MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

IPE:MAY -2017[AP]

Section A Vsaq

1. If $A = \left\{0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}\right\}$ and $f: A \to B$ is a surjection defined by $f(x) = \cos x$ then find B.

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2. Find the domain of the real function $f(x) = \frac{1}{(x^2 - 1)(x + 3)}$

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3. Define Trace of a matrix and skew symmetric matrix.

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4. Find the Adjoint and Inverse of the matrix $A = \begin{bmatrix} 2 & -3 \\ 4 & 6 \end{bmatrix}$

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5. If the position vectors of the points A,B,C are $-2\bar{i} + \bar{j} - \bar{k}, \ -4\bar{i} + 2\bar{j} + 2\bar{k}, 6\bar{i} - 3\bar{j} - 13\bar{k}$ respectively and $\overline{AB} = \lambda\overline{AC}$ then find the value of λ.

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

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7. Find the area of the parallelgram whose adjacent sides are $\bar{a} = 2\bar{i} - 3\bar{j}, \bar{b} = 3\bar{i} - \bar{k}$

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

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

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

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Section B Saqs

1. IF $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then show that $A^2 - 4A - 5I = O$.

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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. P.T the smaller angle θ between any two diagonals of a cube is given by $\cos\theta = 1/3$

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4. If A is not an integral multipe of π, prove that $\cos A \cos 2A \cos 4A \cos 8A = \frac{\sin 16A}{16 \sin A}$

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5. If $a\cos 2\theta + b\sin 2\theta = c$ has θ_1, θ_2 as its solutions then show that $\tan\theta_1 + \tan\theta_2 = \frac{2b}{c+a}\tan\theta_1 . \tan\theta_2 = \frac{c-a}{c+a}$ and hence show that $\tan(\theta_1 + \theta_2) = b/a.$

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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. In a ΔABC if $a:b:c=7:8:9$ then show that $\cos A:\cos B:\cos C=14:11:6$

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Section C Laqs

1. If $f:A\to B, g:B\to C$ are two bijective functions then P.T $(\text{gof})^{-1}=f^{-1}\text{og}^{-1}$

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2. 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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3. Solve the following system of equations by using Cramer,s ruel .

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

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4. If

$A = (1, -2, -1), B = (4, 0, -3), C = (1, 2, -1), D = (2, -4, -5)$

then find distance between $\overline{AB}, \overline{CD}$

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5. IF A,B,C are angles in the triangle, then prove that

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

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6. In a ΔABC if $a = 13, b = 14, c = 15$ then show that $R = \frac{65}{8}, r = 4, r_1 =$

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