

※ 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。

1. 回答下面問題:(20%)
 - 1.1 分別說明 Minimum Attractive Rate of Return (MARR) 及 Weighted Average Cost of Capital (WACC)
 - 1.2 MARR 及 WACC，哪一個數值通常會比較大？為什麼？
 - 1.3 分別說明 Sunk Cost 及 Book Cost
 - 1.4 Sunk Cost 及 Book Cost，哪一個並不是因為實際支出造成的成本？為什麼？
2. Compute the effective annual interest rate to four decimal places in each of the following conditions: (10%)
 - 2.1 18% nominal interest, compounded monthly.
 - 2.2 18% nominal interest, compounded quarterly.
3. An engineering school has just completed a new engineering complex worth \$50 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. You purchased a building five years ago for \$10,000,000. Its annual maintenance expense has been \$50,000 per year. At the end of the year 3, you spent \$90,000 on building repairs. At the end of five years (now), you sell the building for \$1,200,000. During the period of ownership, you rented out the building for \$100,000 per year at the beginning of each year. Use the AW method to evaluate this investment when your MARR is 8% per year. (15%)
5. You obtain a 30 years loan on the 2.4% nominal interest rate mortgage of \$18,000,000 from ABC bank. The payment is due each month. You are allowed to pay back only the interest due for the first three years (the grace period) then make the monthly payments thereafter. You have paid back the loan for 10 years including the three years of the grace period. (30%)
 - 5.1 What is the interest due per month for the first three years? What is the monthly payment that you are asked to make after the grace period ends?
 - 5.2 What is the total interest that you have paid in 10 years? What is the remaining principal after the first 10 years of payments?
 - 5.3 Another bank CDE offers you a bargain to transfer your loan at the nominal rate of 2% for the remaining 20 years with a transfer fee of \$40,000. You also get an opportunity that would give you 12% return on the investment per year. Will you transfer your loan? Why or why not? Show your calculation.

6. The capital investment for a new highway paving machine is \$900,000. The estimated annual expense, in year zero dollars, is \$95,000. This expense is estimated to increase at the rate of 6% per year. Assume that f (inflation rate) = 2.4 %, $N = 7$ years, MV at the end of year seven is 15% of the capital investment, and the MARR (inflation-free) is 10.05% per year. What uniform annual revenue would the machine need to generate to break even? (15%)

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)

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

$$F = \frac{G}{i} (F/A, i\%, N) - \frac{NG}{i}$$