



**I. Answer the following questions:**

[5 x 2 = 10]

1. Find the adjoint of  $\begin{bmatrix} -3 & 4 \\ 6 & 2 \end{bmatrix}$
2. Prove that  $\begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$  is orthogonal.
3. If  $\text{adj}(A) = \begin{bmatrix} 2 & -4 & 2 \\ -3 & 12 & -7 \\ -2 & 0 & 2 \end{bmatrix}$ , find A
4. Find the rank of the matrices by minor method,  $\begin{bmatrix} 3 & 2 & 5 \\ 1 & 1 & 2 \\ 3 & 3 & 6 \end{bmatrix}$
5. Verify the property  $(A^T)^{-1} = (A^{-1})^T$  with  $A = \begin{bmatrix} 2 & 9 \\ 1 & 7 \end{bmatrix}$

**II. Answer the following questions:**

[3 x 5 = 15]

1. Solve the following system of linear equations by matrix inversion method.  
 $x + y + z - 2 = 0$ ,  $6x - 4y + 5z - 31 = 0$ ,  $5x + 2y + 2z = 13$ .
2. If  $A = \begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix}$ , show that  $A^2 - 3A - 7I_2 = 0_2$ , Hence find  $A^{-1}$
3. Decrypt the received encoded message [45 -28 23] [46 -18 3] [5 -5 5] with the encryption matrix  $\begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$   
and the decryption matrix as its inverse, where the system of codes are described by the numbers 1–26 to the letters A- Z respectively, and the number 0 to a blank space.

-----ALL THE BEST-----

Test should be written under the supervision of your parents and get the answer paper signed from them.

No corrections should be made after the test timings. We expect your honesty.

Test Papers have to be submitted after the completion of all the 4 tests.

Submission Date of Test Papers: 1<sup>st</sup> June, 2<sup>nd</sup> June, 3<sup>rd</sup> June

Timings: 9 AM – 12.30 PM / 5 PM- 7 PM