編號： 120
國立成功大學九十七學年度碩士班招生考試試題
共 2 頁，第 1 頁

系所：土木工程學系戊組
科目：工程經濟

本試題是否可以使用計算機： ☑可使用 ， □不可使用 （請命題老師勾選）
考試日期：0301，節次：2

1. Questions
   1.1. Why do we need to consider the depreciation of an asset in performing engineering economic analyses？（5%）
   1.2. Please list at least three items that are not responsive to inflation? (5%)
   1.3. Please describe the loss and gain on the disposal of the asset in terms of tax? (5%)

2. 現有一債券面值10萬元，5年為期，期滿償付面值，債券之年名利率3%，利息每季付息一次，另有一投資機會可以獲得1%/季之投資報酬率，請問你最多會用多少錢購買？(10%)

3. An engineering school has just completed a new engineering complex worth $5 million dollars. A campaign, targeting alumni, is planned to raise funds for future maintenance costs, which are estimating at $2 million per year. Assuming that the school can create a trust fund that earns 8% interest annually, how much has to be raised now to cover the initial capital and annual costs? (10%)

4. 請計算下列現金流量之現值，年名義利率=12%，每季計息一次 (10%)
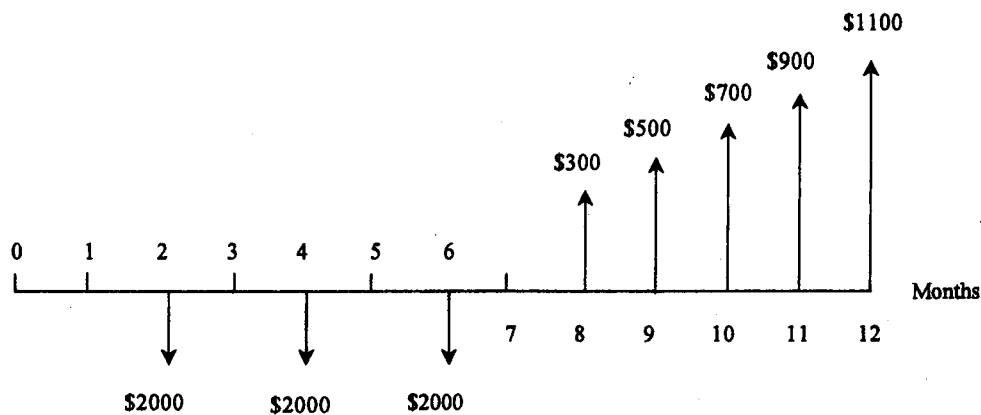
5. 某公司正計劃購買一價格為20萬元的設備，其使用期限為五年並用直線法折舊，期末預計之市場價格為2萬元，假設營運成本為每工作天400元，每年維修費為1萬元，實際稅率為40%；另有一方案為租用此設備，每年租金為10萬元，假設稅後年最小投資報酬率為10%，請問每年使用此設備最多使用多少工作天以內方值得購買？(15%)

6. A contractor plans to purchase a new excavator to enhance its current operation. The cost of this new excavator is NT$ 1,500,000 and will have a salvage value of 300,000 (at the end of 5 years). In addition, it is expected that this new equipment will produce a net cash flow of NT$400,000 per year for the next 5 years. The economic life of this new equipment is expected to be 5 years. The effective tax rate is 30% and the company has an opportunity of investment at the rate of 15% (after tax, with the consideration of the inflation). The straight-line method is applied to determining the depreciation of this excavator.
   6.1. If the contractor can get a loan (owner's equity is 30% of the cost of the equipment) from a local bank at the rate of 12% and the loan would be paid back annually in the next 5 years, is this investment justified? (20%)
   6.2. Assume that there is another alternative that the contractor could buy the excavator directly from the manufacturer from Japan at the cost of 5,200,000 Yen. To promote the new product, the sale representative in Taiwan provides a competitive loan plan that the bank in Japan could grant a loan

（背面仍有題目,請繼續作答）

of 4,000,000 Yen at very low rate of 5%. In addition, the contractor pays only the interest of the loan in the loaning period and then pays back all debts in the fifth year. If the exchange rate from NT$ to Yen is 1: 4 and is expected to be devalued at the rate of 2% per year, is this investment justified? (20%)

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

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