ENGINEERING ECONOMICS
ECO 1192B

Second Mid-Term Examination (PE2)

C.Théoret **Winter 2011**

Please Note:

1. **You have 85 minutes (7 pm to 8:25 pm) to complete Partial Examination #2 which consists of 30 multiple choice questions.**
2. ***Questionnaires and answer sheets are colour coded. Ensure that your copies have matching colours.***
3. **All questions must be answered on the Scantron sheet.**
4. **Please indicate your name, student number and course number on the front of the Scantron sheet. Failure to provide this information could result in the cancellation of your examination.**
5. **Correct answers are worth one (1) point and incorrect answers zero (0).**
6. **You may keep the examination questionnaire.**
7. **You MUST show your University of Ottawa I.D. card as you hand-in the answer sheet AND sign the attendance sheet.**
8. **Thank you.**

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1. When the business requirements for a capital asset extend beyond the current asset's remaining service life, it is usually assumed that the business requirements will be met by
a) keeping the defender
b) switching from the defender to a challenger
c) answers a) or b)
d) answers a) and b)
e) None of these answers.

2. The half-year rule was introduced by the Canadian Government in 1981 to
a) provide businesses with incentives to purchase physical assets.
b) alleviate the income tax burden of businesses with significant income from operations.
c) decrease the loss of government income tax revenues arising from business purchases of physical assets.
d) None of the above answers.

3. The major reasons for replacing a physical asset include
   a) inflation, inadequacy, wear and tear
   b) deterioration, obsolescence and inadequacy.
   c) deterioration, sensitivity, inadequacy
   d) obsolescence, inadequacy and equity
   e) None of the above answers.

INFORMATION FOR QUESTIONS 4 TO 8

A firm is considering the purchase of a truck described as follows:

- Purchase price = $200,000 fully installed
- N = 3 years
- SV = $100,000 after 3 years
- Annual revenues from operations = $400,000
- Annual operating and maintenance costs = $200,000
- Depreciation method and rate: DB method (d=20%).
- Before-tax interest rate = 10%.
- After-tax interest rate = 5%.
- Income tax rate = 50%.
- The **half-year rule** applies

The firm gets a $100,000 loan (at a 10% rate of interest) which is repaid as follows:

End of year	Loan repaid
1	20%
2	30%
3	50%

180000

Item			End of Year Cash Flows	
	0	**1**	**2**	**3**
1. Before Tax Cash Flow	-200000	200	200	200
2. Annual Depreciation		**AA**	36000	**BB**
3. Interest Expense			**CC**	
4. Taxable Income				
5. Taxes Payable				
6. After Tax Cash Flow				
7. Interest Expense				
8. Loan Repayment			**DD**	
9. Cash Flow on Owner Equity	**EE**			

4. The dollar value of cell AA is
   a) $30,000
   b) $60,000
   c) $100,000
   d) None of the above answers

$AA = \frac{200000}{2} \times 0.2 = 20000$

5. The dollar value of cell BB is
   a) $30,000
   b) $54,000
   c) $43,200
   d) None of the above answers

6. The dollar value of cell CC is
   a) $10,000
   b) $8,000
   c) $5,000
   d) None of the above answers

7. The dollar value of cell DD is
   a) $20,000
   b) $30,000
   c) $50,000
   d) None of the above answers

8. The dollar value of cell EE is
   a) -$300,000
   b) -$200,000
   c) -$100,000
   d) None of the above answers

9. Which of the following statements is true?
   a) Smaller depreciation charges generate less taxable income, more taxes payable and less after-tax cash flows.
   b) Higher depreciation charges generate less taxable income, more taxes payable and more after-tax cash flows.
   c) Smaller depreciation charges generate more taxable income, more taxes payable and more after-tax cash flows.
   d) More depreciation charges generate less taxable income, less taxes payable and less after-tax cash flows.
   e) None of the above answers.

10. A project's recovery period is less than the industry standard based on the discounted payback method. This result means that the project's internal rate of return (IRR)
   a) must be larger than the MARR
   b) must be smaller than the MARR
   c) may be larger than, smaller than or equal to the MARR
   d) None of these answers.

11. A capital (physical) asset's annual accounting depreciation is defined as
   a) its purchase price minus its total depreciation
   b) its purchase price minus its book value
   c) its market value at the beginning of the year less its market value at the end of the year
   d) None of the above answers.

INFORMATION FOR QUESTIONS 12 TO 16

The Paragon Company purchased a new truck two years ago on January 1, 2009. Company officials were informed today (January 1, 2011) that new trucks are more fuel-efficient.
Defender and challenger details are given below. MARR = 10%.
Use the outsider perspective for questions 12, 13.
Use the insider perspective for questions 14 .

DETAILS	DEFENDER	CHALLENGER
Purchase price 2 years ago ($)	**200,000**	
Current Trade-in Value ($)	**100,000**	**300,000**
Economic Life (years)	**2 years from January 1, 2011**	**5**

Annual operating cost ($)	50,000 in year 2011 followed by an annual increase of 5,000	40,000 in year 2011 followed by annual increases of 10%
Salvage Value ($) on • January 1, 2012 • January 1, 2013	 • 50,000 • 0	 100,000 at any time.

12. Using the outsider perspective, the annual equivalent cost of the challenger during its economic life is
    a) 300,000(A/P,10%,5) + 100,000(A/F,10%,5) + [5(40,000)/(1+0.1)](A/P,10%,5)
    b) 300,000(A/P,10%,5) - 100,000(A/P,10%,5) + 5(40,000)(A/F,10%,5)
    c) 300,000(A/P,10%,5) - 100,000(A/F,10%,5) + [5(40,000)/(1+0.1)](A/P,10%,5)
    d) 300,000(A/P,10%,5) - 100,000(A/F,10%,5) + 5(40,000)/(1+0.1)
    e) None of these answers

13. Using the outsider perspective, the annual equivalent cost of keeping the defender two additional years beginning on January 1, 2011 is
    a) 200,000(A/P,10%,4) + 50,000 + 5,000
    b) 100,000(A/P,10%,2) + 50,000 - 5,000
    c) 200,000(A/P,10%,2) + 50,000 + 5,000(A/G,10%,2)
    d) 100,000(A/P,10%,2) + ~~50,000~~ + 5,000(A/G,10%,2)
    e) None of the above answers. ? trend fn ?

14. Using the insider perspective, the annual equivalent cost of keeping the defender from January 1, 2011 to January 1, 2013 (i.e., two more years) is
    a) 100,000(A/P,10%,2) + 50,000 + 5,000
    b) 200,000 + 5,000(A/G,10%,2)
    c) 100,000(A/P,10%,2) + 50,000 - 5,000
    d) 50,000 + 5,000(A/G,10%,2)
    e) None of the above answers

15. In switching decisions between defenders and challengers, the challenger's annual equivalent cost is always based on its physical life.
    a) True
    b) False

16. The economic life of a physical asset is defined as
    a) the period of time after which an asset can no longer be repaired or refurbished so that it can perform a useful function
    b) the period of time after which an asset cannot perform its intended function without a major overhaul)
    c) the period of time over which a prudent owner will retain an existing facility to minimise costs.
    d) the length of time an asset might reasonably be expected to be useful in the production of income.

17. The two major perspectives on the replacement of physical assets are
a) Insider and cash flow
b) Insider and owner
c) Insider and consultant
d) Outsider and consultant

INFORMATION FOR QUESTIONS 18 to 22

Speedo Company Balance Sheet
at December 31, 2010

ASSETS	
Current Assets	
Cash	**120,000**
Accounts Receivable	**80,000**
Raw Materials Inventory	**40,000**
Finished Goods Inventory	**30,000**
Total Current Assets	**270,000**
Long Term Assets	
Equipment	**500,000**
Accumulated depreciation	**300,000**
Buildings	**200,000**
Accumulated depreciation	**100,000**
Land	**500,000**
Total Long Term Assets	**800,000**
TOTAL ASSETS	**1,070,000**
LIABILITIES AND OWNERS' EQUITY	

INFORMATION FOR QUESTIONS 18 to 22

Speedo Company Balance Sheet at December 31, 2010	
Current Liabilities	
Accounts Payable	**100,000**
Loan due in six (6) months	**100,000**
Total Current Liabilities	200,000
Long Term Liabilities	
Loan due in ten (10) years	**600,000**
TOTAL LIABILITIES	**800,000**
Common Stock: $10 per share	**100,000**
Retained Earnings	**170,000**
Total Owners' Equity	**270,000**
TOTAL LIABILITIES & OWNERS' EQUITY	**1,070,000**

Speedo Company Income and Expense Statement **January 1 to December 31, 2010**	
NET REVENUES	
Sales	500,000
Cost of Goods Sold	200,000
Net revenues	300,000

Speedo Company Income and Expense Statement **January 1 to December 31, 2010**	
EXPENSES	
Operating Expenses	120,000
Building Depreciation Expense	10,000
Equipment Depreciation Expense	10,000
Interest Expense	10,000
Selling Expenses	25,000
Total Expenses (excluding "Cost of Goods Sold")	175,000
PROFIT BEFORE TAXES	125,000
Income Taxes **@40%** of Profit Before Taxes	50,000
PROFIT AFTER TAXES	**75,000**

18. The quick-asset or acid-test (rounded up to 2 decimals) for the Speedo Company on December 31, 2010 was
   a) 1.00
   b) 1.10
   c) 1.45
   d) 1.85
   e) None of the above answers.

$\frac{quick}{l\,tch}$

19. The ownership or equity percentage (rounded up to 1 decimal) for the Speedo Company on December 31, 2010 was
   a) 74.8%
   b) 25.2%
   c) 38.1%
   d) None of the above answers.

$\frac{owners}{total\ assets}$ $\frac{270\,000}{1070\,000}$

20. The profitability or return-on-total assets percentage (rounded up to 2 decimals) for the Speedo Company in 2010 was
a) 2.11%
b) 4.21%
c) 7.01%
d) None of the above answers.

21. The total "inventory turnover ratio" (rounded up to 2 decimals) for the Speedo Company in 2010 was
a) 3.48
b) 7.14
c) 8.7
d) None of the above answers.

22. The Speedo Company after-tax cash flow (ATCF) for the year 2010 was
a) $20,000
b) $50,000
c) $75,000
d) $95,000
e) None of the above answers.

23. Annual income taxes and depreciation charges represent explicit cash flows.
a) True
b) False

INFORMATION FOR QUESTIONS 24 to 26

CCA ≡ capital cost allowance
UCC ≡ undepreciated capital cost
(   ) ≡ sale (disposal) of assets.

Assume that:
- **d = 20% (Declining Balance)**
- **t = 50%**
- **the half-year rule applies.**

Year	Adjustment s to UCC from Purchases & (Disposals)	Base UCC Amount for CCA ($)	CCA ($)	Undep Remaining UCC ($)	Tax Savings Due to CCA ($)
2007	$400,000	200 000	40 000	360 000 AA	70 000
2008	($100,000)	A	B	C	BB
2009	$200,000	CC			
2010	$100,000				

A: ~~360000 - (0.5 × 100000)~~
= ~~310 000~~
~~B = 62 000~~
C = 248 000

or
(360 000 - 100 000)
260 000
B = 52 000

24. The dollar amount of cell AA is
a) $360,000
b) $320,000
c) $200,000
d) None of these answers.

25. The dollar amount of cell BB is
a) $22,000
b) $26,000
c) $40,000
d) None of these answers

26. The dollar amount of cell CC is
a) $476,000
b) $358,000
c) $396,000
d) None of these answers

27. The net (after-tax) income of a business is equal to its
a) before-tax cash flow - income taxes paid.
b) after-tax cash flow – income taxes paid.
c) before-tax cash flow – income taxes paid + annual depreciation.
d) after-tax cash flow – annual depreciation
e) None of the above answers.

28. Using the outsider method, assume that the defender was beyond its economic life and that its cost for the year 2011 would be less than the challenger's annual equivalent cost based on its economic life. Hence, the defender would be kept for at least one additional year.

In the cost comparison between the defender and a challenger on January 1, 2012 (i.e., one year from now), the defender's cost would be calculated as
a) 50,000(A/P,10%,1) + 50,000
b) 100,000(A/P,10%,2) + 50,000+5,000(A/P,10%,2)
c) 50,000(A/P,10%,1) + 55,000
d) 100,000(A/P,10%,3) -75,000(A/F,10%,3) + 50,000 -5,000(A/G,10%,3)
e) None of these answers.

29. The book value of a physical asset at the end of its economic is equal to its salvage value (SV) with the
a) Declining Balance depreciation method
b) Straight Line depreciation method.
c) Present Worth method
d) None of the above answers.

30. The Declining Balance (DB) depreciation method is preferred to the Straight Line (SL) method of depreciation because it generates larger income tax credits from the annual depreciation of a physical (capital) asset.
a) True
b) False
c) Need more information.

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