

## Topic :-MATRICES

1. If  $A = [a_{ij}]_{m \times n}$  is a matrix of rank  $r$  and  $B$  is a square submatrix of order  $r + 1$ , then
  - a)  $B$  is invertible
  - b)  $B$  is not invertible
  - c)  $B$  may or may not be invertible
  - d) None of these
  
2. If  $A$  is square matrix,  $A'$ , is its transpose, then  $\frac{1}{2}(A - A')$  is
 

a) A symmetric matrix	b) A skew-symmetric matrix
c) A unit matrix	d) An elementary matrix
  
3. Inverse of the matrix  $A = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}$  is
 

a) $\frac{1}{10} \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}$	b) $\frac{1}{10} \begin{bmatrix} 4 & 2 \\ -3 & 1 \end{bmatrix}$	c) $\begin{bmatrix} 4 & 2 \\ -3 & 1 \end{bmatrix}$	d) $\frac{1}{10} \begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$
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4. Let  $A$  be a matrix of rank  $r$ . Then,
 

a) $\text{rank}(A^T) = r$	b) $\text{rank}(A^T) < r$	c) $\text{rank}(A^T) > r$	d) None of these
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5. The adjoint matrix of  $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$  is
 

a) $\begin{bmatrix} 4 & 8 & 3 \\ 2 & 1 & 6 \\ 0 & 2 & 1 \end{bmatrix}$	b) $\begin{bmatrix} 1 & -1 & 0 \\ -2 & 3 & -4 \\ -2 & 3 & -3 \end{bmatrix}$	c) $\begin{bmatrix} 11 & 9 & 3 \\ 1 & 2 & 8 \\ 6 & 9 & 1 \end{bmatrix}$	d) $\begin{bmatrix} 1 & -2 & 1 \\ -1 & 3 & 3 \\ -2 & 3 & -3 \end{bmatrix}$
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6. If a matrix  $A$  is such that  $3A^3 + 2A^2 + 5A + I = 0$ , then  $A^{-1}$  is equal to
 

a) $-(3A^2 + 2A + 5)$	b) $3A^2 + 2A + 5$	c) $3A^2 - 2A - 5$	d) None of these
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7. Let  $A = [a_{ij}]_{n \times n}$  be a square matrix, and let  $c_{ij}$  be cofactor of  $a_{ij}$  in  $A$ . If  $C = [c_{ij}]$ , then
 

a) $ C  =  A $	b) $ C  =  A ^{n-1}$	c) $ C  =  A ^{n-2}$	d) None of these
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8. The system of equations  $x + y + z = 0$ ,  $2x + 3y + z = 0$  and  $x = 2y = 0$  has
 

a) A unique solution; $x = 0, y = 0, z = 0$	b) Infinite solutions
c) No solutions	d) Finite number of non-zero solutions

9. If  $2X - \begin{bmatrix} 1 & 2 \\ 7 & 4 \end{bmatrix} = \begin{bmatrix} 3 & 2 \\ 0 & -2 \end{bmatrix}$ , then  $X$  is equal to  
 a)  $\begin{bmatrix} 2 & 2 \\ 7 & 4 \end{bmatrix}$                       b)  $\begin{bmatrix} 1 & 2 \\ \frac{7}{2} & 2 \end{bmatrix}$                       c)  $\begin{bmatrix} 2 & 2 \\ \frac{7}{2} & 1 \end{bmatrix}$                       d) None of these
10. Let  $A = \begin{bmatrix} 1 & 2 \\ -5 & 1 \end{bmatrix}$  and  $A^{-1} = xA + yI$ , then the values of  $x$  and  $y$  are  
 a)  $x = -\frac{1}{11}, y = \frac{2}{11}$                       b)  $x = -\frac{1}{11}, y = -\frac{2}{11}$                       c)  $x = \frac{1}{11}, y = \frac{2}{11}$                       d)  $x = \frac{1}{11}, y = -\frac{2}{11}$
11. Let  $A$  and  $B$  be two symmetric matrices of same order. Then, the matrix  $AB - BA$  is  
 a) A symmetric matrix                      b) A skew-symmetric matrix  
 c) A null matrix                      d) The identity matrix
12. If  $A = \begin{bmatrix} 1 & x \\ x^2 & 4y \end{bmatrix}, B = \begin{bmatrix} -3 & 1 \\ 1 & 0 \end{bmatrix}$  and  $\text{adj } A + B = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ , then the values of  $x$  and  $y$  are respectively  
 a) (1, 1)                      b) (-1, 1)                      c) (1, 0)                      d) None of these
13. Let  $p$  is a non-singular matrix such that  $1 + p + p^2 + \dots + p^n = O$  ( $O$  denotes the null matrix), then  $p^{-1}$  is  
 a)  $p^n$                       b)  $-p^n$                       c)  $-(1 + p + \dots + p^n)$                       d) None of these
14. If  $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{1}{40} \begin{bmatrix} 5 & 10 & -5 \\ -5 & -2 & 13 \\ 10 & -4 & 6 \end{bmatrix} \begin{bmatrix} 5 \\ 0 \\ 5 \end{bmatrix}$ , then the value of  $x + y + z$  is  
 a) 3                      b) 0                      c) 2                      d) 1
15. The matrix  $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$  is the matrix reflection in the line  
 a)  $x = 1$                       b)  $x + y = 1$                       c)  $y = 1$                       d)  $x = y$
16. If  $\begin{bmatrix} 1 & -\tan \theta \\ \tan \theta & 1 \end{bmatrix} \begin{bmatrix} 1 & \tan \theta \\ -\tan \theta & 1 \end{bmatrix}^{-1} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$ , then  
 a)  $a = 1, b = 1$                       b)  $a = \sin 2\theta, b = \cos 2\theta$   
 c)  $a = \cos 2\theta, b = \sin 2\theta$                       d) None of the above
17. If  $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ , then  $\text{adj } A$  is equal to  
 a)  $A$                       b)  $A'$                       c)  $3A$                       d)  $3A'$
18. Let the homogeneous system of linear equations  $px + y + z = 0$ ,  $x + qy + z = 0$ , and  $x + y + rz = 0$ , where  $p, q, r \neq 1$ , have a non-zero solution, then the value of  $\frac{1}{1-p} + \frac{1}{1-q} + \frac{1}{1-r}$  is  
 a) -1                      b) 0                      c) 2                      d) 1

19. If  $A = \begin{bmatrix} 1 & \tan \frac{\theta}{2} \\ -\tan \frac{\theta}{2} & 1 \end{bmatrix}$  and  $AB = I$ , then  $B$  is equal to

a)  $\cos^2 \frac{\theta}{2} \cdot A$

b)  $\cos^2 \frac{\theta}{2} \cdot A^T$

c)  $\cos^2 \theta \cdot I$

d)  $\sin^2 \frac{\theta}{2} \cdot A$

20. The values of  $x, y, z$  in order, if the system of equations  $3x + y + 2z = 3, 2x - 3y - z = -3, x + 2y + z = 4$  has unique solution, are

a) 2, 1, 5

b) 1, 1, 1

c) 1, -2, -1

d) 1, 2, -1