Jan - April 2018 ODD SEMESTER

HUM 4002: Engineering Economics and Financial Management

1. A Car Company is advertising a 24-month lease of its new car. The lease requires $520, payable at the beginning of each month, $2,500 down payment, plus a $500 refundable security deposit. As an alternative, the company offers a 24-month lease with a single up-front payment of $12,780, plus a $600 refundable security deposit. The security deposit will be refunded at the end of the 24-month lease. At an interest rate of 6%, compounded monthly, which lease is the preferred one?
2. The following equation describes the conversion of a cash flow into an equivalent equal payment series with :

   A = { [50+25(A/G, 15%,8)](F/A, 15%, 8) (F/P, 15%,17) + [500-10(A/G, 15%, 10)] (F/A, 15%, 10) (F/P, 15%, 7) - [200+100(A/G,15%,6] (P/A,15%,6) (F/P,15%, 25) – [1300+100(A/G, 15%,4)] (F/A, 15%, 4) (F/P,15%,15) – [1200-200(A/G, 15%, 6)] (F/A, 15%, 6) } X (A/F, 15%, 25).Reconstruct the original cash flow diagram
3. The American Cement plant may generate a revenue base of $50 million per year. The president of the company may have reason to be quite pleased with this projection for the simple reason that over the 5-year planning horizon, the expected revenue would total $250 million, which is $50 million more than the initial investment. With money worth 10% per year, address the following questions from the president: Will the initial investment be recovered over the 5-year horizon? If so, by how much extra in present worth funds? If not, what is the equivalent annual revenue base required for the recovery plus the 10% return on money?
4. Cycle Atherton wants to buy a car when he graduates college in two years. He has the following sources of money. He has $5,000 now in the bank in an account paying 8% compounded quarterly. He will receive $2,000 in one year from a trust. He will take out a car loan at the time of purchase on which he will make $500 monthly payments at 18% compounded monthly over four years. His uncle is going to give him $1,500 a quarter starting today for one year. In addition, he will save up money in a credit union through monthly payroll deductions at his part-time job. The credit union pays 12% compounded monthly. If the car is expected to cost $40,000, how much must he save each month?

5. Malvika C, who owns a travel agency, bought an old house to use as her business office. She found that the ceiling was poorly insulated and that the heat loss could be cut significantly if 6 inches of foam insulation were installed. She estimated that with the insulation, she could cut the heating bill by $40 per month and the air-conditioning cost by $25 per month. Assuming that the summer season is three months (June, July, and August) of the year and that the winter season is another three months (December, January, and February) of the year, how much can Malvika spend on insulation if she expects to keep the property for five years? Assume that neither heating nor air-conditioning would be required during the fall and spring seasons. If she decides to install the insulation, it will be done at the beginning of May. Malvika's interest rate is 15% compounded monthly.
6. An engineer plans to start a part-time consulting business next September 5, on his 40^{th} birthday. The business will require an initial cash outlay of Rs.3,25,000, and will cost Rs.32,500 per year to operate; the business is estimated to generate Rs.1,30,000 per year in cash receipts. During the 20 years that he expects to operate the business, he plans to deposit the annual net proceeds in a bank each year, at an interest rate of 8% per year, compounded annually. When he retires, on his 60^{th} birthday, the engineer expects to invest whatever proceeds plus interest he then has from the business in a long-term savings plan that pays 10% per year, compounded annually. What is the maximum amount he could withdraw from the savings plan each year during his retirement and still have the funds last 15 years?
7. The announcement of the HAC cement factory states that the $200 million (M) investment is planned for 2012. Most large investment commitments are actually spread out over several years as the plant is constructed and production is initiated. Further investigation may determine, for example, that the $200 M is a present worth in the year 2012 of anticipated investments during the next 4 years. Assume the amount planned for 2013 is $100 M with constant decreases of $25 M each year thereafter. Assume the time value of money for investment capital is 10% per year to answer the following questions,

   (a) In equivalent present worth values, does the planned decreasing investment series equal the announced $200 M in 2012?

   (b) Given the planned investment series, what is the equivalent annual amount that will be invested from 2013 to 2016?

   (c) What must be the amount of yearly constant decrease through 2016 to have a present worth of exactly $200 M in 2012, provided $100 M is expended in 2013?

8. You want to open a savings plan for your future retirement. You are considering the following two options:

   Option 1: Deposit $1,000 at the end of each quarter for the first 10 years, then you leave the amount accumulated at the end of 10 years for the next 15 years.

   Option 2: Do nothing for the first 10 years. Then deposit $6,000 at the end of each year for the next 15 years.

   If your deposits earn an interest rate of 12% compounded monthly for option 1 and 12% compounded quarterly for option 2, which is the best retirement plan?

9. A private hospital borrowed Rs.3,00,000 to purchase a laboratory equipment from a bank. The loan is to be repaid in end-of-year equal installments over next five years at i= 8%.
   i) Compute the annual installment.
   ii) At the end of six months, the hospital wants to negotiate with the bank to defer the first installment payment until the end of year 2, but still desires to pay 5 installments at 8% interest. Determine the deferred annuity (i.e. annual installment) if the bank approves with condition that the interest rate is 8% compounded semi-annually.

10. A manufacturer purchased electrical services for the next ten years with $70,000 now followed by five annual payments of $15,000 per year beginning with the 6th year. After two years' service, the manufacturer having surplus profit requested the electrical company to accept the single payment in advance. If the electrical company accepts the payment in advance what would each company set as a fair settlement to be paid if,
    I) Electrical company considers 15% a fair return.
    II) Manufacturer considers 12% as fair return.