Note :1) All questions are compulsory and carry equal marks.

2) Use of simple calculator is allowed.

3) Figures to right indicate full marks of each sub question.

Q. 1 A) Solve the linear programming problem graphically 7

Maximize $Z = 20x + 25y$ subject to

$2x + 3y \leq 36$, $2x + y \leq 10$, $x \geq 0$, $y \geq 0$

B) If 18 chocolate cost ₹342, how much would 23 chocolates cost? 4

C) An agent charged 8% commission on sales and thus earned ₹3708. Find the value of his sales. 4

OR

P) Solve the linear programming problem graphically 7

Minimize $Z = 90x + 100y$ Subject to

$3x + y \geq 30$, $x + 2y \geq 30$, $x \geq 0$, $y \geq 0$

Q) Anita, Sunita and Binita started a business investing capitals of ₹64,000, ₹48,000 and ₹80,000 respectively At the end of the year the profit was ₹63000 which was distributed among them in proportion to their capitals. What was each partner's share of profit? 4

R) A cupboard was sold for ₹7906 at 18% profit. What was the cost price of cupboard? 4

Q. 2 A) Define the terms. 10

1) Identity matrix 2) annuity 3) Simple Interest

4) Column matrix 5) Principal

B) Fill in the blanks 5

1) A matrix having all its elements as zero is called _____

2) When two metrices have the same number of rows as well as the same number of columns, they are called _____

3) The total _____ is given by addition of principal and interest

4) If all the payments are equal then the annuity is called _____

5) A _____ is an array of $n^2 = n \times n$ numbers arranged in n rows an n columns written between two vertical straight lines

Q. 3 **A)** Find the inverse using reduction method for the following equations simultaneou

$x + y + z = 2,\ -8x - y + 2z = -1$ $\qquad 3x + 2y + 2z = 3$

B) If $A = \begin{bmatrix} 2 & -1 & 3 \\ 4 & 2 & 0 \\ -2 & 7 & 3 \end{bmatrix}, B = \begin{bmatrix} 6 & -2 & 7 \\ 8 & 0 & 9 \\ 3 & 1 & -5 \end{bmatrix}$

Find the matrix X such that $2A + 3x = 5B$

C) If $A = \begin{bmatrix} 6 & -3 \\ 4 & 8 \end{bmatrix}, B = \begin{bmatrix} -3 & 6 \\ -8 & 4 \end{bmatrix}$ find $A \times B - B \times A$

OR

P) Find the inverse using adjoint metho

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

Q) $A = \begin{bmatrix} 1 & 3 \\ 4 & 1 \\ -1 & 2 \end{bmatrix} B = \begin{bmatrix} 2 & 1 \\ -1 & 3 \\ 4 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} 0 & 2 \\ 1 & -3 \\ 7 & 2 \end{bmatrix}$ Then verify that $B - (A - C) = (B - A) +$

R) If $A = \begin{bmatrix} 1 & -1 \\ -2 & 2 \end{bmatrix}$ find $A^2 - 3A$

Q. 4 **A)** A loan of ₹1,00,000 is to be returned in 4 equal monthly instalments at 12% p.a.

i) Calculate the EMI using reducing balance method.

ii) Find the interest and principal repayment break-up of EMI for each month

OR

P) For the following data find NPV with $i_1 = 10\%$ and $i_2 = 15\%$ as the interest rate per and interpolate ϕ the IRR if cost of capital is 14%, would you accept the project or r

Year	0	1	2	3	4	5
Cash flow (Rs)	-70000	10000	15000	20000	30000	350

Q) Find the simple interest on ₹15000 for 6 months at 10% p.a.

R) In how many years will ₹8,20,000 amount to ₹9,76,633.12 at 6% p.a. compound int

Q. 5 **A)** The following table gives the repairs and maintenance cost incurred in a cost centr various levels of annual production

Output (000) units	1	2	3	4	5	6	7
Repair & maintenance cost (000 ₹)	15	21	26	32	36	40	44

Find the repair and maintenance cost for output 9000 units.

B) What are the problems in estimating the GDP of India. 4

C) What are type I and type II errors? 4

OR

P) Purchasing department estimated annual consumption of 10,000 units with fixed cost per order being ₹100 carrrying cost was 15% of inventary value and the purchase cost per unit was ₹2 calculate. Economic order quantity and the number of orders per year. 5

Q) Explain the terms Null hypothesis and Alternate hypothesis 5

R) Write a note on External Debt and Debt service ratio. 5

— The End —