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| Dr. A. El-Tannir | American University of Beirut | Spring 2012 |
|  | **Faculty of Engineering and Architecture**  **Department of Engineering Management** |  |
| ENMG 400 sec 4 | Engineering Economy | **Test 1** |

**Attempt All Problems, Carefully draw All Cash Flows**

**Open Book and Notes but NO Notebooks!**

**Problem 1: (25 Points)**

Walid would like to purchase a 5-year treasury bond with face value of $5,000 at a bond rate of 10% paid semiannually. All of the bond payment will be deposited in a savings account that provides an interest of 18% per year compounded monthly.

1. What is the effective annual interest rate to be considered for this investment?
2. What is the maximum price Walid has to pay to make this bond worth to invest in?
3. How much money will Walid have in his account by the end of the bond’s third year due to this bond?
4. Suppose Walid wants to sell the bond by the end of its third year, how much at least should he sell it for?

**Problem 2: (25 Points)**

One of three alternative equipments is under consideration. The estimated cash flows for each alternative are given below. The firm's MARR is 15% per year.

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| **Manufacturer** | **C** | **D** | **K** |
| First cost | $12,000 | $26,000 | $17,000 |
| Annual costs | 2,000 | 5,000 | 3,00 |
| Salvage value at the end of useful life | 2,000 | 3,000 | 2,000 |
| Useful life | 2 years | 3 years | 6 years |

Use the Net Present Value to decide which of the three alternatives, if any, should be adopted? State your assumptions.

**Problem 3: (25 Points)**

A successful Engineering graduate of AUB wants to start an endowment in her name that would provide scholarships to students in the engineering management department. She wants to provide an annual scholarship per year and perpetually starting two years from now. Therefore, she plans to deposit an endowment that totals $1,000,000 in five annual amounts that starts with an initial amount of $100,000 to open a savings account this year, and which will increase gradually by a fixed amount and deposited at the beginning of each year until the total of the endowment is paid. The savings account pays a compounding interest rate of 12% interest per year.

1. How much should each deposit be for the next four years so that the total of all amounts deposited including the first $100,000 payment becomes $1,000,000?
2. What will be the amount of the scholarship to be awarded for ever on her behalf starting two years from now?

Clearly state your analysis assumptions and draw the cash flow.

**Problem 4: (25 Points)**

In order to finance your 4-year school tuition, you are considering seeking a bank loan for the amount of $2,000 every month starting now and ends by the last payment ends. Your first semester school fees starts now at $12,000 and is expected to increase at a constant rate of $500 per semester. Consider summer as one semester and thus one academic year consists of three semesters starting in September, Jan منمنمنمنمuary, and Maتنى