

Name: KEY

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ISE 307, Term 153
ENGINEERING ECONOMIC ANALYSIS

Quiz# 5

Date: Sunday, August 28, 2016

Q1. Peabody Corporation has the following base-case estimates for its new small engine assembly project:

- Price per unit= \$450 increasing at a rate of 10%
- Variable costs = \$200 per unit increasing at a rate of 8%
- Fixed costs = \$1 million increasing by 100,000 each year
- Demand = 12,000 units per year decreasing at a 5% rate
- Capital investment = \$7 million at year 0
- Product life = 5 years
- Salvage value = \$2,000,000
- Depreciation method: Seven-year MACRS
- Tax rate= 35%
- MARR = 15%

a) Calculation the depreciation for each year over the product life, the book value at the end of year 5 and the Tax Gains or Losses.

$$D_1 = 7,000,000 * .1429 = 1,000,300; \quad D_2 = 7,000,000 * .2449 = 1,714,300$$

$$D_3 = 7,000,000 * .1749 = 1,224,300; \quad D_4 = 7,000,000 * .1249 = 874,300$$

$$D_5 = 7,000,000 * .0893 / 2 = 312,550$$

$$B_5 = 7,000,000 - (1,000,300 + 1,714,300 + 1,224,300 + 874,300 + 312,550) = \$1,874,250.$$

$$\text{Tax Gains (losses)} = 0.35 * (2,000,000 - 1,874,250) = \$44,013$$

Thus, there will be tax loss of \$44,013

b) Develop the project's cash flows over its project life.

c) Determine the net present worth (NPW) of the project at the company's MARR of 15%.
Is this project acceptable?

MACRS Depreciation Schedule with Half Year Convention for 7-Year MACRS property

1	2	3	4	5	6	7	8
14.29	24.49	17.49	12.49	8.93	8.92	8.93	4.46

Income Statement						
	0	1	2	3	4	5
Revenues						
Unit Price		\$450	\$495	\$545	\$599	\$659
Demand(Units)		12,000	11,400	10,830	10,289	9,774
Sales Revenue		\$5,400,000	\$5,643,000	\$5,896,935	\$6,162,297	\$6,439,600
Expenses						
Unit Variable Cost		\$200	\$216	\$233	\$252	\$272
Variable Cost		\$2,400,000	\$2,462,400	\$2,526,422	\$2,592,109	\$2,659,504
Fixed Cost		\$1,000,000	\$1,100,000	\$1,200,000	\$1,300,000	\$1,400,000
Depreciation		\$1,000,300	\$1,714,300	\$1,224,300	\$874,300	\$312,550
Taxable Income		\$999,700	\$366,300	\$946,213	\$1,395,888	\$2,067,546
Income Taxes (35%)		\$349,895	\$128,205	\$331,174	\$488,561	\$723,641
Net Income		\$649,805	\$238,095	\$615,038	\$907,327	\$1,343,905
Cash Flow Statement						
Operating Activities						
Net Income		\$649,805	\$238,095	\$615,038	\$907,327	\$1,343,905
Depreciation		1000300	1714300	1224300	874300	312550
Investment Activities						
Investment		(\$7,000,000)				
Salvage						\$2,000,000
Gains Tax						(\$44,012.50)
Net Cash Flow		(\$7,000,000)	\$1,650,105	\$1,952,395	\$1,839,338	\$3,612,443
PW(15%)		(\$64,767)				

Since $PW(15\%) = \$-64,767 < 0$, the project is not acceptable.