

系所組別： 土木工程學系戊組

考試科目： 工程經濟

考試日期： 0219，節次： 2

※ 考生請注意：本試題 可 不可 使用計算機

1. Compute the effective annual interest rate to four decimal places in each of the following conditions: (10%)
 - 1.1. 12% nominal interest, compounded monthly.
 - 1.2. 12% nominal interest, compounded quarterly.
2. For the cash flow diagram in Fig. 1, solve for X such that the cash receipt in year zero is equivalent to the cash outflows in years one through six. (10%)

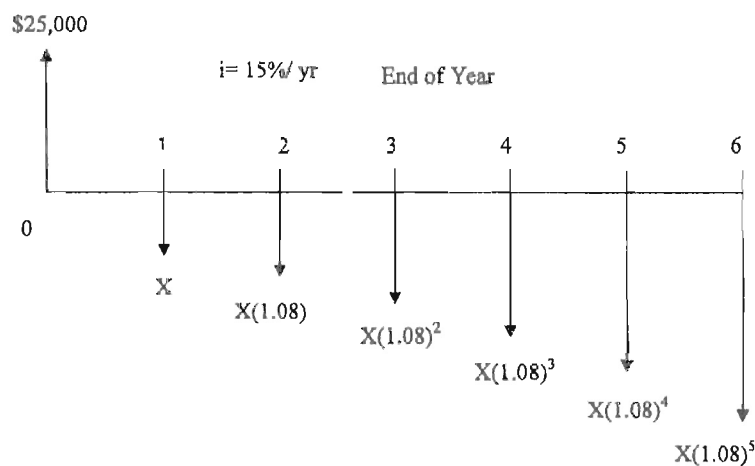


Fig. 1

3. A company has two alternatives to perform the 5-year long operation. Alternative A will cost \$75,000 annually for the next 3 years and \$100,000 in years 4 and 5. Alternative B requires an installation fee of \$150,000 at the start and the operation fee of \$60,000 per year. Which alternative will the company choose at the discount rate of 6% per year? (20%)
4. A loan of \$10,000 is to be repaid over a period of 8 years. During the first 4 years, exactly half of the loan principal is to be repaid (along with accumulated compounded interest) by a uniform series of payments A_1 dollar per year. The other half of the loan principal is to be repaid over 4 years, with accumulated interest, by a uniform series of payments of A_2 dollars per year. If $i=9\%$ per year, what are A_1 and A_2 ? (20%)
5. A bridge is to be constructed now as part of a new road. Engineers have determined that traffic density on the new road will justify a two-lane road and a bridge at the present time. Because of uncertainty regarding future use of the road, the time at which an extra two lanes will be required is currently being studied. The two-lane bridge will cost \$250,000 and the four-lane bridge, if built initially, will cost \$500,00. The future cost cost of widening a two-lane bridge to four lanes will be an extra \$350,000 plus \$40,000 for every year that widening is delayed. The minimum attractive rate of return used by the department is 15% per year. In addition, based on prediction of the traffic density, the times at which the future four-lane could be required are 3, 5, and 7 years. When should the bridge be widen that provides the most economically solution. (20%)

(背面仍有題目,請繼續作答)

系所組別： 土木工程學系戊組

考試科目： 工程經濟

考試日期：0219，節次：2

※ 考生請注意：本試題 可 不可 使用計算機

6. Two alternative machines are under review for providing the service around a community. The followings are relevant data please determine which machine is better based on an after-tax present worth value analysis (PW method) with an effective tax rate of 40% and an after-tax attractive rate of 12%. Using straight-line method for depreciation.* You need to state your assumption. (20%)

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)

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

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

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