22107

21819

3 Hours / 70 Marks   Seat No.

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) 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) Solve $\log_2(7x + 2) = 3$

b) Find the area of triangle whose vertices are (1, 1), (2, 1), (–3, 2)

c) Without using calculator, find the value of tan75°

d) Find the height of the triangle. If its area is 60 cm^2 and its base is 15 cm

e) Find the volume of sphere whose radius is 3 cm.

f) Find range and co-efficient of range 50, 90, 120, 180, 200, 80

g) If mean is 82.5 standard deviation is 7.2. Find co-efficient of variance.

2. **Solve any THREE of the following.** 12

a) If $A = \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ and $C = \begin{bmatrix} 4 & 5 \\ 2 & 3 \end{bmatrix}$ then show that

AB = AC

b) Resolve into Partial Fraction

$$\frac{2x + 3}{x^2 - 2x - 3}$$

c) Solve the Equation using Cramer's rule

$x + y = 4 - z, \quad y + z = 1 - 2x, \quad x + z = y$

d) Find the Standard Deviation from following frequency table.

Weekly Expenditure below Rs.	5	10	15	20	25
No of Student	6	16	28	38	46

3. **Solve any THREE of the following.** 12

a) Prove that $\tan 70° - \tan 50° - \tan 20° = \tan 70° \tan 50° \tan 20°$

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

c) Prove that
$\sin 20° \sin 40° \sin 60° \sin 80° = \dfrac{3}{16}$

d) Prove that
$\sin^{-1}\left(\dfrac{4}{5}\right) + \sin^{-1}\left(\dfrac{8}{17}\right) = \sin^{-1}\left(\dfrac{84}{85}\right)$

4. **Solve any THREE of the following.** 12

a) If $A = \begin{bmatrix} 1 & 2 \\ -2 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 1 \\ 2 & 3 \end{bmatrix}$

$C = \begin{bmatrix} -3 & 1 \\ 2 & 0 \end{bmatrix}$ verify that A (B+C) = AB+AC

b) Resolve into Partial fraction.
$$\frac{x^2 - 2x + 7}{(x + 1)(x - 1)^2}$$

Marks

c) If A and B are obtuse angles such that $\sin A = \frac{5}{13}$ and $\cos B = -\frac{4}{5}$ find $\tan (A + B)$

d) Prove that

$$\frac{\cos2A + 2\cos4A + \cos6A}{\cos A + 2\cos3A + \cos5A} = \cos A - \tan3A \sin A$$

e) Prove that

$$\tan A \ \tan(60° - A) \ \tan (60° + A) = \tan 3A$$

5. **Solve any TWO of the following.** **12**

a) Solve the following

   (i) Find the length of perpendicular from point (3, 2) on the line $4x - 6y - 5 = 0$

   (ii) Find the equation of straight line passing through $(-4, 6)$ and $(8, -3)$

b) Solve the following

   (i) Find the equation of line passing through the point (3, 4) and perpendicular to line $2x - 4y + 5 = 0$

   (ii) Find the acute angle between the lines $2x + 3y = 13$ and $2x - 5y = 7$

c) Solve the following

   (i) A rectangle is 3.2 m × 2.4 m and has same perimeter as a square. Find the length of the side of the square.

   (ii) A Solid cube of side 12 cm cut into eight cubes of equal volume. What will be the side of the new cube.

6. **Solve any TWO of the following.** 12

a) Find S.D. and variance and co-efficient of variance for the following data.

Class interval	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	3	5	9	15	20	16	10	2

b) Solve the following.

(i) Find the range and co-efficient of range of the following.

Age (in year)	10-19	20-29	30-39	40-49	50-59	60-69	70-79
Frequency	3	61	223	137	53	19	4

(ii) From the following data investigate which set is more consistent

Set	a.m. $= x$	S.D. $= \sigma$
Set – I	83.4	5.9
Set – II	51.83	7.45

c) Solve the following equation by using matrix inversion method.

$x + y + z = 3$ $x + 2y + 3z = 4$ $x + 4y + 9z = 6$

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