Junior Inter MATHS-1B

MODEL PAPER-2

Max. Marks:75

Section-A

Very Short Answer Questions. Answer all Questions.

Each Question carries' Two' marks

10x2=20M

- 1. Find the equation of the straight line passing through (-4, 5) and cutting off equal nonzero intercepts on the coordinate axes.
- 2. Find the area of the triangle formed by the following straight lines and the coordinate axes.

x - 4y + 2 = 0

- 3. If (3, 2, -1), (4, 1, 1) and (6, 2, 5) are three vertices and (4, 2, 2) is the centroid of a tetrahedron, find the fourth vertex
- 4. Reduce the equation x + 2y 3 6 = 0 of the plane to the normal form
- 5. $\lim_{x \to 0} \left(\frac{3^x 1}{\sqrt{1 + x 1}} \right)$

6.

- $\lim_{x \to \infty} \frac{8|x| + 3x}{3|x| 2x}$
- 7. Find the derivatives of the $\log(\sin^{-1}(e^x))$
- 8. Find the derivatives of the $Cos^{-1}(4x^3 3x)$
- 9. If the increase in the side of a square is 1% find the percentage of change in the area of the square.
- 10. Find the equations of tangent to the curve $y = x^3 + 4x^2$ at (-1, 3)

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Section-B

Short Answer Questions. Answer any 'Five' Questions.

Each Question carries 'Four' marks.

5 x4 =20 M

- 11. A (5, 3) and B (3, -2) are two fixed points. Find the equation of locus of P, so that the area of triangle PAB is 9.
- 12. If the distance from P to the points (2, 3) and (2, -3) are in the ratio 2 : 3, then find the equation of locus of P.
- 13. When the origin is shifted to (-1, 2) by the translation of axes, find the transformed equations of the following

 $2x^2 + y^2 - 4x + 4y = 0$

- 14. When the axes are rotated through an angle 45°, the transformed equation of a curve is $17x^2 16xy + 17y^2 = 225$. Find the original equation of the curve.
- 15. A straight line through $Q(\sqrt{3},2)$ makes an angle $\overline{6}$ with the positive direction of the X-axis. If the straight line intersects the line $\sqrt{3}x 4y + 8 = 0$ at P, find the distance PQ.
- 16. A(5, 4, 6), B(1, -1, 3), C(4, 3, 2) are three points. Find the coordinates of the point in which the bisector of |BAC| meets the side \overline{BC} .

$$\lim_{x \to a} \frac{\sin(x-a)\tan^2(x-a)}{(x^2-a^2)^2}$$

- 17. Evaluate.
- 18. If $ax^2 + 2hxy + by^2 = 1$ then prove that $\frac{d^2y}{dx^2} = \frac{h^2 ab}{(hx + by)^2}$
- 19. Find the lengths of sub tangent, subnormal at a point t on the curve $x = a(\cos t + t \sin t)$, $y = a(\sin t t \cos t)$
- 20. Find the angle between the curves $y^2 = 4x$; $x^2 + y^2 = 5$

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Section-C

Long Answer Questions. Answer any 'Five' Questions.

Each Question carries 'Seven' marks. 5 x7 = 35 M

- If Q (h, k) is the foot of the perpendicular from $P(x_1, y_1)$ on the straight line ax = by + c = 0, then 21. $(h-x_1): a = (k-y_1): b = -(ax_1+by_1+c): (a^2+b^2)$
- Find the circum center of the triangle whose vertices are (1, 3), (-3, 5) and (5, -1)22.
- Show that the product of the perpendicular distances from a point (α, β) to the pair of straight lines 23. $\left|a\alpha^{2}+2h\alpha\beta+b\beta^{2}\right|$

$$ax^{2} + 2hxy + by^{2} = 0$$
 is $\sqrt{(a-b)^{2} + 4h^{2}}$

- Find the values of k, if the lines joining the origin to the points of intersection of the curve 24. $2x^2 - 2xy + 3y^2 + 2x - y - 1 = 0$ and the line x + 2y = k are mutually perpendicular
- Find the direction cosines of two lines which are connected by the relations l-5m+3n=0 and 25. $7l^2 + 5m^2 - 3n^2 = 0$

26. If
$$x^{\log y} = \log x \text{ then } \frac{dy}{dx} = \frac{y}{x} \left[\frac{1 - \log x \log y}{\log^2 x} \right]$$

27. If
$$y = Tan^{-1} \left[\frac{\sqrt{1+x^2} + \sqrt{1-x^2}}{\sqrt{1+x^2} - \sqrt{1-x^2}} \right]_{\text{for } 0 < |x| < 1, \text{ find } \frac{dy}{dx}.$$

- If the tangent at any point on the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ intersects the coordinate axes in 28. A and B, then show that the length AB is a constant
- A wire of length l is cut into two parts which are bent respectively in the form of a 29. square and circle. Find the lengths of the pieces of the wire, so that the sum of the areas is the least
- 30.. From a rectangle sheet30cm x 80 cm four corners equal square pieces are removed and sides are turned to form open rectangular box. I f the volume is greatest then side of square piece cut

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