

※ 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。

MARR: Minimum Attractive Rate of Return

- 1 A bank assesses the risk of loaning a real estate developer for the construction cost on an apartment project and comes up with the following statement "The loan can be recovered if the developer reduces 20% of the project selling price and sells 26% of the project worth". If the bank usually grants 50% of the construction cost, what is the construction cost of the apartment project (in terms of selling price)? (5%)
- 2 A developer promotes an apartment project that is under construction and expected to be finished in 3 years at the price of NT\$20,000,000 each unit. You are interested in buying one unit. 30% of the price needs to be paid during the construction period. The property that you prepare for acquiring this apartment is worth more than NT\$6,000,000, which allows you to pay the down payment during the construction. In addition, the local bank ABC can loan you a 20-year NT\$14,000,000 mortgage at the rate of 2% per year compounding monthly with an option of 3-year grace period (pay interest only). (20%)
 - 2.1 Suppose the project is finished, what is the monthly payment you have to make to the bank ABC without taking the option of the grace period?
 - 2.2 Suppose the project is finished, what is the monthly payment you have to make to the bank ABC after the grace period?
 - 2.3 If you took the grace period option and have paid the loan for 7 years, what is the unpaid amount if you want to pay back the loan in full?
- 3 Refer to question 2. You think the real estate market is promising and will sell the apartment unit before the construction ends. Therefore, you decide to mortgage your property to pay for the down payment at the rate of 2.4% per year compounding monthly for 20 years with an option of 3-year grace period. (25%)
 - 3.1 What is the monthly cost during the construction that you have to bear?
 - 3.2 What is the selling price that you would ask for if you sell the apartment at the end of the construction period and earn the rate of return of 100% per year compounding monthly?
 - 3.3 If the real estate market goes down and the market price of the apartment that you acquire drops down 30% at the end of the construction, what

is the loss of your investment in terms of present worth?

3.4 What is the monthly cost you have to take if the apartment could be not sold after the construction ends?

4 The capital investment for a new machine is \$900,000. The current estimated annual expense is \$100,000. This expense is estimated to increase at the rate of 6% per year. Assume that f (inflation rate) = 5%, $N = 5$ years, MV at the end of year seven is 10% of the capital investment, and the after-tax MARR (inflation-free) is 10% per year. (25%)

4.1 What uniform annual revenue would the machine need to generate to break even?

4.2 If the machine is depreciated by the stright line method and the effective tax rate is 40%, what uniform annual revenue would the machine need to generate to break even

5 A contractor wants to add a new machine to its prodction team. The following information is prepared for the economic evaluation. Either machine is to be used for 8 years and sold for the estimated salvage value. The before-tax MARR is 12.31% per year and the effective tax rate is 35%. Using Straight-line depreciation, select a machine on the basis of after-tax **annual worth** analysis. (25%)

Alternative	T1	T2
First costs	\$490,000	\$475,000
Annual benefits	\$110,000	\$93,000
Salvage value	\$39,000	\$34,000
Useful life, years	10	8

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)

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

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

$$i_{CR} = (1+i)/(1+f) - 1$$