MATHS

BOOKS - VGS PUBLICATION-BRILLIANT

MATHEMATICS -I(B) MODEL PAPER -9

Section A

1. Find the perpendicular distance from the point (-3,4) to the straight $5x - 12y = 2$.

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2. Find the equation of the straight line passing through the points $\left(at_1^2, 2at_1\right), \left(at_2^2, 2at_2\right).$

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3. If (3,2,-1),(4,1,1) and (6,2,5) are three vertices and (4,2,2) is the centroid of a tetrahedro, find the fourth vertex to that tetrahedron.

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4. Find the angle between the planes $x + 2y + 2z - 5 = 0$ and $3x + 3y + 2z - 8 = 0$.

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5. Compute $\lim_{x \to \infty} \frac{x^2 + 5x + 2}{2x^2 - 5x + 1}$

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6. Is the function f, defined by $f(x) = \begin{cases} x^2 & \text{if } x \leq 1 \\ x & \text{if } x > 1 \end{cases}$ continuous on R?

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7. Find the derivative of the function

$$(x^2 - 3)(4x^3 + 1)$$

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8. If $y = \frac{2x + 3}{4x + 5}$ then find y''.

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9. Find Δy and dy for the following functions for the values of x and Δx which are shown against each of the functions.

$y = x^2 + 3x + 6, x = 10$ and $\Delta x = 0.01$

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10. Find the equation of the tangent and the normal to the curve $y = 5x^4$ at the point

$(1, 5)$.

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Section B

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

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2. 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 curve.

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3. Find the equations of the straight line passing through (1,3) and

parallel to the line passing through the points (3,-5) and(-6,1)

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4. Find the equations of the straight line passing through (1,3) and

Perpendicular to the line passing through the points (3,-5) and (-6,1)

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5. Evaluate $Lt_{x \to 0} \frac{\sqrt[3]{1+x} - \sqrt[3]{1-x}}{x}$

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6. Find the derivative of the function tan 2x from the first principle.

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7. S.T the curves $y^2 = 4(x+1), y^2 = 36(9-x)$ intersect orthogonally.

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8. The total cost C(x) in Rupees, associated with the production of x units of an item is given by

$C(x) = 0.005x^3 - 0.02x^2 + 30x + 5000$

Find the marginal cost when 3 units are produced, where by marginal cost we mean the instantaneous rate of change of total cost at any level of output.

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Section C

1. Find the orthocentre of the triagle whose vertices are $(-2, -1)(6, -1), (2, 5)$.

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2. Show that the product of perpendicular from (α, β) to the pair of lines $ax^2 + 2hxy + by^2 = 0$ is

$$\left| \frac{a\alpha^2 + 2h\alpha\beta + b\beta^2}{\sqrt{(a-b)^2 - (2h)^2}} \right|$$

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3. Write down the equation of the pair of straight lines joining the origin to the points of intersection of the $6x - y + 8 = 0$ with the pair of straight lines $3x^2 + 4xy - 4y^2 - 11x + 2y + 6 = 0$. Show that the lines so obtained make equal angles with the coordinates axes.

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4. Find the angle between the lines, whose direction cosines are given by the equation $3l + m + 5n = 0$ and $6mn - 2nl + 5lm = 0$.

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5. 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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6. Show that the tangent at $P(x_1, y_1)$ on the curve

$$\sqrt{x} + \sqrt{y} = \sqrt{a} \text{ is } x x_1^{\frac{-1}{2}} + y y_1^{\frac{-1}{2}} = a^{\frac{1}{2}}$$

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

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