



## MATHS

### BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

#### IPE: MARCH-2016 [AP]

##### Section A Vasq

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

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2. If  $f: Q \rightarrow Q$  is defined by  $f(x) = 5x + 4$ , find  $f^{-1}$ .

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3. if  $A = [(I, 0)(0, -i)]$  then show that  $A^2 = -1$  ( $i^2 = -1$ ).

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

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5. 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 and n.

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6. 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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7. Find the area of the parallelogram whose adjacent sides are

$$\bar{a} = 2\bar{j} - \bar{k}, \bar{b} = -\bar{i} + \bar{k}.$$

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8. If  $\tan 20^\circ = \lambda$  then show that  $\frac{\tan 160^\circ - \tan 110^\circ}{1 + \tan 160^\circ \cdot \tan 110^\circ} = \frac{1 - \lambda^2}{2\lambda}$ .

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9. Find a sine function whose period is  $2/3$ .

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

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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. If ABCDEF is a regular hexagon with centre O , then P.T  
 $\overline{AB} + \overline{AC} + \overline{AD} + \overline{AE} + \overline{AF} = 3\overline{AD} = 6\overline{AO}$

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3. Find the volume of the tetrahedron having the edges

$$\bar{i} + \bar{j} + \bar{k}, \bar{i} - \bar{j}, \bar{i} + 2\bar{j} + \bar{k}.$$

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



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6. Prove that  $\sin^{-1} \frac{3}{5} + \cos^{-1} \frac{12}{13} = \cos^{-1} \frac{33}{65}$ .



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7. If  $\sin \theta = \frac{a}{b+c}$  then show that  $\cos \theta = \frac{2\sqrt{bc}}{b+c} \cos \left( \frac{A}{2} \right)$



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1. If  $f: A \rightarrow B, g: B \rightarrow C$  are two bijective functions then prove that  $g \circ f: A \rightarrow C$  is also a bijective function.

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2. Using the principle of finite Mathematical Induction prove that

$$1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \dots + n \text{ terms} = \frac{n(n+1)^2(n+2)}{12}, \forall n \in \mathbb{N}$$

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3. Show that

$$\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$$

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4. Solve the following system of equations by using Cramer's rule.

$$2x - y + 3z = 9, x + y + z = 6, x - y + z = 2.$$

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

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

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



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