**Assignment 2**

**Q1) Computer Staffing Centre**

1. **Assuming that there are full time workers in 3 shifts s1, s2, s3**

Number of full-time employees in 8am – 4 pm = s1

Number of full-time employees in 12pm -8pm =s2

Number of full-time employees in 4pm-12 am = s3

1. **Assuming the part time employees for the shifts are x1,x2,x3,x4**

Number of full-time employees in 8am-12 pm = x1

Number of full-time employees in 12pm-4pm = x2

Number of full-time employees in 4pm -8 = x3

Number of full-time employees in 8-12 am =x4

1. **Constraints:**

8-12 am >=4, i.e. s1+x1 >=4

12pm-4pm >=8, i.e. s1+s2+x2 >=8

4pm -8 >= 10, i.e. s2+s3+x3 >=8

8-12 am > =6, i.e. s3+x4 >=6

One full time should be there with part time during a shift

s1>=x1 for 1st shift

s1+s2 >=x2 for 2nd shift

s2+s3>= x3 for 3rd shift

s3>= x4 for 4th shift

Minimum number of employees required are = **28**

Time required to complete the work is 4, total number of fulltime = **28/4=7** and remaining **14** are parttime

Given Fulltime employees are paid 14 $/hr and for 8 hrs = **14 \* 8 = 112,**

Therefore 7 FT salary per head is = **112\*7 = 784**

Part time employees are paid 12 /h and for 4 hrs from the table = **12 \* 4 = 48**

For 14 parttime employees = **48 \* 14 = 672**

Therefore, minimum daily cost is = **784 + 672 = 1456**

**B ) If 1 hr break is provided**

If one hour break is provided, then full time employees will work for only 7 hrs

And the cost will be = **14\*8 = 98**, and for 7 employees = **98 \* 7 = 686**

Since part time employees does not have a break, their cost will remain at = **672**

Total minimum daily cost after providing 1 hrs break is **= 686 + 672 = 1358**

Minimum cost = **98 $.**

**Question 2 )**

C = number of collegiate bags

M =number of minis

**Maximize**

**Z = 32C +24M**

St

3C + 2M <= 5000, C <=1000, `M<=1200

45C + 40M <= 35\*60\*40 , 45C + 40M<=84000

C,M>=0

Diagram

Description automatically generated

Graphical representation

**Question 3)**

X =large, Y= Medium, Z = small

1. **Decision Variables**

Storage space for each size for X1 , Y1, Z1.

Production per day X2,Y2,Z2

Forecast of sales X3,Y3, Z3

Total 9 decision variables

1. **LP formulation.**

Max P = 420(X1+X2+X3) + 360 (Y1+Y2+Y3)+ 300(Z1+Z2+Z3)

St

X1+Y1+Z1 <=750

X2+Y2+Z2 <=900

X3+Y3+Z3 <=450

Productions :

20X1+15Y1+12Z1<=13000

20X2+15Y2+12Z2<=12000

20X3+15Y3+12Z3<=5000

Storage:

X1+X2+X3 <=900

Y1+Y2+Y3 <= 1200

Z1+Z2+Z3 <=7500

1/750(X1 +Y1+ Z1 ) – 1/900 (X2+Y2+Z2) = 0

1/750(X1 +Y1+ Z1 ) – 1/450(X3+Y3+Z3) = 0

**Therefore: X1, X2, X3 ,Y1, Y2, Y3, Z1, Z2, Z3 >= 0**

1. **R pdf file in git hub**