

**A** **Printed Pages : 4**  
**(21119)** **Roll No. ....**  
**BCA-I Sem.**

**18005**

**B.C.A. Examination, November 2019**

**MATHEMATICS-I**  
**(BCA-101)**

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

**Note :** Attempt questions from all Sections as per instructions.

**Section-A**

**Note :** Attempt all the five question of this section. Each question carries 3 marks. Veryshort answer is required. 5×3=15

1. Define rank of a matrix.
2. Show that  $\lim_{x \rightarrow 2} \frac{|x-2|}{x-2}$  does not exist.
3. Verify Rolle's theorem for the function.  
 $f(x) = 2x^3 + x^2 - 4x - 2, x \in [-\sqrt{2}, \sqrt{2}]$

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4. Evaluate :

$$\int x^2 e^x dx$$

5. Write the formula of  $\vec{a} \cdot \vec{b}$  and  $\vec{a} \times \vec{b}$ .

**Section-B**

**Note :** Attempt any two questions out of the following three questions. Each question carries 7½ marks. Short answer is required.

2×7½=15

6. Solve the following system of equations by Cramers Rule

$$3x + 4y = 5$$

$$x - y = -3$$

7. Differentiate  $(\sin x)^x$

8. Evaluate :

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

**Section-C**

**Note :** Answer any three questions out of the following five questions. Each question carries 15 marks. Answer is required in detail. 3×15=45

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9. (i) Given :

$$\vec{a} = \hat{i} + 3\hat{j} - 2\hat{k}$$

$$\vec{b} = -\hat{i} + 3\hat{k}$$

Find  $\vec{a} \cdot \vec{b}$  and  $|\vec{a} \times \vec{b}|$

(ii) Find the unit vector perpendicular to both the vectors

$$4\hat{i} - \hat{j} + 3\hat{k} \text{ and } -2\hat{i} + \hat{j} - 2\hat{k}$$

10. Evaluate the following Integral of limit of sum

$$\int_a^b x \, dx.$$

11. Evaluate by L' Hospital rule

(i)  $\lim_{x \rightarrow 1} \frac{x^5 - 2x^3 - 4x^2 + 9x - 4}{x^4 - 2x^3 + 2x - 1}$

(ii)  $\lim_{x \rightarrow 0} \frac{x - \sin x}{x^3}$

12. (i) Evaluate  $\lim_{x \rightarrow 0} \frac{x - |x|}{x}$

(ii) Given  $f(x) = \frac{|x|}{x}$ , for  $x \neq 0$

and  $f(0) = 0$

show that  $f(x)$  is not continuous at  $x = 0$

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13. (i) Find the Rank of the matrix

$$A = \begin{bmatrix} 2 & 2 & 2 \\ 2 & 2 & 2 \\ 2 & 2 & 2 \end{bmatrix}$$

(ii) Find the adjoint of the matrix

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

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