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Assignment :- 1

Linear programing

1) a) $P(C,M) = 32C + 24M$

P = Total profit as a function

C = No of Collegiate

M = No. of Minis

b) Objective function:

Maximize profit

$P(C,M) = 32C + 24M$

c) Constraints:

$3C + 2M \leq 5000$

$\frac{3}{4}C + \frac{2}{3}M \leq 1400$

Non-negativity

$P \geq 0$

$C \geq 0$

$M \geq 0$

$0 \leq C \leq 1000$

$0 \leq M \leq 1200$

D) full Mathematical formulation:

Maximize profit $P(C,M) = 32C + 24M$

Constraints are $3C + 2M \leq 5000$

$\frac{3}{4}C + \frac{2}{3}M \leq 1400$

$0 \leq C \leq 1000$

$0 \leq M \leq 1200$

Non - Negativity

$P(c, m) \geq 0$

$C \geq 0$

$M \geq 0$

(2)

a) Decision Variables:

Let N_{ij} be no. of units of size

N = No of unit

i = No of plant (1, 2, 3)

j = holds the plant of small, medium, large

P = has to be maximised

objective function:-

$$P = 420(N_1L + N_2L + N_3L) + 360(N_1m + N_2m + N_3m) + 300(N_1S + N_2S + N_3S)$$

Constraints:-

$N_{1L} + N_{1m} + N_{1S} \leq 750 \rightarrow$ plant 1

$N_{2L} + N_{2m} + N_{2S} \leq 900 \rightarrow$ plant 2

$N_{3L} + N_{3m} + N_{3S} \leq 450 \rightarrow$ plant 3

Storage limit:- $20\ N_{1L} + 15 N_{1m} + 12 N_{1S} \leq 13000$

$20\ N_{2L} + 15 N_{2m} + 12\ N_{2S} \leq 12000$

$20\ N_{3L} + 15 N_{3m} + 12\ N_{3S} \leq 5000$

Sales force cost:-

$N_{1L} + N_{1m} + N_{1S} \leq 900$

$N_{2L} + N_{2m} + N_{2S} \leq 1200$

$N_{3L} + N_{3m} + N_{3S} \leq 750$

Percentage to avoiding layoff

$$= \frac{N_{1L} + N_{1m} + N_{1S}}{750} \times 100$$

$$= \frac{N_{2L} + N_{2m} + N_{2S}}{900} \times 100$$

$$= \frac{N_{3L} + N_{3m} + N_{3S}}{450} \times 100$$

objective function:-

$$P = 420 (N_{1L} + N_{2L} + N_{3L}) + 360 (N_{1m} + N_{2m} + N_{3m}) + 300 (N_{1S} + N_{2S} + N_{3S})$$

Constraints:-

non-Negativity

$N_{ij} \geq 0$

$P \geq 0$