S'12 : 3 FN : AN 203/AD 303 (1403)

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 answers 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. (*a*) Design an algorithm to convert a character of 32-bit 2s complement number into its decimal equivalent.   7

   (*b*) Represent your algorithm arrived at **Q.1** (*a*) in flow-chart form.   5

   (*c*) Write a C function that accepts a character string of 32 characters representing a 2s complement number and returns its decimal equivalent.   8

2. (*a*) What is the difference between a local and a global variable ?   6

   (*b*) What is a static variable ?   6

(c) Write a C function that would return an integer value, indicating the total number of times it is called. The first time it is called, it would return one, second time two, and so on. 8

3. (a) What do you understand by a macro in C ? 4

   (b) What is the advantage of writing a processing step as a macro as compared to a function ? 8

   (c) Write a macro definition for determining the larger of two integers. 8

4. (a) Briefly explain the working of the CSMA/CD protocol. At which ISO/OSI layer does it operate ? 7

   (b) Briefly explain the client-server technology. How is a client-server application developed ? 7

   (c) What is the difference between a hub and a switch ? 6

Group B

5. (a) What is a process in the Unix operating system ? How is a process created ? 6

   (b) What is virtual memory ? How does an operating system translate a virtual address into a physical address ? 8

   (c) What is the difference between a volatile and a non-volatile memory ? Explain the advantage and disadvantage of each memory. 6

6. (a) What is the role of the control unit in a CPU ? Explain the difference between microprogrammed and hardwired control. Identify their relative advantages. 10

   (b) What is an interrupt ? Who generates interrupts ? How are interrupts handled by an operating system ? 10

7. (a) Briefly explain, by using suitable diagrams, how various basic logic gates can be realized using NOT gate. 7

   (b) What is a D flip-flop ? By using an appropriate diagram, briefly explain how a shift register can be realized using D flip-flops ? 7

   (c) Convert the following sum of product (SOP) expression into product of sum (POS) expression : $\overline{A}\,\overline{B} + \overline{C}\,\overline{D}$. 6

8. (a) Convert the following octal number into its binary equivalent : 735. 6

   (b) Convert the following hexadecimal number into its octal equivalent : AFB8. 6

   (c) How is a floating point number represented in a computer ? 8

Group C

9. Answer the following in brief : 10 × 2

   (i) To realize 8 Mbyte of memory, how many chips of size 512 kbytes are required ?

   (ii) When an instruction is under execution, it should be in which register in the CPU ?

   (iii) What would be the binary representation of the decimal value 0·25.

   (iv) What is the full form of TCP ?

   (v) What is the name of the parameter passing mechanism that is used to pass an array as a parameter during a function call ?

   (vi) Why is it necessary to normalize the database tables ?

(*vii*) What would be displayed when the following program is compiled and run ?

```
Main ( ) {
        float a = 0·7;
        if (a == 0·7) print f("Equal\n");
        else print f("Not Equal\n");
}
```

(*viii*) Which protocol is involved when a mail client sends an e-mail to its mail server ?

(*ix*) Why is redundancy a threat in a DBMS ?

(*x*) What is the full form of CSMA/CD ?