D 112278 **(Pages : 2)** **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 $\int \left(2x^2 + e^x\right) dx$.

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 $\int \sin\left(x^3\right) \cdot 3x^2$.

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)