

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) Write a 'C' program to calculate the mean and standard deviation of an array of 100 integer values. The array elements are to be read from the keyboard. Write functions to calculate standard deviation and mean. 10
- (b) A class of n students take an annual examination in m subjects. Write a 'C' program to read the marks obtained by each student in various subjects and to compute and print the total marks obtained by each of them. 10
2. (a) Write an algorithm to check a given number is prime or not. Draw the flow chart for this algorithm. 8
- (b) What are pointers and structures ? Explain their use through suitable examples. 6

(Turn Over)

(c) What is a Management Information System (MIS) ?
Give at least two realistic MIS examples. 6

3. (a) What is wireless LAN ? Explain why it is needed and
how it is used ? 7

(b) Explain the architecture of an email system. What are
the standard protocols used in such a system ? 7

(c) Briefly explain the mechanism by which TCP is able
to provide reliable transmission service. 6

4. (a) Discuss the main characteristics of a database and how
it differs from traditional file systems. 7

(b) What are the responsibilities of the database
administrators and the database designers ? 7

(c) Briefly explain the 3-tier client-server architecture.
Clearly mention the role and services provided by each
layer. 6

Group B

5. (a) Convert the following numbers : $2 + 2 + 4 + 2$

(i) $(723)_8 = (?)_2$ $7 \times 8^2 + 2 \times 8 + 3$

(ii) $(10001010101)_2 = (?)_{16}$

(iii) $(285.48)_{10} = (?)_{16}$

(iv) $(0.8125)_{10} = (?)_2$

$$\begin{array}{r} 1 \times 7, 8, 2 \\ \hline 285 \\ \hline + 6 \end{array}$$

$$\begin{array}{r} 0 \\ 10 \\ 100 \\ 101 \\ 110 \\ 111 \\ 1000 \\ 1001 \\ 1010 \\ 1011 \end{array}$$

(b) Compare and contrast between serial access memory
with random access memory. 5

(c) Define the terms 'seek time' and 'latency time' of a
hard disk. How can each be reduced to small values ? 5

6. (a) Design a logic circuit to add two positive numbers that
are each 2 bits long. 6

$$\begin{array}{r} 0 \ 0 \ 0 \\ \times 1 \ 0 \\ \hline 0 \ 0 \ 0 \end{array}$$

(Continued)

(b) Using theorems of Boolean algebra, prove the following: 4 + 4

(i) $X \cdot Y + X \cdot Z + Y \cdot Z = X \cdot Y + \bar{X} \cdot Y \cdot Z + X \cdot Z$

(ii) $(X \cdot Y) \cdot (\bar{X} \cdot \bar{Z} + Z) \cdot (X \cdot \bar{Z} + Y) = 0$

(c) What is a scripting language? In what way it is different from application or applicative language? Name two scripting languages. 6

7. (a) Describe UNIX pipes and filters with examples. 6

(b) What is a time sharing operating system? How is it different from a multitasking operating system? 7

(c) Briefly explain the UNIX file system. What is an *i*-node? 7

8. (a) Distinguish among the following classes of computers: Supercomputer, mainframe computer, mini computer, personal computer and embedded computer. 8

(b) Explain the working of optical character reader, video graphic terminal and dot matrix printer. 3 × 2

(c) Write the purpose of following DOS commands: 6 × 1

(i) TYPE (ii) REN (iii) RD (iv) PATH (v) ATTRIB
(vi) FORMAT

Group C

9. Answer the following: 10 × 2

(i) What is Moore's law?

(ii) Represent the decimal number 12 as a 2s complement number.

(iii) A 2.5 inch diameter disk pack has six plates, 512 bytes per sector, 256 sectors, 5268 tracks per surface. What is the capacity of disk and density of disk ?

(iv) How many different digits are there in a octal system ? List them.

(v) What is the role of a linker ?

(vi) What should be the output for the following code segment in C ?

```
int main ( )
{
int a = 2, b = 3 ;
Print f ( " %d ", ++a - b);
return o ;
}
```

2
25
1280
1310

(vii) Identify *two* reasons as to why data redundancy in a database considered to be harmful.

(viii) Suppose the binary encoding of a decimal number is n bits long. What would be the length of the octal encoding of the number ?

(ix) Write any *two* categories of services provided by an operating system to the user.

(x) Arrange the following types of storage elements in increasing order of access time : (a) Hard disk, (b) cache memory, (c) main memory and (d) register.