Junior Inter MATHS-1B

MODEL PAPER-1 **Max. Marks :75**

Section-A

Very Short Answer Questions. Answer all Questions.

Each Question carries' Two' marks **10x2=20M**

1. Find the distance between the following parallel lines $5x - 3y - 4 = 0$, $10x - 6y - 9 = 0$
2. Find the equation of the straight line parallel to the line $2x + 3y + 7 = 0$ and passing through the point $(4, -3)$
3. Show that the points $(1, 2, 3)$, $(7, 0, 1)$ and $(-2, 3, 4)$ are collinear
4. Find the angle between the planes $x + 2y + 2z - 5 = 0$ and $3x + 3y + 2z - 8 = 0$
5. Show that $\lim_{x \to 2}\left(\frac{2|x|}{x} + x + 1\right) = 3$
6. Value of $\lim_{x \to 0}\frac{\sin(a+bx) - \sin(a-bx)}{x}$
7. Find the derivatives of the functions. $Tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$
8. If $x = a\cos^3 t,\ y = a\sin^3 t,$ find $\frac{dy}{dx}$.
9. Find an approximate value of $\sqrt[3]{123}$
10. Find the slope of the normal to the curve $x = a\cos^3\theta, y = a\sin^3\theta$ at $\theta = \frac{\pi}{4}$

Section-B

II. Short Answer Questions. Answer any 'Five' Questions.

Each Question carries 'Four' marks. 5 x4 =20 M

11. Find the equation of locus of a point P such that $PA^2 + PB^2 = 2c^2$, where A = (a, 0), B = (-a, 0)and $0 < |a| < |c|$.

12. Find the equation of locus of P, if A = (2, 3), B = (2, -3) and PA + PB = 8

13. Find the point to which the origin is to be shifted so as to remove the first degree terms from the equation

$4x^2 + 9y^2 - 8x + 36y + 4 = 0$

14. Find the angle through which the axes are to be rotated so as to remove the xy term in the equation $x^2 + 4xy + y^2 - 2x + 2y - 6 = 0$

15. x – 3y – 5 = 0 is the perpendicular bisector of the line segment joining the point A, B If A = (-1, -3), find the coordinates of B.

16. Show that the points A (3, 2, -4), B(5, 4, -6) and C(9, 8, -10) are collinear and find the ratio in which B divides $\overline{AC}$.

17. Evaluate $\lim_{x \to a} \left(\frac{\cos ax - \cos bx}{x^2} \right)$

18. Find the derivatives of the functions $f(x) = \tan 2x$

19. Show that the length of the subnormal at any point on the curve $y^2 = 4ax$ is a constant.

20. At any point t on the curve x = a (t + sin t), y = a (1 – cos t), find the lengths of tangent, normal, sub tangent and subnormal.

Section-C

Long Answer Questions. Answer any 'Five' Questions.

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

21. If p and q are the lengths of the perpendiculars from the origin t the straight lines x sec α + y cosec α = a and x cos α -y sin α = a cos2 α, prove that $4p^2+q^2=a^2$

22. If the equations of the sides of a triangle are 7x + y – 10 = 0, x – 2y + 5 = 0 and x + y + 2 = 0, find the orthocenter of the triangle.

23.. Show that the lines joining the origin to the points of intersection of the curve $x^2-xy+y^2+3x+3y-2=0$ and the straight line $x-y-\sqrt{2}=0$ are mutually perpendicular

24. The area of the Δ^{le} formed by $ax^2 + 2hxy + by^2 = 0$, $lx + my + n = 0$ is $\frac{n^2\sqrt{h^2-ab}}{|am^2-2hlm+bl^2|}$ sq. units.

25. Show that the lines whose d.c's are given by l + m + n = 0, 2mn + 3nl – 5lm = 0 are perpendicular to each other

26. If $\sqrt{1-x^2}+\sqrt{1-y^2}=a(x-y)\,then\,\frac{dy}{dx}=\sqrt{\frac{1-y^2}{1-x^2}}$

27. $x^y=y^x$ *then* $\frac{dy}{dx}=\frac{y(x\log y-y)}{x(y\log x-x)}$

28. 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 A and B, then show that the length AB is a constant

29. Show that the curves $y^2=4(x+1)$ and $y^2=36(9-x)$ intersect orthogonally

30. Show that when the curved surface of right circular cylinder inscribed in a sphere of radius R is maximum, t hen the height of the cylinder is $\sqrt{2}R$