

**\*All cash flows diagrams should be clearly illustrated.**

1. Please **ANSWER** the following questions:
  - 1.1. Explain why you may sell a bond for more than the face value? (5%)
  - 1.2. When should we be concerned that a cash flow diagram will produce multiple internal interest rate? (5%)
  - 1.3. What is depreciation? Is it a cash flow or an expense? How does it affect tax? (10%)
2. You get a five-year, \$50,000 loan from a financial institute at a secured nominal interest rate of 4% per year, compounded quarterly.
  - 2.1. what is the quarterly payment? (10%)
  - 2.2. If immediately after making your fifth quarterly payment you decide to pay off the loan, what is the amount you still need to pay the bank? (10%)
3. Alternative Method I and II are proposed for a plant operation. The following is comparative information:

	Method I	Method II
Initial Investment	\$10,000	\$40,000
Useful Life	5 years	10 years
Terminal Market Value	\$1,000	\$5,000
Annual Expenses		
Labor	\$12,000	\$4,000
Power	\$250	\$300
Rent	\$1,000	\$500
Maintenance	\$500	\$200
Property Taxes and Insurance	\$400	\$2,000

Determine which is better alternative based on an **after-tax annual cost analysis** with an effective income tax rate of 40% and an after-tax MARR of 12% assuming Straight-Line method is used for depreciation. (20%)

4. Suppose that an asset has a cost basis of \$48,000 and a salvage value of \$15,000 at the end of 6 years. This asset is depreciated by the Straight-Line method. The effective income tax rate is 40 % and the after-tax MARR = 10%. If the company is going to sell this asset after 3 years at the market value of \$34,000
  - 4.1. What is the minimum profit per year this equipment should produce to breakeven the investment? (10%)
  - 4.2. If the inflation rate is 2% per year, what is the minimum profit per year this equipment should produce to breakeven the investment? (10%)

**(背面仍有題目,請繼續作答)**

系所組別： 土木工程學系戊組

考試科目： 工程經濟

考試日期： 0225，節次： 2

5. ABC contractor is awarded a \$300 million project. The work is expected to take 50 months. Under the contract, ABC will be paid equal monthly payments of \$10 million over the 30 months of construction. ABC estimates the cost of project is \$270 million and is equally distributed in 50 months. In addition, a loan covers 20% of the construction cost is issued by a bank at the start of the project with the nominal interest rate 12% per year compound monthly. The loan will be paid back with an equal monthly payment over the 40 months. The minimum attractive rate of return of ABC is 16% per year compound monthly.

5.1. What is the present worth of this project?(10%)

5.2. if the inflation rate is 0.1% per month? What is the present worth of this project? (10%)

To Find:	Given:	Factor by Which to Multiply "Given"	Factor Name	Factor Functional Symbol
<i>For single cash flows:</i>				
F	P	$(1+i)^N$	Single payment compound amount	(F/P, i%, N)
P	F	$\frac{1}{(1+i)^N}$	Single payment present worth	(P/F, i%, N)
<i>For uniform series(annuities):</i>				
F	A	$\frac{(1+i)^N - 1}{i}$	Uniform series compound amount	(F/A, i%, N)
P	A	$\frac{(1+i)^N - 1}{i(1+i)^N}$	Uniform series present worth	(P/A, i%, N)
A	F	$\frac{i}{(1+i)^N - 1}$	Sinking fund	(A/F, i%, N)
A	P	$\frac{i(1+i)^N}{(1+i)^N - 1}$	Capital recovery	(A/P, i%, N)