

# Quantitative Management Modeling

## Assignment - 2

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1. a. Decision Variables :

$x =$  collegiate Backpack

$y =$  Mini Backpack

b. Objective functions :

$$\text{Max } (Z) = 32x + 24y$$

c. constraints

Material constraint

$$3x + 2y \leq 5000$$

Labour constraints

$$45x + 40y \leq 35 \times 40 \times 60$$

$$0 \leq x \leq 1000$$

$$0 \leq y \leq 1200$$

$$\text{D. } \text{Max } (Z) = 32x + 24y$$

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$$0 \leq x \leq 1000$$

$$0 \leq y \leq 1200$$

2 a) Decision variable

$x$  = Number of Large units

$y$  = Number of Medium units

$z$  = Number of Small units

b. Lp Model

Objective function.

$$\text{Max } Z = 420(x_1 + x_2 + x_3) + 360(y_1 + y_2 + y_3) + 300(z_1 + z_2 + z_3)$$

constraints

Capacity constraint

$$x_1 + y_1 + z_1 \leq 750$$

$$x_2 + y_2 + z_2 \leq 900$$

$$x_3 + y_3 + z_3 \leq 450$$

Storage constraint

$$20x_1 + 15y_1 + 12z_1 \leq 13000$$

$$20x_2 + 15y_2 + 15z_2 \leq 12000$$

$$20x_3 + 15y_3 + 15z_3 \leq 5000$$

Sale constraint

$$x_1 + x_2 + x_3 \leq 900$$

$$y_1 + y_2 + y_3 \leq 1200$$

$$z_1 + z_2 + z_3 \leq 750$$

constraint to avoid layoffs

$$\frac{x_1 + y_1 + z_1}{750} \times 100 = \frac{x_2 + y_2 + z_2}{900} \times 100$$

$$= \frac{x_3 + y_3 + z_3}{450} \times 100$$

$$\begin{array}{lll} x_1 \geq 0 & y_1 \geq 0 & z_1 \geq 0 \\ x_2 \geq 0 & y_2 \geq 0 & z_2 \geq 0 \\ x_3 \geq 0 & y_3 \geq 0 & z_3 \geq 0 \end{array}$$