Applications of matrices and determinants - Part IV

12th Standard

Business Maths

Reg.No. :

I.Answer all the questions.

II.Use Blue pen only.

Time : 01:20:00 Hrs

Total Marks : 110

Section-A

4 x 1 = 4

1) A system of linear homogeneous equations has at least

(a) one solution   (b) two solutions   (c) three solutions   (d) four solutions

2) The equations AX = B can be solved by Cramer's rule only when

(a) $|A| = 0$ (b) $|A| \neq 0$ (c) A=B   (d) A$\neq$B

3) The number of Hawkins - Simon conditions for the viability of an input - output model is

(a) 1   (b) 3   (c) 4   (d) 2

4) If $\quad A \quad B \quad$ is a transition probability matrix, then the value of x is

$$T = \begin{matrix} A \\ B \end{matrix} \begin{pmatrix} 0.7 & 0.3 \\ x & 0.8 \end{pmatrix}$$

(a) 0.3   (b) 0.2   (c) 0.3   (d) 0.7

Section-B

7 x 6 = 42

5) Find k if the equations $x + y + z = 1, 3x - y - z = 4, x + 5y + 5z = k$ are inconsistent.

6) Find the value of k for the equations $2x - 3y + z = 0, x + 2y - 3z = 0, 4x - y + kz = 0$ to have non trivial solutions.

7) Find k for which the equations $x + 2y + 3z = 0, 2x + 3y + 4z = 0$ and $7x + ky + 9z = 0$ have no non trivial solutions.

8) Solve by matrix method the equations $2x + 3y = 7, 2x + y = 5$

9) Solve by Cramer's rule the equations $6x - 7y = 16, 9x - 5y = 35$.

10) Solve by Cramer's rule : $x + y = 2, y + z = 6, z + x = 4$.

11) The technology matrix of an economic system of two industries is $\begin{pmatrix} \frac{1}{2} & \frac{1}{4} \\ \frac{2}{5} & \frac{2}{3} \end{pmatrix}$. Test whether the system is viable as per Hawkins Simon conditions.

Section-C

6 x 10 = 60

12) Solve the equations x+2y+5z=23, 3x+y+4z=26, 6x+y+7z=47 by determinant method.

13) A salesman has the following record of sales during three months for three items A,B and C which have different rates of commission.

Months	Sales of units			Total commission drawn (in Rs.)
	A	B	C	
January	90	100	20	800
February	130	50	40	900
March	60	100	30	850

Find out the rates of commission on the items A,B and C. Solve by Cramer's rule.

14) In an economy there are two industries P and Q and the following table gives the supply and demand positions in crores of rupees.

Producer	User		Final Demand	Total Output
	P	Q		
P	10	25	15	50
Q	20	30	10	60

Determine the outputs when the final demand changes to 35 for P and 42 for Q.

15) Two products A and B currently share the market with shares 60% and 40% each respectively. Each week some brand switching takes place. Of those who bought A the previous week, 70% buy it again whereas 30% switch over to B. Of those who bought B the previous week, 80% buy it again whereas 20% switch over to A. Find their shares after one week and after two weeks. If the price war continues, whend is the equilibrium reached?

16) A new transit system has just gone into operation in a city. Of those who use the transit system this year, 10% will switch over to using their own car next year and 90% will continue to use the transit system. Of those who use thier cars this year, 80% will continue to use their cars next year and 20% will switch over to the transit system. Suppose the population of the city remains constant and that 50% of the commuters use the transit system and 50% of the commuters use their own car this year, (i) what percent of commuters will be using the transit system after one year? (ii) what percent of commuters will be using the transit system in the long run?

17) Write the Adjoint of the matrix $A = \begin{pmatrix} 1 & -2 \\ 4 & 3 \end{pmatrix}$

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