

Roll No. ....

Total Pages : 3

**3452**

**NBCA/D-24**

**MATHEMATICAL FOUNDATIONS FOR  
COMPUTER SCIENCE-I**

**Paper : B23-CAP-104**

**(CC-M1)**

**(BCA)**

**Time : Three Hours]**

**[Maximum Marks : 20**

**Note :** Attempt *five* questions in all. Question No. 1 is compulsory.  
Attempt *four* more questions selecting exactly *one* question  
from each unit. All questions carry equal marks.

**Compulsory Question**

1. (a) What is a universal set?
- (b) Define the co-factor of an element in a matrix.
- (c) Write the formula for finding the arithmetic mean of two numbers a and b.
- (d) Find the derivative of  $x^3 + 2x$ . (4×1=4)

**UNIT-I**

2. In a group of 60 students, 25 like mathematics, 30 like physics, 15 like both mathematics and physics. Find how many students like :

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- (a) Only mathematics.
- (b) Only physics.
- (c) Neither mathematics nor physics.

(4)

3. Explain the relationship between the union, intersection, and difference of two sets with examples.

(4)

## UNIT-II

4. Solve the following system of equations using the matrix method :

$$x + y + z = 6,$$

$$2x - y + z = 3,$$

$$x + 3y - 2z = 4.$$

(4)

5. Explain the process of finding the determinant of a  $3 \times 3$  matrix using minors and co-factors.

(4)

## UNIT-III

6. If  $a = 5$ ,  $b = 20$ , find the A.M., G.M., and H.M. between  $a$  and  $b$ . Verify the relation  $H.M. \leq G.M. \leq A.M.$

(4)

7. Explain the nature of roots of a quadratic equation based on the discriminant. Provide examples.

(4)

#### UNIT-IV

8. The population of a town grows according to the model  $P(t) = 500e^{0.02t}$ , where  $t$  is the time in years. Find the rate of change of the population at  $t = 5$  years. (4)
9. Explain the differentiation of  $e^x$  and  $a^x$  (where  $a > 0$  and  $a \neq 1$ ). Provide examples. (4)
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