Time hour **Sample Paper: Class XII** **MM 32**

Relations & Functions, Continuity, Matrices & Determinants, Inverse Trigonometric Functions

1. If $A=\begin{bmatrix}\cos\alpha & \sin\alpha\\ -\sin\alpha & \cos\alpha\end{bmatrix}$, show that $A^2=\begin{bmatrix}\cos 2\alpha & \sin 2\alpha\\ -\sin\alpha & \cos 2\alpha\end{bmatrix}$ 1

2. If $A=\{-1,0,1\}$ and $f=\{(x,x^2):x\in A\}$. Show that $f:A\to A$ is neither one one nor onto. 1

3. For what choice of k is the function $f(x)=\begin{cases}\dfrac{\sin 5x}{3x} & \text{if } x\neq 0\\ k & \text{if } x=0\end{cases}$ continuous. 1

4. Write $\sin^{-1}\left(2x\sqrt{1-x^2}\right)$, $-\dfrac{1}{\sqrt{2}}\le x\le\dfrac{1}{\sqrt{2}}$ in the simplest form. 1

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

6. Let N be the set of all natural numbers. Show that the relation R on $N\times N$, defined by $(a,b)R(c,d)\Leftrightarrow a+d=b+c\ \forall\in(a,b),(c,d)\in N\times N$ is an equivalence relation.

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7. Prove that $\lim\limits_{x\to 0}\dfrac{e^{\frac{1}{x}}-1}{e^{\frac{1}{x}}+1}$ does not exist. 4

8. Solve: $2\tan^{-1}(\cos x)=\tan^{-1}(2\operatorname{cosec} x)$. 4

9. If $A=\begin{bmatrix}2 & 1 & 1\\ 2 & 0 & 1\\ 0 & -2 & -1\end{bmatrix}$, then by finding A^{-1} solve the equations $2x+y+z=3$, $2x+z=5$, $-2y-z=1$ 6

10. The function f defined as $f(x)=\begin{cases}x^2+ax+b, & 0\le x\le 2\\ 3x+2, & 2\le x\le 4\\ 2ax+5b & 4\le x\le 8\end{cases}$ If f is continuous on $[0,8]$ find the values a and b. 6

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