

**IE 342 18-19 Spring**

**Study Set 3**

**Please do not submit your answers as they will not be graded!!**

**(Solutions will not be provided)**

- 1) A production facility is planning to buy an enterprise resource planning software. The implementation and training costs will result a total of \$120,000 at the end of first year. At the end of second year, it will generate a profit of \$45,000, and continuing \$50,000, \$55,000, \$60,000, at the end of third, fourth and fifth year, respectively. If MARR=15%, what is the net present worth of this 5-year project.

Ans: \$23,831.48

- 2) A new bus terminal will have a construction cost of \$200,000. The terminal will need a renovation every 10 years at a cost of \$50,000. Annual maintenance costs will be \$15,000 and MARR is 9%.

a) What is the capitalized cost of the bus terminal? Ans: \$403,233.33

b) Because of bad weather conditions the terminal will need a renovation every 8 year. What would be the capitalized cost in that case? Ans: \$417,041.33

c) How would the results change if MARR=15%, how does the rate affect the results?

Ans: \$394,028.89

- 3) Consider the following cash flow: Zeynep earns \$1,000 in year 1, \$1,100 in year 2, \$1,200 in year 3, \$1,300 in year 4, and the same pattern continues up to infinity (\$1,000 in year 5, \$1,100 in year 6, \$1,200 in year 7,...). What is the present worth of this cash flow under MARR 10%? Ans: \$11,381.12

- 4) Consider the following projects whose cash flows are given in the table below. What is the value of the investment at the end of third year under MARR = 10%?

| Project's Cash Flow (in \$) |        |        |        |
|-----------------------------|--------|--------|--------|
| Year                        | A      | B      | C      |
| 0                           | -2,000 | -4,100 | -7,200 |
| 1                           | -800   | 1,500  | 2,500  |
| 2                           | 900    | -3,000 | 0      |
| 3                           | 1,500  | 5,000  | 8,000  |
| 4                           | 3,200  | 5,000  | 0      |
| 5                           | -500   | -3,050 | 0      |

Ans: Project A \$1,355.87

Project B \$82.69

Project C \$1,441.8

- 5) One of the leading consumer goods companies considers investing in the project whose cash flows are indicated in the table below. Project costs \$130,000.

| Year | Cash Flows |
|------|------------|
| 1    | \$20,000   |
| 2    | \$30,000   |
| 3    | \$40,000   |
| 4    | \$50,000   |
| 5    | \$75,000   |

- a. Find the payback period of the project. Ans: 4 years
- b. If interest rate is 15%, what is the discounted payback period? Ans: 5 years

- 6) A third wave coffee shop considers replacing their old coffee machine with a new one due to its high maintenance costs. The new coffee machine costs \$30,000 including the installation cost and it will require maintenance and repair every 2 years at a cost of \$6,000. In addition, an expenditure of \$8,000 will need to be made at the end of the third year for a caffeine extraction mechanism for the customers who prefer decaf coffee which will not be available until then. Annual operating costs are expected to be \$1,000 for the first 5 years and \$1,500 thereafter. Compute the capitalized equivalent assuming  $i=5\%$ .

Ans: \$121,586.4

- 7) Suppose you won a contract to excavate the ore for a mining company for 2 years. There are two different excavators available to excavate the mine. Assume that the salvage values of Excavators A and B at the end of 2 years are \$6,000 and \$7,000 respectively.

| Year | Excavator A |               | Excavator B |               |
|------|-------------|---------------|-------------|---------------|
|      | Cash Flow   | Salvage Value | Cash Flow   | Salvage Value |
| 0    | -\$35,000   |               | -\$22,000   |               |
| 1    | -\$3,000    |               | -\$2,500    |               |
| 2    | -\$3,000    |               | -\$2,500    |               |
| 3    | -\$3,000    |               | -\$2,500    | \$4,500       |
| 4    | -\$3,000    |               |             |               |
| 5    | -\$3,000    | \$2,500       |             |               |

On the basis of the NPW criterion, which project is a better choice at  $MARR = 10\%$ ?

Ans: Choose B with NPW: -\$20,553.72

- 8) Bilkent University wants to buy a new turning machine for machine labs. There are two options:

Option 1: Purchasing cost=\$50,000, Operating Cost=\$6,000, Salvage Value=\$20,000, Lifetime: 3 years

Option 2: Purchasing cost=\$62,000, Operating Cost=\$5,000, Salvage Value=\$30,000, Lifetime: 5 years

Given that this machine will be used indefinitely (i.e. required service period is infinity), and price of the machine and related costs will not change, which option should be chosen at

MARR=12%?

Ans: Choose Option 2 with PW: -\$119,034.23

- 9) The owner of a business is considering investing \$60,000 in new equipment. He estimates that the net cash flows will be \$5,000 during the first year, but will increase by \$2,500 per year the next year and each year thereafter. The equipment is estimated to have a 10-year service life and a net salvage value of \$10,000 at that time. The firm's interest rate is 12%.

- a) Determine the annual capital cost (ownership cost) for the equipment. Ans: \$10,049.2
- b) Determine the equivalent annual savings (revenues). Ans: \$3,912.42
- c) Determine whether this is a wise investment. Ans: Yes

- 10) An automobile that runs on electricity can be purchased for \$20,000 with a battery. The automobile is estimated to have a life of 12 years with annual travel of 25,000 miles. Every 3 years, a new set of batteries will have to be purchased at a cost of \$2,000. Annual maintenance of the vehicle is estimated to cost \$600. The salvage value of the vehicle at the end of 12 years is estimated to be \$1,000. Suppose the MARR is 6%. What is the cost per mile to own and operate this vehicle, based on the preceding estimates? Ans: 0.1374

- 11) Ankara Municipality has built the tallest ferris wheel in the world for \$100,000,000 and it has a useful life of 20 years. Operating cost of the ferris wheel for each year is \$10,000 and the salvage value at the end of the 20th year is \$10,000,000. In the first year, they obtained \$8,000,000, and revenue increases 10% each year. If MARR=10%.

- a. Find AE(10%). Ans: \$5,503,670.1
- b. Suppose that 900,000 people visits each year, what is the profit obtained per visitor? Ans: 6.12