Your name:

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LAURENTIAN UNIVERSITY
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Course and No.
Date .....April 15, 2013..... Course et no ... ..Engineering Economics – ENGR 3426..
Bharti School of Engineering

Total no. of pages
Nombre total de pages ...3..... Questions .....six (6).....

Professor
Professeur .....Vassilios Kazakidis..... Exam time allowed
Durée de l'examen.....3 hours.....

Other instructions
Autres directives

Clearly show you calculations

OPEN TEXTBOOK, Scientific Calculator, No other Notes

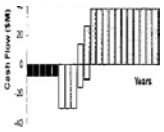
Note: Return this form along with your answers at the end of the exam period

The value of each section, out of 100%, is shown in brackets.

Question #1 (15%):

What is the *total after-tax annual* cost of a machine producing bolts in Canada with a first cost of the machine being $45,000 and operating and maintenance costs of $0.22 per bolt unit per day? It will be sold for $4,500 at the end of five years. Production volumes are 1000 units per day, 350 days per year. The CCA rate is 30%, the after-tax MARR is 20%, and the corporate income tax in 2013 is 40%. (Consider *the Canadian Taxation System for your calculations. Formulation of the CTF and CSF factors is provided in Chapter 8.8.3 and Example 8.7 of the textbook).*

Question #2 (20%):



An investment alternative in a project requires a capital cost of $100 million completed at time zero. The investment will produce a stream of revenue of $60 million per year over a 6-year period with operating costs of $20 millions per year. General inflation is 5% and the rate of taxation is 40%. Assume an individual project basis for taxation in which the capital expenditure can be fully depreciated over the duration of the project on a straight-line basis.

Calculate:

i) The annual after tax cash flows, in real/constant dollars, in a table after taking into account both taxation and inflation effects; *You do not need to calculate the PW values*

ii) The payback period – based on annual after tax cash flows of constant dollars.

Question #3 (20%):

A chemical plant is considering the replacement of a piece of equipment in its materials handling system with a new piece. If the company's cost of capital is 10%, should the present asset be kept for one more year or replaced? State your recommendation. {*TIP: calculate the EAC (Equivalent Annual Cost) to compare the options A and B using the basic discounted formulae*}. The following data are provided:

Present asset

OLD

- Recent salvage value: $10,000
- Economic life: 1 year
- Next year's operating and maintenance costs: $51,000
- Salvage value in one year: $5,000

Replacement alternative

NEW

- Capital cost: $200,000
- Economic life: 8 years
- Operating and maintenance costs:
  - Years 1-2: $15,000 per year
  - Years 3-4: $20,000 per year
  - Years 5-6: $25,000 per year
  - Years 7-8: $30,000 per year
- Salvage value in 8 years**: $25,000**

Note: all calculations are approximated to the nearest $100

Option A = keep the old piece of equipment for one more year before replacing

Option B = buy the new piece and sell the old piece of equipment

Question #4 (15%): A forecasted increase in metal prices has encouraged the Delta Resource Company to consider the expansion of the capacity in one of its open pit mine operations in Northern Ontario. For this purpose, the following after-tax cash flow estimates have been made:

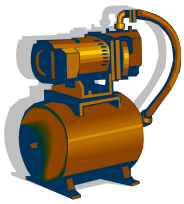
Existing capacity: positive after tax annual cash flows of $12.5 million over the remaining 10-year mine life.

Expanded capacity: $40 million capital expenditure now (time 0), followed by positive annual cash flows of $20 million over the remaining 8-year mine life.

(i) Determine the distribution of after-tax cash flows, as well as the rate of return associated with the considered incremental investment for expanding the production capacity.

(ii) If the company's cost of capital is 30% and it is considering selling the mine, what should its minimum acceptable selling price be? What capacity option did you choose (existing or expanded)? **Explain your answer**.

Question #5 (15%): Your company owns a compressor that cost $60 000 to purchase and $10 000 to install seven years ago. The market value now of the particular compressor is $33 000 and this will decline by 12% of current value each year for the next three years. Operating and maintenance costs are estimated to be $3400 this year, and are expected to increase by $500 per year. How much should the total EAC (Equivalent Annual Cost) of a *new compressor* be over its economic life to justify replacing the old one sometime in the *next three years*? The MARR is 10%.



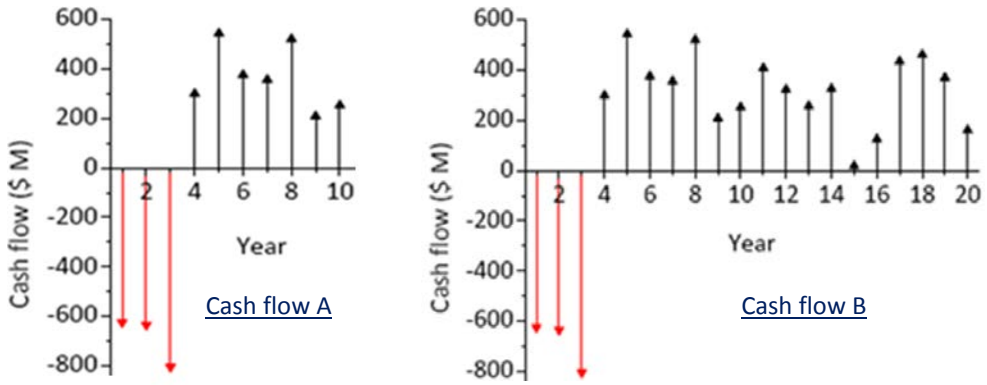
Question #6 (15%)

a) Cash flow comprehension

(i) Two *undiscounted* after tax cash flows, shown in diagrams A and B, have the same payback period of 9 years from time zero. Provide the reason for the same payback period

(ii) The *discounted* payback period would be more or less than 9 years? Explain your answer.

(ii) List three comparative discounted cash flow methods that can be used to evaluate the two cash flows.



(iv) What risk factors should be considered in the investment decision making for forecasting cash flows after the 10th year?

You do not need to do any calculations for this problem

b) Financial statements

(i) Describe the difference between the *balance sheet* and the *income statement* in the financial statements of companies.

(ii) Which of the following represents a *liability*: (a) inventory; (b) accounts receivable; (c) retained earnings; (d) accounts payable; (e) all of them.

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