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) *Use of Non-programmable Electronic Pocket Calculator is **permissible**.*

(6) *Mobile Phone, Pager and any other Electronic Communication devices are **not** permissible in Examination Hall.*

Marks

1. Attempt **any five** of the following :   **10**

   a) Evaluate $\log_3^{81}$.

   b) Find the area of the triangle whose vertices are (4, 3) (1, 4) and (2, 3).

   c) Find the value of sin (15°) using compound angles.

   d) Find the area of rhombus whose diagonals are 6 cm and 9 cm.

   e) The length, breadth and height of a cuboid are 8 cm, 11 cm and 15 cm respectively. Find the total surface area.

   f) Find the range of the data :

      14, 18, 22, 35, 42, 44, 8, 7, 5 and 2.

   g) If mean is 34.5 and standard deviation is 5 find the coefficient of variance.

2. Attempt **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 into partial fractions : $\dfrac{x^2 + 23x}{(x+3)(x^2+1)}$.

c) Solve the following equations by Cramer's rule :

$x + y + z = 2$

$y + z = 1$

$x + z = 3$

d) Find mean of the following data :

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

3. Attempt **any three** of the following :   12

a) If $\tan A = \dfrac{1}{2},\ \tan B = \dfrac{1}{3}$, find the value of $\tan(A + B)$.

b) Prove : $\tan\left(\dfrac{\pi}{4} + A\right) = \dfrac{\cos A + \sin A}{\cos A - \sin A}$.

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

d) Prove : $\cos^{-1}\left(\dfrac{4}{5}\right) + \cos^{-1}\left(\dfrac{12}{13}\right) = \cos^{-1}\left(\dfrac{33}{65}\right)$.

4. Attempt **any three** of the following :   12

a) If $A = \begin{bmatrix} 2 & 4 & 4 \\ 4 & 2 & 4 \\ 4 & 4 & 2 \end{bmatrix}$ show that $A^2 - 8A$ is a scalar matrix.

Marks

b) Resolve into partial fraction : $\dfrac{3x-1}{(x-4)\,(x+1)(x-1)}$.

c) Prove that $\cos 20° \cos 40° \cos 60° \cos 80° = \dfrac{1}{16}$.

d) Prove : $\sin A \cdot \sin(60-A) \cdot \sin(60+A) = \dfrac{1}{4}\sin 3A$.

e) Prove : $\tan^{-1}\left(\dfrac{1}{7}\right) + \tan^{-1}\left(\dfrac{1}{13}\right) = \cos^{-1}\left(\dfrac{9}{2}\right)$.

5. Attempt **any two** of the following :   12

   a) Attempt the following :

   i) Find the equation of straight line passes through the points $(-4, 6)$ and $(8, -3)$.

   ii) Find the equation of line passing through the point $(2, 5)$ and through the intersection of the lines $x + y = 0$ and $2x - y = 9$.

   b) Attempt the following :

   i) Find the acute angle between the lines $3x + 2y + 4 = 0$ and $2x - 3y - 7 = 0$.

   ii) Find the distance between the lines $3x + 2y = 5$ and $6x + 4y = 6$.

   c) Attempt the following :

   i) A square grassy plot is of side 100 metre. It has a gravel path 10 metres wide all round it on the inside. Find the area of path.

   ii) The volume of cube is 1000 cm³. Find its total surface area.

6. Attempt **any two** of the following :   12

   a) Find mean, 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 mean for the following data :

Class-Interval	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	4	6	10	18	9	3

ii) The two sets of observation are given below :

Set – I	Set – II
$\bar{x} = 82.5$	$\bar{x} = 48.75$
$\sigma = 7.3$	$\sigma = 8.35$

Which of the two sets is more consistent ?

c) Solve the following equations by matrix inversion method :

$x + 3y + 2z = 6$

$3x - 2y + 5z = 5$

$2x - 3y + 6z = 7.$

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