MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

IPE:MAY-2015[TS]

Section A

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 $\frac{\sqrt{2+x}+\sqrt{2-x}}{x}$

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3. Find the trace of A if $A = \begin{bmatrix} 1 & 2 & -\frac{1}{2} \\ 0 & -1 & 2 \\ -\frac{1}{2} & 2 & 1 \end{bmatrix}$.

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4. IF $A = \begin{bmatrix} -1 & 2 & 3 \\ 2 & 5 & 6 \\ 3 & x & 7 \end{bmatrix}$ is symmetric, find the value of x

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5. Define linear combination of vectors.

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6. If the vectors $2\bar{i}+\lambda\bar{j}-\bar{k}$ and $4\bar{i}-2\bar{j}+2\bar{k}$ are perpendicular to each other than find λ.

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7. If $\cos\theta+\sin\theta=\sqrt{2}\cos\theta$, prove that $\cos\theta-\sin\theta=\sqrt{2}\sin\theta$.

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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. IF $\cosh x = 5/2$, then find the value of (i) cosh(2x) and (ii) sinh(2x)

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Section B

1. IF $\theta - \phi = \frac{\pi}{2}$, then show that $\begin{bmatrix} \cos^2\theta & \cos\theta\sin\theta \\ \cos\theta\sin\theta & \sin^2\theta \end{bmatrix}\begin{bmatrix} \cos^2\phi & \cos\phi\sin\phi \\ \cos\phi\sin\phi & \sin^2\phi \end{bmatrix} = O$

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2. If the points whose position vectors are $3\bar{i} - 2\bar{j} - \bar{k}, 2\bar{i} + 3\bar{j} - 4\bar{k}, -\bar{i} + \bar{j} + 2\bar{k}, 4\bar{i} + 5\bar{j} + \lambda\bar{k}$ are coplanar, then show that $\lambda = -\frac{146}{17}$.

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3. Let $\bar{a} = 2\bar{i} + \bar{j} - 2\bar{k}, \bar{b} = \bar{i} + \bar{j}$. If $\bar{c}$ is a vector such that $\bar{a}.\bar{c} = |\bar{c}|, |\bar{c} - \bar{a}| = 2\sqrt{2}$ and the angle between $(\bar{a} \times \bar{b})$ and $\bar{c}$ is 30°, then $\left|(\bar{a} \times \bar{b}) \times \bar{c}\right| =$

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

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5. If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta)$, then prove that $\cos\left(\theta - \frac{\pi}{4}\right) = \pm\frac{1}{2\sqrt{2}}$

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6. If $\cos^{-1}\frac{P}{a}+\cos^{-1}\frac{q}{b}=\alpha$, then prove that $\frac{p^2}{a^2}-\frac{2pq}{ab}.\cos\alpha+\frac{q^2}{b^2}=\sin^2\alpha$

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7. Show that $a\cos^2\frac{A}{2}+b\cos^2\frac{B}{2}+c\cos^2\frac{C}{2}=s+\frac{\Delta}{R}$.

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Section C

1. Using the principle of finite Mathematical Induction prove the following:

(iii) $\frac{1}{1.4}+\frac{1}{4.7}+\frac{1}{7.10}+\ldots\ldots\ldots+\text{n terms}=\frac{n}{3n+1}$.

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2. The shortest distance between the skew lines $\bar{r}=\left(\bar{i}+3\bar{j}+3\overline{K}\right)+t\left(\bar{i}+3\bar{j}+2\bar{k}\right)$ and $\bar{r}=\left(4\bar{i}+5\bar{j}+6\bar{k}\right)+t\left(2\bar{i}+3\bar{j}+\bar{k}\right)$ is

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3. If A, B, C are angles of a triangle, then prove that $\sin^2\frac{A}{2}+\sin^2\frac{B}{2}-\sin^2\frac{C}{2}=1-2\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$.

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4. In ΔABC prove that $\cos^2.\frac{A}{2}+\cos^2.\frac{B}{2}+\cos^2.\frac{C}{2}=2+\frac{r}{2R}$

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