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Questions:

ANSWER ALL QUESTIONS

1. Suppose the inter-industry flow of the product of two industries are given as under.

Production sector	Consumption sector		Domestic demand	Total output
	X	Y		
X	30	40	50	120
Y	20	10	30	60

Determine the technology matrix and test Hawkin's -Simon conditions for the viability of the system. If the domestic demand changes to 80 and 40 units respectively, what should be the gross output of each sector in order to meet the new demands.

2. Solve by matrix inversion method : 2x - z = 0; 5x + y = 4; y + 3z = 5.

3. If $A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$ then, verify that $(AB)^{-1} = B^{-1}A^{-1}$

4. In an economy there are two industries P_1 and P_2 and the following table gives the supply and the demand position in crores of rupees.

Production sector	Consumption sector		Final demand	Gross output
	P_1	P_2		
P_1	10	25	15	50
P_2	20	30	10	60

Determine the outputs when the final demand changes to 35 for P_1 and 42 for P_2.

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5. Solve: $\begin{vmatrix} 7 & 4 & 11 \\ -3 & 5 & x \\ -x & 3 & 1 \end{vmatrix} = 0$

6. Solve by matrix inversion method: 2x + 3y - 5 = 0, x - 2y + 1 = 0.

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

8. The following inter – industry transactions table was constructed for an economy of the year 2016

Industry	1	2	Final consumption	Total output
1	500	1,600	400	2,500
2	1,750	1,600	4,650	8,000
Labours	250	4,800	-	-

Construct technology co-efficient matrix showing direct requirements. Does a solution exist for this system.

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9. The technology matrix of an economic system of two industries is $\begin{bmatrix} 0.50 & 0.30 \\ 0.41 & 0.33 \end{bmatrix}$. Test whether the system is viable as per Hawkins Simon conditions.

10. Find the inverse of each of the following matrices. $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$

11. Evaluate: $\begin{vmatrix} 1 & 2 & 4 \\ -1 & 3 & 0 \\ 4 & 1 & 0 \end{vmatrix}$

12. Solve $\begin{vmatrix} x-1 & x & x-2 \\ 0 & x-2 & x-3 \\ 0 & 0 & x-3 \end{vmatrix} = 0$

Multiple Choice Question

13. The value of x if $\begin{vmatrix} 0 & 1 & 0 \\ x & 2 & x \\ 1 & 3 & x \end{vmatrix} = 0$ is_____.

(a) 0, - 1 (b) 0, 1 (c) - 1, 1 (d) - 1, - 1

14. The co-factor of -7 in the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$ is_____.

(a) -18 (b) 18 (c) -7 (d) 7

15. If A is square matrix of order 3, then |kA| is_____.

(a) k|A| (b) -k|A| (c) $k^3|A|$ (d) $-k^3|A|$

16. If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ such that ad - bc $\neq 0$ then A^{-1} is _____.

(a) $\frac{1}{ad-bc}\begin{pmatrix} d & b \\ -c & a \end{pmatrix}$ (b) $\frac{1}{ad-bc}\begin{pmatrix} d & b \\ c & a \end{pmatrix}$ (c) $\frac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$ (d) $\frac{1}{ad-bc}\begin{pmatrix} d & -b \\ c & a \end{pmatrix}$

17. Which of the following matrix has no inverse.

(a) $\begin{pmatrix} -1 & 1 \\ 1 & -4 \end{pmatrix}$ (b) $\begin{pmatrix} 2 & -1 \\ -4 & 2 \end{pmatrix}$ (c) $\begin{pmatrix} \cos a & \sin a \\ -\sin a & \cos a \end{pmatrix}$ (d) $\begin{pmatrix} \sin a & \cos a \\ -\cos a & \sin a \end{pmatrix}$

18. If $A = \begin{pmatrix} -1 & 2 \\ 1 & -4 \end{pmatrix}$ then A (adj A) is _____.

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

19. If A is an invertible matrix of order 2, then det (A^{-1}) be equal to _____.

(a) det (A) (b) $\frac{1}{det(A)}$ (c) 1 (d) 0

20. If A = $\begin{vmatrix} cos\theta & sin\theta \\ -sin\theta & cons\theta \end{vmatrix}$, then |2A| is equal to _____.

(a) 4 cos 2 θ (b) 4 (c) 2 (d) 1

21. If $\begin{vmatrix} 4 & 3 \\ 3 & 1 \end{vmatrix} = -5$ then value of $\begin{vmatrix} 20 & 15 \\ 15 & 5 \end{vmatrix}$ is _____.

(a) -5 (b) -125 (c) -25 (d) 0

22. If A is a scalar matrix with scalar k $\neq$ 0, of order 3, then A^{-1} is_____

(a) $\frac{1}{k^2}I$ (b) $\frac{1}{k^3}I$ (c) $\frac{1}{k}I$ (d) KI

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