



## MATHS

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

#### BOARD MODEL PAPER-1

#### Questions

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

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3. A certain bookshop has 10 dozen chemistry books, 8 dozen physics books, 10 dozen economics books. Their selling prices are Rs80, Rs60 and Rs,40 each respectively. Find the total amount the bookshop will receive by selling all the books, using matrix algebra.

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4. If  $A = \begin{bmatrix} 2 & -4 \\ -5 & 3 \end{bmatrix}$ , then find  $A+A'$  and  $AA'$ .

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5. IF  $\bar{a}, \bar{b}, \bar{c}$  are non-coplanar, then prove that the points with position vectors  $2\bar{a} + 3\bar{b} - \bar{c}, \bar{a} - 2\bar{b} + 3\bar{c}, 3\bar{a} + 4\bar{b} - 2\bar{c}, \bar{a} - 6\bar{b} + 6\bar{c}$  are coplanar.

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6. 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  $\bar{a} + \bar{b} + \bar{c}$

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7. IF  $\bar{a} = \bar{i} + 2\bar{j} - 3\bar{k}$  and  $\bar{b} = 3\bar{i} - \bar{j} + 2\bar{k}$  then show that  $\bar{a} + \bar{b}$  and  $\bar{a} - \bar{b}$  are perpendicular to each other.

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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. Find period of  $\tan(x + 4x + 9x + \dots + n^2x)$ .

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10. If  $\sinh x = 3$  then show that  $x = \log(3 + \sqrt{10})$

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11. Show that 
$$\begin{vmatrix} bc & b+c & 1 \\ ca & c+a & 1 \\ ab & a+b & 1 \end{vmatrix} = (a-b)(b-c)(c-a)$$

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12. 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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13. IF  $\bar{a} = \bar{i} - 2\bar{j} - 3\bar{k}$ ,  $\bar{b} = 2\bar{i} + \bar{j} - \bar{k}$  and  $\bar{c} = \bar{i} + 3\bar{j} - 2\bar{k}$  ,find  
 $\bar{a} \cdot (\bar{b} \times \bar{c})$ .

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14. If  $A$  is not an integral multiple of  $\frac{\pi}{2}$ , prove that

(i)  $\tan A + \cot A = 2 \operatorname{cosec} 2A$

(ii)  $\cot A - \tan A = 2 \cot 2A$

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15. Solve the following equations :  $2 \cos^2 \theta + 3 \sin \theta = 0$

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16. Show that:  $\cos \left( 2 \frac{\tan^{-1} 1}{7} \right) = \sin \left( 4^{-1} \frac{1}{3} \right)$

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17. त्रिभुज ABC में, सिद्ध कीजिए कि

$$\tan \frac{B - C}{2} = \frac{b - c}{b + c} \cot \frac{A}{2}$$

$$\tan \frac{C - A}{2} = \frac{c - a}{c + a} \cot \frac{B}{2}$$
$$\tan \frac{A - B}{2} = \frac{a - b}{a + b} \cot \frac{C}{2}$$

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18. 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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19. For all  $n \in \mathbb{N}$ , prove by principle of mathematical induction that,

$$\frac{1}{1 \cdot 4} + \frac{1}{4 \cdot 7} + \frac{1}{7 \cdot 10} + \dots \text{ to terms } n = \frac{n}{3n + 1}.$$

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20. IF  $A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 1 \end{bmatrix}$  than find  $(A^{-1})^{-1}$ .

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

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

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22.

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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23.

$$\sin^2\left(\frac{A}{2}\right) + \sin^2\left(\frac{B}{2}\right) - \sin^2\left(\frac{C}{2}\right) = 1 - 2\cos\left(\frac{A}{2}\right)\cos\left(\frac{B}{2}\right)\sin\left(\frac{C}{2}\right)$$

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24. In a  $\Delta ABC$ , If  $a=13$  ,  $b=14$  ,  $c=15$ , find  $R$ ,  $r$ ,  $r_1$ ,  $r_2$  and  $r_3$ .



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