COMPUTING AND INFORMATICS

Time : Three hours

Maximum Marks : 100

Answer FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

All parts of a question (a, b, etc.) should be answered at one place.

Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answer may result in loss of marks.

Any missing or wrong data may be assumed suitably giving proper justification.

Figures on the right-hand side margin indicate full marks.

Group A

1. Assume that a cartesian co-ordinate point is represented by a pair of integers (X, Y) indicating its X and Y co-ordinate values.

(*a*) Define a class, named, Coord that would store X and Y co-ordinate values. 4

(*b*) Overload the constructor of the Coord such that if no parameters exist, then the co-ordinate with default parameter (0,0) is created, otherwise a co-ordinate point with specified X and Y values should be created. 6

(*c*) Read 10 pairs of integers and create the corresponding ten co-ordinate points. 5

(*d*) Arrange the created co-ordinates of part (*c*) of this question in the increasing order of X co-ordinates. 5

2. (*a*) What is the difference between call by reference and call by value mechanisms ? Illustrate the use of these two by using appropriate C++ code segments. Which is the mechanism used to pass object parameters ? 10

(*b*) What do you understand by method overloading ? Explain its use by using an example. How is method overloading different from method overriding ? 10

3. A class has 30 students. Each student has a name (up to 30 characters) and roll number (integer). Each student appears in an examination of 100 marks. The names of the students who have scored more than class average need to be printed.

(*a*) Draw flow-chart for the problem. 6

(*b*) Write C++ code for solving the problem. The code should be adequately documented. 14

4. (*a*) What are the advantages of storing data pertaining to an application in a database management system compared to storing data in a file. 7

(*b*) What is a relational database management system ? 6

(*c*) Why data in an RDBMS needs to be normalized ? 7

Group B

5. (*a*) Using a block diagram, show how the CPU, the cache, the memory unit, and the secondary storage units of a computer are interconnected. 8

(*b*) What do you understand by cache memory ? Why is cache memory needed in a computer ? 6

(*c*) Write the truth table of a 1-bit adder and draw the logic gate design of the 1-bit adder. 6

6. (*a*) What is the role of an operating system in a computer ? 6

(*b*) What do you understand by booting of a computer ? What are the main activities that are carried out by a computer during booting ? 7

(*c*) What is a flip-flop ? Draw the logic gate representation of a flip-flop. How is a flip-flop useful ? 7

7. (*a*) What do you understand by file management ? Explain the organization of a file system using a suitable schematic diagram. 8

(*b*) Convert the following two hexadecimal numbers into binary and decimal numbers : (*i*) 9F, and (*ii*) E7. 6

(*c*) Perform the following hexadecimal operations : (*i*) 5F + AB, and (*ii*) CD + BE. 6

8. (*a*) Explain how data are stored and accessed from a hard disk. 7

(*b*) What is BIOS in DOS ? What is its role ? 7

(*c*) What are the important ways in which Windows operating system is different from DOS ? 6

Group C

9. Choose the *correct* answer for the following and write *one* sentence justification for your choice: 10×2

(*i*) The packing of data and functions into a single unit in a program is known as

(*a*) polymorphism

(*b*) abstraction

(*c*) encapsulation

(*d*) inheritance

(*ii*) The mechanism of defining the same method with multiple types of parameters is known as

(*a*) method overriding

(*b*) method overloading

(*c*) virtual method

(*d*) method aggregation

(*iii*) The type of members of a class are by default

(*a*) private

(*b*) public

(*c*) protected

(*d*) None of the above.

(*iv*) For the following C program, how many times is the for loop executed?

```
main(){
    int i;
    for (i=0;i<10;)
        printf("loop count = %d\n", i);
}
```


(*a*) 9

(*b*) 10

(*c*) 11

(*d*) infinite number of times

(*v*) In the following C program segment, what would be the value of *x* after the execution of the program segment?

```
x = -5; y = 10;
if (x>y)
    if (x<0) x = x*-1;
    else x = 2* x;
```

(*a*) 5

(*b*) -5

(*c*) 10

(*d*) -10

(*vi*) What are the typical capacities of (*i*) main memory, and (*ii*) hard disk of a modern PC?

(*a*) 1 Gb and 150 Gb

(*b*) 1 MB and 20 Mb

(*c*) 15 Kb and 200 Mb

(*d*) 20 Gb and 800 Gb

(*vii*) What would be the output of the following program:

```
main (){
    printf ("Expression values = %d %d\n",
                                5/2*2, 6/2*2);
}
```

(*a*) 1,1

(*b*) 6,6

(*c*) 5,6

(*d*) 4,6

(*viii*) Consider the following C program. How many times will the print statement be executed ?

```
for( i=0 ; i<99 ; i++)
  for( j= i; j<100 ; j++)
    printf ("Institution of Engineers\n") ;
```

(*a*) 9900

(*b*) 4950

(*c*) 5049

(*d*) 5051

(*ix*) What is the binary representation of 0·125 ?

(*a*) 0·11

(*b*) 0·01

(*c*) 0·001

(*d*) 0·011

(*x*) The *scope* of a variable refers to the

(*a*) range of values that the variable may assume.

(*b*) portion of code in which the variable may be meaningful.

(*c*) set of variables to which the given variable can be meaningfully assigned.

(*d*) set of variables from which the given variable can meaningfully assume.