

D 112278

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Name.....

Reg. No.....

**FIRST SEMESTER (CUFYUGP) DEGREE EXAMINATION
NOVEMBER 2024**

Computer Application

BCA 1CJ 102—MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

(2024 Admission onwards)

Time : Two Hours

Maximum Marks : 70

Section A

*Answer all questions.
Each question carries 3 marks.
(Ceiling 24 marks)*

1. Define rank of a matrix. What is the rank of $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$?
2. Write a short note on cofactors and minors.
3. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$. Find $6A - 3B$.
4. What is a characteristic vector ?
5. Explain non-homogeneous system of linear equations.
6. Find $a \cdot b$ when $a = \langle 2, 2, -1 \rangle$ and $b = \langle 5, -3, 2 \rangle$.
7. State mean value theorem.
8. Define quotient rule.
9. Find the antiderivative of the function $3x^2 + 4x^3$.
10. Evaluate $\int (2x^2 + e^x) dx$.

Turn over

Section B

*Answer all questions.
Each question carries 6 marks.
(Ceiling 36 marks)*

11. Write a short note on operations on matrices.
12. What are the elementary transformations of matrices ?
13. Solve the system of linear equations by Gauss Siedel method :

$$\begin{aligned} 2x + y &= 8 \\ x + 2y &= 1 \end{aligned}$$

14. Find the eigenvalues of the matrix $\begin{bmatrix} -2 & -4 & 2 \\ -2 & 1 & 2 \\ 4 & 2 & 5 \end{bmatrix}$.

15. Briefly explain different types of vectors.
16. Differentiate $\frac{x^3 + 2x}{x - 1}$.
17. Explain : Indefinite integral and constant of integration.
18. Find $\int \sin(x^3) \cdot 3x^2$.

Section C

*Answer any one question.
The question carries 10 marks.*

19. Find the inverse of the matrix $\begin{bmatrix} 3 & 5 & 7 \\ 2 & -3 & 1 \\ 1 & 1 & 2 \end{bmatrix}$.

20. Find $\frac{dy}{dx}$ if $y = \frac{4 \sin x}{2x + \cos x}$.

(1 × 10 = 10 marks)