Assignment

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:

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 =?
Inflation free assumption is made for the solution

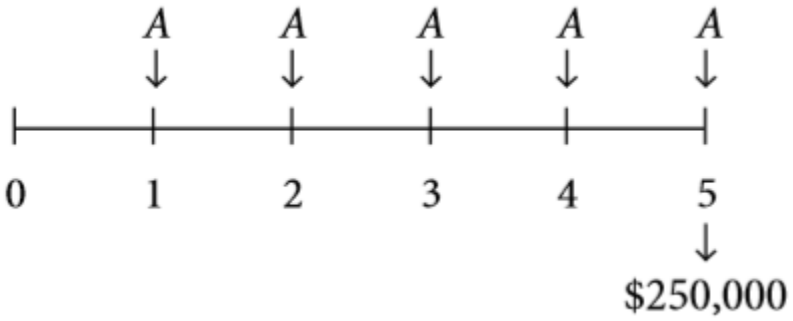

Fig. 1. – Sum of $ 250000 accumulated by five uniform periodic (annual) payments.

Using Formula:
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

Using Formula:
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 above problem can be solved using the following table:

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	

By putting different values of x, we observe that the break-even occurs when volume x is 20000 units. If the production of the company is less than 20000 units then the company is in loss and if production is greater than 20000 the company is making profit.

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.

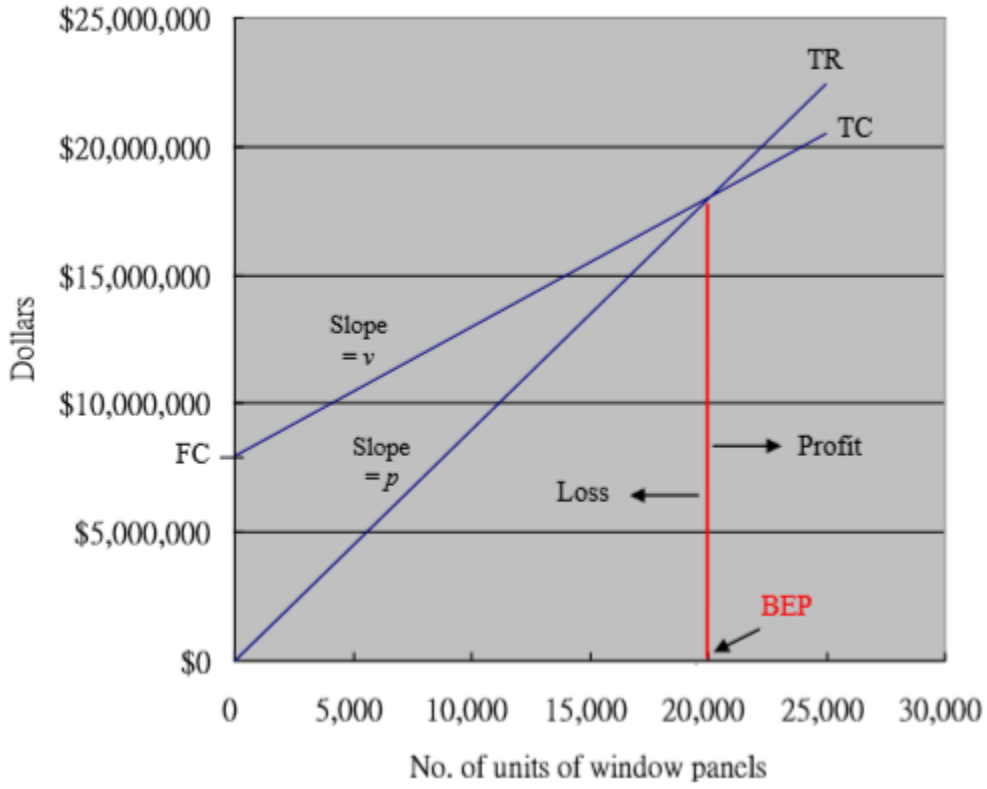

Fig. 2. - The break-even chart for problem 2.