a[3]
(C) a = pa + 1 **(D)** pa = a + 1

i. What is the value assigned to the variable temp by the following program segment?

```
#define SQUARE(x)  (x * x)

temp = SQUARE(2+4)
```

(A) 36 **(B)** 14
(C) 20 **(D)** Compilation error

j. Which of the following is used in finding the time complexity of an algorithm?

(A) Time taken for the execution of the corresponding program
(B) Number of operation involved in the program
(C) Number of steps in the algorithm
(D) Number of variables used in the program

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

Q.2 a. What is an algorithm? What are its characteristic features? **(6)**

b. Describe the basic functions of the following software:
(i) Assembler (ii) Compiler
(iii) Interpreter (iv) Linker and
(v) Loader **(10)**

Q.3 a. Define Big O notation. Describe the complexity of the following functions using O notation. What is meant by tight upper bound?
(i) $f(n) = 4\ n^2 + 2n$ (ii) $f(n) = 5n^3 + n \log n$
(iii) $f(n) = 7n^4 + n \log n + 2^n$ **(8)**

b. Describe the steps involved in generating the Fibonacci sequence. Write the complete algorithm description of the problem. **(8)**

Q.4 a. Write a C program to multiply two matrices. **(8)**

b. Write a C program to read a set of numbers, sort them using insertion sort and print the sorted list. **(8)**

Q.5 a. Let name = "Ramanu". Write the output of the following printf statements. Indicate blank spaces if any using ~~b~~
(i) printf("10s\n", name) (ii) printf("10.3s\n", name)
(iii) printf("5s\n", name) (iv) printf(".3s\n", name)
(v) printf("-10.3s\n", name) **(5)**

b. Differentiate between structure and union. **(5)**

c. Explain the syntax of switch statement and with an example show how control is transferred during its execution. **(6)**

Q.6 a. Describe passing parameters to a function by value and by reference? Indicate the effects of each way of parameter passing. Give examples to support your answer. **(8)**

b. Write the function to concatenate and compare two strings without using the library functions. **(8)**

Q.7 a. What will be printed as the result of the following programs: **(8)**

(i)
```
main() {
    char *ptr = " Cisco Systems";
    *ptr++; printf("%s\n",ptr);
    ptr++;
    printf("%s\n",ptr);
    }
```

(ii)
```
main() {
    int x=20,y=35;
    x=y++ + x++;
    y= ++y + ++x;
    printf("%d  %dn",x,y);
    }
```

b. What are the different storage classes? Indicate their scope and life. **(8)**

Q.8 a. Write a program to insert and delete an element from a singly liked list. **(10)**

b. Explain the role of malloc(), calloc(), realloc(), and free() functions in dynamic memory management. **(6)**

Q.9 a. What do you understand by testing the program? What is meant by "basic path testing" and "black box testing" with example? **(8)**

b. What are the advantages of using C preprocessor? Explain the syntax and use of the following directives with examples:
(i) #define (ii) #undef
(iii) ifdef (iv) #line **(8)**