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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. $5 \times 3 = 15$

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 $7\frac{1}{2}$ marks. Short answer is required.

$$2 \times 7\frac{1}{2} = 15$$

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. $3 \times 15 = 45$

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

(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

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