MATHS

BOOKS - VGS PUBLICATION-BRILLIANT

MODEL PAPER 10

Section A I Very Short Answer Type Questions

1. If $f: R \to (0, \infty)$ defined by $f(x) = 5^x$, then find $f^{-1}(x)$

▶ **Watch Video Solution**

2. Find the domains of the real valued function

$f(x) = \dfrac{1}{\sqrt{x^2 - a^2}}$, (a > 0)

3. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 3 & 8 \\ 7 & 2 \end{bmatrix}$ and $2X + A = B$ then find X.

4. For any square matrix A, show that AA' is symmetric.

5. If $\vec{a} = 2i + 4j - 5k$, $\vec{b} = i + j + k$ and $\vec{c} = j + 2k$.

Find the unit vector in the opposite direction of $\vec{a} + \vec{b} + \vec{c}$

6. Find the vector equation of the line passing through the point $2\bar{i} + 3\bar{j} + \bar{k}$ and parallel to the vector $4\bar{i} - 2\bar{j} + 3\bar{k}$

▶ Watch Video Solution

7. If $\bar{a} = \bar{i} + \bar{j} + t\bar{k}, \bar{b} = \bar{i} + 2\bar{j} + 3\bar{k}$, then the value of 't' when $\bar{a} + \bar{b}$ and $\bar{a} - \bar{b}$ are perpendicular is

▶ Watch Video Solution

8. Find the period of the function $\tan\left(x + 4x + 9x + \ldots\ldots\ldots + n^2x\right)$.

▶ Watch Video Solution

9. Prove that $\dfrac{\cos 9^\circ + \sin 9^\circ}{\cos 9^\circ - \sin 9^\circ} = \cot 36^\circ$

10. S.T $\dfrac{\tanh^{-1} 1}{2} = \dfrac{1}{2}\log_e 3.$

Section B Ii Short Answer Type Questions

1. If $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $E = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ then show that $(aI + bE)^3 = a^3 I + 3a^2 bE$ where I is identify matrix of order 2.

2. If ABCDEF is a regular hexagon with centre O , then P.T

$$\overline{AB} + \overline{AC} + \overline{AD} + \overline{AE} + \overline{AF} = 3\overline{AD} = 6\overline{AO}$$

▶ **Watch Video Solution**

3. If

$$\vec{a} = 2i + j - k, \ \vec{b} = -i + 2j - 4k \ \text{and} \ \vec{c} = i + j + k,$$

then find $\left(\vec{a} \times \vec{b} \right) . \left(\vec{b} \times \vec{c} \right)$

▶ **Watch Video Solution**

4. Prove that

$$\left(1 + \cos \frac{\pi}{10}\right)\left(1 + \cos \frac{3\pi}{10}\right)\left(1 + \cos \frac{7\pi}{10}\right)\left(1 + \cos \frac{9\pi}{10}\right) = \frac{1}{16}$$

▶ **Watch Video Solution**

5. Solve $\sqrt{2}(\sin x + \cos x) = \sqrt{3}$

▶ Watch Video Solution

6. Prove that $\tan^{-1}\left(\dfrac{1}{2}\right) + \tan^{-1}\left(\dfrac{1}{5}\right) + \tan^{-1}\left(\dfrac{1}{8}\right) = \dfrac{\pi}{4}$

▶ Watch Video Solution

7. In $\triangle ABC$ show that $\dfrac{b^2 - c^2}{a^2} = \dfrac{\sin(B - C)}{\sin(B + C)}$

▶ Watch Video Solution

Section C Iii Long Answer Type Questions

1. If $f : A \to B$ is a bijective function then prove that

(ii) $f^{-1}of = I_A$.

2. Using Mathematical Induction, prove that statement for all n

$\in$ N

$$\left(1 + \frac{3}{1}\right)\left(1 + \frac{5}{4}\right)\left(1 + \frac{7}{9}\right)\dots\dots.\left(1 + \frac{2n+1}{n^2}\right) = (n+1)^2$$

.

3. Without expanding the determinant show that

$$\begin{vmatrix} b+c & c+a & a+b \\ c+a & a+b & b+c \\ a+b & b+c & c+a \end{vmatrix} = 2\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$$

4. Solve the equations

$3x + 4y + 5z = 18, 2x + y + 8z = 13, 5x - 2y + 7z = 20$ by

matrix inversion method.

5. If $\vec{a}$, $\vec{b}$, $\vec{c}$ are three vectors, then prove that

$$\vec{a} \times \left(\vec{b} - \vec{c} \right) = \left(\vec{a} \times \vec{b} \right) - \left(\vec{a} \times \vec{c} \right)$$

6. If $\vec{a}$, $\vec{b}$, $\vec{c}$ are three vectors, then prove that

$$\vec{a} \times \left(\vec{b} - \vec{c} \right) = \left(\vec{a} \times \vec{b} \right) - \left(\vec{a} \times \vec{c} \right)$$

7. IF $A + B + C = \pi$, then P.T

$$\cos^2 \frac{A}{2} + \cos^2 \frac{B}{2} + \cos^2 \frac{C}{2} = 2\left(1 + \sin \frac{A}{2} \sin \frac{B}{2} \sin \frac{C}{2}\right)$$

8. In a $\triangle ABC$ if $a = 13, b = 14, c = 15$ then S.T

$$R = \frac{65}{8}, r = 4, r_1 = \frac{21}{2}, r_2 = 12, r_3 = 14.$$