MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

IPE:MARCH-2018(TS)

Section A

1. Find the value of x, if the slope of the line passing through (2,5) and (x,3) is 2.

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2. Transform the equation $x + y + 1 = 0$ into Normal form.

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3. Find the ratio in which the XZ-plane divides line joining A(-2,3,4) and B(1,2,3)

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4. Find the intercepts of the plane $4x + 3y - 2z + 2 = 0$ on the coordinate axes.

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5. Compute $Lt_{x \to 0} \frac{\sin ax}{\sin bx}, b \neq 0, a \neq b$

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6. Evaluate $\underset{x \to \pi/2}{\text{Lt}} \frac{\cos x}{\left(x - \frac{\pi}{2}\right)}$

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7. If $y = \frac{a - x}{a + x}, (x \neq -a)$ then find $\frac{dy}{dx}$

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8. If $y = \left(\cot^{-1} x^3\right)^2$ then find $\frac{dy}{dx}$.

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9. If the increase in the side of a square is 2% then find the approximate percentage of increase in the area of the square.

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10. Verify the conditions of Lagrange's mean value theorem for the function $x^2 - 1$ on [2,3]

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Section B

1. Find the locus of the third vertex of a right angled triangle , the ends of whose hypotenuse are (4,0) and (0,4)

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2. Find the transformed equation of $x^2 + 2\sqrt{3}xy - y^2 = 2a^2$ when the axes are rotated through an angle 30^0.

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3. Find the value of k if the lines $2x - 3y + k = 0, 3x - 4y - 13 = 0, 8x - 11y - 33 = 0$ are concurrent.

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4. Find the real constants a , b, so that the function f given by $f(x) = \begin{cases} \sin x & \text{if } x \leq 0 \\ x^2 + a & \text{if } 0 < x < 1 \\ bx + 3 & \text{if } 1 \leq x \leq 3 \\ -3 & \text{if } x > 3 \end{cases}$ is continuous on R .

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5. Find the derivative of sin2x from the first principle.

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6. Show that at any point (x,y) on the curve $y = b^{\frac{x}{a}}$, the length of the subtangent is a constant and the length of the subnormal is $\frac{y^2}{a}$.

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7. A particle is moving along a line according $s = f(t) = 4t^3 - 3t^2 + 5t - 1$ where s is measured

in meters and t is measured in seconds. Find the velocity and acceleration at time t. At what time the acceleration is zero.

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Section C

1. Find the circumcentre of the triangle whose vertices are (1,3) (-3,5) and (5,-1).

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2. 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 .

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3. Show that tha angles between the diagonals of a rectangular parallelopiped having sides a,b and c are $\cos^{-1}\left(\frac{|\alpha|}{a^2 + b^2 + c^2}\right)$, where $\alpha = \pm a^2 \pm b^2 \pm c^2$ and $|\alpha| \neq a^2 + b^2 + c^2$. Hence find the angle between the diagonals of a cube.

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4. If $y = \tan(-1)\left(\frac{\sqrt{(1+x^2)}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right)$ then find $\frac{dy}{dx}$.

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5. Show that the equation of the tangent to the curve $\left(\frac{x}{a}\right)^n + \left(\frac{y}{b}\right)^n = 2(a \neq 0, b \neq 0)$ at the point (a,b) is $\frac{x}{a} + \frac{y}{b} = 2$

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6. From a rectangular sheet of dimensions $30cm \times 80cm$, four squares of sides x cm are removed at the corners, and the sides are then turned up so as to form an open rectangular box. What is the value of x, so that the volume of the box is the greatest?

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