

Roll No. :

Total No. of Questions : 11]

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BCA (Part-I) Examination, 2023

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 Symmetric Matrix.
- (ii) Define Eigen Value.

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- (iii) Define De-Morgan law for proposition.
- (iv) Define the Quantifiers.
- (v) Define Division Algorithm.
- (vi) Define Rational Numbers.
- (vii) If $A = \{a, b\}$, find power set.
- (viii) If $O(A) = m$ and $O(B) = n$, then what is $O(A \times B)$?
- (ix) Define equivalence relation.
- (x) Define Bayes Theorem.

Section-B

2. Show that $AB \neq BA$ if :

$$A = \begin{bmatrix} 5 & -1 \\ 6 & 7 \end{bmatrix}, \quad B = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$$

Or

Find Eigen value and Eigen vector of Matrix :

$$\begin{bmatrix} 3 & 4 \\ 4 & -3 \end{bmatrix}$$

3. Define conjunction and disjunction.

Or

Prove that :

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

4. Prove that :

$$1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$$

Or

Describe difference between prime and co-prime number by example.

5. If :

$$A = \{1, 2, 3, 4, 5\}$$

$$B = \{4, 5, 6, 7, 8\}$$

$$C = \{7, 8, 9, 10, 11\}$$

$$D = \{10, 11, 12, 13, 14\}$$

Find :

$$(A \cap B) \cap (B \cap C)$$

$$(A \cup D) \cap (B \cup C)$$

Or

Write set builder form :

$$\left\{ \frac{1}{2}, \frac{2}{5}, \frac{3}{10}, \frac{4}{17}, \frac{5}{26}, \frac{6}{37}, \frac{7}{50} \right\}$$

6. Let R is a relation :

$$R = \{(x, y) : x, y \in \mathbb{N}, 2x + y = 4\}$$

Find R, Range (R), domain (R).

Or

What is the probability that a number selected from the numbers 1, 2, 3,, 15 is a multiple of 4 ?

Section-C

7. If :

$$A = \begin{bmatrix} 3 & 2 & 0 \\ 1 & 4 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$

Show that :

$$A^2 - 7A + 10I = 0$$

8. Prove distributive law :

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

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

9. $U = \{2, 3, 5, 7, 9\}$, $A = \{3, 7\}$, $B = \{2, 5, 7, 9\}$.

Then prove that :

$$(A \cup B)' = A' \cap B'$$

$$(A \cap B)' = A' \cup B'$$

10. Prove that :

$$f: \mathbb{R} \rightarrow \mathbb{R}$$

Given by $f(x) = 2x$ is one-one and onto.

11. (i) Find order of 5 (mod 12).

(ii) Solve the linear congruence $18x \equiv 30 \pmod{42}$.