BCA Examination, 2025-26

(Odd Semester)

BASIC MATHEMATICS

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION – A

1. Attempt all parts of the following : $8 \times 1 = 8$

   (a) Write nth term of the arithmetic progression.

   (b) Define square matrix.

   (c) If two rows of a determinant are equal then what will be the value of determinant?

   (d) Define diagonal matrix.

(e) Find 10th term of the geometric progression, 2, 4, 8, 16, ...

(f) Evaluate :

$$\int x^{-5}\, dx$$

(g) Evaluate :

$$\int_1^3 \frac{1}{x}\, dx$$

(h) Evaluate :

$$\frac{d}{dx}(x \log x)$$

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

(a) Find the values of x, y, z and a which satisfy the matrix equation :

$$\begin{bmatrix} x-1 & y+4x \\ z-2 & 5a-2 \end{bmatrix} = \begin{bmatrix} 1 & -5 \\ 3 & a \end{bmatrix}$$

(b) Evaluate the determinant :

$$\begin{vmatrix} 4 & -1 & 2 \\ 1 & 0 & -1 \\ 2 & -5 & 0 \end{vmatrix}$$

(c) Evaluate :

$$\frac{d}{dx}\left(x^4 \cot x - e^{2x}\right)$$

(d) Evaluate :

$$\int x e^{-2x}\, dx$$

SECTION – C

Note :– Attempt all questions. Attempt any two parts from each questions. $8 \times 5 = 40$

3. (a) Explain arithmetic progression, geometric progression and harmonic progression with example.

(b) If :

$$A = \begin{bmatrix} 4 & 3 \\ 1 & -1 \end{bmatrix},\ B = \begin{bmatrix} -3 & 2 \\ 1 & 0 \end{bmatrix},\ C = \begin{bmatrix} 1 & 2 \\ 0 & -1 \end{bmatrix}$$

find $A^2 + BC$.

(c) In an A. P. if $S_n = n(2n+1)$, find an A.P.

4. (a) If

$$A = \begin{bmatrix} 2 & 4 \\ -1 & 3 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix}$$

Find AB and BA.

(b) Find X when :

$$Y = \begin{bmatrix} 5 & 8 \\ 10 & -4 \end{bmatrix} \text{ and } 3X + Y = \begin{bmatrix} 5 & 1 \\ 3 & 2 \end{bmatrix}$$

(c) Find :

(i) 10th term

(ii) Sum of first 23 term of the G.P.

$$\frac{2}{5}, \frac{8}{5^2}, \frac{32}{5^3}, \ldots\ldots\ldots$$

5. (a) Differentiate $x^3 \log x - 2 \sin 3x \cdot e^x$ with respect to x.

(b) Differentiate $5^x + e^{-x} \sec x$ with respect to x.

(c) Differentiate $e^{3x} + 3x \cdot \log x - 4x^{-3}$ with respect to x.

6. (a) Evaluate :

$$\int \log x \, dx$$

(b) Evaluate :

$$\int_0^1 x \cos x \, dx$$

(c) Evaluate :

$$\int \left(e^{4x} + \cot x + 2 - \sqrt{x}\right) dx$$

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