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）

1. Answer the following questions: (15%)

   1.1. What are differences between ERR (External Rate of Return) and IRR (Internal Rate of Return)?

   1.2. What are the price escalation and the general price inflation?

   1.3. How do you come up with the MARR(Minimum Attractive Rate of Return)?

2. A firm must decide between two structure designs, S1 and S2, shown in the accompanying table. Their effective income tax rate is 40%, and the straight-line depreciation is used. If the after-tax desired return on investment is 10% per year, which design should be chosen? State your assumptions. (20%)

	S1	S2
Capital investment	$100,000	$200,000
Useful life (years)	7	6
Terminal Market Value	$30,000	$50,000
Annual revenues less expenses over useful life	$20,000	$40,000

3. 某工程公司有一新承接的工程，由於工地施工狀況特殊，因而必須採用特殊的挖土設備。經過查訪得知有兩家廠商（A及B）的設備能滿足該工程的需求。A與B廠商設備的購買成本、每年之運作成本、殘餘價值及生命週期為分別為

	A	B
購買成本	500萬	600萬
第一年之運作成本及年增加率	15萬 7%	10萬 5%
殘餘價值	50萬	80萬
生命週期	6年	8年

若工程預計施工時間為4年，而該項設備將於施工完畢後便售出，A與B於使用4年後的市場價值分別為100及150萬，那麼在考慮稅率為30%、通貨膨脹率為5%及利用直線折舊的情況，那家的設備較划算？假設 after-tax MARR 為10%。 (20%)

4. The ABC corporation has an overhead crane that has an estimated remaining life of 10 years. The crane can be sold now for $9,000. If the crane is kept for service, it must be overhauled immediately at a cost of $5000. Operating and maintenance costs will be $3,000 per year after the crane is overhauled. The overhauled crane will have zero market value at the end of 10-year study period. A new crane will cost $20,000, will last for 10 years, and will have $5,000 market value at that time. Operating and maintenance costs are $1,000 per year for the new crane. The company uses a before-tax interest rate of 10% per year in evaluating investment alternatives. Should the company replace the old crane? (15%)

（背面仍有題目,請繼續作答）

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5. A construction firm currently owns a heavy-duty tractor that has a present value (MV) of $80,000. Estimates of the tractor's operating and maintenance (O&M) expenses and MV at the end of each of the remaining six years of useful life are in Table 1. The firm is considering a new heavy-duty tractor to replace the one presently owned. The new tractor's purchase price is $250,000 and its estimated O&M and MV for each of the nest six years of the study period are in Table 2. If the MARR= 10% per year,

Table 1

	End of Year k					
	1	2	3	4	5	6
O&M	$20,000	$25,000	$38,000	$45,000	$47,000	$50,000
MV	$70,000	$60,000	$50,000	$40,000	$30,000	$20,000

Table 2

	End of Year k					
	1	2	3	4	5	6
O&M	$10,000	$12,000	$16,000	$17,000	$20,000	$25,000
MV	$180,000	$150,000	$120,000	$100,000	$90,000	$75,000

5.1 what is the economical life of the new tractor? (15%)

5.2 should the new tractor be purchased? If so, when? (15%)

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)