

**FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2020**

B.C.A.

BCA 1C 01—MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATION

(2019 Admissions)

Maximum : 60 Marks

Time : Two Hours

Section A

Answer at least eight questions.

Each question carries 3 marks.

All questions can be attended.

Overall Ceiling 24.

1. Find the length of the vector with initial point P : (4, 0, 2) and terminal point Q (6, -1, 2).
2. If $a = [4, 0, 1]$ and $b = [2, -5, 1/3]$. Find $a + b$.
3. Evaluate the characteristic polynomial of the matrix $\begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix}$.
4. When two non-zero vectors are orthogonal ?
5. Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \end{bmatrix}$.
6. Define linear dependence of vectors.
7. Find $\frac{dy}{dx}$ if $y = \sin^{-1} \sqrt{x}$.
8. Find the derivative of $y = 2 \sin x + 3 \cos x$.
9. Find $\frac{dy}{dx}$ if $y = x \sin x \log x$.

Turn over

10. What is the value of $\int_{-a}^0 \sin x \, dx$? Justify.
11. Evaluate $\int x^{-5/4} \, dx$.
12. Integrate $\sin^2 x$.

(8 × 3 = 24 marks)

Section B (Short Essay Type Questions)*Answer at least five questions.**Each question carries 5 marks.**All questions can be attended.**Overall Ceiling 25.*

13. Compute the inverse of A, Where $A = \begin{bmatrix} 2 & 3 & 6 \\ 3 & -6 & 2 \\ -6 & -2 & 3 \end{bmatrix}$.
14. If $a = [1, -2, 1]$, $b = [2, -1, 1]$ and $c = [1, 1, -2]$ then prove that $a \times (b \times c) = (a \times b) \times c$.
15. Solve the linear system :
- $$\begin{aligned} 2x + 3y + 3z &= 5 \\ x - 2y + z &= -4 \\ 3x - y - 2z &= 3. \end{aligned}$$
16. Find $\frac{dy}{dx}$, $y = e^x \cos^3 x \sin^2 x$.
17. Find $\frac{dy}{dx}$, $y = x^{\sin x}$.
18. Integrate $\cos^7 x$ with respect to x .
19. Evaluate $\int_1^2 \frac{dx}{(x+1)(x+2)}$.

(5 × 5 = 25 marks)

Section C (Essay Type Questions)

Answer any one question.

The question carries 11 marks.

20. Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix}$.

21. (a) Find the derivative of $\log x$ using the first principal.

(b) Evaluate the integral $\int_0^2 \frac{dx}{x+4-x^2}$.

(1 × 11 = 11 marks)