Multiple Choice Questions

[MHT-CET 2022] (online shift)

1. If matrix $A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$ is such that $Ax = I$, where I is 2×2 unit matrix, then $x =$

   a) $\frac{1}{5}\begin{bmatrix} -3 & 2 \\ 4 & -1 \end{bmatrix}$ b) $\frac{1}{5}\begin{bmatrix} 3 & -2 \\ -4 & 1 \end{bmatrix}$ c) $\frac{1}{5}\begin{bmatrix} -3 & -2 \\ -4 & -1 \end{bmatrix}$ d) $\frac{1}{5}\begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$

2. If $A = \begin{bmatrix} 2 & -3 \\ 5 & -7 \end{bmatrix}$ then $A - A^{-1} =$

   a) $5\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ b) $\begin{bmatrix} 3 & -2 \\ \frac{10}{3} & -3 \end{bmatrix}$ c) $3\begin{bmatrix} 3 & 2 \\ 10 & 3 \end{bmatrix}$ d) $\begin{bmatrix} -5 & 0 \\ 0 & -5 \end{bmatrix}$

3. If $A = \begin{bmatrix} 0 & 1+2i & i-2 \\ -1-2i & 0 & K \\ 2-i & 7 & 0 \end{bmatrix}$ and A^{-1} does not exists, then K = ... (where $i = \sqrt{-1}$)

   a) $1 + 2i$ b) $1 - 2i$ c) 7 d) – 7

4. If matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$ and $A^{-1} = \propto I + \beta A$, where A is *a* unit matrix of order 2 and $\propto, \beta$ are constants, then the value of $\propto + \beta + \propto\beta$ is

   a) 11 b) – 7 c) 7 d) – 11

5. If $A = \begin{bmatrix} 2 & -3 \\ 4 & 1 \end{bmatrix}$ then $A + adj\, A$ is

   a) $\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$ b) $\begin{bmatrix} 1 & -3 \\ 4 & 2 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 3 \\ -4 & 2 \end{bmatrix}$

6. If $A = [aij]_{3 \times 3} = \begin{bmatrix} 1 & 3 & 3 \\ -1 & 2 & 2 \\ 1 & 1 & 4 \end{bmatrix}$ and Aij is a cofactor of *aij*, then the value of $a_{31} A_{31} + a_{32} A_{32} + a_{33} A_{33}$ is equal to

   a) 5 b) 20 c) 15 d) 0

7. If $A = \begin{bmatrix} 2 & -3 \\ -4 & 1 \end{bmatrix}$ then $adj\,(3A^2 + 12A)$ is equal to

   a) $\begin{bmatrix} 72 & -63 \\ -84 & 51 \end{bmatrix}$ b) $\begin{bmatrix} 51 & 63 \\ 84 & 72 \end{bmatrix}$ c) $\begin{bmatrix} 72 & -84 \\ -63 & 51 \end{bmatrix}$ d) $\begin{bmatrix} 51 & 84 \\ 63 & 72 \end{bmatrix}$

8. If $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 1 & 2 \\ 1 & 2 \end{bmatrix}$ then $(AB)^{-1} =$

a) $\begin{bmatrix} \frac{-17}{5} & \frac{9}{5} \\ 2 & -1 \end{bmatrix}$ b) $\begin{bmatrix} \frac{17}{5} & 2 \\ \frac{9}{5} & 1 \end{bmatrix}$ c) $\begin{bmatrix} \frac{-17}{5} & 2 \\ \frac{-9}{5} & -1 \end{bmatrix}$ d) $\begin{bmatrix} \frac{17}{5} & \frac{9}{5} \\ 2 & 1 \end{bmatrix}$

9. If $A = [aij]_{3\times 3} = \begin{bmatrix} 3 & 2 & 4 \\ 1 & 4 & 1 \\ 2 & 6 & 3 \end{bmatrix}$ and Aij is a cofactor of aij, then the value of $a_{21} A_{21} + a_{22} A_{22} + a_{23} A_{23}$ is equal to

a) 0 b) 8 c) 18 d) – 8

10. Given $A = \begin{bmatrix} x & 3 & 2 \\ 1 & y & 4 \\ 2 & 2 & z \end{bmatrix}$ if $xyz = 60$ and $8x + 4y + 3z = 20$, then A adj (A) is equal to

a) $\begin{bmatrix} 60 & 0 & 0 \\ 0 & 60 & 0 \\ 0 & 0 & 60 \end{bmatrix}$ b) $\begin{bmatrix} 108 & 0 & 0 \\ 0 & 108 & 0 \\ 0 & 0 & 108 \end{bmatrix}$ c) $\begin{bmatrix} 20 & 0 & 0 \\ 0 & 20 & 0 \\ 0 & 0 & 20 \end{bmatrix}$ d) $\begin{bmatrix} 68 & 0 & 0 \\ 0 & 68 & 0 \\ 0 & 0 & 68 \end{bmatrix}$

[MHT-CET 2021] (online shift)

11. $A(\alpha) = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then $[A^2(\alpha)]^{-1} =$

a) $A(\alpha)$ b) $A^2(\alpha)$ c) $A(-2\alpha)$ d) $A(2\alpha)$

12. If $A = \begin{bmatrix} 1 & 0 & 2 \\ -1 & 1 & -2 \\ 0 & 2 & 1 \end{bmatrix}$, $adj\,(A) = \begin{bmatrix} 5 & x & -2 \\ 1 & 1 & 0 \\ -2 & -2 & y \end{bmatrix}$, then the value of $x + y$ is

a) 6 b) 3 c) 4 d) 5

13. If $A^{-1} = \frac{-1}{2}\begin{bmatrix} 1 & -4 \\ -1 & 2 \end{bmatrix}$ then $2A + I_2 =$ ...., where I_2 is a unit matrix of order 2

a) $\begin{bmatrix} 5 & 8 \\ 1 & 2 \end{bmatrix}$ b) $\begin{bmatrix} 5 & 8 \\ 2 & 2 \end{bmatrix}$ c) $\begin{bmatrix} 2 & 4 \\ 1 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 5 & 8 \\ 2 & 3 \end{bmatrix}$

14. If $A = \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then $adj\,(A) =$

a) $\begin{bmatrix} -\cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$ b) $\begin{bmatrix} \cos\theta & \sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$ c) $\begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ -\sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$ d) $\begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$

15. If $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & a & 1 \end{bmatrix}$ and $A^{-1} = \frac{1}{2}\begin{bmatrix} 1 & -1 & 1 \\ -8 & 6 & 2c \\ 5 & -3 & 1 \end{bmatrix}$, then values of a and c are respectively.

a) $\frac{1}{2}, \frac{1}{2}$ b) $-1, 1$ c) $2, -\frac{1}{2}$ d) $1, -1$

16. If $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$ then $A^{-1} =$

a) $\frac{1}{2}\begin{bmatrix} 0 & 1 & 2 \\ 3 & 2 & 1 \\ 4 & 2 & 3 \end{bmatrix}$ b) $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \\ -4 & 3 & -1 \\ \frac{5}{2} & -\frac{3}{2} & \frac{1}{2} \end{bmatrix}$ c) $\begin{bmatrix} \frac{1}{2} & -1 & \frac{5}{2} \\ 1 & -6 & 3 \\ -1 & 2 & -1 \end{bmatrix}$ d) $\begin{bmatrix} 1 & -1 & -1 \\ -8 & 6 & -2 \\ 5 & -3 & 1 \end{bmatrix}$

17. The sum of three numbers is 6. Thrice the third number when added to the first number gives 7. On adding three times first number to the sum of second number and third number we get 12. The product of these numbers is

a) 20 b) 3 c) $\frac{20}{3}$ d) $\frac{5}{3}$

18. If $A = \begin{bmatrix} 1 & 2 & 1 \\ -1 & 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ -3 & 1 \\ 0 & 2 \end{bmatrix}$ then $(AB)^{-1} =$

a) $\begin{bmatrix} 5 & -6 \\ -4 & 5 \end{bmatrix}$ b) $\begin{bmatrix} 5 & 6 \\ 4 & 5 \end{bmatrix}$ c) $\begin{bmatrix} -5 & 6 \\ -4 & 5 \end{bmatrix}$ d) $\begin{bmatrix} -5 & -6 \\ -4 & -5 \end{bmatrix}$

19. If $A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 1 & 2 \\ 1 & 2 & 4 \end{bmatrix}$ then $A\,(adj\,(A)) =$

a) $\begin{bmatrix} -\frac{1}{3} & 0 & 0 \\ 0 & -\frac{1}{3} & 0 \\ 0 & 0 & -\frac{1}{3} \end{bmatrix}$ b) $\begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 2 & 3 \\ -1 & 1 & 2 \\ 1 & 2 & 4 \end{bmatrix}$ d) $\begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & 2 \\ \dots \end{bmatrix}$

20. If $A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 1 & 2 \\ 1 & 2 & 4 \end{bmatrix}$ and $A\,(adj\,A) = KI$, then the value of $(K+1)^4$ is

a) 256 b) 81 c) 16 d) 625

[MHT-CET 2020] (online shift)
(Selected Question)

21. If $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ such that $A^2 - 4A + 3I = 0$ then $A^{-1} =$

a) $-\frac{1}{3}\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ b) $\frac{1}{3}\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ c) $\frac{1}{3}\begin{bmatrix} -2 & -1 \\ 1 & -2 \end{bmatrix}$ d) $-\frac{1}{3}\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$

22. If ω is a complex cube root of unity and $A = \begin{bmatrix} \omega & 0 \\ 0 & \omega \end{bmatrix}$, then $A^{-1} = \ldots\ldots$

a) $-A$ b) $2A$ c) A^2 d) A

23. If $A = \begin{bmatrix} 2 & -3 \\ 5 & -7 \end{bmatrix}$ then $2A - 3A^{-1} =$

a) $\begin{bmatrix} 25 & 25 \\ -15 & -20 \end{bmatrix}$ b) $\begin{bmatrix} 25 & 15 \\ 25 & 20 \end{bmatrix}$ c) $\begin{bmatrix} 25 & -25 \\ -15 & -20 \end{bmatrix}$ d) $\begin{bmatrix} 25 & -15 \\ 25 & -20 \end{bmatrix}$

24. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and x is a 2×2 matrix such that $Ax = I$ then $x =$

a) $\begin{bmatrix} -2 & 1 \\ 3/2 & 1/2 \end{bmatrix}$ b) $\begin{bmatrix} -2 & 1 \\ 3/2 & -1/2 \end{bmatrix}$ c) $\begin{bmatrix} 2 & 1 \\ 3/2 & -1/2 \end{bmatrix}$ d) $\begin{bmatrix} -2 & 1 \\ -3/2 & -1/2 \end{bmatrix}$

25. If $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ -\sin\theta & -\cos\theta \end{bmatrix}$ then $A^{-1} =$

a) $\begin{bmatrix} -\cos\theta & \sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ b) $\begin{bmatrix} -\sin\theta & -\cos\theta \\ -\cos\theta & \sin\theta \end{bmatrix}$ c) $\begin{bmatrix} \sin\theta & -\cos\theta \\ \cos\theta & -\sin\theta \end{bmatrix}$ d) $\begin{bmatrix} \cos\theta & -\sin\theta \\ -\sin\theta & -\cos\theta \end{bmatrix}$

26. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -3 \\ -1 & 2 \end{bmatrix}$ then $(B^{-1}A^{-1})^{-1} =$

a) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ c) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ d) $\begin{bmatrix} 2 & 3 \\ 1 & -2 \end{bmatrix}$

27. The value of x such that the matrix $\begin{bmatrix} x & 2 & 3 \\ 4 & 5 & 6 \\ 2 & 3 & 5 \end{bmatrix}$ is not invertible is

a) $7/10$ b) $10/7$ c) $-7/10$ d) $-10/7$

28. The sum of the cofactors of the elements of second row of the matrix $\begin{bmatrix} 1 & 3 & 2 \\ -2 & 0 & 1 \\ 5 & 2 & 1 \end{bmatrix}$ is

a) 23 b) 5 c) 3 d) – 23

29. The matrix $A = \begin{bmatrix} a & -1 & 4 \\ -3 & 0 & 1 \\ -1 & 1 & 2 \end{bmatrix}$ is not invertible if and only if $a =$ ......

a) – 16 b) 16 c) 17 d) – 17

30. If $A = \begin{bmatrix} 1 & 2 \\ -5 & 1 \end{bmatrix}$ and $A^{-1} = xA + yI$, where I is unit matrix of order 2, then the values of x and y are respectively.

a) $\frac{1}{11}, \frac{-2}{11}$ b) $\frac{1}{11}, \frac{2}{11}$ c) $\frac{-1}{11}, \frac{2}{11}$ d) $\frac{-1}{11}, \frac{-2}{11}$

[MHT-CET 2019]

31. If A is non – singular matrix such that $(A - 2I)(A - 4I) = 0$ then $A + 8A^{-1} =$ .....

a) 6 I b) 0 c) 3 I d) I

32. If $A = \begin{bmatrix} x & 1 \\ 1 & 0 \end{bmatrix}$ and $A = A^{-1}$, then $x =$

a) 2 b) 1 c) 4 d) 0

33. If $A = \begin{bmatrix} 1+2i & i \\ -i & 1-2i \end{bmatrix}$ where $i = \sqrt{-1}$ then $A\,(adj\,A) =$

a) – 2I b) 2I c) 4I d) 5I

34. If A is non–singular matrix and $(A + I)(A - I) = 0$, then $A + A^{-1} =$

a) I b) 2A c) 0 d) 3I

35. A and B are square matrices of order 3 such that $|A| = 2$, $|B| = 4$ then $|A(\text{adj})(B)| =$ ....

a) 32 b) 64 c) 8 d) 16

36. If ω is a complex cube root of unity and $A = \begin{bmatrix} \omega & 0 & 0 \\ 0 & \omega^2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then $A^{-1} =$ ......

a) $\begin{bmatrix} 0 & 0 & \omega \\ 0 & \omega^2 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & \omega^2 & 0 \\ 0 & 0 & \omega \end{bmatrix}$ d) $\begin{bmatrix} \omega^2 & 0 & 0 \\ 0 & \omega & 0 \\ 0 & 0 & 1 \end{bmatrix}$

37. If $A = \begin{bmatrix} 4 & 3 & 2 \\ -1 & 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ -1 & 0 \\ 1 & -2 \end{bmatrix}$ then $(AB)^{-1} =$ ....

a) $\frac{1}{6}\begin{bmatrix} -2 & -4 \\ 3 & 3 \end{bmatrix}$ b) $\frac{1}{6}\begin{bmatrix} 2 & 4 \\ 3 & 3 \end{bmatrix}$ c) $\frac{1}{6}\begin{bmatrix} -2 & 4 \\ 3 & -3 \end{bmatrix}$ d) $\frac{1}{6}\begin{bmatrix} 2 & -4 \\ -3 & 3 \end{bmatrix}$

102. Let $F(\alpha)=\begin{bmatrix}\cos\alpha & -\sin\alpha & 0\\ \sin\alpha & \cos\alpha & 0\\ 0 & 0 & 1\end{bmatrix}, G(\beta)=\begin{bmatrix}\cos\beta & 0 & \sin\beta\\ 0 & 1 & 0\\ -\sin\beta & 0 & \cos\beta\end{bmatrix}$, then $(F(\alpha)G(\beta))^{-1}=$

a) $F(\alpha)-G(\beta)$
b) $-F(\alpha)-G(\beta)$
c) $(F(\alpha))^{-1}(G(\beta))^{-1}$
d) $(G(\beta))^{-1}(F(\alpha))^{-1}$

103. If $A=\begin{bmatrix}1 & 1 & 1\\ 0 & 1 & 3\\ 1 & -2 & 1\end{bmatrix}, B=\begin{bmatrix}6\\ 11\\ 0\end{bmatrix}, X=\begin{bmatrix}x\\ y\\ z\end{bmatrix}$ and $AX=B$, then $2x+y+2z=$

a) 6
b) 8
c) 10
d) 12

[MHT-CET 2024]

104. For any square matrix A, AA^T is a

a) unit matrix
b) diagonal matrix
c) symmetric matrix
d) skew-symmetric matrix

105. If $M=\begin{bmatrix}1 & 1 & 1\\ 1 & 1 & 1\\ 1 & 1 & 1\end{bmatrix}$, then $M^{50}=$

a) -1
b) 0
c) 1
d) $3^{49}M$

106. For the matrix $A=\begin{bmatrix}2 & 0 & -1\\ 3 & 1 & 2\\ -1 & 1 & 2\end{bmatrix}$, the matrix of cofactors is

a) $\begin{bmatrix}0 & -8 & 4\\ -1 & 3 & 2\\ -1 & -7 & 2\end{bmatrix}$
b) $\begin{bmatrix}0 & 8 & -4\\ 1 & -3 & 2\\ -1 & 7 & -2\end{bmatrix}$
c) $\begin{bmatrix}0 & -8 & 4\\ -1 & 3 & -2\\ 1 & -7 & 2\end{bmatrix}$
d) $\begin{bmatrix}0 & 8 & -4\\ -1 & 3 & 2\\ -1 & -7 & 2\end{bmatrix}$

107. If $A=\begin{bmatrix}0 & 1 & 2\\ 1 & 2 & 3\\ 3 & a & 1\end{bmatrix}$ and $A^{-1}=-\frac{1}{2}\begin{bmatrix}-1 & 1 & -1\\ 8 & -6 & -2k\\ -5 & 3 & -1\end{bmatrix}$, then

a) $a=-1, k=1$
b) $a=1, k=-1$
c) $a=2, k=-\frac{1}{2}$
d) $a=\frac{1}{2}, k=\frac{1}{2}$

108. If $A=\begin{bmatrix}1 & -1 & 1\\ 2 & 1 & -3\\ 1 & 1 & 1\end{bmatrix}, 10B=\begin{bmatrix}4 & 2 & 2\\ -5 & 0 & \alpha\\ 1 & -2 & 3\end{bmatrix}$ and B is the inverse of matrix A, then $\alpha=$

a) -2
b) -1
c) 2
d) 5

109. If A is a square matrix of order 3 such that A^{-1} exists, then $|\text{adj } A|=$

a) $|A|$
b) $|A|^2$
c) $|A|^3$
d) $|A|^4$

110. If A is a unit matrix of order n, then A (adj A) is

a) row matrix
b) zero matrix
c) unit matrix
d) not unit matrix

143. If $A = \begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$, then $A^T A^{-1} =$

a) $\begin{bmatrix} \cos 2x & -\sin 2x \\ -\sin 2x & \cos 2x \end{bmatrix}$ b) $\begin{bmatrix} \cos 2x & \sin 2x \\ -\sin 2x & \cos 2x \end{bmatrix}$ c) $\begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}$ d) $\begin{bmatrix} -\cos 2x & \sin 2x \\ -\sin 2x & \cos 2x \end{bmatrix}$

144. If $A = \begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$ and $A^{-1} = xI + yA$, where $x, y \in R$ and I is unit matrix of order 2, then $4(x+y) =$

a) $\frac{8}{3}$ b) $\frac{2}{3}$ c) $\frac{10}{3}$ d) $\frac{1}{3}$

145. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, then $A^{-1} =$

a) A b) A^2 c) A^3 d) A^4

146. If $A = \frac{1}{11}\begin{bmatrix} -1 & 7 & -24 \\ 2 & a & 4 \\ 2 & -3 & 15 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 3 & 3 & 4 \\ 2 & -3 & 4 \\ b & -1 & c \end{bmatrix}$, then the values of a, b, c respectively are

a) 3, 1, 0 b) $-3, 0, 1$ c) $-\frac{6}{11}, 0, \frac{1}{11}$ d) $-\frac{3}{11}, 0, \frac{1}{11}$

147. If $A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 4 \\ 1 & 3 & 4 \end{bmatrix}$, $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$, $B = \begin{bmatrix} 12 \\ 15 \\ 13 \end{bmatrix}$ and $AX = B$, then $x^2 + y^2 + z^2 =$

a) 6 b) 14 c) 19 d) 21

148. Let A and B are non-singular commutative matrices. Then $A((\text{adj } A^{-1})(\text{adj } B^{-1}))^{-1} B$ is equal to **[JEE Main 2025]**

a) $|A||B| I_n$ b) $\frac{I_n}{|A||B|}$ c) $\frac{I_n}{|A|}$ d) $\frac{I_n}{|B|}$

149. Consider the matrix $P = \begin{pmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}$. Let the transpose of a matrix X be denoted by X^T. Then the number of 3×3 invertible matrices Q with integers entries, such that $Q^{-1} = Q^T$ and $PQ = QP$, is **[JEE Advance 2025]**

a) 32 b) 8 c) 16 d) 24

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