

**Instructions**

- Make sure to write in the point formation. You handwriting should be neat and clean
- Honesty is the best policy.
- New section on new page

**SECTION-A**

- Q1.** If  $\begin{bmatrix} x & 2 \\ 3 & x-1 \end{bmatrix}$  is a singular matrix, then the product of all possible values of x is:      **A 6**      **B -6**      **C 0**      **D -7**      **1 Mark**
- Q2.** The matrix  $\begin{bmatrix} 2 & -1 & 3 \\ \lambda & 0 & 7 \\ -1 & 1 & 4 \end{bmatrix}$  is not invertible for:      **A  $\lambda = 0$**       **B  $\lambda \in \mathbb{R} - \{1\}$**       **1 Mark**
- Q3.** If  $A = \begin{bmatrix} -2 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -2 \end{bmatrix}$ , then the value of  $|\text{adj } A|$  is      **A 64**      **B 16**      **C 0**      **D -8**      **1 Mark**
- Q4.** If a matrix has 36 elements, the number of possible orders it can have, is:      **A 13**      **B 3**      **C 5**      **D 9**      **1 Mark**
- Q5.** If  $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$  and  $(3I + 4A)(3I + 4A) = x^2I$ , then the value(s) of x is/ are:      **A  $\pm\sqrt{7}$**       **B 0**      **C  $\pm 5$**       **D 25**      **1 Mark**
- Q6.** Let  $A = \begin{bmatrix} 200 & 50 \\ 10 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 50 & 40 \\ 2 & 3 \end{bmatrix}$ , then  $|AB|$  is equal to      **A 460**      **B 2000**      **C 3000**      **D -7000**      **1 Mark**
- Q7.** Write the number of all possible matrices of order  $2 \times 2$  with each entry 1, 2 or 3.      **A 27**      **B 8**      **C 16**      **D 27**      **1 Mark**
- Q8.** matrix  $3 \times 3$  if A is a and  $|3A| = K|A|$ , then write the value of K.      **A 27**      **B 8**      **C 16**      **D 27**      **1 Mark**
- Q9.** If  $\begin{bmatrix} 9 & -1 & 4 \\ -2 & 1 & 3 \end{bmatrix} = A + \begin{bmatrix} 1 & 2 & -1 \\ 0 & 4 & 9 \end{bmatrix}$ , then find the matrix A.      **A  $\begin{bmatrix} 8 & -3 & 5 \\ -2 & -3 & 4 \end{bmatrix}$**       **B  $\begin{bmatrix} 10 & -3 & 5 \\ -2 & -3 & 4 \end{bmatrix}$**       **C  $\begin{bmatrix} 8 & -3 & 5 \\ -2 & -3 & 4 \end{bmatrix}$**       **D  $\begin{bmatrix} 10 & -3 & 5 \\ -2 & -3 & 4 \end{bmatrix}$**       **1 Mark**
- Q10.** Solve the following matrix equation for x;  $[x \ 1] \begin{bmatrix} 1 & 0 \\ -2 & 0 \end{bmatrix} = O$ .      **A 1**      **B -1**      **C 2**      **D -2**      **1 Mark**
- Q11.** If  $\begin{bmatrix} x+y & 7 \\ 9 & x-y \end{bmatrix} = \begin{bmatrix} 2 & 7 \\ 9 & 4 \end{bmatrix}$ , then  $xy =$  \_\_\_\_\_.      **A 13**      **B -13**      **C 13**      **D -13**      **1 Mark**
- Q12.** Write the element  $a_{33}$  of a  $3 \times 3$  matrix  $A = (a_{ij})$  whose elements  $a_{ij}$  are given by  $a_{ij} = \frac{|i-j|}{2}$ .      **A 1**      **B -1**      **C 1**      **D -1**      **1 Mark**
- Q13.** If  $\begin{pmatrix} 2 & 3 \\ 5 & 7 \end{pmatrix} \begin{pmatrix} 1 & -3 \\ -2 & 4 \end{pmatrix} = \begin{pmatrix} -4 & 6 \\ -9 & x \end{pmatrix}$  write the value of x.      **A 13**      **B -13**      **C 13**      **D -13**      **1 Mark**
- Q14.** Find the value of a if  $\begin{bmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$       **A 13**      **B -13**      **C 13**      **D -13**      **1 Mark**

**SECTION-B**

- Q15.** If  $A = \begin{bmatrix} -3 & 6 \\ -2 & 4 \end{bmatrix}$  then show that  $A^3 = A$ .      **2 Marks**
- Q16.** If  $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$ , then find  $(A^2 - 5A)$ .      **2 Marks**
- Q17.** If  $A = \begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$  and  $kA = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$ , then find the values of k, a and b.      **2 Marks**
- Q18.** Show that if A and B are square matrices such that  $AB = BA$ , then  $(A + B)^2 = A^2 + 2AB + B^2$ .      **2 Marks**
- Q19.** If A and B are symmetric matrices of the same order, write whether  $AB - BA$  is symmetric or skew-symmetric or neither of the two.      **2 Marks**
- Q20.** Express the following matrix as the sum of a symmetric and a skew symmetric matrix:      **3 Marks**
- $$\begin{bmatrix} 1 & 3 & 5 \\ -6 & 8 & 3 \\ -4 & 6 & 5 \end{bmatrix}$$

3 Marks

- Q21.** Find X and Y, if:  
 1.  $X + Y = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$  and  $X - Y = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$   
 2.  $2X + 3Y = \begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix}$  and  $3X + 2Y = \begin{bmatrix} -2 & -2 \\ -1 & 5 \end{bmatrix}$       **3 Marks**

3 Marks

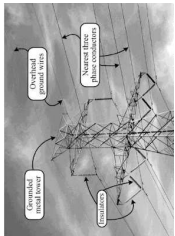
- Q22.** Find the matrix A such that  
 $\begin{bmatrix} 4 \\ 1 \\ 1 \\ 3 \end{bmatrix} A = \begin{bmatrix} -4 & 8 & 4 \\ -1 & 2 & 1 \\ -3 & 6 & 3 \end{bmatrix}$       **3 Marks**

**SECTION-C**

- Q23.** A trust invested some money in two type of bonds. The first bond pays 10% interest and bond pays 12% interest. The trust received 2,800 as interest. However, if trust had interchanged money in bonds, they would have got 100 less as interest. Using matrix method, find the amount invested by the trust. Which value is reflected in this question?      **4 Marks**

4 Marks

- Q24.** Electrical transmission wires which are laid down in winters are stretched tightly to accommodate expansion in summers.      **4 Marks**



- Two such wires lie along the following lines :  
 $l_1 : \frac{x-1}{3} = \frac{y-3}{x-2} = \frac{z-2}{z-1}$   
 $l_2 : \frac{x-1}{-1} = \frac{y-3}{3} = \frac{z-2}{-2}$   
 Based on the given information, answer the following questions:  
 Are the lines  $l_1$  and  $l_2$  coplanar? Justify your answer.  
 Find the point of intersection of the lines  $l_1$  and  $l_2$ .      **4 Marks**

4 Marks

- Q25.** If  $A = \begin{bmatrix} 1 & 2 \\ 3 & -4 \\ 0 & -1 \end{bmatrix}$ , compute  $A^2 - 4A + 3I_3$ .      **4 Marks**

5 Marks

- Q26.** If  $A = \begin{bmatrix} 1 & -2 & 0 \\ 2 & -1 & -1 \\ 0 & -2 & 1 \end{bmatrix}$  find  $A^{-1}$  and use it to solve the following system of equations:  
 $x - 2y = 10, 2x - y - z = 8, -2y + z = 7$       **5 Marks**