



# 22103

21718

3 Hours / 70 Marks

Seat No.

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- 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) Find the value of  $\log\left(\frac{2}{3}\right) + \log\left(\frac{4}{5}\right) - \log\left(\frac{8}{15}\right)$ .
- b) Find the area of the triangle whose vertices are (3, 1), (-1, 3) and (-3, -2).
- c) Without using calculator, find the value of  $\sec(3660^\circ)$ .
- d) The length of one side of the rectangle is twice the length of its adjacent side. If the perimeter of rectangle is 60 cms, find the area of the rectangle.
- e) Find the surface area of a cuboid of dimensions 26 cms ; 20 cms and 12 cms.
- f) Find range and coefficient of range for the data :  
120, 50, 90, 100, 180, 200, 150, 40, 80.
- g) If coefficient of variation of a distribution is 75% and standard deviation is 24, find its mean.

2. Attempt **any three** of the following :

**12**

- a) If  $A = \begin{bmatrix} 3 & -1 \\ 2 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}$ . Find X such that  $2X + 3A - 4B = I$ .
- b) Resolve into partial fractions :  $\frac{x^2 + 1}{x(x^2 - 1)}$ .

**P.T.O.**



- c) The voltage in an electric circuit are related by following equations :  
 $V_1 + V_2 + V_3 = 9$ ;  $V_1 - V_2 + V_3 = 3$ ;  $V_1 + V_2 - V_3 = 1$  find  $V_1$ ,  $V_2$  and  $V_3$  by using Cramer's rule.
- d) Calculate the mean deviation about the mean of the following data :  
 3, 6, 5, 7, 10, 12, 15, 18.

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

12

- a) Without using calculator, find the value of  
 $\cos 570^\circ \cdot \sin 510^\circ + \sin(-330^\circ) \cdot \cos(-390^\circ)$ .
- b) Prove that  $\frac{\sin 4\theta + \sin 2\theta}{1 + \cos 2\theta + \cos 4\theta} = \tan 2\theta$ .
- c) Prove that  $\frac{\sin 3A - \sin A}{\cos 3A + \cos A} = \tan A$ .
- d) Prove that  $\tan^{-1} \frac{1}{4} + \tan^{-1} \frac{2}{9} = \cot^{-1} 2$ .

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

12

- a) Find x and y if

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

- b) Resolve into partial fractions  $\frac{2x+1}{(x-1) \cdot (x^2+1)}$ .
- c) Prove that  $\cos 20^\circ \cdot \cos 40^\circ \cdot \cos 60^\circ \cdot \cos 80^\circ = \frac{1}{16}$ .
- d) If  $\tan \frac{\theta}{2} = \frac{2}{3}$  find the value of  $2 \sin \theta + 3 \cos \theta$ .
- e) If A and B are obtuse angles and  $\sin A = \frac{5}{13}$  and  $\cos B = \frac{-4}{5}$ , then find  $\sin(A+B)$ .



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

a) Attempt the following :

i) Find the length of the perpendicular from the point (5, 4) on the straight line  $2x + y = 34$ .

ii) Find the equation of the line passing through (3, -4) and having slope  $\frac{3}{2}$ .

b) Attempt the following :

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

ii) Find the acute angle between the lines  $3x - y = 4$ , and  $2x + y = 3$ .

c) Attempt the following :

i) Find the capacity of a cylindrical water tank whose radius is 2.1 m and length is 5 m.

ii) External dimensions of a wooden cuboid are  $30 \text{ cm} \times 25 \text{ cm} \times 20 \text{ cm}$ . If the thickness of wood is 2 cm all round. Find the volume of the wood contained in the cuboid formed.

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

12

a) Calculate the mean, standard deviation and coefficient of variance of the following data :

Class interval	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	03	05	08	03	01

b) Attempt the following :

i) Calculate the range and coefficient of range from the 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 data of run scored by two batsmen A and B in five one day matches is given below :

Batsman	Average run scored	S.D.
A	44	5.1
B	54	6.31

State which batsman is more consistent ?

c) Solve the following equations by matrix inversion method :

$$x + 3y + 3z = 12; x + 4y + 4z = 15; x + 3y + 4z = 13.$$

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