



## MATHS

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

#### IPE:MAT-2019(AP)

##### Ipe May 2019 Ap Maths 1 A

1. If  $A = \{-2, -1, 0, 1, 2\}$  and  $f: A \rightarrow B$  is a surjection defined by  $f(x) = x^2 + x + 1$  then find B.

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2. Find the domain of the real function  $f(x) = \sqrt{4x - x^2}$

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

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

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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  $\lambda$ .

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

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7.  $\vec{a} = 2\vec{i} - \vec{j} + \vec{k}$ ,  $\vec{b} = \vec{i} - 3\vec{j} - 5\vec{k}$ . Find the vector  $\vec{c}$  such that  $\vec{a}$ ,  $\vec{b}$  &  $\vec{c}$  form the sides of a triangle.

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8. Sketch the graph of  $\sin 2x$  in the intervals  $(0, \pi)$ .

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9. P.T (i)  $\sin^2 52\frac{1^\circ}{2} - \sin^2 22\frac{1^\circ}{2} = \frac{\sqrt{3} + 1}{4\sqrt{2}}$

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

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11. 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.

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12. IF  $\bar{a} + \bar{b} + \bar{c} = \bar{0}$ ,  $|\bar{a}| = 3|\bar{b}| = 5$  and  $|\bar{c}| = 7$ , then find the angle between  $\bar{a}$  and  $\bar{b}$ .

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13. If  $\alpha, \beta$  are the solutions of the equation  $a \cos \theta + b \sin \theta = c$ , where  $a, b, c \in R$  and if  $a^2 + b^2 > 0$ ,  $\cos \alpha \neq \cos \beta$  then show that (i)  $\sin \alpha + \sin \beta = \frac{2bc}{a^2 + b^2}$  (ii)  $\sin \alpha \cdot \sin \beta = \frac{c^2 - a^2}{a^2 + b^2}$

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14. If  $0 < x < \frac{\pi}{2}$  then solve  $\cot^2 x - (\sqrt{3} + 1)\cot x + \sqrt{3} = 0$

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15. P.T  $\tan^{-1} \frac{1}{7} + \tan^{-1} \frac{1}{13} - \tan^{-1} \frac{2}{9} = 0$

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16. Prove that  $\frac{1 + \cos(A - B)\cos C}{1 + \cos(A - C)\cos B} = \frac{a^2 + b^2}{a^2 + c^2}$

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17. If  $f: A \rightarrow B, g: B \rightarrow C$  are two bijective functions then P.T  
 $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$

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18. Using Mathematical Induction , prove that statement for all  $n \in \mathbb{N}$

$$\left(1 + \frac{3}{1}\right) \left(1 + \frac{5}{4}\right) \left(1 + \frac{7}{9}\right) \dots \left(1 + \frac{2n+1}{n^2}\right) = (n+1)^2$$

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19. Solve 
$$\begin{vmatrix} x-2 & 2x-3 & 3x-4 \\ x-4 & 2x-9 & 3x-16 \\ x-8 & 2x-27 & 3x-64 \end{vmatrix} = 0$$

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20. Apply the test of rank to examine whether the equations  $x + y + z = 6$ ,  $x - y + z = 2$ ,  $2x - y + 3z = 9$  is consistent or inconsistent and if consistent find the complete solution.

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21. For any four vectors  $\vec{a}$ ,  $\vec{b}$ ,  $\vec{c}$  and  $\vec{d}$ , prove that

$$(i) \quad (\vec{a} \times \vec{b}) \times (\vec{c} \times \vec{d}) = [\vec{a}\vec{c}\vec{d}]\vec{b} - [\vec{b}\vec{c}\vec{d}]\vec{a} \quad \text{and} \quad (ii)$$

$$(\vec{a} \times \vec{b}) \times (\vec{c} \times \vec{d}) = [\vec{a}\vec{b}\vec{d}]\vec{c} - [\vec{a}\vec{b}\vec{c}]\vec{d}$$



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22. In  $\Delta ABC$ ,  $(r_1 + r_2)\sec^2 \frac{C}{2} =$



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