Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

BCA (Sem.–4)

MATH

Subject Code : BC-301

Paper ID : [B0227]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. (a) Give an example of a matrix of order 3 × 3 and having rank one.

(b) If $\begin{bmatrix} 2a+b & a-b \\ a-c & a+b+c \end{bmatrix} = \begin{bmatrix} 10 & -1 \\ 2 & 8 \end{bmatrix}$

Find the value of a, b and c.

(c) What is Simpson's $\frac{1}{3}$ rule for numerical integration?

(d) What is the relation between mean, median and mode?

(e) Differentiate with respect to x the function $y = x^2 - \frac{1}{\sqrt{x}}$.

(f) Evaluate $\int_0^1 e^{2x}(e^{2x}+3)dx$.

(g) Find the local maximum and minimum values (if any) of the function $f(x) = x^3 - 6x^2 + 12x - 8$.

(h) Evaluate $\int x^3 \sin x^4 dx$.

(i) Find inverse of the matrix $\begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix}$

(j) The sum of 20 observations is 300 and its sum of square is 5000 and median is 15. Find its coefficient of skewness. (10 × 2 = 20)

SECTION-B

2. (*a*) Find x and y if

$$x + y = \begin{bmatrix} 6 & 8 & 2 \\ 11 & 21 & -5 \end{bmatrix} \text{ and } x - y = \begin{bmatrix} 4 & -10 & -12 \\ 3 & -3 & -1 \end{bmatrix}$$

(*b*) Find the rank of the matrix

$$\begin{bmatrix} 4 & 4 & 0 & 3 \\ -2 & 3 & -1 & 5 \\ 1 & 4 & 8 & 7 \end{bmatrix}$$

3. Solve by using Gauss elimination method

(a) $2x + 3y + z = 9,\ x + 2y + 3z = 6,\ 3x + y + 2z = 8$

(b) If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, Find A^{-1} and prove that $A^2 - 4A - 5I = 0$

4. (a) Find the missing frequencies in the following distribution if it is given that the mean of the distribution is 1.46.

No. of Accidents :	0	1	2	3	4	5	Total
Frequency :	46	?	?	25	10	5	200

(b) Find standard deviation of the following data :

Age under :	10	20	30	40	50	60	70	80
No. of persons :	15	30	53	75	100	110	115	125

5. (a) If $y = \sqrt{x} + \dfrac{1}{\sqrt{x}}$, prove that $2x\dfrac{dy}{dx} + y = 2\sqrt{x}$.

(b) Show that of all the rectangles with a given perimeter, the square has the largest area.

6. (a) Find $\dfrac{dy}{dx}$ if $x^y = y^x$

(b) Evaluate $\int \dfrac{x^2}{(x-1)(x-2)(x-3)}\,dx$

7. (a) Evaluate $\int_0^{\frac{\pi}{4}} \sin 2x \sin 3x\,dx$

(b) A curve is drawn to pass through the points given by the following table :

***x* :**	1	1.5	2	2.5	3	3.5	4
***y* :**	2	2.4	2.7	2.8	3	2.6	2.1

Estimate the area bounded by the curve, x-axis and the lines $x = 1$, $x = 4$.