Name: KEY Id#

ISE 307, Term 153

ENGINEERING ECONOMIC ANALYSIS

Quiz# 5

Date: Sunday, August 28, 2016

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# **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 = l5%

1. 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.

D1 = 5,000,000\*.1429= 714,500; D2 = 5,000,000\*.2449= 1,224,500

D3 = 5,000,000\*.1749= 874,500; D4 = 5,000,000\*.1249= 624,500

D5 = 5,000,000\*.0893/2= 223,250

B5 = 5,000,000-(714,500+1,224,500+874,500+624,500+223,250)=$1,338,750.

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

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

1. Develop the project’s cash flows over its project life.
2. 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** |  | **$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** |
| **Expenses** |  |  |  |  |  |  |
| **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** |
|  |  |  |  |  |  |  |
| **Net Income** |  | **$510,575** | **$386,425** | **$866,233** | **$1,333,335** | **$1,959,566** |
|  |  |  |  |  |  |  |
| **Cash Flow Statement** |  |  |  |  |  |  |
| **Operating Activities** |  |  |  |  |  |  |
| **Net Income** |  | **$510,575** | **$386,425** | **$866,233** | **$1,333,335** | **$1,959,566** |
| **Depreciation** |  | **714500** | **1224500** | **874500** | **624500** | **223250** |
| **Investment Activities** |  |  |  |  |  |  |
| **Investment** | **($5,000,000)** |  |  |  |  |  |
| **Salvage** |  |  |  |  |  | **$1,000,000** |
| **Gains Tax** |  |  |  |  |  | **$118,562.50** |
|  |  |  |  |  |  |  |
| **Net Cash Flow** | **($5,000,000)** | **$1,225,075** | **$1,610,925** | **$1,740,733** | **$1,957,835** | **$3,301,378** |
| **PW(15%)** | **$1,188,700** |  |  |  |  |  |

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