ASSIGNMENT-1 [SOLUTIONS]

Q1:- Given its present value, the formula for an annuity starting one year from now is:-

$$A = PV \frac{r}{1-\left(\frac{1}{1+r}\right)^n}$$

For 5 annual withdrawals the annuity is

$$500{,}000 \frac{0.06}{1-\left(\frac{1}{1+0.06}\right)^5} = \boxed{118{,}700.}$$

and for annual (10) with drawals the annuity is:-

$$500{,}000 \frac{0.06}{1-\left(\frac{1}{1+0.06}\right)^{10}} = \boxed{67{,}934.}$$

Q2: the formula for an annuity gives its future value is

$$A = FV \frac{r}{(1+r)^n - 1}$$

So,

$$A = 35000 \frac{0.07}{(1+0.07)^7 - 1} = \boxed{4044.4} \text{ Ans}$$

Q3: First we have to calculate how large the fund must be on the ~~date~~ daughter's birthday (18th). That is the present value of 4 annual payments of $25000 each, starting "TODAY" (= 18th birthday). The PV of this annuity is

$$PV = A\,\frac{1-\left(\frac{1}{1+r}\right)^5}{1-\frac{1}{1+r}} = 25000\,\frac{1-\left(\frac{1}{1+0.06}\right)^4}{1-\left(\frac{1}{1+0.06}\right)} = \$91,825.$$

We can then calculate how large the annual payments have to be to give the fund the required future value.

Notice that the fund is filled by 19 payments, 1 on each of the 18 birthdays plus the payment today (= date of birth).

$$A = FV\,\frac{r}{(1+r)^n-1} = 91825\,\frac{0.06}{(1+0.06)^{19}-1} = \$2719.90$$

If you want to, you can do this with the formula for the future value of an annuity:—

$$FV = A\,\frac{(1+r)^n-1}{r} = 2719.9 \times \frac{(1+0.06)^{19}-1}{0.06} = \$91,82$$

Gives check.

Q4:- (a) To choose which strategy ZX Co should choose. We have to compare their net present value (NPVs).

The safe strategy has a NPV of

$$-300 + \frac{50}{1.08} + \frac{50}{(1.08)^2} + \frac{50}{(1.08)^3} + \frac{50}{(1.08)^4} + \cdots$$

$$\cdots + \frac{50}{(1.08)^{10}} = 35.504.$$

The Risky has a NPV of

$$-300 + \frac{100}{1.125} + \frac{100}{(1.125)^2} + \frac{100}{(1.125)^3} + \cdots + \frac{100}{(1.125)^5} = 56.057$$

Since the sums of the undiscounted cash flow are the same (500) but the higher discount rate for the risky project is more compensated by the fact that its cash flow occur less far in the future.

(b) IRR? of safe and risky projects

$$-300 + \frac{50}{r} + \frac{50}{r^2} + \cdots + \frac{50}{r^{10}} = 0$$

for "r", which gives many different solutions of which $r = 1.1056 \simeq$ IRR $= 10.56\%$.

IRR of the risky projects

$$-300 + \frac{100}{r} + \frac{100}{r^2} + \cdots + \frac{100}{r^5} = 0$$

$$r = 1.1986 = 19.86\%.$$

(c) The IRR is the relative measure (%) while the NPV is in amounts: this can lead to the wrong choice if the projects differ in scale.

For example: if the risky project would be one tenth of its size (investment 30, annual cash flow 10) its IRR would still be 19.86%. But its NPV would also be one tenth, 5.6057, much less than the 35.504 of the safe project.

Ans: 5

Depreciation is tax deductible: it influences taxes and, hence, the cash flows available for the investors.

The End