

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

B.C.A.

BCA 1C 01—MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATION

(2019 Admissions)

Time : Two Hours

Maximum : 60 Marks

**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  $\int_{-a}^a \sin x \, dx$ ? 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 :

$$2x + 3y + 3z = 5$$

$$x - 2y + z = -4$$

$$3x - y - 2z = 3.$$

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)