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(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 $\lim_{x \to 2} \frac{|x-2|}{x-2}$ does not exist.

3. Verify Rolle's theorem for the function.

$$f(x) = 2x^3 + x^2 - 4x - 2, \; x \in \left[-\sqrt{2}, \sqrt{2}\right]$$

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

9. (i) Given :

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

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

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

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

$4\hat{i} - \hat{j} + 3\hat{k}$ 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) $\lim_{x \to 1} \dfrac{x^5 - 2x^3 - 4x^2 + 9x - 4}{x^4 - 2x^3 + 2x - 1}$

(ii) $\lim_{x \to 0} \dfrac{x - \sin x}{x^3}$

12. (i) Evaluate $\lim_{x \to 0} \dfrac{x - |x|}{x}$

(ii) Given $f(x) = \dfrac{|x|}{x}$, 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 matirx

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

(ii) Find the adjoint of the matirx

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

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