TS INTER MATHS -1 B

Model Papers

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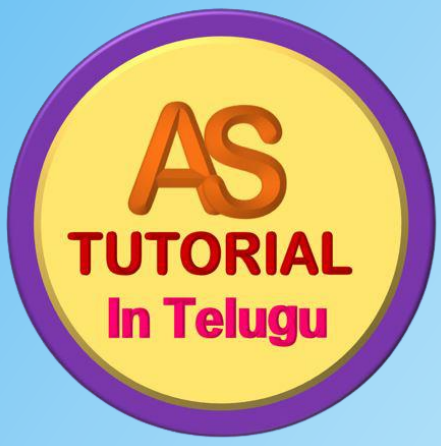

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TS INTER

MATHS 1B

PRACTICE PAPER - 1

By Satyam

MATHS - IB **TOTAL MARKS: 75**

MODEL PAPER - I **TIME: 3hrs.**

I. Very short answer type questions $10 \times 2 = 20$

1. Find the distance between the parallel lines $3x + 4y - 3 = 0$ and $6x + 8y - 1 = 0$.
2. Find the equation of the straight line perpendicular to the line $5x - 3y + 1 = 0$ and passing through the point $(4, -3)$.
3. Find the ratio in which XZ – plane divides the line joining A $(-2, 3, 4)$ and B $(1, 2, 3)$
4. Find angle between the planes $x + 2y + 2z - 5 = 0$ and $3x + 3y + 2z - 8 = 0$
5. Evaluate $\lim_{x \to 0} \frac{e^x - 1}{x}$.
6. Compute $\lim_{x \to \infty} \frac{11x^3 - 3x + 4}{13x^3 - 5x^2 - 7}$.
7. If $y = a\, e^{nx} + b\, e^{-nx}$, then prove that $y'' = n^2 y$.
8. If $y = \sin^{-1}(3x - 4x^3)$ then find $\frac{dy}{dx}$.
9. Find dy and Δy if $y = x^2 + x$ at $x = 10$ and $\Delta x = 0.1$.
10. Verify the Roll's theorem for the function $f(x) = x(x + 3)\, e^{\frac{-x}{2}}$ on $[-3, 0]$.

II. Short answer type questions $5 \times 4 = 20$

11. Find the equation of locus of P, if the ratio of the distance from P to $(5, -4)$ and $(7, 6)$ is 2 : 3.
12. When the axes are rotated through an angle 45^0, the transformed equation of a curve is $17x^2 - 16xy + 17y^2 = 225$. Find the original equation of the curve.
13. Find the points on the line $3x - 4y - 1 = 0$ which is at a distance of 5 units from the point $(3, 2)$.
14. Is f defined by $f(x) = \begin{cases} \frac{\sin 2x}{x} ; \text{ if } x \neq 0 \\ 1 ; \quad \text{if } x = 0 \end{cases}$ continuous at $x = 0$?

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15. If $x^y = e^{x-y}$, then show that $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$.

16. Show that the tangent at any point θ on the curve $x = C \sec\theta$, $y = C \tan\theta$ is $y \sin\theta = x - C\cos\theta$.

17. The volume of cube is increasing at the rate of 8 cm^3/sec. How fast is the surface area increasing, when the length of an edge is 12 cm.

III. **Long answer type questions** $5 \times 7 = 35$

18. Find the orthocentre of the triangle with the vertices (–2, –1), (6, –1) and (2, 5).

19. Show that the area of the triangle formed by the lines $ax^2 + 2h\,xy + by^2 = 0$ and $lx + my + n = 0$ is $\frac{n^2\sqrt{h^2-ab}}{|am^2-2h\,lm+bl^2|}$

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

21. Find the angle between the lines whose direction cosines are given by the equations $l + m + n = 0$ and $l^2 + m^2 - n^2 = 0$.

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

23. Show that the equation of the tangent at the point (x_1, y_1) on the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ is $x \cdot x_1^{\frac{-1}{2}} + y \cdot y_1^{\frac{-1}{2}} = a^{\frac{1}{2}}$

24. Find two positive numbers whose sum is 15 and the sum of their squares is minimum.

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MATHS 1B

PRACTICE PAPER - 2

By Satyam

MATHS - IB **TOTAL MARKS: 75**

MODEL PAPER - 2 **TIME: 3hrs.**

I. Very short answer type questions $10 \times 2 = 20$

1. Transform the equation $x + y + 1 = 0$ into normal form.
2. Find the value of P if the straight lines $3x + 7y - 1 = 0$ and $7x - py + 3 = 0$ are mutually perpendicular.
3. Show that the points A (1, 2, 3), B (7, 0, 1), C (– 2, 3, 4) are collinear.
4. Find the equation of the plane whose intercepts on X, Y, Z axes are 1, 2, 4 respectively.
5. Show that $\lim_{x \to 0^+} \left(\frac{2|x|}{x} + x + 1\right) = 3$.
6. Compute $\lim_{x \to 0} \frac{a^x - 1}{b^x - 1}$ $(a>0, b>0, b \neq 1)$
7. If $f(x) = \log(\tan e^x)$, then find $f'(x)$.
8. If $y = e^{a \sin^{-1} x}$ then prove that $\frac{dy}{dx} = \frac{ay}{\sqrt{1-x^2}}$.
9. Find the approximate value of $\sqrt[3]{65}$.
10. Find the value of 'c' from Roll's theorem for the function $f(x) = x^2 - 1$ on $[-1, 1]$.

II. Short answer type questions $5 \times 4 = 20$

11. Find the equation of locus of P, if A = (4, 0), B = (– 4, 0) and $|PA - PB| = 4$.
12. When the origin is shifted to the point (–1, 2) by the translation of axes, find the transformed equation of $x^2 + y^2 + 2x - 4y + 1 = 0$.
13. A straight line through Q $(\sqrt{3}, 2)$ makes an angle $\frac{\pi}{6}$ 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 f given by $f(x) = \begin{cases} \frac{x^2 - 9}{x^2 - 2x - 3} ; \text{ if } 0 < x < 5, x \neq 3 \\ 1.5 ; \quad \text{if } x = 3 \end{cases}$

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15. Find the derivative of the function $f(x) = \cos^2 x$ from the first principle of derivative.

16. Find the equation of the tangent and normal to the curve $y^4 = a\,x^3$ at (a, a).

17. The distance time formula for the motion of a particle along a liner according to $S = f(t) = 4t^3 - 3t^2 + 5t - 1$ where S is measured in meters and t is measured in seconds. Find the velocity and acceleration, at what time the acceleration is zero?

III. **Long answer type questions** $5 \times 7 = 35$

18. If Q (h, k) is the image of the point P (x_1, y_1) w.r.t the line $ax + by + c = 0$, then show that $\frac{h - x_1}{a} = \frac{k - y_1}{b} = \frac{-(ax_1 + by_1 + c)}{a^2 + b^2}$ and find the image of the point (1, –2) w.r.t. the line $2x - 3y + 5 = 0$.

19. Show that the product of the perpendicular distances from a point (α, β) to the pair of straight line $ax^2 + 2h\,xy + by^2 = 0$ is $\frac{|a\alpha^2 + 2h\,\alpha\beta + b\,\beta^2|}{\sqrt{(a-b)^2 + 4h^2}}$

20. Find the condition for the chord $lx + my = 1$ of the circle $x^2 + y^2 = a^2$ to subtend a right angle at the origin.

21. Find the angle between the two diagonals of a cube.

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

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

24. If the curved surface of a right circular cylinder inscribed in a sphere of radius 'r' is maximum, show that the height of the cylinder is $\sqrt{2}r$.

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MATHS 1B

PRACTICE PAPER - 3

By Satyam

MATHS - IB **TOTAL MARKS: 75**

MODEL PAPER - III **TIME: 3hrs.**

I. Very short answer type questions $10 \times 2 = 20$

1. Find the value of x, if the slope of thew line passing through (2, 5) and (x, 3) is 2.
2. Find the equation of the straight line passing through the (– 4, 5) and cutting off equal intercepts on the coordinate axes.
3. If (3, 2, – 1), (4, 1, 1) and (6, 2, 5) are three vertices and (4, 2, 2) is the centroid of the tetrahedron, find the fourth vertex.
4. Reduce the equation $x + 2y - 3z - 6 = 0$ of the plane into normal form.
5. Find $\lim_{x \to \infty}\left(\sqrt{x^2 + x} - x\right)$.
6. Compute $\lim_{x \to \frac{\pi}{2}} \frac{\cos x}{\left(x - \frac{\pi}{2}\right)}$
7. If $f(x) = x\, e^x \sin x$, then find $f'(x)$.
8. If $f(x) = 1 + x + x^2 + x^3 + \ldots + x^{100}$, then $f'(1)$.
9. If the increase in the side of a square is 4%, then find the approximate percentage of increasing in the area of square.
10. State Roll's theorem.

II. Short answer type questions $5 \times 4 = 20$

11. A (5, 3) and B (3, – 2) are two fixed points. Find the equation of locus of P, so that the area of Δ PAB is 9 square units.
12. When the axes are rotated through an angle 'α', find the transformed equation of the curve $x \cos \alpha + y \sin \alpha = p$.
13. Find the equation of the line perpendicular to the line $3x + 4y + 6 = 0$ and making an intercept – 4 on the X – axis.
14. Compute $\lim_{x \to a}\left[\frac{x \sin a - a \sin x}{x - a}\right]$.

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15. Find $\frac{dy}{dx}$ for the functions $x = a(\cos t + t \sin t)$, $y = a(\sin t - t \cos t)$.

16. Find the lengths of the subtangent and subnormal at a point on the curve

$y = b \sin \frac{x}{a}$

17. The volume of a cube is increasing at the rate of 9 c.cm./sec. How fast is the surface area increasing when the length of edge is 10cm.

III. **Long answer type questions** $5 \times 7 = 35$

18. If p and q are the lengths of the perpendiculars from the origin to the lines $x \sec \alpha + y \operatorname{cosec} \alpha = a$ and $x \cos \alpha - y \sin \alpha = a \cos 2\alpha$, prove that $4p^2 + q^2 = a^2$.

19. If the equation $ax^2 + 2hxy + by^2 = 0$ represents pair of distinct lines, then the combined equation of pair of bisectors of the angles between these lines is $h(x^2 - y^2) = (a - b)xy$.

20. Find the angle between the lines joining the origin to the points of intersection of the curve $x^2 + 2xy + y^2 + 2x + 2y - 5 = 0$ and the line $3x - y + 1 = 0$.

21. Find the direction cosines of two lines which are connected by the relations $l - 5m + 3n = 0$ and $7l^2 + 5m^2 - 3n^2$.

22. If $f(x) = \sin^{-1} \sqrt{\frac{x - \beta}{\alpha - \beta}}$ and $g(x) = \tan^{-1} \sqrt{\frac{x - \beta}{\alpha - x}}$, then show that $f'(x) = g'(x)$.

23. If the tangent any point on the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} + = a^{\frac{2}{3}}$ intersects the coordinate axes at A and B, then show that the length AB is a constant.

24. A wire of length 'ℓ' is cut into two parts which are bent respectively in the form of a square and a circle. What are the lengths of the pieces of the wire respectively so that the sum of the areas is the least.

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TS INTER

MATHS 1B

PRACTICE PAPER - 4

By Satyam

MATHS - IB **TOTAL MARKS: 75**

MODEL PAPER - IV **TIME: 3hrs.**

I. Very short answer type questions $10 \times 2 = 20$

1. Find the angle which the straight-line $y = \sqrt{3}\, x - 4$ makes with Y – axis.
2. Find the length of the perpendicular drawn from the point $(-2, -3)$ to the straight line $5x - 2y + 4 = 0$.
3. Find x, if the distance between $(5, -1, 7)$ and $(x, 5, 1)$ is 9 units.
4. Find the equation of the plane passing through the point $(1, 1, 1)$ and parallel to the plane $x + 2y + 3z - 7 = 0$.
5. Find $\lim_{x \to 0} \frac{e^{3+x} - e^3}{x}$.
6. Compute $\lim_{x \to \infty} \frac{8|x|+3x}{3|x|-2x}$.
7. If $x = a\cos^3 t$, $y = a \sin^3 t$, then find $\frac{dy}{dx}$.
8. If $f(x) = 7^{x^3 + 3x}$ $(x>0)$, then $f'(x)$.
9. Find dy and Δy if $y = x^2 + 3x + 6$, at $x = 10$ and $\Delta x = 0.01$.
10. Verify the condition of the Lagrange's mean value theorem for the function $f(x) = x^2 - 1$ on $[2, 3]$, find a point 'c' in the interval as stated by the theorem.

II. Short answer type questions $5 \times 4 = 20$

11. A (1, 2), B (2, – 3) and C (– 2, 3) are three points. A point 'P' moves such that $PA^2 + PB^2 = 2\, PC^2$. Show that the equation of locus of P is $7x - 7y + 4 = 0$.
12. When the origin is shifted to the point (2, 3) the transformed equation of a curve is $x^2 + 3xy - 2y^2 + 17x - 7y - 11 = 0$. Find the original equation of the curve.
13. Transform the equation $\frac{x}{a} + \frac{y}{b} = 1$ into the normal form when $a > 0$ and $b > 0$. If the perpendicular distance of straight line from the origin is p, deduce that $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{p^2}$.

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14. If f is given by $f(x) = \begin{cases} k^2x - k & \text{if } x \geq 1 \\ 2 & \text{if } x < 1 \end{cases}$ is continuous function on R, then find the values of k.

15. If $ay^4 = (x + b)^5$ then show that $5y\,y'' = (y')^2$.

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

17. The distance – time formula for the motion of a particle along a straight line $S = t^3 - 9t^2 + 24t - 18$ then find when and where the velocity is zero.

III. **Long answer type questions** $5 \times 7 = 35$

18. 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 orthocentre of the triangle.

19. Show that the lines represented by $(lx + my)^2 - 3(mx - ly)^2 = 0$ and $lx + my + n = 0$, forms an equilateral triangle of area $\frac{n^2}{\sqrt{3}(l^2 + m^2)}$ square units.

20. Find the condition for the lines joining the origin to the points of intersection of the circle $x^2 + y^2 = a^2$ and the line $lx + my = 1$ to coincide.

21. If a ray makes the angles α, β, γ and δ with the four diagonals of a cube then find $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta$.

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

23. Find the lengths of subtangent, subnormal at a point 't' on the curve $x = a(\cos t + t \sin t)$, $y = a(\sin t - t \cos t)$.

24. A window is in the shape of rectangle surmounted by a semicircle. If the perimeter of widow is 20 ft., find the maximum area.

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TS INTER

MATHS 1B

PRACTICE PAPER - 5

By Satyam

MATHS - IB **TOTAL MARKS: 75**

MODEL PAPER - V **TIME: 3hrs.**

I. Very short answer type questions $10 \times 2 = 20$

1. Find the area of the triangle formed by the straight line $3x - 4y + 12 = 0$ with the coordinate axes.
2. Find the condition for the points (a, 0), (h, k) and (0, b) to be collinear.
3. Find the coordinates of the vertex C of Δ ABC if its centroid is the origin and the vertices A, B are (1, 1, 1) and (– 2, 4, 1) respectively.
4. Find the equation of the plane passing through the point (– 2, 1, 3) and having (3, – 5, 4) as direction ratios of its normal.
5. Evaluate $\lim_{x \to 0} \frac{\log_e x}{x - 1}$.
6. Compute $\lim_{x \to -\infty} \frac{2x + 3}{\sqrt{x^2 - 1}}$.
7. If $y = \sec\left(\sqrt{\tan x}\right)$, then find $\frac{dy}{dx}$.
8. Find the derivative of the function $f(x) = \tan^{-1}\left(\frac{\sqrt{1 + x^2} - 1}{x}\right)$ with respect to x.
9. Find the relative error and percentage error of the variable y.
10. Find the value of 'c' in Roll's theorem for the function $f(x) = x^2 + 4$ on [– 3, 3].

II. Short answer type questions $5 \times 4 = 20$

11. The ends of the hypotenuse of a right triangle are (0, 6) and (6, 0). Find the equation of locus of its third vertex.
12. When the axes are rotated through an angle $\frac{\pi}{6}$, find the transformed equation of $x^2 + 2\sqrt{3}\,x - y^2 = 2a^2$.
13. Transform the equation $\sqrt{3}\,x + y = 4$ into (i) slope – intercept form (ii) intercept form (iii) normal form.
14. Show that $f(x) = \begin{cases} \frac{\cos ax - \cos bx}{x^2} & \text{if } x \neq 0 \\ \frac{1}{2}(b^2 - a^2) & \text{if } x = 0 \end{cases}$ where a, b are real constants, is continuous at $x = 0$.

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15. If $y = a \cos x + (b + 2x) \sin x$, then show that $y'' + y = 4 \cos x$.

16. Find the equation of the tangents and normal to the curve $y = x^2 - 4x + 2$ at (4,2).

17. A container is in the shape of an inverted cone has height 8 m and radius 6 m at the top. If it is field with water at the rate of $2m^3$ /minute, how fast is the height of water changing when the level is 4 m?

III. **Long answer type questions** $5 \times 7 = 35$

18. Find the circum centre of the triangle whose vertices are (1, 3), (0, – 2) and (– 3 , 1).

19. The equation $S \equiv ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$represents a pair of parallel lines, then show thar (i) $h^2 = ad$, (ii) $af^2 = bg^2$ and (iii) distance between two parallel lines is $2\sqrt{\frac{g^2 - ac}{a\,(a+b)}} = 2\sqrt{\frac{f^2 - bc}{b\,(a+b)}}$

20. Find the values of k, if the lines joining the points of intersection of the curve $2x^2 - 2xy + 3y^2 + 2x - y - 1 = 0$ and the line $x + 2y = k$ are mutually perpendicular.

21. The vertices of a triangle are (1, 4, 2), (– 2, 1, 2), (2, 3, – 4). Find ∠A, ∠B, ∠C.

22. If $x^{\log y} = \log x$, then show that $\frac{dy}{dx} = \frac{y[1 - \log x \log y]}{x\,(\log x)^2}$.

23. If the tangent at any point P on the curve $x^m y^n = a^{m+n}$ meets the coordinate axes in A and B then show that AP : BP is a constant.

24. From a rectangular sheet of dimensions 30cm × 80cm four equal squares of 'x' cm are removed at the corners, and the sides are turned up so as to form an open rectangular box. Find the value of x, so that the volume of box is the greatest.