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(20126)

Roll No.

BCA-I Sem.

19007

B.C.A. Examination, December-2025 (Under NEP)

MATHEMATICAL FOUNDATION FOR

COMPUTER SCIENCE-I

(BCA-1001)

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt all the sections as per instructions..

Section-A

(Very Short Answer Questions)

Note : Attempt all the five questions. Each question carries 3 marks every short answer is required not exceeding 75 words. $5 \times 3 = 15$

1. Define rank of a matrix.
2. Discuss planar graphs.
3. Define floor and ceiling functions with one example.
4. How many words can be formed by using 4 letters from the word "COMPUTER".
5. Use the binomial theorem to express $(x + y)^7$ in expanded form.

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Section-B

(Short Answer Questions)

Note : Attempt any **two** questions out of the following three questions. Each question carries 7.5 marks. Short answer is required not exceeding 200 words.

$$2 \times 7.5 = 15$$

6. Discuss spanning trees with examples.
7. Discuss Warshall's algorithm in detail with examples.
8. Define permutations and combinations with formulas and examples.

Section-C

(Detailed Answer Questions)

Note : Attempt any **three** questions out of the following five questions. Each question carries 15 marks.

Answer is required in detail.

$$3 \times 15 = 45$$

9. Find the inverse of matrix :

$$\begin{bmatrix} 4 & 3 & 8 \\ 6 & 2 & 5 \\ 1 & 5 & 9 \end{bmatrix}$$

10. Define with one example each :

(a) Linear recurrence equation.

- (b) Order, of linear recurrence equation.
- (c) Linear recurrence equation with constant coefficients.
- (d) Homogeneous linear recurrence equation.

11. Compute the Eigen value and Eigen vector of :

$$\begin{bmatrix} -1 & 1 \\ 2 & 0 \\ \frac{1}{2} & 0 \end{bmatrix}$$

12. (a) Discuss connected and disconnected graphs with example.
- (b) Define sub graph and path with example.
- (c) Define complete graphs and diagraphs with example.
13. (a) Show that in any group of n people, there are two who have an identical number of friends within the group.
- (b) Solve the system of equations using Cramer's rule :

$$x + y + z = 6$$

$$2x - y + 3z = 14$$

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