MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

IPE:MARCH-2018[TS]

Section A Vsaq

1. Find the inverse of the real function of $f(x) = ax + b, a \neq 0.$

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2. Find the domain of the real function $f(x) = \sqrt{4x - x^2}$

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

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4. Find the rank of $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

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5. Find the vector equation of the line passing through the points $2\bar{i} + \bar{j} + 3\bar{k}$ and $-4\bar{i} + 3\bar{j} - \bar{k}$.

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6. IF $\bar{a} = 2\bar{i} + 5\bar{j} + \bar{k}, \bar{b} = 4\bar{i} + m\bar{j} + n\bar{k}$ are collinear vectors then find $m + n$

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7. If $\bar{a} = 2\bar{i} - 3\bar{j} + 5\bar{k}, \bar{b} = -\bar{i} + 4\bar{j} + 2\bar{k}$, then find $(\bar{a} + \bar{b}) \times (\bar{a} - \bar{b})$ and unit vector perpendicular to both $\bar{a} + \bar{b}$ and $\bar{a} - \bar{b}$

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

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9. Prove that $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ = 0$

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10. Prove that $(\cosh x + \sinh x)^n = \cosh(nx) + \sinh(nx)$

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Section B Saqs

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

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2. Prove that the following four points are coplanar.

i) $4\bar{i} + 5\bar{j} + \bar{k},\ -\bar{j} - \bar{k}, 3\bar{i} + 9\bar{j} + 4\bar{k},\ -4\bar{i} + 4\bar{j} + 4\bar{k}$

ii)

$-\bar{a} + 4\bar{b} - 3\bar{c}, 3\bar{a} + 2\bar{b} - 5\bar{c},\ -3\bar{a} + 8\bar{b} - 5\bar{c},\ -3\bar{a} + 2\bar{b} + \bar{c}\ \ (\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors)

iii) $6\bar{a} + 2\bar{b} - \bar{c}, 2\bar{a} - \bar{b} + 3\bar{c},\ -\bar{a} + 2\bar{b} - 4\bar{c},\ -12\bar{a} - \bar{b} - 3\bar{c}\ \ (\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors)

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3. For any two vectors $\bar{a}$ and $\bar{b}$, show that

$\left(1 + |\bar{a}|^2\right)\left(1 + |\bar{b}|^2\right) = |1 - \bar{a}.\,\bar{b}|^2 + |\bar{a} + \bar{b} + \bar{a} \times \bar{b}|^2$

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4. Show that $\frac{1}{\sin 10^\circ} - \frac{\sqrt{3}}{\cos 10^\circ} = 4.$

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

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

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7. Prove that $\cot A + \cot B + \cot C = \frac{a^2 + b^2 + c^2}{4\Delta}$

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Section C Laqs

1. If $f: A \to B$ is a function and I_A, I_B are identify functions on A,B respectively then prove that $foI_A = f = I_B$ of

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

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3. Show that

$$\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}^2 = \begin{vmatrix} 2bc - a^2 & c^2 & b^2 \\ c^2 & 2ac - b^2 & a^2 \\ b^2 & a^2 & 2ab - c^2 \end{vmatrix} = \left(a^3 + b^3 + c^3 - 3abc\right)^2$$

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4. By using Cramer's rule solve

$2x - y + 3z = 9, \ -x + 2y + z = 4, 3x + y - 4z = 0.$

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5. If

$\bar{a} = \bar{i} - 2\bar{j} + 3\bar{k}, \bar{b} = 2\bar{i} + \bar{j} + \bar{k}, \bar{c} = \bar{i} + \bar{j} + 2\bar{k}$ then find $(\bar{a} \times \bar{b}) \times \bar{c}|$

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6. If A+B+C = 2S , then

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$\cos(S - A) + \cos(S - B) + \cos(S - C) + \cos S = 4\cos.\frac{A}{2}\cos.\frac{B}{2}\cos.\frac{C}{2}$

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7. If p_1, p_2, p_3 are altitudes of a ΔABC then show that

$$\frac{1}{p_1}+\frac{1}{p_2}+\frac{1}{p_3}=\frac{1}{r}$$

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8. If p_1, p_2, p_3 are altitudes of a ΔABC then show that

$$P_1P_2P_3=\frac{(abc)^2}{8R^3}=\frac{8\Delta^3}{abc}$$

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