

※ 考生請注意：本試題可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。
※請清楚列出思考邏輯及計算方式，沒有完整列出計算程序不予計分。

1 回答下列問題 (20%)

- 1.1 說明在何種情況下最大化內部投資率與現值法的分析結果會一致？何種情況不會？
- 1.2 簡述如何評估新機具的經濟壽命？以及將被置換的舊機具的經濟壽命？

2 An expenditure of \$600,000 is made to introduce the Building Information Modeling (BIM) system to improve the process of delivering shop drawings within the contractor. This improvement will result in first-year saving of \$60,000, a second-year saving of \$120,000, and a saving of \$150,000 per year thereafter. How many years must the BIM system last if an 18% return on investment is required? Market value is not considered at any time. (20%)

* hint: list the equation and find the reasonable and closest number of years by trial-and-error.

3 You bought an apartment which was on a 20-year mortgage of \$10,000,000 from the bank ABC. The bank ABC asked you to pay back the loan by monthly payments on 3.6 % nominal interest rate with 3-year grace period (pay interest only). You have stayed with the bank ABC for 5 years and your Minimum Attractive Rate of Return (MARR) is 0.75% per month.

- 3.1 What is the monthly payment that you are asked to make now? (5%)
- 3.2 What is the interest you have paid so far? (10%)
- 3.3 What is the remaining principal? (5%)
- 3.4 A new bank DEF offers you a deal of refinancing your apartment with 2.4% nominal interest rate compounding monthly for the remaining 15 years. However, set up cost of \$40,000 is required. Will you move your mortgage to the bank DEF? If you decide to move, how many months, at least, should you stay with the bank DEF to cover the cost?

* hint: list the equation and find the reasonable and closest number of years. (10%)

4 A construction company is considering to acquire a new equipment. Table 1 is the information of two alternatives for this new equipment. Complete the following questions according to the PW analysis. The after tax market Minimum Attractive Rate of Return (MARR) is 12% per year.

- 4.1 Which alternative should the company acquire? (15%)
- 4.2 If the inflation rate is 2% per year and the base year is year 0, which alternative should the company acquire? (15%)

Table 1

	A	B
Capital investment	9000	30000
Annual benefit (increases per year as the inflation rate if inflation is considered)	3000	9000
Depreciation method	Straight Line	200% Declining Balance
Depreciation life	3 years	3 years
Salvage Value	2000	0
Useful life	5 years	5 years
Market value (increases per year as the inflation rate if inflation is considered)	2000	2000

公式：

$$F = \frac{G}{i}(F/A, i\%, N) - \frac{NG}{i}, P = \frac{A_1}{1+f}(P/A, i_{CR} \%, N), i_{CR} = (1+i)/(1+f) - 1$$

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)