MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

SOLVED MODEL PAPER-4

Section A

1. If $f = \{(1, 2), (2, -3), (3, -1)$ then find

(i) $2 + f$.

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2. If $f = \{(1, 2), (2, -3), (3, -1)$ then find

(ii) $\sqrt{f}$.

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3. Find the domain of $\sqrt{9-x^2}$

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4. For any square matrix A, show that AA' is symmetric.

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5. Find the determinant of the matrix $\begin{bmatrix} 1^2 & 2^2 & 3^2 \\ 2^2 & 3^2 & 4^2 \\ 3^2 & 4^2 & 5^2 \end{bmatrix}$

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6. Find unit vector in the direction of vector $\bar{a} = \left(2\bar{i} + 3\bar{j} + \bar{k}\right)$

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7. If vectors $-3\bar{i}+4\bar{j}+\lambda\bar{k}, \mu\bar{i}+8\bar{j}+6\bar{k}$ are collinear vectors then find $\lambda \& \mu$.

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8. Find anle between planes $\bar{r}.\left(2\bar{i}-\bar{j}+2\bar{k}\right)=3, \bar{r}.\left(3\bar{i}+6\bar{j}+\bar{k}\right)=4$

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9. If $0<A<\pi/4$ and $\cos A=4/5$, then find the values of $\sin 2A$ and $\cos 2A$

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10. Find the maximum and minimum value of $f(x) = 3\cos x + 4\sin x$

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11. P.T $\cosh^2 x + \sinh^2 x = \cosh 2x$

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Section B

1. Examine whether the following system of equations are consistent or inconsistent and if consistent, find the complete solution, $x + y + z = 1, 2x + y + z = 2, x + 2y + 2z = 1.$

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2. $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors. Prove thate the following four points are coplanar

$-\bar{a}+4\bar{b}-3\bar{c}, 3\bar{a}+2\bar{b}-5\bar{c}$

$-3\bar{a}+8\bar{b}-5\bar{c}, \ -3\bar{a}+2\bar{b}+\bar{c}$

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3. Find the volume of the tetrahedron, whose vertices are (1,2,1), (3,2,5) , (2,-1,0) and (-1,0,1).

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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. Solve $\sqrt{3}\sin\theta - \cos\theta = \sqrt{2}$

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6. $\cos^{-1}\left(\frac{3}{5}\right) + \cos^{-1}\left(\frac{12}{13}\right) =$

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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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Section C

1. If $f: A \to B$ is a bijective function then prove that

(i) $fof^{-1} = I_B$

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2. If $f: A \to B$ is a bijective function then prove that

(ii) $f^{-1}of = I_A$.

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3. Using Mathematical Induction, prove that statement for all n $\in$ N

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

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4. Show that $\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ a^2 & b^3 & c^3 \end{vmatrix} = abc(a-b)(b-c)(c-a)$

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

$x - y + 3z = 5, 4x + 2y - z = 0, x + 3y + z = 5.$

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6. If

$\bar{a} = 2\bar{i} + \bar{j} - 3\bar{k}, \bar{b} = \bar{i} - 2\bar{j} + \bar{k}, \overline{C} = -\bar{i} + \bar{j} - 4\bar{k}, \overline{D} = \bar{i} + \bar{j} + \bar{k}$

, then compute $\left|\left(\bar{a} \times \bar{b}\right) \times \left(\bar{c} \times \bar{d}\right)\right|$.

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7. IF A,B,C are angles of a triangle , Prove that

$\cos 2A + \cos 2B + \cos 2C = -4\cos A \cos B \cos C - 1$

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8. If $A+B+C=180^\circ$ then $\sin^2\frac{A}{2}-\sin^2\frac{B}{2}+\sin^2\frac{C}{2}=$

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