Matrices and Determinant

Mock Test

Q1. It is necessary for an adult to consume 86 grams of proteins, 58 grams of fats and 66 grams of carbohydrates. There are three types A, B, C of food available, which may be mixed to get desired food values. The following table gives the food analysis for the three types of foods:

Types of Food	Food Value (grams)/100 grams		
	Protein	Fats	Carbohydrates
A	8	4	3
B	5	5	5
C	3	3	4

What quantities of three types of foods will just be sufficient to provide necessary food values?

Q2. A firm produces 3 products $P_1, P_2\ and\ P_3$ requiring the mix-up of three materials $M_1, M_2\ and\ M_3$. The per unit requirement of each product for each material is given below:

$$A = \begin{matrix} \\ P_1 \\ P_2 \\ P_3 \end{matrix} \begin{matrix} \begin{matrix} M_1 & M_2 & M_3 \end{matrix} \\ \begin{bmatrix} 2 & 3 & 1 \\ 3 & 1 & 1 \\ 1 & 4 & 2 \end{bmatrix} \end{matrix}$$

Using Matrix method, find production of each product if firm has 850, 1250 and 650 units of three materials respectively. Also find per unit cost of each product, if cost per unit of three materials are Rs 5, Rs 10, Rs 12 per unit respectively.

Q3. A firm owns two machines M_1 and M_2 costing Rs 45000 and Rs 30000. Both machines have a life of 5 years with zero scrap value. Compute depreciation both machines for each year using matrix notation:

(1) Both are depreciated by sum of the years digit method;
(2) Both are depreciated by straight line method;
(3) If first machine is depreciated by sum of the years digit method and second by straight line method.

Q4. (a) Reena, Meena and Deepa buy juice, sandwiches and sweets. Reena buys 10 bottles of juice, 5 sandwiches and 8 pieces of sweets. Meena buys 4, 6 and 10 pieces; While Deepa buys 6, 7 and 9 pieces of each respectively. If a bottle of juice costs Rs 5, a piece of sandwich costs Rs 10 and that of sweet costs Rs 15; find the money spent by each of them on them on the purchase of three items using matrix algebra.

(b) An automobile company has two manufacturing plants located at Delhi and Pune. It manufactures scooters (S) and (M) at each plant. Each vehicle is produced in three modals A, B and C. The following two matrices give the number of vehicles (in thousands) of each model produced in the two plants during 1997.

(1) Write a matrix showing the total production for both plants in 1997.

(2) If the production is increased by 20% in Delhi plant and 10% in Pune plants, write the matrix for total production for the following year.