

48. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ a & 2 & b \end{bmatrix}$ is a matrix satisfying the equation $AA^T = 9I$, where I is 3×3 identity matrix, then the ordered pair (a, b) is equal to :

- (1) (2, 1)
- ✓ (2) (-2, -1)
- (3) (2, -1)
- (4) (-2, 1)

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ a & 2 & b \end{bmatrix}$$

$$\therefore A^T = \begin{bmatrix} 1 & 2 & a \\ 2 & 1 & 2 \\ 2 & -2 & b \end{bmatrix}$$

$$\therefore AA^T = \begin{bmatrix} 9 & 0 & a+4+2b \\ 0 & 9 & 2a+2-2b \\ - & - & - \end{bmatrix}$$

$$= 9I = \begin{bmatrix} 9 & 0 & 0 \\ 0 & 9 & 0 \\ - & - & - \end{bmatrix}$$

$$\therefore a + 4 + 2b = 0 \Rightarrow a + 2b = -4$$

$$2a + 2 - 2b = 0 \Rightarrow \underline{a - b = -1}$$

$$a = -2 ; b = -1$$

Correct option is (2)