# 國立成功大學

# 112學年度碩士班招生考試試題

編　　號：101

系　　所：土木工程學系

科　　目：工程經濟

日　　期：0206

節　　次：第 2 節

備　　註：可使用計算機

※ 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. 近年來有不少國家利用升息降低通膨，但此作為對不同產業帶來程度不一影響，分別就開發商及營建商角度，說明升息可能帶來執行營建工程的風險？(10%)
    1.2. 承上題，如果你是開發商，在此情況下，你會使用 Minimum Attractive Rate of Return (MARR) 或是 Weighted Average Cost of Capital (WACC)進行方案分析？為何？(10%)

2. A promising company has issued 10-year bonds, with a face value of $1,000,000, in $1000 units. Interest at 8% (per year) is paid quarterly. (20%)
    2.1. If an investor desires to earn 12% nominal interest (compounded quarterly) on $10,000 worth of these bonds, what would the purchase price have to be? (10%)
    2.2. If the company plans to redeem these bonds in total at the end of 10 years and establishes a fund that earns 8%, compounded semiannually, for this purpose, what is the annual cost of interest and redemption? (10%)

3. Consider a piece of construction equipment that initially cost $8,000 and has these estimated annual expenses and market values In Table I. If the cost of money is 8% per year before taxes, **show the EUAC of this asset for each year and determine its economical life?** (20%)

Table I

| EOY, k | Annual Expenses | MV at EOY |
|--------|-----------------|-----------|
| 1 | -$3,000 | $4,700 |
| 2 | -3,000 | 3,200 |
| 3 | -3,500 | 2,200 |
| 4 | -4,000 | 1,450 |
| 5 | -4,500 | 950 |
| 6 | -5,250 | 600 |
| 7 | -6,250, | 300 |
| 8 | -7,750 | 0 |

4. You obtain a 30-year loan on the 1.8 % nominal interest rate mortgage of $18,000,000 from a local bank to obtain a brand new apartment at the price of　$26,000,000. Personal own savings of yours will be used to pay the initial down payment of $8,000,000. The loan 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. In addition, an opportunity that would give you 9% return on the investment per year compounding monthly is employed to evaluate the alternatives. (40%)

4.1. What is the interest due per month for the first three years? What is the monthly payment that you are asked to pay after the grace period expires? (10%)

4.2. If you can sell the apartment at the price of \$27,000,000 after 2 years, will it be a good investment? What price will you sell the apartment to earn your expected return after 2 years? (10%)

4.3. Due to the high inflation rate, it is expected that the interest rate could increase at the rate of 15 % per year for three years after you make the loan agreement, what is the extra cost for 3 years of staying in the grace period? (10%)

4.4. If you have paid back the loan for 10 years including the three years of the grace period. What is the total interest that you have paid in 10 years? What is the remaining principal after 10 years of payments? (10%)

*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) |

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

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

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