

CLASS: XII

SUBJECT: MATHEMATICS

TIME ALLOWED: 1 HOUR

MAX. MARKS: 30

**GENERAL INSTRUCTIONS:**

1. All questions are compulsory. There are 12 questions in all.
2. The handwriting must be legible.
3. Overwriting must be avoided.
4. Write the question number correctly

1. If A is a singular matrix. What is the |adjoint A|. 1
2. If for the matrix A,  $A^3 = I$ , then find  $A^{-1}$ ? 1
3. If  $A = \begin{bmatrix} 1 & 2 \\ -1 & 0 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix}$ , then find |AB| 1
4. Let  $A = \{3,5\}$ ,  $B = \{7,11\}$ , Let  $R = \{(a, b) : a \in A, b \in B \text{ and } a-b \text{ is even. Show that } R \text{ is a universal relation from } A \text{ to } B.$  2
5. If  $A = \begin{bmatrix} \cos x & -\sin x \\ \sin x & \cos x \end{bmatrix}$ , then find  $A^{-1}$  2
6. Find a matrix B such that  $B \begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} 6 & 0 \\ 0 & 6 \end{bmatrix}$  2
7. There are two values of a which makes the determinant. 3  
 $\Delta = \begin{vmatrix} 1 & -2 & 5 \\ 2 & a & -1 \\ 0 & 4 & 2a \end{vmatrix}$  equal to 86. find the sum of these two values.
8. Express the following matrix as the sum of a symmetric and skew symmetric matrix 3  
 $\begin{bmatrix} 1 & 3 & 5 \\ -6 & 8 & 3 \\ -4 & 6 & 5 \end{bmatrix}$
9. Let  $A = \mathbf{R} - \{3\}$  and  $B = \mathbf{R} - \{1\}$ . Consider the function  $f: A \rightarrow B$  defined by 3  
 $f(x) = \left( \frac{x-2}{x-3} \right)$ . Is f one-one and onto? Justify your answer.

10. Show that the relation  $R$  defined in the set  $A$  of all polygons as  $R = \{(P_1, P_2) : P_1 \text{ and } P_2 \text{ have same number of sides}\}$ , is an equivalence relation. What is the set of all elements in  $A$  related to the right-angle triangle  $T$  with sides 3, 4 and 5? 4

11. If  $A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$ , find  $x$  and  $y$  such that  $A^2 + xI = yA$ . Hence find  $A^{-1}$  4

12. Given that  $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ . Find  $AB$  Use this to solve the following system of equations  $x - y = 3$ ;  $2x + 3y + 4z = 17$ ;  $y + 2z = 17$  4