COMPUTING AND INFORMATICS

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. (a) What do you understand by structured programming ?   5

   (b) What is a function prototype ? Why is it required ?   5

   (c) Using an example, show how a single dimensional array is passed to a function (your example should have both the function definition and the call statement).   5

   (d) Using an example, show how two-dimensional array is passed to a function (your example should have both the function definition and the call statement).   5

2. (a) Between recursion and iteration, which is more efficient ? Why ? 5

(b) Write a recursive function that would take as its parameters a single dimensional integer array and an integer value indicating the number of elements present in the array and would return the sum of numbers in the array. 10

(c) Declare a structure named student having name (10 characters), roll (integer), mark (float). 5

3. (a) What will be printed out by the following C program ? Explain the reason behind your answer. 10 ·

```c
#include < stdio. h >

int  a [J = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

main ( ) {

    int i ;

    for (i = 0;  i < 10;  i++){

    *(a+i)+ = 1;

    Printf("%d \ n", *(a + i));

    }

}
```

(b) Briefly explain how TCP/IP achieves error-free transmission of data ? 10

4. (a) Explain the working of a e-mail system, and the specific protocols that it uses. 10

(b) What do you understand by a client-server system ? Give an example of a client-server system. What are the advantages of a client server system as compared to a monolithic system ? 10

Group B

5. (a) Convert 211.25 in decimal to binary. 5

(b) Convert 211.25 in decimal to octal. 5

(c) Draw the truth table for the Boolean expression
$$\overline{a}b + \overline{b}c + a\overline{c}.$$
5

(d) What is a cache memory ? What is its role in computer operation ? 5

6. (a) Using an appropriate block diagram, explain how CPU, main memory, cache memory, secondary memory, and the input/output units are interconnected in a computer. 10

(b) Draw the truth table of a 2 to 4 decoder, and realize the decoder circuit using AND and NOT gates. 10

7. (a) Explain the principal differences between a system software and an application software. 5

(b) What is a virtual memory operating system ? 5

(c) Explain, using a suitable diagram, how the virtual address is mapped to a physical address. 10

8. (a) What is meant by a process in an operating system ? 5

(b) What is meant by a time-shared operating system ? 5

(c) What is meant by a system call ? Give an example of a system call. How is a system call different from a function call ? 10

Group C

9. Answer the following : 10 × 2

(i) How much time will be required to transmit 100 K bits of data over a 100 Mbps line ?

(ii) What does 'scope' of a variable mean ?

(iii) What will be the output of the following C program ?
```
main ( ){

    int i = 0;

    for (; ; ) Printf ("%d\n", i++) ;
```

(iv) What will be printed by the following program segment ?
```
int a;

a = 2 + 5 / 20*30 -- 1;

Printf ("value of a = %d\n",a) ;
```

(v) Which of the following best describes the Internet ?
(a) LAN
(b) MAN
(c) WAN
(d) Ethernet

(vi) Consider the following function in C :
```
void swap (int a, int b) {
    int temp ;
    temp = a ;
    a = b ;
    b = temp ;
}
```
Correct the function (if necessary) so that a call to the function, e.g., swap (&x, &y) would interchange the values of x and y.

(vii) Which one of the following statements is false ?
(a) Compilers can detect runtime errors.
(b) Some Unix versions can run on laptops.
(c) Mouse is connected to the computer through the serial interface.
(d) Executable files contain machine code.

(viii) Which one of the following can be considered as an output device of a computer ?
(a) VDU
(b) Mouse
(c) Keyboard
(d) Modem

(ix) Which one of the following statements is false ?
(a) Main memory can be accessed faster than secondary memory.
(b) Main memory is a permanent storage memory.
(c) Cache memory is a volatile memory.
(d) Hard disk is a secondary memory.

(x) What is the full form of HTML ?