MS JUNIOR COLLEGE
Hyderabad

GUESS PAPER - 2
INTERMEDIATE 1st YEAR

Time: 3hours MATHEMATICS- IB **Max.Marks:75**

I. i) Very Short Answer Type Questions. **(10 x 2 = 20)**

ii) Answer **ALL** questions.

iii) Each question carriers **TWO** marks.

1. Find the equation of the straight line passing through the points (at_1^2 $2at_1$) and (at_2^2 $2at_2$).

2. If the product of the intercepts made by the straight lines $x\tan\alpha + y\sec\alpha = 1$ on the coordinate axis is equal to $\sin\alpha$ then find α.

3. Find the fourth vertex of the parallelogram whose consecutive vertices are (2, 4, -1), (3, 6, -1) and (4, 5, 1).

4. Find the constant k so that the planes $x - 2y + kz = 0$ and $2x + 5y - z = 0$ are at right angles.

5. Evaluate $\lim\limits_{x\to 0} \dfrac{\sin(a+bx)-\sin(a-bx)}{x}$.

6. Evaluate $\lim\limits_{x\to\infty} \left(\sqrt{x^2+x}-x\right)$.

7. If $f(x) = 1 + x + x^2 + \ldots\ldots + x^{100}$, then find $f'(1)$.

8. If $y = \log[\sin^{-1}(e^x)]$, then find $\dfrac{dy}{dx}$.

9. If $y = e^x + x$, $x = 5$, $\Delta x = 0.02$, then find Δy and dy.

10. State lagranges mean value theorem.

II. i) Short Answer Type Questions. **(5 x 4 = 20)**

ii) Answer any **FIVE** questions.

iii) Each question carriers **FOUR** marks.

11. A(1, 2), B(2, -3) and C(-2, 3) are three points. A point 'P' moves such that $PA^2 + PB^2 = 2PC^2$. Show that the equation to the locus of 'P' is $7x - 7y + 4 = 0$.

12. If the transformed equation of a curve is $X^2+3XY-2Y^2+17X-7Y-11=0$. when the origin is shifted to (2, 3). Find the original equation of the curve.

13. A straight line through $Q\left(\sqrt{3},2\right)$ makes an angle $\dfrac{\pi}{6}$ with the positive direction of x-axis. If the straight line intersects the line $\sqrt{3}x - 4y + 8 = 0$ at P, find the distance PQ.

14. Check the continuity of the following function at 2, $f(x) = \begin{cases} \dfrac{1}{2}(x^2-4) & \text{if } 0<x<2 \\ 0 & \text{if } x=2 \\ 2-8x^{-3} & \text{if } x>2 \end{cases}$.

15. If sin y = x sin (a + y) then prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$.

16. A point p is moving on the curve $y = 2x^2$. The x-coordinate of P is incresing at the rate of 4 units per second. Find the rate at which the y coordinate is increasing when the point is at (2, 8).

17. Show that the area of the triangle formed by the tangent at any point on the curve xy = c ($c \neq 0$), with the coordinate axes is constant.

III. i) Long Answer Type Questions. **(5 x 7 = 35)**

ii) Answer any **FIVE** questions.

iii) Each question carriers **SEVEN** marks.

18. If Q(h, k) is the image of $P(x_1, y_1)$ w.r.t the straight line ax + by + c = 0, then prove that $(h - x_1) : a = (k - y_1) : b = -2(ax_1 + by_1 + c) : (a^2 + b^2)$ find the image of (1, 2) w.r.t. the straight line 3x + 4y - 1 = 0.

19. If the equation $ax^2 + 2hxy + by^2 = 0$ represents a pair of lines, prove that combined equation of the pair of lines bisecting the angle between those lines is $h(x^2 - y^2) = (a - b)xy$.

20. Find the angle between the lines joining the origin to the point of intersection of the curve $7x^2 - 4xy + 8y^2 + 2x - 4y - 8 = 0$ and the line 3x - y = 2.

21. The vertices of a triangle are (1, 4, 2), (-2, 1, 2), (2, 3 -4) find $\angle A, \angle B, \angle C$.

22. If $y = x\sqrt{a^2 + x^2} + a^2 \log(x + \sqrt{a^2 + x^2})$, then show that $\frac{dy}{dx} = 2\sqrt{a^2 + x^2}$.

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

24. Prove that the radius of the right circular cylinder of greatest curved surface area which can be inscribed in a given cone is half of that of the cone.

All the Best