Assignment 7 Solutions

EECE/CPEN 481

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Selected problems, drawing in part on material from the textbook (Engineering Economic Analysis: Fourth Canadian Edition).

Problems are drawn mainly from material in Chapters 2, 9, 11, and 12.

1. Problem 1
2. Problem 2 (0.5 points)
3. Problem 3
4. Problem 4 (1.5 points)

Answers in blue.

1. **Problem 1**

A firm exists that makes only one product, using one kind of machine. Categorize each of the following costs as direct or indirect. Assume that a traditional costing system is in effect. Justify your selection if the categorization would depend on the assumptions made.

Cost of materials (inputs to production)
Interest payments
Machine depreciation
Product handling and shipping costs
Machine operator wages
Utility costs
Support (administrative) staff salaries
Cost of marketing the product
Cost of storing the product before sale
Insurance costs
Engineering drawings
Machine operator overtime expenses
Cost of tooling and fixtures

Solution:
Some of the costs could fall in either category, depending on your assumptions. Those are marked in green below.

Direct costs (costs that increase in proportion to products produced):
- Cost of materials (inputs to production)
- Product handling and shipping costs
- Machine operator overtime expenses
- Machine operator wages (if you are able to send people home when you don't need to produce product, which is often not the case)
- Utility costs (if these are mainly for running the machines)
- Cost of storing the product before sale (if they are able to rent space at short notice)

Indirect costs (costs that don't change as the volume of production changes)
- Interest payments
- Machine depreciation
- Support (administrative) staff salaries
- Costs of marketing the product
- Insurance costs
- Engineering drawings
- Cost of tooling and fixtures
- Machine operator wages (if the operators are permanent staff, paid whether the machines run a lot or not)
- Utility costs (if these are mainly for the office and other non-production utility needs)
- Cost of storing the product before sale (if they have a permanent warehouse with lots of space)

2. Problem 2

The general ledger of the Fly-Buy-Nite Engineering Company (FBN) contained the following account balances. FBN has a tax rate of 25%.

	Amount ($ thousands)
Administrative expenses	$ 3,750
Subcontracted expenses	$ 19,000
Development expenses	$ 1,900
Interest expense	$ 1,200
Sales revenue	$ 35,000
Selling expenses	$ 5,500

a. Construct an income statement, with separate sections for Operating and Non-operating revenues and expenses.
b. What is the net income before taxes?
c. What is the profit (or loss) after taxes?

Solution:

Operating Revenues and Expenses

Revenue	
Sales	35,000
Total	35,000
Expenses	
Administrative	3,750
Cost of goods sold	19,000
Development	1,900
Selling	5,500
Total	30,150
Total operating income	4,850

Non-Operating Revenues and Expenses

Interest paid	1,200
Income before taxes	3,650
Taxes (@25%)	912.50
Profit (loss)	2,737.50

3. **Problem 3**

Eastern Slopes Coal Company expected to produce 150,000 tonnes of coal annually for 15 years. The deposit cost $3.2 million to acquire. The annual gross revenues are expected to be $13 per tonne, and the net revenues are expected to be $2.95 per tonne.

(a) Compute the annual depletion allowance using a cost depletion method based on the recoverable product, rounded to the nearest dollar.
(b) Compute the annual depletion allowance using both possible options: a percentage depletion method or using a taxable income limitation basis.
(c) Which of these two percentage depletion options is allowed to be applied, under law, and why?

Show your calculations. If necessary, round to the nearest dollar.

Solution:

a) Since the same amount of material is produced each year:
Total coal that can be produced: 150,000 tonnes x 15 yrs = 2,250,000 tonnes
Investment cost per unit of coal = $3,200,000 / 2,250,000 = $1.42 per tonne
Annual Cost Depletion-based depletion allowance = 150,000 tonnes x $1.42 per tonne = **$213,333/year**

b) Option 1: From Table 11-2: allowed depletion percentage = 10%.
Computed percentage depletion = gross income x allowed depletion percentage = $13/ton (150,000 tons) (10%) = **$195,000**

Option 2:
Taxable Income from operation = $2.95 per tonne * 150,000 tonnes = $442,500
Deduction limitation = 50%
Taxable income limitation = $442,500 x 50% = **$221,250**

Allowable percentage depletion = **Minimum of the two values** = min ($195,000, $221,250) = **$195,000**

4. Problem 4

Chun operates a consulting business that produces a taxable income of $200,000 per year. The business is set up as a proprietorship, so the taxable income is treated like salary income for her, from a tax perspective. (It's the same as if she had a job that paid that amount of salary). Chun can claim $11,474 as a federal personal exemption against her personal income (from Table 12-2). The applicable individual federal income tax table is in Table 12-1.

Chun is considering incorporating her business. If she does, she will pay herself a salary of $110,000 a year from the corporation, upon which federal income tax must be paid. The corporation will then pay taxes on the remaining $90,000. A federal corporate tax rate of 15% will apply (this value is from Table 12-3). The corporation will retain the balance (as retained earnings). Assume that no Small Business Deduction applies.

You can ignore provincial income and corporate taxes (which would also normally apply).

a. How much tax will she pay if she continues to operate the business as a proprietorship?
b. How much tax would she pay if she incorporated her business, both personally and through her corporation?
c. Should she incorporate (will her taxes go down)? How much will her taxes change by?

Solution:

a. Proprietorship:

Federal taxes: Income of $200,000
Federal taxes = $45,282(0.15) on the first $45,282 + $($90,653-45,282) (0.205) on the next piece, plus ($140,388 - $90,563) (.26) on the next, plus $180,000-140,388) (.29) on the remainder
= $6,792 + $9,283 + $12,955+$11,487 = $40,517
Less federal exemption: –$11,474(0.15) = -$1,721
Total federal tax = **$44,596**

b. Incorporation:

Personal Federal taxes: Income of $110,000
So personal federal taxes paid = $45,282(0.15) on the first $45,282 + $(90,563-45,282) (0.205) + $(110,000-90,563) (0.26) = $25,113
Less tax exemption: $11,474 (0.15) = –$1,721
For a personal federal income tax total of **$23,392**
Corporate federal taxes = $90,000(15%) = **$13,500**
Total personal and corporate taxes paid **= $36,892**

So Jane can save $7,704 in taxes by incorporating. Yes, she should incorporate.