



Class: XII

MODEL PAPER EXAMINATION 2025

Time Allowed: 20 minutes

SUBJECT: MATHEMATICS

Q1:

SECTION "A"

Marks: 20

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

- The point (3,3) is _____ the circle $x^2 + y^2 = 64$.
A. Outside B. Inside C. On D. Cannot be determined
- The perimeter of a rectangle is given by the function $p(x, y) = 2(x + y)$, where x and y are the length and breadth, respectively. What is the sum of the partial derivatives $p(x, y)$ with respect to x and y ?
A. $2x$ B. $2y$ C. $2(x + y)$ D. 4
- What is the slope of a line perpendicular to a vertical line?
A. 2 B. $\frac{1}{2}$ C. 90° D. Undefined
- The length of tangent drawn to the circle $x^2 + y^2 + 2y - 1 = 0$ from the point (5,2) is:
A. $\sqrt{24}$ unit B. $\sqrt{33}$ unit C. $\sqrt{32}$ unit D. $\sqrt{31}$ unit
- The equation of the tangent to the circle $x^2 + y^2 = 25$ at (3,4) is
A. $3x + 4y = 0$ B. $4x + 3y = 25$ C. $3x + 4y = 25$ D. $3x + 4y = 5$
- Let $f(x, y)$ and $g(x, y)$ be homogenous functions of degrees 2 and 3, respectively. What is the degree of the homogenous function $\frac{f(x, y)}{g(x, y)}$?
A. 6 B. 1 C. $\frac{2}{3}$ D. -1
- In the bisection method, the approximate root is the _____ of the endpoints of the interval in which an actual root lies.
A. Arithmetic mean B. Geometric mean C. Sum D. Product
- If $g(x) = 3x + 2$ and $g(f(x)) = x$ then $f(2) =$ _____
A. 2 B. 6 C. 0 D. 8
- The area bounded by the curve $y = \ln ex^2$ from $x = -1$ to $x = 1$ is
A. $\frac{2}{3}$ B. 1 C. $\ln 2$ D. $\ln 3$
- What point on the line $2x - 3y = 5$ is equidistant from (1,2) and (3,4)?
A. (-2,2) B. (4,1) C. (1,-1) D. (4,6)
- The center of a circle given by the equation $x^2 + y^2 + 10 - 8y + 1 = 0$ is
A. (-5,8) B. (-10,8) C. (5,-4) D. (-5,4)
- In a plane, three or more points are said to be collinear if
A. They lie on a circle B. They form closed loop tighter
C. They lie on a straight-line D. They do not make any defined shapes
- The equation $xy = c^2$ represents a
A. Parabola B. Ellipse C. Hyperbola D. Circle
- In the trapezoidal rule, the number of sub-intervals must be a multiple of
A. 0 B. 1 C. 2 D. 3
- If a function $f(x)$ satisfies $f(c) = 0$, the point $(c, f(c))$ is referred to as a
A. Maximum point B. Minimum point C. Stationary point D. Critical point
- The eccentricity of a rectangular hyperbola is
A. 1 B. 2 C. $\sqrt{3}$ D. $\sqrt{2}$
- The center of the circle represented by $x^2 + y^2 + 6x + 8 = 0$ is
A. On the x-axis B. On the y-axis C. In the first quadrant D. At the origin
- For what value of k does the circle $x^2 + y^2 + 6x - 4y + k = 0$ have a radius of 5?
A. 11 B. -12 C. 10 D. 12
- Two lines are said to be parallel if their slopes are
A. Equal B. Unequal C. Non-existent D. Negative reciprocals of each other
- The fastest method to solve the nonlinear equation numerically is:
A. Bisection Method B. False Position Method
C. Newton Raphson Method D. Simpson $\frac{1}{3}$ Method

END OF SECTION A



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MODEL PAPER EXAMINATION 2025

Time: 2 hours 40 minutes **SUBJECT: MATHEMATICS SECTION “B” AND SECTION “C”**
SECTION “B” SHORT ANSWER QUESTIONS
Total Marks 80
Marks 50

Q2:

Note: Attempt any **TEN-PART** questions from this section. All questions carry equal marks.

(i) Evaluate any one of the following limits.

$$\text{a) } \lim_{x \rightarrow 0} \frac{\sqrt{x+3} - \sqrt{3}}{x} \quad \text{b) } \lim_{x \rightarrow 0} \frac{3\sin x - x^3}{2x}$$

(ii) Find the equation of the circle whose centre is at its origin and it contains a point (5,6).

(iii) Find the order and degree of $\frac{d^3y}{dx^3} - 5 \left(\frac{d^2y}{dx^2}\right)^3 + 7\left(\frac{dy}{dx}\right)^8 = 0$ (iv) Obtain the first three terms of the Maclaurin's series for $e^{\sin x}$.(v) Find the values of m and n , so that the given function f is continuous at $x = 3$

$$f(x) = \begin{cases} mx & \text{if } x < 3 \\ n & \text{if } x = 3 \\ -2x + 9 & \text{if } x > 3 \end{cases}$$

(vi) Evaluate $\int \frac{5dx}{25x^2+9}$ by using trigonometric substitution.(vii) Differentiate $\ln[\tanh(x^2 + 2x + 1)]$ with reference to x (viii) The line through (6, -4) and (-3, 2) is parallel to the line through (2, 1) and (y, 0). Find y .(ix) A, B and C are three collinear points and the coordinates of A and B are (3, 4) and (7, 7) respectively. Find the coordinates of C if $|\overline{AC}| = 10 \text{ units}$.(x) The area of the triangle is given by formula $A = \frac{1}{2}bh$. Differentiate A with respect to their independent variables.(xi) Find the equation of the parabola whose vertex is (3, 4) and directrix $x = 5$.(xii) Use Bisection method to find a real root of $f(x) = \cos x$, [1, 2] up to one decimal place (five iterations)**OR**Show that the line $y = 2x + 4$ is tangent to the ellipse $4x^2 + 3y^2 = 12$. Also find the point of contact.(xiii) Find eccentricity, foci, vertices and latus rectum of $\frac{x^2}{9} - \frac{y^2}{16} = 1$ **SECTION “C” DETAILED ANSWER QUESTIONS****Marks 30****Note:** Attempt any **FIVE QUESTIONS** from this Section. **Question No.3** is compulsory. All questions carry equal marks.Q.3 A. Integrate $\int x^2 e^x dx$ by parts B. Evaluate $\int \frac{(x^2+2x+3)dx}{x^3-x}$ by using partial fractionQ.4 Find the area above the x-axis under the following curve $y = 5e^{5x}$
 $x = -2, \quad x = 3$ Q.5 Find the condition of tangency of line $y = mx + c$ to ellipse

$$\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$$

Q.6 Prove that the two circles $x^2 + y^2 + 2gx + c = 0$ and $x^2 + y^2 + 2fy + c = 0$ touch each other, if $\frac{1}{f^2} + \frac{1}{g^2} = \frac{1}{c}$ Q.7 The gradient of one of the lines of $ax^2 + hxy + by^2 = 0$ is twice that of the other. Show that $8h^2 = 9ab$

Q.8 Solve the any ONE of the following differential equations:

$$\text{A. } \frac{dy}{dx} = \left(\frac{y}{x}\right) + \sin\left(\frac{y}{x}\right)$$

$$\text{B. } (6x^2 + 2y^2)dx - (x^2 + 4xy)dy = 0$$

Q.9 For what value of k , the line $y = 2kx$ will be tangent to $2x^2 - 5y^2 = 10$ Q.10 Use Newton Raphson method to find the real root of $f(x) = 3x - \sqrt{1 + \sin x}$, $x_0 = 1$ **END OF PAPER**