Assignment-1

1. To provide for a college education for his daughter, a man opened an escrow account in which equal deposits were made. The first deposit was made on January 1, 1990, and the last deposit was made on January 1, 2014. The yearly college expenses, including tuition were estimated to be Rs.4,00,000 in the first year, and then onwards increases with a gradient of Rs.20,000 every year for each of the remaining 4 years. Assuming the interest rate to be 6%, compounded monthly for the deposits and 10%, compounded annually for the withdrawals, how much did the father have to deposit each year in the escrow account for the daughter to draw the required college expenses for the 5 years duration beginning from January 1, 2015?

2. Mr. KK deposits Rs.60, 000 for 5 years, starting from now in a savings account that pays 6% interest compounded monthly. Two years after the last deposit he makes another deposit of Rs.60, 000. Two after this deposit he makes another deposit of Rs.15, 000. Two years after the 15,000 deposit, half of the accumulated amount is transferred to another fund that pays 8%, interest compounded quarterly. How much money will be available in each account 10 years after the transfer?

3. Smita has saved ₹18,000 each year for 20 years. A year after the saving period ended, she withdrew ₹75,000 each year for a period of 5 years. In the 6^{th} and 7th years, she withdrew only ₹50,000 per year. In the 8th year she decided to withdraw the remaining money in her account. If the interest rate was 6%, for the first 22 years and 8%, compounded quarterly for the remaining period, what was the amount she withdrew at the end of 8^{th} year?

4. A person wishes that his son becomes an Engineering graduate. To achieve this he starts saving every month when his son is 5 years old till the son ages 18 years. If Rs. 250,000 is to be paid as college fees at the beginning of every semester, what is the money the father has to save every month if the interest rate is 12% per annum, compounded monthly during the first 14 years and 12% per annum compounded quarterly thereafter? Assume that the first instalment of the fees is paid six months after the last deposit.

5. A fertilizer company is considering installing a new process control system in one of its plants to augment the existing system. Production of the fertilizer is 30,000 kgs annually, and it sells for $15 per kg currently. The new system will cost $650,000 and is expected to have the following benefits:

    - The selling price of the fertilizer can be increased by $2 per kg, since the installation of the process control system will be of superior quality of the fertilizer
    - Production will increase by 4,000 kgs annually due to higher production yields, without any change in the raw material quantity or production parameters.
    - Finally, the number of operators (employees) can be reduced by one, which represents a savings of $500 per month.
    - The new control system would result in additional maintenance costs of $53,000 per year and has an expected useful life of 5 years.

If an interest rate of 12%, compounded monthly is taken into account, what is the maximum amount the company can spend on the new process control system now?