ASSINMENT

Problem 1: A construction company will replace an excavator after 5 years. A new one costs $250,000. How much is the end-of-year annual uniform payment the company has to put into a bank in order to save enough money in five years' time for purchasing the equipment if the bank is offering an interest rate of 4% per annum?

Solution 1:

For the solution of the above problem, inflation free assumption is made

Principal amount = S = $250,000 Number of periods = n = 5

Interest rate in % per period (nominal or apparent rate) = i = 4% = 0.04

Annual uniform payment = A =?

Fig. 1. – Sum of $ 250000 accumulated by five uniform periodic (annual) payments.

Formula Used:

S = A x [{(1+i)^n -1}/i]

A = S x [i/{(1+i)^n -1}]

250000 = A x [{(1+0.04)^5 – 1}/0.04]

250000 = A x [{1.21665 -1}/0.04]

250000 = A x [0.21665/0.04]

250000 = A x 5.4163

A = 250000/5.4163

A = 46156.78

A = $ 46157

Therefore Annual uniform payment is $ 46157.

Problem 2: A construction material company makes and sells window panels. The selling price per panel is $900. The variable cost for making the window panels is $500 per unit. The fixed cost is $8,000,000. Find the BEP (break-even point)?

Solution 2:

Selling Price per unit = p = $900
Variable cost per unit = v = $500
Fixed Cost = FC = $8,000,000
Break-even point = BEP =?
Number of units = x

Formulas Used:

TR = a + b + c + Profit
Total Cost (TC) = Variable Cost (VC) + Fixed Cost (FC)
Where as
TR = total revenue
a =Direct cost (material, labour, equipment, etc)
b = Cost of administering the company
c = Costs of marketing/advertisements
At break-even point (BEP)
TR = a + b + c
TR = TC
TR = px ……. (i)
TC =VC + FC
TC = vx + FC …… (ii)
So
Px =vx +FC
Hence, at BEP, x = FC/ (p – v)

Mathematical Presentation:

x = 8000000/ (900-500)
x = 8000000/400
x = 20000 units
Therefore Break-even point (BEP) = 20000 units
Let x = 18000, 20000 and 22000

The following table using different values of x, can be used to solve problem 2:

Cost-volume-profit analysis (or Break-even analysis				
Volume	x=18000	x=20000	x=22000	x=25000
Total Revenue	16200000	18000000	19800000	22500000
Variable Cost	9000000	10000000	11000000	12500000
Fixed Cost	8000000	8000000	8000000	8000000
Total Cost	17000000	18000000	19000000	20500000
Net Income	-800000	0	800000	2000000
	Loss	**BEP**	**Profit**	

From the above table, at x = 20000 the company's profit is zero that is the company is neither making profit nor loss. So x = 20000 is the break-even point (BEP) of the company. In order to make profit the company must have production volume greater than 20000 units. If the production volume is less than 20000 units then the company will be at loss.

If the maximum capacity of the company is assumed 25000 units then the company's maximum profit is $ 2,000,000.

BEP % = [BEP/Maximum Capacity] x 100
BEP % = (20000/25000) x 100
BEP % = 80%

Graphical presentation – Break-even chart:

The Break-even is a graphical presentation of TR, VC, FC and TC. The Fig.2 below shows the break-even chart of problem 2.

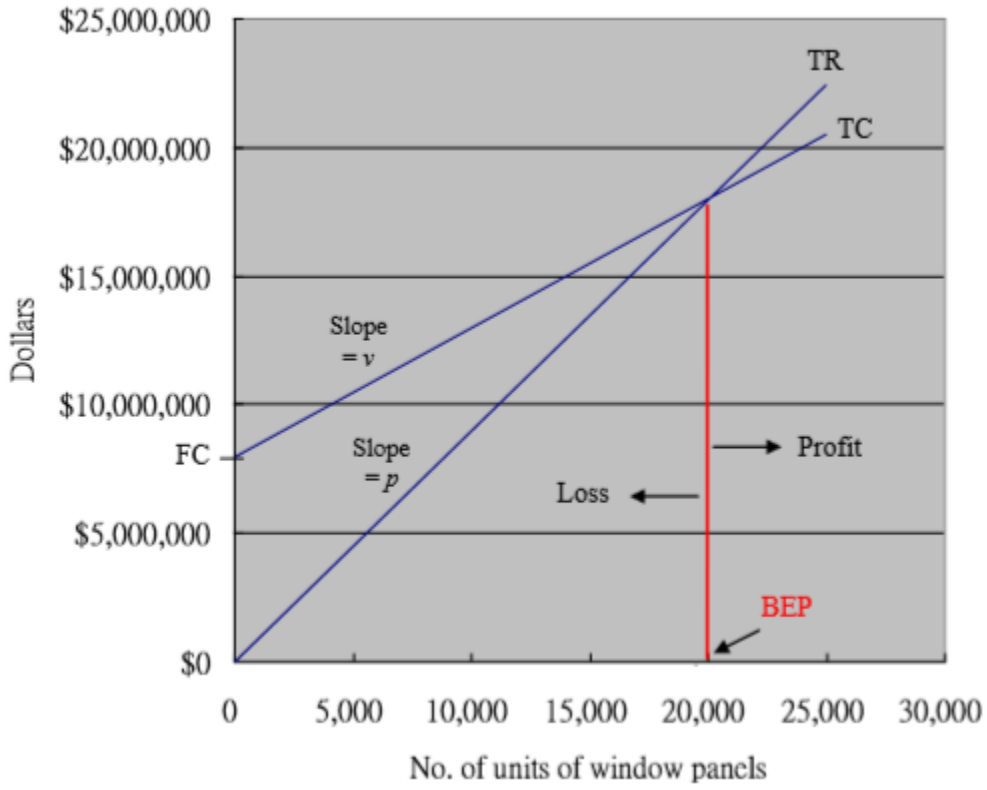

Fig. 2. - The break-even chart for problem 2.