

S.No. : 180

BCA 2104

No. of Printed Pages : 05

Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 21104	Roll No.																			
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BCA Examination 2018-19

(First Semester)

MATHEMATICS - I

Time : Three Hours]

[Maximum Marks : 60

Note :- Attempt all questions.

SECTION - A

1. Attempt all parts of the following : $8 \times 1 = 8$

(a) Evaluate

$$\begin{vmatrix} \sin 20^\circ & -\cos 20^\circ \\ \sin 70^\circ & \cos 70^\circ \end{vmatrix}$$

(b) If

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

then find $A.A'$, where A' is transpose of A .

[P. T. O.]

- (c) Find the 8th derivative of $4 e^{2x+5}$.
- (d) Find the radius of curvature for $s = c \tan \psi$.
- (e) Evaluate

$$\int_0^1 (x^3 - 1) dx$$

- (f) Evaluate

$$\int_0^1 \int_0^2 (x + y) dx dy$$

- (g) Find the order and degree of the differential equation

$$\left(\frac{d^3 y}{dx^3} \right)^4 - 6 x^2 \left(\frac{dy}{dx} \right)^5 = 0$$

- (h) Solve

$$y dx + x dy = 0$$

SECTION - B

2. Attempt any two parts of the following : $2 \times 6 = 12$

- (a) Solve the system of linear equations with the help of matrices :

$$x + 2y + 3z = 11$$

$$x - 2y + 3z = 3$$

$$x + 2y - 3z = -1$$

- (b) State and verify Lagrange's mean values theorem for

$$f(x) = 2x^2 - 7x + 10 \text{ in } [2, 5]$$

- (c) Find the area lying between the parabola $y = 4x - x^2$ and the curve $y = x$.

- (d) Solve :

$$y \log y = \frac{dx}{dy} + x - \log y = 0$$

SECTION - C

Note :- Attempt all questions of this section.

3. Attempt any two parts of the following : $5 \times 2 = 10$

- (a) Prove that

$$\begin{vmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = 4a^2b^2c^2$$

- (b) Find the rank of the following matrix :

$$\begin{bmatrix} -1 & 2 & 3 & -2 \\ 2 & -5 & 1 & 2 \\ 3 & -8 & 5 & 2 \\ 5 & -12 & -1 & 6 \end{bmatrix}$$

[P. T. O.]

(c) Verify that the matrix

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

satisfies its characteristic equation. Is it true for every square matrix? State the theorem that applied here.

4. Attempt any two parts of the following : $5 \times 2 = 10$

- (a) Expand the function $f(x) = e^x \cdot \sin x$ by Maclaurin's theorem upto terms containing x^5 .
- (b) Find the asymptotes of the curve

$$x^3 - y^3 - 3axy = 0$$

(c) Find the values of x for which function

$$f(x) = x^5 - 5x^4 + 5x^3 - 1$$

is maximum or minimum. Show that $x = 0$, the function is neither maximum nor minimum.

5. Attempt any two parts of the following : $5 \times 2 = 10$

(a) Evaluate

$$\int_0^{\pi/2} x \cdot \sin x \, dx$$

- (b) Find the area of the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

- (c) Evaluate

$$\int_0^3 \int_0^2 xy(1+x+y) dx \cdot dy$$

6. Attempt any two parts of the following : $5 \times 2 = 10$

- (a) Solve

$$x^2 dy + y(x+y) dx = 0$$

- (b) Solve

$$x \frac{dy}{dx} + y \log y = x y e^x$$

- (c) Solve

$$(y^2 e^{xy^2} + 4x^3) dx + (2xy e^{xy^2} - 3y^2) dy = 0$$

