Unit-1

Question Bank Answers

Ans 1 $A^{-1} = \begin{bmatrix} 1 & -1 & 0 \\ -2 & 3 & -4 \\ -2 & 3 & -3 \end{bmatrix}$

2) $A^{-1} = \begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$

3. $\rho = 2$

4. $P = \begin{bmatrix} 1 & -1 & 0 \\ -2 & 3 & -4 \\ 0 & 0 & 1 \end{bmatrix}$, $Q = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & -1 & 1 \end{bmatrix}$

$A^{-1} = \begin{bmatrix} 1 & -1 & 0 \\ -2 & 3 & -4 \\ -2 & 3 & -3 \end{bmatrix}$

5. $\rho(A) = 3$ $\quad [I_3 : O_{3\times 1}]$

6. $\rho(A) = 3$ $\quad \begin{bmatrix} I_3 : O_{3\times 1} \\ O_{1\times 3} : O_{1\times 1} \end{bmatrix}$

7. $\rho(A) = 2$

8. $x=2, y=2, z=2$.

9. 1) No sol^n $d=3, \mu \neq 5/2$
2) unique $d \neq 3$, μ can take any value
3) Infinite $d=3, \mu=5/2$.

10. $x=k-2, y=8-2k, z=k$ k is arbitrary

11. $k=8$.

12. 1) ~~trivial~~ trivial $b \neq 8$
2) ~~non-trivial~~ non-trivial $b=8, x=k, y=-4k, z=k$
k is arbitrary.

13. $a=0, \pm\sqrt{2}$

14. $A^\theta = A$ $\quad B = iA$ $\quad \overline{B} = \overline{iA}$
$B^\theta = -B$ $\because \bar{i} = -i$

15. $A^\theta A = I$

16. $d^3 - 5d^2 + 8d - 4 = 0$ $\boxed{1, 2, 2}$
$d=1$ $X_1 = \begin{bmatrix} 1 \\ 1 \\ -1 \end{bmatrix}$ $\quad d=2$ $\begin{bmatrix} -2 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} \quad \end{bmatrix}$

17. 1, 1, 7 $\begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$

18. $d^3 - 5d^2 + 7d - 3 = 0$

$A^{-1} = \frac{1}{3} \begin{bmatrix} 2 & -1 & -1 \\ 0 & 3 & 0 \\ -1 & -1 & 2 \end{bmatrix}$

expression $= \begin{bmatrix} 8 & 5 & 5 \\ 0 & 3 & 0 \\ 5 & 5 & 8 \end{bmatrix}$

Q.19 Correct $A = \begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$

$d^3 - 7d^2 + 16d - 12 = 0$

$d = 2, 2, 3$

$d=3$, $X_1 = \begin{bmatrix} 1 \\ 1 \\ -2 \end{bmatrix}$ $\quad d=2$ $\begin{bmatrix} 5k \\ 2k \\ -5k \end{bmatrix}$

20. $d^3 - 3d^2 + (-7)d - 11 = 0$

$A^{-1} = \frac{1}{11} \begin{bmatrix} -2 & 5 & -1 \\ -1 & -3 & 5 \\ 7 & -1 & -2 \end{bmatrix}$