



Class: XI

MODEL PAPER EXAMINATION 2025

Time Allowed: 25 minutes

SUBJECT: MATHEMATICS

Q1:

SECTION "A"

Marks: 20

Note: Attempt ALL questions from this section. Each question carries ONE mark.

- 1) For any triangular matrix A , $|A|$ is equal to:
 - A. Product of leading diagonal elements
 - B. Sum of leading diagonal elements
 - C. Sum of square of diagonal elements
 - D. All of these
- 2) The multiplicative inverse of $(5, 2)$ is:
 - A. $(\frac{5}{18}, \frac{2}{18})$
 - B. $(\frac{5}{25}, \frac{-2}{25})$
 - C. $(\frac{-5}{25}, \frac{2}{25})$
 - D. $(1, 0)$
- 3) If A is an idempotent matrix then:
 - A. $A^2 = I$
 - B. $A^2 = A$
 - C. $A^2 = 2A$
 - D. None
- 4) A square matrix A is diagonal if:
 - A. $A^t = -A$
 - B. $A^2 = A$
 - C. All diagonal elements are 0
 - D. Only diagonal elements are non-zero
- 5) If $Z = 3i - 4$, then $Z + \bar{Z} =$:
 - A. 8
 - B. $-3i$
 - C. -8
 - D. $3i - 8$
- 6) If $\vec{a}$ and $\vec{b}$ are orthogonal then $\vec{a} \cdot \vec{b} =$:
 - A. ab
 - B. 1
 - C. 0
 - D. -1
- 7) $i \cdot (j \times k) =$
 - A. j
 - B. $-i$
 - C. k
 - D. 0
- 8) If the order of two matrices A and B are $m \times n$ and $n \times q$ respectively, then order of AB is:
 - A. $m \times q$
 - B. $n \times m$
 - C. $q \times m$
 - D. $q \times q$
- 9) The H.M between a and b is:
 - A. $\frac{3(a+b)}{ab}$
 - B. $\frac{ab}{a+b}$
 - C. $\frac{2ab}{a+b}$
 - D. $\frac{a+b}{ab}$
- 10) If in a G.P., $a = 3$, and $r = \frac{2}{3}$ then S is equal to:
 - A. 9
 - B. 12
 - C. 15
 - D. 18
- 11) The imaginary part of $i(3 + 5i^2)$ is:
 - A. $-2i$
 - B. $3i$
 - C. -2
 - D. -5
- 12) Middle term in the expansion of $(a + b)^{2n}$ is:
 - A. n th term
 - B. $(n + 1)$ th term
 - C. $(2n + 1)$ th term
 - D. None
- 13) The value of 5P_3 is:
 - A. 120
 - B. 60
 - C. 20
 - D. 80
- 14) A function $f(x) = x^3 + 2x^2 - 5x + 6$ is:
 - A. Polynomial
 - B. Linear
 - C. Even
 - D. Odd
- 15) Solution of equation $3\sin x + \sqrt{2} = 0$ in the 3rd quadrant.
 - A. $\frac{-2\pi}{35}$
 - B. $\frac{-\pi}{4}$
 - C. $\frac{-\pi}{3}$
 - D. $\frac{-11\pi}{6}$
- 16) The period of $5 \tan 8x$ is:
 - A. $\frac{\pi}{8}$
 - B. $\frac{\pi}{5}$
 - C. 5π
 - D. π
- 17) In ΔABC if $a = 25\text{cm}$, $b = 15\text{cm}$ and $c = 35\text{cm}$ then the value of $2S$ is:
 - A. 30cm
 - B. 25cm
 - C. 40cm
 - D. 75cm
- 18) The probability of getting a head in a single toss of a coin is:
 - A. $\frac{1}{4}$
 - B. $\frac{1}{3}$
 - C. $\frac{1}{2}$
 - D. $\frac{2}{5}$
- 19) $\sin \frac{\alpha}{2} = ?$
 - A. $\sqrt{\frac{s(s-a)}{bc}}$
 - B. $\sqrt{\frac{(s-b)(s-c)}{ac}}$
 - C. $\sqrt{\frac{(s-a)(s-b)}{s(s-c)}}$
 - D. $\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$
- 20) _____ are the entities whose values are to be determined from the solution of the LP problem.
 - A. Objective function
 - B. Decision variables
 - C. Constraints
 - D. Opportunity cost

END OF SECTION A



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Time: 2 hours 40 minutes **SUBJECT: MATHEMATICS SECTION “B” AND SECTION “C”**
SECTION “B” SHORT ANSWER QUESTIONS
Total Marks 80
Marks 40
Q2: Attempt any **TEN PART** questions from this section. All questions carry equal marks.

(i) Find the point of intersection where y is function of x

$$3x - 2y = 4 \text{ and } x = 4y = 6$$

(ii) Find out whether the following matrix is idempotent or involuntary:

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

(iii) Find the indicated terms in the following harmonic progression:

$$\frac{9}{5}, \frac{9}{13}, \frac{9}{21}, \dots; 8^{\text{th}} \text{ term}$$

(iv) Find the area of an equilateral triangle with each side x units long.

(v) Solve the quadratic equation $z^2 - 6z + 34 = 0$ by completing the squares, where z is a complex number.

(vi) There are 11 men and 9 women members of a club. How many committees of 8 members can be formed, if there are?

a) Exactly five men

b) at most five women

c) At least five women

(vii) Find the area of Triangle ABC when

$$c = 36, \quad \alpha = 46^\circ, \quad \beta = 66^\circ$$

(viii) The paths of two aeroplanes A and B are determined by the straight lines $2x - y = 6$ and $3x + y = 4$ respectively. Graphically find the point where the two paths cross each other.(ix) Write in the simplified form the term independent of x in the expansion of $\left(3x + \frac{2}{x^3}\right)^{10}$.

(x) Prove that:

$$\text{a) } \sin 4\theta = 4 \sin \theta \cos \theta \cos 2\theta$$

$$\text{b) } \frac{\sin \alpha + \sin \beta}{\sin \alpha - \sin \beta} = \tan \left(\frac{\alpha + \beta}{2} \right) \cot \left(\frac{\alpha - \beta}{2} \right)$$

(xi) Find the inverse of $f(x) = \frac{1}{x+3}, x \neq -3$ and verify that $f^{-1}[f(x)] = x$.(xii) Find the equation of a quadratic function of the form $y = ax^2 + bx + c$ that intersects the x-axis at the points (-2,0) and (6,0).(xiii) If $A + B + C = 90^\circ$ then prove that $\sin \frac{A}{2} = \cot \frac{B+C}{2}$ (xiv) Find the largest angle of ΔABC , when $a = 7\text{cm}$, $b = 10\text{cm}$, and $c = 12\text{cm}$.
SECTION “C” DETAILED ANSWER QUESTIONS
Marks 40
NOTE: Attempt any **FIVE QUESTIONS** from this Section. All questions carry equal marks.

Q.3 Solve the non-homogeneous system of linear equations using Gauss- Jordan –method.

$$2x + 3y - z = 5, \quad x - 4y + 2z = -3, \quad 3x + y + z = 6$$

Q.4 If $f: \mathbb{R} \rightarrow \mathbb{R}$ is the function defined by $f(x) = 5x + 7$. Find $f^{-1}(x)$ and verify that $f^{-1}[f(x)] = x$.
OR

Find five numbers in A.P, whose sum is 30 and the sum of their squares is 210.

Q.5 A pair of dice is rolled. Find the probability of:

(i) Getting a sum of 8

(ii) Rolling doubles (both dice show the same number)

(iii) Getting a number greater than 4 on at least one die

(iv) The product of the two numbers being 12.

Q.6 If $x = \frac{1}{3} + \frac{1.3}{3.6} + \frac{1.3.6}{3.6.9} + \frac{1.3.6.9}{3.6.9.12} + \dots$, prove that $x^2 + 2x - 2 = 0$.

Q.7 The sides of a parallelogram are 25cm and 35cm long and one of its angles is 36° . Find the length of its diagonals.

Q.8 The number of bacteria in a culture increased in G.P. from 515,000 to 15,45,000 in 7 days. Find the daily rate of increase, assuming the rate of increase to be constant

Q.9 Find and verify the general solution of $2\cos x - \sin^2 x - 1 = 0$.

Q.10 Evaluate without using calculator: $\cos 30^\circ \cos 45^\circ \cos 60^\circ$.
END OF PAPER