

MM: 20 **Class Test XII Determinants** Time: 40 min

Q 1 carry 2 marks, Q 2-4 each carry 4 marks and Q 5 carry 6 marks.

1. Find the value of x if $\begin{vmatrix} x-2 & -3 \\ 3x & 2x \end{vmatrix} = 3$

2. Using elementary transformations, find inverse of

$A = \begin{bmatrix} 2 & -3 \\ 3 & 4 \end{bmatrix}$ 3. Using properties of determinants show that:

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

4. Using properties

of determinants, solve for x :

$$\begin{vmatrix} a+x & a-x & a-x \\ a-x & a+x & a-x \\ a-x & a-x & a+x \end{vmatrix} = 0$$

MM: 20 **Class Test XII Class MATRICES** Time: 40 min

Each question carries 4 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. $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$, prove that $A^3 - 4A^2 + A = 0$

3. Express the given matrix as the sum of symmetric and a skew-symmetric matrix:

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

$$A^n = \begin{bmatrix} 1+2n & -4n \\ n & 1-2n \end{bmatrix}$$

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

MM: 20 **Class Test XII Class** Time: 45 min

Q 1-4 carry 1 mark, Q 5-8 carry 4 marks .

1. Write the points of discontinuity of $f(x) = [x]$.

2. If $y = \tan^{-1}(\cot x^2)$, write value of dy/dx .

3. Is Rolle's theorem applicable to $f(x) = x^2 - 4$ for $x \in [1, 2]$?

4. If $f(1) = 4, f'(1) = 2$ find the value of the derivative of $\log f(e^x)$ at $x=0$.

5. Show $f(x) = \begin{cases} x-1 & \text{if } x < 2 \\ 2x-3 & \text{if } x \geq 2 \end{cases}$ is not differentiable at $x=2$.

6. If $y = \tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$, find $\frac{dy}{dx}$.

7. If $y = x^{\log x} + \cos x^{\sin x}$, find dy/dx .

8. If $x = a(\cos \theta + \theta \sin \theta)$ and $y = b(\sin \theta - \theta \cos \theta)$, find d^2y/dx^2 .

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

Each question carries 5 marks.

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

2. Let $f : \mathbb{R} - \{2\} \rightarrow \mathbb{R} - \{1\}$ is a mapping defined by $f(x) = \frac{x-1}{x-2}$,

show that f is bijective.

3. Consider $f : \mathbb{R}_+ \rightarrow [4, \infty)$ 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 \mathbb{R}_+ is the set of all non-negative real numbers.

4. Let A be a set of all real numbers i.e. $A = \mathbb{R} - \{-1\}$. 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 .