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Assignment - 1

Ans1) $d^{4} = 8\%$

i) $-\delta = \ln(1-d)$

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

$1 \cancel{+} d = \left(1 - \frac{d^{p}}{p}\right)$

$1-d = \left(1 - \frac{d^{p}}{p}\right)^{p}$

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

$d = 1-\left(1-\frac{d^{p}}{p}\right)^{p}$

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

$d = 1-(1-0.02)^{4}$

$= 1 - 0.92236816$

$d = \cancel{8}7.763184\%$

$\delta = -\ln(1-0.07763184)$

$= 0.0808108 2927$

$= 8.081082927\%$

ii) i

We know $d = 7.763184\%$

$i = \frac{d}{1-d}$

$= \frac{0.07763184}{1-0.07763184}$

$i = 8.416578473$ or 8.42%

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iii) $d^{12} = ?$

$$1 - d = \left(1 - \frac{d^p}{p}\right)^p$$

$$d^p = p\left(1 - (1-d)^{1/p}\right)$$
$$d^{12} = 12\left(1 - (1 - 0.07763184)^{1/12}\right)$$
$$d^{12} = 12\left(1 - 0.993288884\right)$$

$$d^{12} = 8.05393392\,\%.$$

Ans 2) $\delta(t) = 0.004t + 0.002t^2$

i) $PV_0 = 1000 \cdot V(0, 10)$
$$= 1000 \cdot e^{-\int_0^{10} (0.004t + 0.002t^2)\,dt}$$
$$= 1000 \cdot e^{-\left[\frac{0.004t^2}{2} + \frac{0.002t^3}{3}\right]_0^{10}}$$
$$= 1000 \cdot e^{-\left[\frac{0.4}{2} + \frac{2}{3} - 0\right]}$$
$$= 1000 \cdot e^{-[0.2 + 2/3]}$$
$PV_0 = Rs\,420.3508845$

ii) ~~$e^{\delta(10-0)}$~~
~~$e^{(0.004t + 0.002t^2)x}$~~

ii) $V(0, 10) = v^{10}$
$$\frac{1}{(1+i)^{10}} = 0.4203503845$$
$$(1+i) = (0.4203503845)^{-1/10}$$
$$i = 9.053310809\,\%.$$

Ans 3) i) $d = i \cdot v$

If investment of Rs 1 is made then:-

★ Intrest earned on investment at the beginning of the year is d

★ Intrest earned on investment at the end of the year is i

- Let v be ~~t~~ the discounting factor
- Thus if we discount i from the end to beginning of the period with v; we acquire de

$$\therefore d = iv$$

ii) a) $\frac{d^4}{4} = 2.25\%$ or 0.0225

$$1 - d = \left(1 - \frac{d^p}{p}\right)^p$$

$$1 - d = (1 - 0.0225)^4$$

$$1 - d = 0.912992193 8$$

$$d = 8.7007 8062\%$$

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

$$d^2 = 2\left(1 - (1 - 0.08700 78602)^{1/2}\right)$$

$$d^2 = 2(1 - 0.9555 062217)$$

$$d^2 = 8.89875566\%$$

b) $d^{0.5} = 5\%$

$$d^2 = ?$$

$$1 - d = \left(1 - \frac{0.05}{0.5}\right)^{0.5}$$

$$1 - d = (0.9486832981)$$

$$d = 1 - 0.9486832981$$

$$d = 5.1316 7019\%$$

$$d^2 = 2\left(1 - (1 - 0.0513167019)^{1/2}\right)$$

$$= 2\left(1 - (0.9740037465)\right)$$

$$d^2 = 5.199250711\%$$ ~~or 5~~.

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iii) $\therefore AV = (1+ni)$
$= \left(1 + \frac{91}{365}(0.05)\right)$

$\cancel{i = \frac{0.05}{1.05}}$ $d = \frac{i}{1+i} = \frac{0.05}{1.05} = 4.761904762\%$

Ans 4) ii) a) $i = 0.08 / 8\%$
$d = i/_{1+i} = 0.08/1.08 = 7.407407407$
$d^{12} = 12[1-(1-7.407407407)^{1/12}$
$= 12[1 - 0.993607102]$
$= 12[0.006392898$
$d^{12} = 7.6714776\%$

b) $i^{(365)} = 365[(1+0.08)^{1/365} - 1]$
$= 7.696915541\%$

c) $\delta = \ln(1+i)$
$= \ln(1+0.08)$
$= 7.696104114\%$ $\frac{1}{0.5}$

d) $i^{(0.5)} = 0.5[[1+0.08]^{0.5} - 1]$
$= 8.32\%$

Ans 5) i) a) $d^4 = 6\%$
$i^2 = ?$
$1 - d = \left(1 - \frac{d^p}{p}\right)^p$
$d = 1 - \left(1 - \frac{d^p}{p}\right)^p$
$= 1 - \left(1 - \frac{0.06}{4}\right)^4$
$= 1 - 0.9413365506$
$d = 5.8663449\%$
$i = \frac{d}{1-d} = \cancel{5.541274655\%}$
$= 6.231931541\%$

~~b) d^{12}~~

~~We know $d = 5.86634494\%$.~~

~~$d^{12} = 12[1-(1-5.86634494)^{1/12}]$~~

~~$= 12[1-0.9949747896]$~~

~~$d^{12} = 6.03025248\%$.~~

i $\quad i^{2} = 2[[1+0.0623193154]^{1/2}-1]$

$i^{2} = 6.137751556$

b) d^{12}

$d = 5.86634494\%$.

$d^{12} = 12[1-(1-0.0586634494)^{1/12}]$

$= 12[1-0.9949747896]$

$d^{12} = 6.03025248\%$.

ii) a)

$AV_1 = 2,00,000 \times A(0,1)$

$2,20,000 = 2,00,000 \times (1+i)$

$\frac{2,20,000}{2,00,000} = 1+i$

$1.1 = 1+i$

$1.1 - 1 = i$

$i = 0.1$

$i = 10\%$.

~~AV~~ $i^{4} = 4[(1+0.1)^{1/4}-1]$

$= 4[(1.1)^{1/4}-1]$

$i^{4} = 9.645475634\%$.

~~$AV = 2,00,000 \times (1+0.09645475634)$~~

$AV = 2,00,000 \times (1+0.1)^{3/12}$

$= Rs\ 2,04,822.7378$.

Ans7) $26,000 = 20,000 \times \frac{1}{(1+i^{12}/12)^{17}}$

$\frac{26,000}{20,000} = (1+i^{12}/12)^{17}$

$(1.3)^{1/17} = \left(1 + \frac{i^{12}}{12}\right)$

$i^{12} = 18.6634785\%$

i) $i^4 = ?$

$1 + i = \left(1 + \frac{i^p}{p}\right)^p$

$i = \cancel{1} = \left(1 + \frac{i^p}{p}\right)^p - 1$

$i = \left(1 + \frac{i^{12}}{12}\right)^{12} - 1$

$i = 20.34570677\%$

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

$= 4\left[1 + 0.2034570677\right]^{1/4} - 1]$

$i^4 = 18.9552546\%$

ii) $d^2 =$

$d = \frac{i}{1+i} = \frac{0.2034570677}{1.2034570677} = 16.8655690\%$

$d^2 = (1 - (1 - 0.168655690)^{1/2})$

$= (1 - 0.9117808453)$

$d^2 = \cancel{8.8219154 7\%}\ 17.64383094\%$

iii) $\cancel{i = 20.345706 77\%}$

iv)

$\overline{12}$ 12

iii) $\cancel{26{,}000 = 20{,}000 \times (1 + 10i)}$

$\cancel{1.3 = 1 + 10i}$

$\cancel{0.3 = 10i}$

$\cancel{= i}$

iii) $26{,}000 = 20{,}000 \times \left(1 + \frac{17i}{12}\right)$

$1.3 = \cancel{10} \; 1.416666667 i$

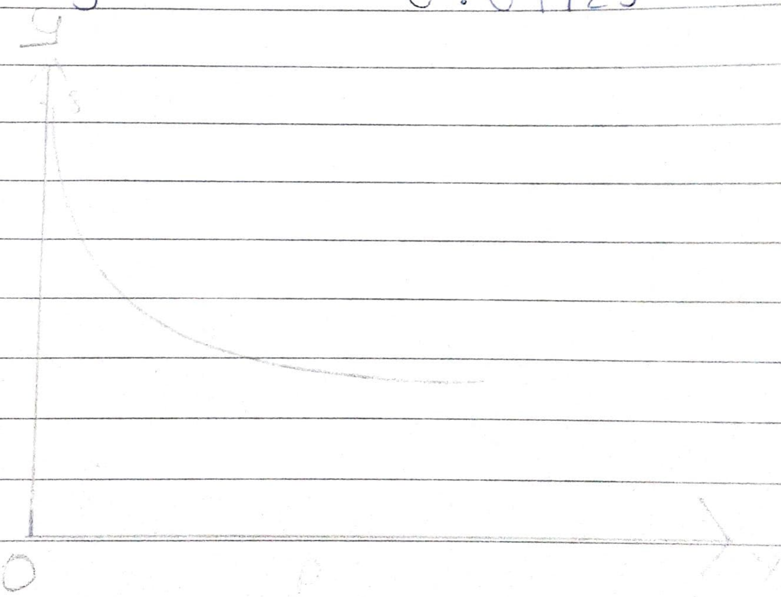
$\cancel{1.3} \; \cancel{0.3} = 1.416666667 i$

$\frac{0.3}{1.416666667} = i$

$21.1764705551 = i$

Ans 8) $i = 8.1$

p	$i^{(p)}$
2	0.07846
3	0.07770
4	0.0775
5	0.07725



Ans 9) i) Force of intrest refers to a nominal intrest / discount rate compounded continuously over a period of time.

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ii) $i^{(2)} = 0.0775$

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

$i = 7.9001\%$

$d =$

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

$= 7.60361\%$

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

$$= \left(1-\frac{0.0721679961}{12}\right)^{12}$$

$$= (1-0.00610139996)^{12}$$

$d^{12} = 7.57\%$

$$i^{(0.5)} = 0.5\left[(1.079001)^{\frac{1}{0.5}} - 1\right]$$

$= 8.21\%$