

22103

21222

3 Hours / 70 Marks

Seat No.

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15 minutes extra for each hour

- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Solve any FIVE of the following: 10

- a) Find value of $\log\left(\frac{2}{3}\right) + \log\left(\frac{4}{5}\right) - \log\left(\frac{8}{15}\right)$.
- b) Show that the points (8, 1), (3, -4), (2, -5) are collinear.
- c) Without using calculator find value of $\sin(105^\circ)$.
- d) Find area of Rhombus where diagonals are of length 6 cm and 9 cm.
- e) Find surface area of cuboid whose dimensions are 8 cm \times 11 cm \times 15 cm.
- f) If coefficient of variance is 5 and mean is 60. Find standard deviation.
- g) Find range and coefficient of range for the data: 40, 52, 47, 28, 45, 36, 47, 50.
- h) Find surface area of sphere whose volume is $\frac{4\pi}{3}$ cm³.

P.T.O.

2. Solve any THREE of the following:

12

a) If $A = \begin{bmatrix} 0 & 1 & -1 \\ 4 & -3 & 4 \\ 3 & -3 & 4 \end{bmatrix}$ prove that $A^2 = I$.

b) Resolve following into partial fraction $\frac{x + 3}{(x - 1)(x + 1)(x + 5)}$

c) Following results are obtained as a result of experiment.
Find V_1, V_2, V_3 by using Cramer's Rule.

$$V_1 + V_2 + V_3 = 9, \quad V_1 - V_2 + V_3 = 3, \quad V_1 + V_2 - V_3 = 1$$

d) Compute mean deviation for the mean of the data:
12, 6, 7, 3, 15, 10, 18, 5.

3. Solve any THREE of the following:

12

a) Solve without using calculator,
 $\sin(420^\circ) \cos(390^\circ) + \sin(-330^\circ) \cos(-300^\circ)$

b) Prove : $\frac{\sin 4\theta + \sin 2\theta}{1 + \cos 2\theta + \cos 4\theta} = \tan 2\theta$

c) Prove that : $\frac{\sin 4A + \sin 5A + \sin 6A}{\cos 4A + \cos 5A + \cos 6A} = \tan 5A$

d) Prove : $\tan^{-1}\left(\frac{1}{8}\right) + \tan^{-1}\left(\frac{1}{5}\right) = \tan^{-1}\left(\frac{1}{3}\right)$

4. Solve any THREE of the following:

12

a) Find x and y if

$$\left\{ 4 \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 3 \end{bmatrix} - 2 \begin{bmatrix} 1 & 3 & -1 \\ 2 & -3 & 4 \end{bmatrix} \right\} \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$$

b) Resolve into partial fractions: $\frac{3x - 2}{(x + 2)(x^2 + 4)}$

c) Prove : $\cos 20^\circ \cdot \cos 40^\circ \cdot \cos 80^\circ = \frac{1}{8}$

- d) If $\tan(x + y) = \frac{3}{4}$ and $\tan(x - y) = \frac{1}{3}$. Find $\tan 2x$.
- e) If $\sin A = \frac{1}{2}$. Find $\sin 3A$.

5. Solve any TWO of the following:

12

- a) Attempt the following:
- Find equation of line passing through points $(6, -4)$ and $(-3, 8)$.
 - Find distance between parallel lines $3x + 2y - 5 = 0$ and $3x + 2y - 6 = 0$.
- b) Attempt the following:
- Find equation of line passing through point $(2, 0)$ and perpendicular to $x + y + 3 = 0$.
 - Find acute angle between the lines $3x - y + 4 = 0$ and $2x + y = 3$.
- c) Attempt the following:
- Find the area of ring between two concentric circles whose circumferences are 77 cm and 55 cm.
 - The area of piece of land is in the form of a quadrilateral ABCD. The diagonal AC is 400m long off-set to B is 220m and off-set to D is 98m. Find the area.

6. Solve any TWO of the following:

12

- a) Find the mean and standard deviation and coefficient of variance of the following data:

Class interval	0-10	10-20	20-30	30-40	40-50
Frequency	3	5	8	3	1

- b) Attempt the following:

- i) Find range and coefficient of range for following data:

Marks	10-19	20-29	30-39	40-49	50-59	60-69
No. of students	6	10	16	14	8	4

- ii) The two sets of observations are given below:

Set I	Set II
$\bar{x} = 82.5$	$\bar{x} = \text{mean} = 48.75$
$\sigma = \text{S.D} = 7.3$	$\sigma = \text{S.D} = 8.35$

Which of two sets is more consistent?

- c) Solve the following equations by matrix inversion method.

$$x + y + z = 3, \quad x + 2y + 3z = 4, \quad x + 4y + 9z = 6.$$
