Assignment :

1) $d^{(4)} = 0.08$

$\therefore d = 1 - \left(1 - \frac{0.08}{4}\right)^4 = 0.077632$

i) $\delta = 1 - e^{-\delta}$

$= 0.074695$

ii) $i = d/1-d = 0.084166$

iii) $d^{(12)} = 12\left(1 - (1-d)^{1/12}\right)$

$= \cancel{0.80}\ 0.080539.$

2) $\delta(t) = 0.004t + 0.0002t^2$,

$\cancel{\therefore PV = \frac{1000}{e^{\int_0^{10} 0.004t + 0.0002t^2\, dt}}}$

$\therefore$ Acc factor $= v(0,10)$

$= e^{\int_0^{10} 0.004t + 0.0002t^2}$

$= e^{\left[0.002t^2 + \frac{0.0002t^3}{3}\right]_0^{10}}$

$= 1.305605$

$\therefore FV_{10} = PV\,(v^{10})$

$\therefore PV = \frac{FV_{10}}{v^{10}} = \frac{1000}{1.305605} = 765.928338.$

3) i) $\because d = \frac{i}{1+i}$

$\therefore d = i \times \frac{1}{(1+i)}$

$\because v = \frac{61}{1+i}$

$\therefore d = iv$

$\because$ discount can be defined as the intrest paid in advance So if the intrest is multiplied with the discount factor, we can get the present value of the intrest ~~paid~~ to be paid in future i.e discount.
Hence $d = iv$.

ii) $d^2 = ?$

a) If $d^4 = 2.25\%$ i.e 0.00225
$\therefore d = 1 - \left(1 - \frac{d^4}{4}\right)^4 = 0.002248$

$\therefore d^2 = 2\left[1 - (1-d)^{1/2}\right] = 0.0020249$

iii) $\frac{i^4}{4} = 5\%$

4) i) Same as 3) i)

ii) $i = 0.08$

a) ~~$d^{12} =$~~ $d = \frac{i}{1+i} = 0.074074$

Camlin

a) $d^{12} = 12\left[1-(1-d)^{1/12}\right] = 0.076715$

b) $i^{365} = 365\left[(1+i)^{1/365} - 1\right] = 0.076969$

c) $\delta = -\ln(1-d) = 3.912023$

d) $i^{0.5} = 0.5\left[(1+i)^{1/0.5} - 1\right] = 0.076818.$

5) i) $d^{4} = 0.06$

$\therefore d = 0.058663$

$\therefore i = 0.062319$

a) $\therefore i^{2} = 2\left[(1+i)^{1/2} - 1\right]$

$= 0.061378$

b) $\therefore d^{12} = 12\left[1-(1-d)^{1/12}\right]$

$= 0.060303$

ii) Amt borrowed (PV) = 2,00,000

FV ~~after~~ @ $t = 1$ year = 2,20,000

$\therefore i = 10\%$ p.a.

Amit paid after 3 months i.e 1 quater.

$\therefore \cancel{i^{4} = 4\left[(1.1)^{1/4} - 1\right]} =$

$= \cancel{0.096455}$

$\therefore$ Amt paid $= 200000\{1+i^{4}\}$

$= 204822.7378$

6) ?

7) $5\frac{2}{3}$

i) $\therefore (1+i^4) = 1.5$

$\therefore 1+i^4 = 1.074175$

$\therefore i^4 = 0.74175$

ii) $\cancel{(1+i^2)^3} = 1.5$ $\quad (1-d^2)^3 = 1.5$

$\cancel{\therefore 1+i^2 = 1.144714}$ $\quad \therefore 1-d^2 = 1.144714$

$\cancel{\therefore i^2 = 0.144714}$ $\quad \therefore d^2 = -0.144714$

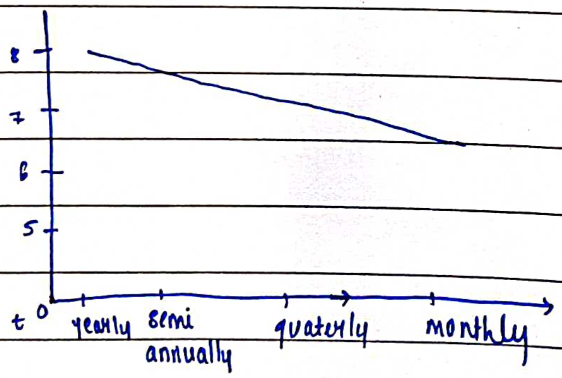
iii) S.I :

$1 + 1.5i = 1.5$

$\therefore i = \frac{0.5}{1.5} = 0.\overline{3333}$

iv) The rate ~~interest~~ of return is high so we get the value of discount rate as negative.

8)



Seeing the above graph we can say that longer the duration higher the intrest.

9) i) Force of intrest refers to a nominal intrest or a discount rate compounded infinte number of times per time period.

ii) $i^{2} = 0.0775$

$$\therefore i = 1 - \left(1 + \frac{i^2}{2}\right)^2 = 0.079002$$

$$\delta = \ln(1+i) = 0.076036$$

$$d = i/1+i = 0.073217$$

$$d^{12} = 12\left[1-(1-d)^{1/12}\right] = 0.075796$$

$$i^{0.5} = 0.5\left[(1+i)^{0.5} - 1\right]$$

$$= 0.082122.$$

10) *

$$\delta(t) = \begin{cases} 0.08 & \text{for } 0 \le t \le 5 \\ 0.06 & \text{for } 5 \le t \le 10 \\ 0.04 & \text{for } t \ge 10 \end{cases}$$

$$\therefore v = e^{\int_0^5 0.08 + \int_5^{10} 0.06 + \int_{10}^{t} 0.04}$$

$$= e^{0.4 + 0.3 + 0.04t - 0.4}$$

$$= e^{0.3 + 0.4t}$$

11) a) FV @ 9 month = 50000 @ $d = 18\%$ p.a

~~$i = 0.21$~~

~~$\therefore 50000 = PV(1+d)^{3/4}$~~ $\therefore 50000 = PV(1-d)^{3/4}$

$\therefore PV = 58024.26061$

~~$\therefore PV = 43085.42623$~~

b) i) $\delta = 6\%$

$\therefore d = 1 - e^{-\delta} = 0.058235$

$=$

$\therefore d^{12} = 12\left[1 - (1-d)^{1/12}\right]$

$= 0.059850$

ii) $d^{4} = 6\%$

$\therefore d = 1 - \left(1 - \dfrac{d^{4}}{4}\right)^{4} = 0.058663$

$\therefore i = \dfrac{d}{1-d} = 0.063830$

$\therefore i^{12} = 12\left[(1+i)^{1/12} - 1\right] = 0.062035$

$\therefore i^{4} = 4\left[(1+i)^{1/4} - 1\right] = 0.062356$

Ans) c) $i > i^{4} > \delta > d.$

d) Explained earlier.

12) a) PV $= 7049$. $t = 6$ years.

$\therefore FV = 7049\,(1+i^{12})^{24}\,(1+i^{4})^{9\frac{2}{3}}\,(1-d^{12})^{17}$

$= 11511.89615.$

13) Time taken for Investment to double

i) @ $i = 10\%$ p.a

$\therefore (1+i)^{n} = 2$

$\therefore \log_{1.1} 2 = 7.27$

$\therefore t = 7.27$ years.

ii) $d^{12} = 10\%$

$\therefore (1-d^{12})^{n} = 2$

$\therefore (0.9)^{n} = 2$

$\therefore n = -6.5788$

$\because n$ is negative $\therefore$ It is not possible.