MATRICES

TRANSPOSE OF A MATRIX

EXERCISE

Q.1 If $A = \begin{bmatrix} -2 \\ 4 \\ 5 \end{bmatrix}$, $B = [1 \;\; 3 \;\; -6]$, verify that $(AB)' = B'A'$.

Q.2 If A and B are matrices of order $m \times n$ and $n \times m$ respectively, then order of matrix $B^T(A^T)^T$ is –

Q.3 If $A = \begin{bmatrix} 1 & 2 \\ -1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 4 \\ 2 & -2 \end{bmatrix}$, then $(AB)^T$ is-

(A) $\begin{bmatrix} 11 & -2 \\ 5 & -6 \end{bmatrix}$ (B) $\begin{bmatrix} 11 & 5 \\ -2 & -6 \end{bmatrix}$

(C) $\begin{bmatrix} 7 & 1 \\ 0 & -8 \end{bmatrix}$ (D) $\begin{bmatrix} 7 & 0 \\ 1 & -8 \end{bmatrix}$

Q.4 If A and B are matrices of order $m \times n$ and $n \times m$ respectively, then the order of matrix $B^T (A^T)^T$ is -

(A) $m \times n$ (B) $m \times m$

(C) $n \times n$ (D) Not defined

Q.5 If A, B, C, are three matrices, then $A^T + B^T + C^T$ is -

(A) zero matrix (B) $A + B + C$

(C) $-(A + B + C)$ (D) $(A + B + C)^T$

Q.6 If $A = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 \\ -1 & 1 \end{bmatrix}$, then correct statement is -

(A) $AB = BA$ (B) $AA^T = A^2$

(C) $AB = B^2$ (D) None of these

Q.7 If $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$, then AA^T equals-

(A) $\begin{bmatrix} \cos 2\theta & -\sin 2\theta \\ \sin 2\theta & \cos 2\theta \end{bmatrix}$ (B) $\begin{bmatrix} \cos^2\theta & \sin^2\theta \\ \sin^2\theta & \cos^2\theta \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (D) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

Q.8 If $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$, then $|A + A^T|$ equals -

(A) $4(a^2 - b^2)$ (B) $2(a^2 - b^2)$

(C) $a^2 - b^2$ (D) $4ab$

Q.9 For suitable matrices A, B; the false statement is-

(A) $(AB)^T = A^T B^T$ (B) $(A^T)^T = A$

(C) $(A - B)^T = A^T - B^T$ (D) $(A^T)^{-1} = (A^{-1})^T$

Q.10 If $A = \begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 4 \\ 2 & 1 \\ 1 & 3 \end{bmatrix}$, then $(AB)'$ equals-

(A) $\begin{bmatrix} 16 & 22 \\ 23 & 31 \end{bmatrix}$ (B) $\begin{bmatrix} 16 & 23 \\ 22 & 31 \end{bmatrix}$

(C) $\begin{bmatrix} 22 & 31 \\ 16 & 30 \end{bmatrix}$ (D) $\begin{bmatrix} 23 & 16 \\ 31 & 20 \end{bmatrix}$

Q.11 If $A = \begin{bmatrix} 3 & x \\ y & 0 \end{bmatrix}$ and $A = A^T$, then -

(A) $x = 0, y = 3$ (B) $x + y = 3$

(C) $x = y$ (D) $x = -y$

Q.12 If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then AA equals -

(A) I (B) A

(C) A′ (D) 0

Q.13 If A is a matrix of order 3×4, then both AB^T and B^TA are defined if order of B is -

(A) 3×3 (B) 4×4

(C) 4×3 (D) 3×4

ANSWER KEY

3. C

4. D

5. D

6. D

7. C

8. A

9. A

10. A

11. C

12. A

13. D