

This question paper contains 4+2 printed pages]

Your Roll No. ....

9670

**B.A./B.Sc. (Hons.)/III**

**B**

**MATHEMATICS—Paper XVII and XVIII (v)**

**(Computer Mathematics)**

*Time : 2 Hours*

*Maximum Marks : 30*

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

*All questions are compulsory.*

*Choice is given within the question.*

1. Attempt any *two* parts :

(a) (i) Construct the truth table of :

$$p \vee \sim(p \wedge q).$$

1

(ii) State and prove De Morgan's laws of propositions.

1½

P.T.O.

(iii) Test the validity of the argument :

$$p \leftrightarrow q, q \vdash p. \quad 1\frac{1}{2}$$

(b) (i) Evaluate :

$$(A \uparrow B\bar{C}) \oplus (A\bar{B} \downarrow C\bar{D})$$

$$\text{for } A = 1, B = 0, C = D = 1. \quad 1\frac{1}{2}$$

(ii) Write the two canonical forms for the logical function :

$$f(A, B, C) = \pi(1, 3, 4)$$

Also design a circuit of any *one* of these forms. 2½

(c) Construct the Karnaugh map for :

$$f(A, B, C, D) = \Sigma(0, 2, 4, 8, 10, 12, 14) + d(1, 3, 7, 15)$$

and find :

(i) complete sum

(ii) minimal sum. 1,1,2

2. Attempt any *two* parts :

(a) (i) Convert  $(536.491)_{10}$  to octal. 1

(ii) Divide 10001 by 1101 using restoring division upto three places of binary point.  $1\frac{1}{2}$

(iii) Write INDIA in 7-bit ASCII code. 1

(b) (i) What is an overflow ? 1

(ii) Using 9's and 10's complement, subtract 335 from -425.  $1\frac{1}{2}$

(iii) What is an end-around carry ? 1

(c) (i) When is a floating point number said to be normalized ? 1

(ii) Perform binary multiplication :

$101.1011 * 10.101$ .  $1\frac{1}{2}$

(iii) Why is zero called a dirty zero ? 1

3. Attempt any two parts :

(a) (i) Determine the value of each of the following expressions :

(1)  $6 = 7$

(2)  $\text{succ}(-5)$ . 1

(ii) Identify invalid identifiers with justification :

(1) `ROLL#`

(2) `Id No.` 1

(iii) Write expression in PASCAL for the following expressions :

(1)  $\log_e \sqrt{\frac{1-x}{1+x^2}}$

(2)  $\frac{1 - e^{-\sqrt{x}}}{\sqrt{\sin(1 \times 1 + 4)}}$  2

(b) (i) What is the final value of K in the following program ?

`K := 5; I := 3; L := 252;`

`M := I * 1000 + L * 10`

`K := M div 100 + K.` 1.

- (ii) Write the general form of repeat – until control structure. How does it differ from while\_do control structure ? 1½
- (iii) How many times the word MATRIX will be printed after executing the following skeleton : 1½

```
I := 8;
```

```
While(I <= 20) do
```

```
begin
```

```
.....
```

```
.....
```

```
Writeln('MATRIX');
```

```
.....
```

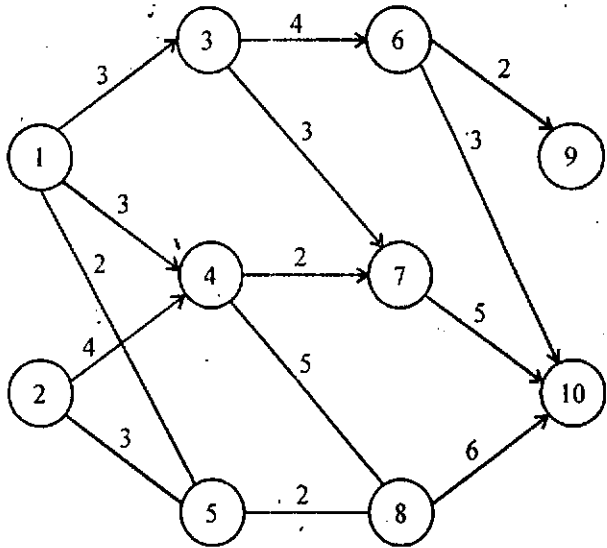
```
.....
```

```
I := I + 3
```

```
end;
```

- (c) Write a program in PASCAL to find the average of any 12 numbers. 4

4. (a) What is a multistage decision problem ? Which principle is used to solve a multistage decision problem ? State it. 2
- (b) Find the optimal path from the source to sink in the following labelled directed graph, exhibiting or explaining the procedure you adopt. 5



Source

Sink