(20113) Roll No. .....

BCA I Sem.

18005

B. C. A. Examination, Dec. 2012

MATHEMATICS-I

(BCA-101)

(New)

Time : Three Hours] *[Maximum Marks : 75*

Note : Attempt all the Sections as per instructions.

Section-A

(Very Short Answer Questions)

Attempt all *five* questions. Each question carries 3 marks. . 3×5=15

1. Show that in the matrices $(AB)^{-1} = B^{-1}A^{-1}$.

2. Examine the continuity of the function :

$$f(x) = \begin{cases} e^{1/x}, & \text{when } x \neq 0 \\ 0, & \text{when } x = 0 \end{cases}$$

at $x = 0$.

3. If $x^p y^q = (x+y)^{p+q}$, prove that $\frac{dy}{dx} = \frac{y}{x}$.

4. Evaluate :

$$\lim_{x \to \infty} \left(\frac{x^n}{e^x} \right).$$

5. Prove that :

$$[\bar{a} + \bar{b},\ \bar{b} + \bar{c},\ \bar{c} + \bar{a}] = 2\,[\bar{a}\,\bar{b}\,\bar{c}]\,.$$

Section-B

(Short Answer Questions)

Attempt any *two* questions out of the following three questions. Each question carries 7½ marks. 7½×2=15

6. State and prove Leibnitz's theorem of differentiation.

7. Solve by Cramer's rule :

$$2x + 3y - 3z = 0$$
$$5x - 2y + 2z = 19$$
$$x + 7y - 5z = 5\,.$$

8. Show that the four points $-\bar{a} + 4\bar{b} - 3\bar{c}$, $3\bar{a} + 2\bar{b} - 5\bar{c}$, $-3\bar{a} + 8\bar{b} - 5\bar{c}$ and $-3\bar{a} + 2\bar{b} + \bar{c}$ are coplanar.

Section-C

(Detailed Answer Questions)

Attempt any *three* questions out of the following five questions. Each questions carries 15 marks. 15×3=45

9. Determine the eignvalues and eigenvectors of the matrix :

$$A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}.$$

10. Find the inverse of the matrix A, where :

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

and verify $A^3 = A^{-1}$.

11. Discuss with examples the types of different discontinuities.

12. (a) State and prove Rolle's theorem.

(b) Find 'c' of the Lagrange's mean value theorem, if :

$$f(x) = x(x-1)(x-2);\ a = 0,\ b = \frac{1}{2}.$$

13. Solve the following parts :

(a) $\int\left(\frac{x-1}{x^2}\right)e^x dx$

(b) $\int\frac{x^4 dx}{(x+2)(x^2+1)}$

(c) $\int\frac{dx}{3-4\cos x}$.