MATHS

BOOKS - VGS PUBLICATION-BRILLIANT

MODEL PAPER 7

Section A

1. If $A = \{-2, -1, 0, 1, 2\}$ and $f: A \to B$ is a surjection defined by $f(x) = x^2 + x + 1$, then find B.

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2. Find the domain of the real valued function $f(x) = \sqrt{9 - x^2}$.

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3. Construct a 3×2 matrix whose elements are defined by $a_{ij} = \frac{1}{2}|i - 3j|$

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4. IF $A = \begin{bmatrix} 2 & 4 \\ -1 & k \end{bmatrix}$ and $A^2 = 0$ then find the value of k

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5. If α, β and γ be the angle made by the vector $3\bar{i} - 6\bar{j} + 2\bar{k}$ with the positive direction of the coordinate axes, then find $\cos\alpha, \cos\beta, \cos\gamma$.

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6. Find the vector equation of the plane passing through the points $\bar{i} - 2\bar{j} + 5\bar{k}, \ -5\bar{j} - \bar{k}$ and $-3\bar{i} + 5\bar{j}$.

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7. If $\vec{a} = \vec{i} - \vec{j} - \vec{k}$ and $\vec{b} = 2\vec{i} - 3\vec{j} + \vec{k}$, then find the projection vector of $\vec{b}$ on $\vec{a}$ and its magnitude.

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8. If $\cos\theta = t(0 < t < 1)$ and θ does not lies in the first quadrent , find $\sin\theta$ and $\tan\theta$.

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9. Find the maximum and minimum values of $13\cos x + 3\sqrt{3}\sin x - 4$.

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10. $\tan h^{-1}\left(\frac{1}{2}\right) =$

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Section B

1. If A is a non-singular matrix then prove that $A^{-1} = \frac{adjA}{|A|}$.

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2. $\bar{a}, \bar{b}, \bar{c}$ are non coplanar vectors. Prove that the four points $-\bar{a}+4\bar{b}-3\bar{c}$, $3\bar{a}+2\bar{b}-5\bar{c}$, $-3\bar{a}+8\bar{b}-5\bar{c}$, $-3\bar{a}+2\bar{b}+\bar{c}$ are co-planar.

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3. Find the unit vector perpendicular to the plane passing through the points $(1, 2, 3), (2, -1, 1)$ and $(1, 2, -4)$.

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4. Prove that $\sqrt{3}\text{cosec}20^\circ - \sec 20^\circ = 4$.

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5. Solve the equation $1 + \sin^2\theta = 3\sin\theta\cos\theta$.

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6. Prove that : $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{8} = \frac{\pi}{4}$

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7. If $\frac{\cot A}{2} : \cot\frac{B}{2} : \cot\frac{C}{2} = 3:5:7$ then show that $a:b:c = 6:5:4$.

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Section C

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

(i) $fof^{-1} = I_B$

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

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

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3. By Mathematical Induction , show that $49^n + 16n - 1$ is divisible by 64 for all positive Integer n .

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4. Show that $\begin{vmatrix} 1 & a^2 & a^3 \\ 1 & b^2 & b^3 \\ 1 & c^2 & c^3 \end{vmatrix}$ =(a-b)(b-c)(c-a)(ab+bc+ca)

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5. Solve

$x + y + z = 9, 2x + 5y + 7z = 52$ and $2x + y - z = 0$

by using matrix inversion method.

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6. If A=(1, -2, -1), B= (4, 0, -3), C = (1, 2, -1), D=(2, -4, -5)`, then distance between AB and CD is

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7. If $A + B + C = 180^\circ$, then show that

$\cos 2A + \cos 2B - \cos 2C = -4 \sin A . \sin B . \cos C + 1.$

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8. If $r_1 = 8, r_2 = 12 r_3 = 24$ then C=

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