MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

SOLVED MODEL PAPER-2

Section A

1. $f: R \to R$ defined by $f(x) = \frac{2x+1}{3}$, then this function is injection or not? Justify.

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2. Find the domain of the real function $\log\left(x^2 - 4x + 3\right)$

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3. Find the trace of $\begin{bmatrix} 1 & 3 & -5 \\ 2 & -1 & 5 \\ 2 & 0 & 1 \end{bmatrix}$.

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4. If $\begin{bmatrix} 0 & 2 & 1 \\ -2 & 0 & -2 \\ -1 & x & 0 \end{bmatrix}$ is a skew symmetric matrix then find the value of x.

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5. Show that the triangle formed by the vectors $3\bar{i}+5\bar{j}+2\bar{k}, 2\bar{i}-3\bar{j}-5\bar{k}, -5\bar{i}-2\bar{j}+3\bar{k}$ is equilateral.

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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. If $|\bar{a}+\bar{b}|=|\bar{a}-\bar{b}|$ then find the angle between $\bar{a}$ and $\bar{b}$.

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8. Find the value of $\sin 34^\circ + \cos 64^\circ - \cos 4^\circ$.

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9. Find the period of $f(x) = \cos(3x + 5) + 7$.

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10. If $\sinh x = \frac{3}{4}$ then find $\cosh 2x$ and $\sinh 2x$.

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Section B

1. Show that the matrix $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$ is non-singular and find A^{-1}.

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2. If the point whose position vectors are $3\bar{i} - 2\bar{j} - \bar{k}, 2\bar{i} + 3\bar{j} - 4\bar{k}, \bar{i} + \bar{j} - 2\bar{k}, 4\bar{i}5\bar{j} + \lambda\bar{k}$ are coplanar, then show that $\lambda = -\frac{46}{7}$.

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3. For any two vectors $\bar{a}$ and $\bar{b}$, show that

$$\left(1 + |\bar{a}|^2\right)\left(1 + |\bar{b}|^2\right) = |1 - \bar{a}.\,\bar{b}|^2 + |\bar{a} + \bar{b} + \bar{a} \times \bar{b}|^2$$

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4. Show that $\sin\frac{\pi}{5}.\sin\frac{2\pi}{5}.\sin\frac{3\pi}{5}.\sin\frac{4\pi}{5}=\frac{5}{16}$.

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

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6. Prove that $2\sin^{-1}\left(\frac{3}{5}\right)-\cos^{-1}\frac{5}{13}=\cos^{-1}\left(\frac{323}{325}\right)$.

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7. If $\frac{\cot A}{2} : \cot \frac{B}{2} : \cot \frac{C}{2} = 3:5:7$ then show that $a:b:c = 6:5:4$.

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Section C

1. 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.

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2. Using the principle of finite Mathematical Indcution prove that

$2.3 + 3.4 + 4.5 + \ldots\ldots$ upto n terms $= \dfrac{n(n^2 + 6n + 11)}{3}$

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3. Show that $\begin{vmatrix} 1 & a^2 & a^3 \\ 1 & b^2 & b^3 \\ 1 & c^2 & c^3 \end{vmatrix}$ =(a-b)(b-c)(c-a)(ab+bc+ca)

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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. P.T the smaller angle θ between any two diagonals of a cube is given by $\cos\theta = 1/3$

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6. If A, B, C are angles in a triangle, then the $\sin^2 A + \sin^2 B - \sin^2 C = 2\sin A \sin B \cos C$

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7. In $\triangle ABC$ prove that $\frac{r_1}{bc} + \frac{r_2}{ca} + \frac{r_3}{ab} = \frac{1}{r} - \frac{1}{2R}$.

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Solved Model Paper 2 Maths 1 B

1. Transform the equation of $x + y + 1 = 0$ into

Normal form

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2. Evaluate $Lt_{x \to 0}([x] + x)$

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3. Show that the points

$A(3, -2, 4), B(1, 1, 1), C(-1, 4, -2)$ are collinear.

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4. Reduce the equation $4x - 4y + 2z + 5 = 0$ of the plane to the intercept form.

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5. Compute $Lt_{x \to 0} \frac{3^x - 1}{\sqrt{1+x} - 1}$.

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6. Find $\underset{x \to \infty}{\text{Lt}} \frac{8|x| + 3x}{3|x| - 2x}$

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7. If $y = x^2 e^x \sin x$, then find $\frac{dy}{dx}$.

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8. Find the derivative of $\sec^{-1}\left(\frac{1}{2x^2 - 1}\right)$

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9. The side of a square is increased from 3 cm to 3.01 cm.

Find the approximate increase in the area of the square.

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10. Verify Rolle's theroem for the function $x^2 - 1$ on [-1,1]`.

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11. A(5,3) and B(3,-2) are 2 fixed points. Find the equation of locus of P, so that the area of $\triangle PAB$ is 9sq. Units.

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12. Prove that the angle of rotation of the axes to eliminate xy term from the equation $ax^2 + 2hxy + by^2 = 0$ is $\tan^{-1}\left(\frac{2h}{a-b}\right)$ where $a \neq b$ and $\frac{\pi}{4}$ if $a = b$.

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13. Find the image of (1,2) in the straight line $3x + 4y - 1 = 0$

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14. Show that $f(x) = \begin{cases} \frac{\cos ax - \cos bx}{x^2} & \text{if } x \neq 0 \\ \frac{1}{2}(b^2 - a^2) & \text{if } x = 0 \end{cases}$ is continuous at 0

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15. Find the derivative of $\cot x$ from the first principle.

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16. A particle moving along a straight line has the relation $s = t^3 + 2t + 3$, connecting the distance s describe by the particle in time t. Find the velocity and acceleration of the particle at t=4 sec.

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17. Find the equations of the tangent and the normal to the curve $y = x^3 + 4x^2$ at (-1,3)

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18. Find the circumcentre of the triangle whose vertices are (1,3) (0,-2) and (-3,1).

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19. Find the centroid and the area of the triangle formed by the lines $2y^2 - xy - 6x^2 = 0, x + y + 4 = 0$

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20. Write down the equation of the pair of straight lines joining the origin to the points of intersection of the $6x - y + 8 = 0$ with the pair of straight lines $3x^2 + 4xy - 4y^2 - 11x + 2y + 6 = 0$. Show that the lines so obtained make equal angles with the coordinates axes.

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21. Find the angle between the lines whose d.c's are related by $l+m+n=0 \& l^2+m^2-n^2=0$

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22. Find the derivative of $(\sin x)^{\log x}+x^{\sin x}$.

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23. IF the tangent at any point P on the curve $x^m y^n = a^{m+n}, mn \neq 0$ meets the coordinate axes in A.B then show that $AP : BP$ is a constant.

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24. Show that when the curved surface of a is right circular cylinder inscribed in a sphere of radius R is maximum , then the height of the cylinder is $\sqrt{2R}$.

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