# MATHS

## BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

## IPE:MARCH-2019 (AP)

**Questions**

**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.

Watch Video Solution

**2.** IF $f(x) = 2x - 1, g(x) = \frac{x+1}{2}$ for all $x \in R$, find (gof) (x)

Watch Video Solution

**3.** If $\begin{bmatrix} x-3 & 2y-8 \\ z+2 & 6 \end{bmatrix} = \begin{bmatrix} 5 & 2 \\ -2 & a-4 \end{bmatrix}$ then find x,y,z & a.

Watch Video Solution

**4.** Find the rank of $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$

Watch Video Solution

**5.** Let $\bar{a} = 2\bar{i} + 4\bar{j} - 5\bar{k}, \bar{b} = \bar{i} + \bar{j} + \bar{k}, \bar{c} = \bar{j} + 2\bar{k}$

Find unit vectors in the opposite direction of $\bar{a} + \bar{b} + \bar{c}$

Watch Video Solution

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

Watch Video Solution

**7.** If vectors $\lambda\bar{i} - 3\bar{j} + 5\bar{k}, 2\lambda\bar{i} - \lambda\bar{j} - \bar{k}$ are perpendicular to each other find $\lambda$.

Watch Video Solution

**8.** IF $\sin\theta = \frac{4}{5}$ and $\theta$ is not in the first quadrant, find the value of $\cos\theta$.

Watch Video Solution

**9.** IF $\theta$ is not an integral muliple of $\frac{\pi}{2}$, prove that

$\tan\theta + 2\tan 2\theta + 4\tan 4\theta + 8\cot 8\theta = \cot\theta$

Watch Video Solution

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

Watch Video Solution

**11.** IF $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ then show that $adjA = 3A^T$ Also find $A^{-1}$

Watch Video Solution

**12.** Show 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 coplanar, where $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors.

Watch Video Solution

**13.** IF $\bar{a} = 2\bar{i} + \bar{j} - \bar{k}, \bar{b} = -\bar{i} + 2\bar{j} - 4\bar{k}, \bar{c} = \bar{i} + \bar{j} + \bar{k}$ then find $(\bar{a} \times \bar{b}).(\bar{b} \times \bar{c})$

Watch Video Solution

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

Watch Video Solution

**15.** Given $p \neq \pm q$ . Show that the solutions of $\cos P\theta + \cos q\theta = 0$ form two series each of which is in A.P . Find also the common difference of each A.P .

Watch Video Solution

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

Watch Video Solution

**17.** If $a = (b + c)\cos\theta, \quad$ then prove that $\sin\theta = \frac{2\sqrt{bc}}{b + c}\cos\left(\frac{A}{2}\right)$

Watch Video Solution

**18.** If $f: A \to B, g: B \to C$ are two bijective functions then prove that $gof: A \to C$ is also a bijective function.

Watch Video Solution

**19.** Using the principle of finite Mathematical Induction prove the following:

(iv) $a + ar + ar^2 + \ldots\ldots\ldots + \text{n terms} = \dfrac{a(r^n - 1)}{r - 1}, r \neq 1.$

Watch Video Solution

**20.** Show that

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

Watch Video Solution

**21.** $x - y + 3z = 5, 4x + 2y - z = 0, -x + 3y + z = 5,$ solve the system of equation of using Cramer's rule.

Watch Video Solution

**22.** If $A + B + C = 180^\circ,$ then show that $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C.$

Watch Video Solution

**23.** In a $\triangle ABC$ if $a = 13, b = 14, c = 15$ then S.T $R = \frac{65}{8}, r = 4, r_1 = \frac{21}{2}, r_2 = 12, r_3 = 14.$

Watch Video Solution

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.

Watch Video Solution

**2.** IF $f(x) = 2x - 1, g(x) = \frac{x+1}{2}$ for all $x \in R$, find (gof) (x)

Watch Video Solution

**3.** IF $\begin{bmatrix} x-2 & 2y-3 \\ z+1 & 5 \end{bmatrix} = \begin{bmatrix} 4 & 3 \\ -1 & a-5 \end{bmatrix}$ then find the values of x,y,z and a

Watch Video Solution

**4.** Find the rank of $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$

Watch Video Solution

**5.** Let $\bar{a} = 2\bar{i} + 4\bar{j} - 5\bar{k}, \bar{b} = \bar{i} + \bar{j} + \bar{k}, \bar{c} = \bar{j} + 2\bar{k}$. Find the unit vector in the opposite direction of $\bar{a} + \bar{b} + \bar{c}$

Watch Video Solution

**6.** IF $\sin\theta = \frac{4}{5}$ and $\theta$ is not in the first quadrant, find the value of $\cos\theta$, $\tan\theta$.

Watch Video Solution

**7.** IF $\theta$ is not an integral muliple of $\frac{\pi}{2}$, prove that

$\tan\theta + 2\tan 2\theta + 4\tan 4\theta + 8\cot 8\theta = \cot\theta$

Watch Video Solution

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

Watch Video Solution

Watch Video Solution

## Section B

**1.** IF $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ then show that $adjA = 3A^T$ Also find $A^{-1}$

Watch Video Solution

**2.** Show 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 coplanar, where $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors.

Watch Video Solution

**3.** IF $\bar{a} = 2\bar{i} - \bar{k}, \bar{b} = -\bar{i} + 2\bar{j} - 4\bar{k}, \bar{c} = \bar{i} + \bar{j} + \bar{k}$ then find $(\bar{a} \times \bar{b}).(\bar{b} \times \bar{c})$

Watch Video Solution

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

Watch Video Solution

**5.** Given $p \neq \pm q$ . Show that the solutions of $\cos P\theta + \cos q\theta = 0$ form two series each of which is in A.P . Find also the common difference of each A.P .

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

## Section C

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

(iv) $a + ar + ar^2 + \ldots\ldots\ldots + \text{n terms} = \dfrac{a(r^n - 1)}{r - 1}, r \neq 1.$

Watch Video Solution

**2.** Show that

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

Watch Video Solution

**3.** $x - y + 3z = 5, 4x + 2y - z = 0, -x + 3y + z = 5,$ solve the system of equation of using Cramer's rule.

Watch Video Solution

**4.** If $A+B+C=180^\circ$, then show that $\sin 2A+\sin 2B+\sin 2C=4\sin A\sin B\sin C$.

Watch Video Solution

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

Watch Video Solution