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21/1085

B.C.A. Examination, 2021

(First Semester)

Fifth Paper

Mathematics - I

Time : 1½ Hours] *[Maximum Marks : 75*

Note : Answer any **five** questions. **All** questions carry equal marks.

1. Find the inverse of the matrix 15

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

2. For the two matrices A and B where 15

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

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Compute AB and BA and show that $AB \neq BA$

3. Evaluate 15

$$\lim_{x \to 0} \frac{(1+x)^n - 1}{x}$$

4. A function $f(x)$ is defined as follows: 15

$$f(x) = \begin{cases} (x^2/a) - a, & \text{when } x < a \\ 0, & \text{when } x = a \\ a - (a^2/x), & \text{when } x > a \end{cases}$$

Prove that the function $f(x)$ is continuous at $x = a$.

5. If $x\sqrt{1-y^2} + y\sqrt{1-x^2} = a$ 15

Show that $\frac{d^2y}{dx^2} = -\frac{a}{(1-x^2)^{3/2}}$

6. Find the maximum value of $(x-1)(x-2)(x-3)$ 15

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7. Evaluate : $\int \frac{x^2 + x + 2}{(x-2)(x-1)}\,dx$ 15

8. Evaluate : $\int \frac{x}{(x-3)\sqrt{(x+1)}}\,dx$ 15

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