

**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= \$400 increasing at a rate of 10%
- Variable costs = \$150 per unit increasing at a rate of 8%
- Fixed costs = \$1 million increasing by 100,000 each year
- Demand = 10,000 units per year increasing at a 5% rate
- Capital investment = \$5 million at year 0
- Product life = 5 years
- Salvage value = \$1,000,000
- 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.

$$D_1 = 5,000,000 * .1429 = 714,500; \quad D_2 = 5,000,000 * .2449 = 1,224,500$$

$$D_3 = 5,000,000 * .1749 = 874,500; \quad D_4 = 5,000,000 * .1249 = 624,500$$

$$D_5 = 5,000,000 * .0893/2 = 223,250$$

$$B_5 = 5,000,000 - (714,500 + 1,224,500 + 874,500 + 624,500 + 223,250) = \$1,338,750.$$

$$\text{Tax Gains (losses)} = 0.35 * (1,000,000 - 1,338,750) = -\$118,563$$

Thus, there will be tax gain or credit of \$118,563

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

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<b>14.29</b>	<b>24.49</b>	<b>17.49</b>	<b>12.49</b>	<b>8.93</b>	<b>8.92</b>	<b>8.93</b>	<b>4.46</b>

Income Statement						
	0	1	2	3	4	5
<b>Revenues</b>						
Unit Price		\$400	\$440	\$484	\$532	\$586
Demand(Units)		10,000	10,500	11,025	11,576	12,155
Sales Revenue		\$4,000,000	\$4,620,000	\$5,336,100	\$6,163,196	\$7,118,491
<b>Expenses</b>						
Unit Variable Cost		\$150	\$162	\$175	\$189	\$204
Variable Cost		\$1,500,000	\$1,701,000	\$1,928,934	\$2,187,411	\$2,480,524
Fixed Cost		\$1,000,000	\$1,100,000	\$1,200,000	\$1,300,000	\$1,400,000
Depreciation		\$714,500	\$1,224,500	\$874,500	\$624,500	\$223,250
Taxable Income		\$785,500	\$594,500	\$1,332,666	\$2,051,284	\$3,014,717
Income Taxes (35%)		\$274,925	\$208,075	\$466,433	\$717,950	\$1,055,151
<b>Net Income</b>		<b>\$510,575</b>	<b>\$386,425</b>	<b>\$866,233</b>	<b>\$1,333,335</b>	<b>\$1,959,566</b>
<b>Cash Flow Statement</b>						
<b>Operating Activities</b>						
Net Income		\$510,575	\$386,425	\$866,233	\$1,333,335	\$1,959,566
Depreciation		714500	1224500	874500	624500	223250
<b>Investment Activities</b>						
Investment		(\$5,000,000)				
Salvage						\$1,000,000
Gains Tax						\$118,562.50
<b>Net Cash Flow</b>		<b>(\$5,000,000)</b>	<b>\$1,225,075</b>	<b>\$1,610,925</b>	<b>\$1,740,733</b>	<b>\$3,301,378</b>
<b>PW(15%)</b>		<b>\$1,188,700</b>				

Since  $PW(15\%) = \$1,188,700 > 0$ , the project is acceptable.