MM: 20 **Class Test XII Class MATRICES** Time: 30 min

Each question carries 5 marks.

1. If $A=\begin{bmatrix}2&3\\1&2\end{bmatrix}$, then find λ,μ so that $A^2=\lambda A+\mu I$.

2. Express the given matrix as the sum of $\begin{bmatrix}1&3&5\\-6&8&3\\-4&6&5\end{bmatrix}$ symmetric and a skew-symmetric matrix:

3. If $A=\begin{bmatrix}3&-4\\1&-1\end{bmatrix}$, then prove by mathematical induction that $A^n=\begin{bmatrix}1+2n&-4n\\n&1-2n\end{bmatrix}$

4. Find the value of x if $\begin{bmatrix}1&x&1\end{bmatrix}\begin{bmatrix}1&3&2\\2&5&1\\15&3&2\end{bmatrix}\begin{bmatrix}1\\2\\x\end{bmatrix}=0$

MM: 20 **Class Test XII Relation/ Function** Time: 40 min

Each question carries 5 marks.

1. Show that relation R in set $A=\{x\in Z:0\le x\le 12\}$ given by $R=\{(a,b):|a-b| \text{ is a multiple of } 4\}$ is equivalence relation.

2. Let $f:R-\{2\}\to R-\{1\}$ is a mapping defined by $f(x)=\frac{x-1}{x-2}$, show that f is bijective.

3. Consider $f:R_+\to[4,\infty)$ given by $f(x)=x^2+4$. Show that f is invertible with the inverse f^{-1} of f given by $f^{-1}(y)=\sqrt{y-4}$, where R_+ is the set of all non-negative real numbers.

4. Let A be a set of all real numbers i.e. $A=R-\{-1\}$. Let $*$ be defined on A as $a*b=a+b+ab$.

Prove that: (*i*) $*$ is a binary operation on A.

(*ii*) $*$ is commutative and associative

(*iii*) 0 is the identity element. (*iv*) $-a/(1+a)$ is inverse of a.

MM: 30 **Home Test Class XII Matrix/Determinant** Time: 1 hr

Q1 carry 2 marks, Q 2-5 carry 4 marks each and Q6-7 carry 6 marks each.

1. Find the equation of the line joining $A(1,3)$ and $B(0,0)$ using determinants and find k if $D(k,0)$ is a point such that $ar(\Delta ABD)$ is 3 sq. units.

2. Using properties of determinants show that:

$$\begin{vmatrix}a+b+c&-c&-b\\-c&a+b+c&-a\\-b&-a&a+b+c\end{vmatrix}=2(a+b)(b+c)(c+a)$$

3. If $A=\begin{bmatrix}1&2&2\\2&1&2\\2&2&1\end{bmatrix}$, prove that $A^2-4A-5I=0$. Hence find A^{-1}.

4. Using elementary transformations, find the inverse of:

$$A=\begin{bmatrix}2&-6\\1&-2\end{bmatrix}$$

5. If $A=\begin{bmatrix}1&1&1\\0&1&1\\0&0&1\end{bmatrix}$, prove $A^n=\begin{bmatrix}1&n&\frac{n(n+1)}{2}\\0&1&n\\0&0&1\end{bmatrix}, n\in N$

6. If $A=\begin{bmatrix}2&-1&1\\-1&2&-1\\1&-1&2\end{bmatrix}$ and $B=\begin{bmatrix}3&1&-1\\1&3&1\\-1&1&3\end{bmatrix}$, find AB and use this result to

MM: 15 **Class Test XII A** Time: 30 min

Each question carries 5 marks.

Attempt any three:

1. Show that the right circular cylinder of given surface and maximum volume is such that its height is equal to the diameter of the base.

2. Show that the semi-vertical angle of the cone of the maximum volume and of given slant height is $\tan^{-1}\sqrt{2}$.

3. Show that the height of the cylinder of maximum volume that can be inscribed in a sphere of radius R is $\frac{2R}{\sqrt{3}}$. Also find maximum volume.

4. Find the point on the curve $y^2=4x$ which is nearest to the point $(2,1)$.