Roll No. : .....

Total No. of Questions : **11**] [Total No. of Printed Pages : **3**

BC–196

BCA (Part–I) Examination, 2022

MATHEMATICS FOR COMPUTER SCIENCE

Paper - BCA-101

*Time : **3** Hours*] [*Maximum Marks : **70***

Section–A **(Marks : 2 × 10 = 20)**

Note :– Answer all *ten* questions (Answer limit **50** words). Each question carries **2** marks.

Section–B **(Marks : 4 × 5 = 20)**

Note :– Answer all *five* questions. Each question has internal choice (Answer limit **200** words). Each question carries **4** marks.

Section–C **(Marks : 10 × 3 = 30)**

Note :– Answer any *three* questions out of five (Answer limit **500** words). Each question carries **10** marks.

Section–A

1. (i) Define Identity Matrix.

   (ii) Define Transpose of Matrix.

   (iii) Define Propositions with example.

   (iv) Define Tautologies.

   (v) Define Greatest Common Divisor (GCD).

(vi) Define Absolute Value.

(vii) Define Power Sets with example.

(viii) Define Universal Set.

(ix) Define Relations.

(x) Define Function.

Section–B

2. If $A = \begin{bmatrix} 1 & 0 & -2 \\ 2 & 2 & 4 \\ 0 & 0 & 2 \end{bmatrix}$, verify $A^2 - 3A + 2I = 0$.

Or

Find x, y, z and w, if $3\begin{bmatrix} x & y \\ z & w \end{bmatrix} = \begin{bmatrix} x & 6 \\ -1 & 2w \end{bmatrix} + \begin{bmatrix} 4 & x+y \\ z+w & 3 \end{bmatrix}$.

3. Prove that the statement $(p \to q) \leftrightarrow (\sim q \to \sim p)$ is a tautology.

Or

Construct the Truth Tables :

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

$$p \vee (q \wedge r) \cong (p \vee q) \wedge (p \vee r)$$

4. Prove by Mathematical Induction :

$$1^2 + 2^2 + 3^2 + \ldots\ldots\ldots\ldots + (2n - 1) = n^2$$

Or

Explain Primes, divisibility and properties of Integer.

5. Explain Associative law and Commutative law.

Or

State and prove De Morgan's laws.

6. Explain :

(a) Domain and Range of a Relation

(b) Explain one to one and onto function

Or

Consider the function $f, g : R \to R$ defined by :

$$F(x) = x^2 + 3x + 1$$

$$g(x) = 2x - 3$$

Find :

(i) $f o f$

(ii) $f o g$

(iii) $g o f$

Section–C

7. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, find A^{-1}.

8. Show that given Argument is Valid :

$$p \to q$$

$$q \to r$$

$$\therefore \quad p \to r$$

9. Explain Euclidean algorithm.

10. Explain Operation on sets with example.

11. Explain Equivalence relation with example.