FINA 0025 –Financial Management

Question 1

Choice “c” is correct. All other things being equal, longer maturity bonds have greater duration than shorter maturity bonds, and lower coupon bonds have greater duration than higher coupon bonds. Greater duration means greater bond price volatility when interest rates change. Bond “c” has the combination of the longer maturity and lower coupon.

Choice “a” is incorrect. Since bond “c” has lower coupon than bond “a”, bond “c” will have greater volatility.
Choice “b’ is incorrect. Since bond “c” has a longer maturity than bond “b”, bond “c” will have greater volatility.
Choice “d” is incorrect. Since bond “c” has longer maturity and lower coupon than bond “d”, bond “c” will have greater volatility.

Question 2

Pricing the 180 day T-bill
Interest rate factor = (n/365)×r = (180/365)×0.06 = 2.959%
Price = 100,000/[1 + 0.02959] = $97,126.13
Pricing the 90 day T-bill
Price = 100,000/[1 + (90/365)×0.06] = $98,542.12

Price approaches the face value as bill approaches maturity.

Question 3

Given: P_n = $1,000, n = 5 years, and k_d = YTM = 8%
a) P_0 = 1000/1.085 = $680.58

b) The price has risen so you’d expect the YTM to be lower
New price, P_0 = 700 = 1000/(1 + k_d*)5
k_d* = (1000/700)1/5 - 1 = 7.39% or 7.4%
Note: Prices and yields are inversely related

Question 4

Given: Coupon rate = 10%, n = 5 years, P_n = $1,000, k_d = 8%
a) P_0 = 100[(1 - 1.08-5)/0.08] + 1000/1.085
P_0 = 399.27 + 680.58 = $1079.85
The bond is selling at a premium of $79.85 (= 1079.85 - 1000) above face value because YTM < Coupon rate promised

b) P_4 = (100 + 1000)/1.08 = $1018.52
Note: Price does not include the coupon paid in that year

c) Price immediately before maturity?

d) Price of a zero coupon bond, P_0 = 1000/1.085 = $680.58

Question 5

Both bonds are currently selling at par (why?)

Price of bonds A and B

$P_0^{A} = 100[(1 - (1 + k_d)^{-2})/k_d] + 1000/(1 + k_d)^2$

$P_0^{B} = 100[(1 - (1 + k_d)^{-20})/k_d] + 1000/(1 + k_d)^{20}$

Effect of market interest rate changes on prices

6%: P_0^{A} = \$1073.34 (+7.33%) P_0^{B} =\$1458.80 (+45.88%)

8%: P_0^{A} = \$1035.67 (+3.57%) P_0^{B} = \$1196.36 (+19.63%)

12%: P_0^{A} = \$966.20 (-3.38%) P_0^{B} = \$850.61 (-14.94%)

14%: P_0^{A} = \$934.13 (-6.59%) P_0^{B} = \$735.07 (-26.49%)

Question 6

Given: P_{t+1} = \$5.00, D_{t+1} = \$0.50 and k_e = 10%

$$P_t = \frac{0.50 + 5.00}{1 + 0.10} = \$5.00$$

If the current price changes to \$4.80, the expected return rises to

$$k_e = \frac{0.50 + 5.00}{4.80} - 1 = 14.6\%$$

Note that prices and expected returns are inversely related

Question 7

Given: D_1 = 0.26, g = 0.05 and ke = 0.10

a) P_0 = 0.26/(0.10 - 0.05) = \$5.20

b) P_1 = D2/(ke - g) = 0.26(1.05)/(0.10 - 0.05) = \$5.46 (a 5% rise)

c) ke = D_1/P_0 + g or g = ke - D_1/P_0

g = 0.10 - 0.26/4.75 = 0.0453 or 4.5%

d) Sensitivity of Telstra's price to changes in expectations of g

g = 3%:P_0 = 0.26/(0.10 - 0.03) = \$3.71 (-28.7%)

g = 4%:P_0 = 0.26/(0.10 - 0.04) = \$4.33 (-16.7%)

g = 5%:P_0 = 0.26/(0.10 - 0.05) = \$5.20

g = 6%:P_0 = 0.26/(0.10 - 0.06) = \$6.50 (+25.0%)

g = 7%:P_0 = 0.26/(0.10 - 0.07) = \$8.67 (+66.7%)

e) Sensitivity of Telstra's price to changes in ke

ke = 8%: P_0 = 0.26/(0.08 - 0.05) = \$8.67 (+66.7%)

ke = 9%: P_0 = 0.26/(0.09 - 0.05) = \$6.50 (+25.0%)

ke = 10%: P_0 = 0.26/(0.10 - 0.05) = \$5.20

ke = 11%: P_0 = 0.26/(0.11 - 0.05) = \$4.33 (-16.7%)

ke = 12%: P0 = 0.26/(0.12 - 0.05) = \$3.71 (-28.7%)

Question 8

a) Payout ratio, α = 0.758 and growth in dividends, *g =5%*

$$P_0 = \frac{\alpha E_1}{k_e - g} = \frac{0.758 \times 0.343}{0.10 - 0.05} = \$5.20$$

b) P/E ratio = 5.20/0.343 = 15.2

Question 9

FALSE. The percent price decline for longer maturity bond will be higher than for the shorter maturity bond, all else being the same.

Question 10

Par =1000 C = 5% t = 7 m = 2
c = C/m = 2.5%
n = t × m = 14
R = 6%
i = R/m = 3%

Z = 1/ (1+0.03) = 0.9709
Z_14 = 0.9709^{14} = 0.6612
A_14 = (1-0.6612) / 0.03 = 11.2961

Annuity value = 11.2961 × 0.025 × 1000 = $282.40
Principal Value = 0.6612 × 1000 = $661.12
Bond Value = $282.40 + $661.2 = $943.52

Question 11

Here only the principal repayment matters
Z_14 (r = 6%) × 1000 = $661.12
Note that this has to be the same as the calculation of the principal value in Question 16

Question 12

As a bond approaches maturity its price approaches the bond's par value.

Question 13

Dividend Last year was £2m/3m = £0.67

Next years dividend is £0.67*(1.1) = £0.74
Year After £0.74*(1.07) = £0.79
Year After £0.79*(1.06) = 0.84
Year After £0.84*(1.03) =0.87

PV = £0.74/(1+r) + £0.79/(1+r)^2 +0.84/(1+r)^3 +0.87/(r-0.03)(1+r)^3

With r = 15%

PV = £0.74/(1.15) + £0.79/(1.15)^2 +0.84/(1.15)^3 +0.87/(0.15-0.03)(1.15^3)

= 0.6435 +0.5974 +0.5523 + 4.7670
=**6.5602**

Question 14
a) There will be a increasing in the stable growth rate; the discount rate will also go up.
b) The stable growth rate will be higher, if the economy is growing faster.
c) The stable growth rate will not be affected, but the high growth period for this company will be longer.
d) Again the stable growth rate will be unaffected, but the high growth period and growth rate will be higher.

Question 15
All other factors constant, the longer the maturity, the greater the price change when interest rates change. So, Bond B is the answer.

Question 16

Quoted Price	Price per $1 of par value	Par value	Dollar price
96 ¼	*0.9625*	$1,000	*962.50*
102 7/8	*1.0288*	$5,000	*5,143.75*
109 9/16	*1.0956*	$10.000	*10,956.25*
68 11/32	*0.6834*	$100,000	*68,343.75*

Question 17
Correct answer: C. You would prefer the prize with the highest present value. The present value of each payment option is as follow:

Prize B: $250\ 000 \times \frac{1-(1+0.08)^{-5}}{0.08} = \$998{,}178$

Prize C: $\frac{1\ 500\ 000}{(1.08)^5} = \$1{,}020{,}875$

Prize D: $\frac{500\ 000}{(1.08)^1} + \frac{600\ 000}{(1.08)^2} = \$977{,}36$

Question 18
Correct answer: B. We need to compute an annuity whose future value is $50,000 usning the following future value of an annuity expression

$$Fn = C \times \frac{(1+r/m)^{n\times m} - 1}{r/m} \Leftrightarrow 50{,}000 = C \times \frac{(1+0.08/1)^{5\times 1} - 1}{0.08/1}$$

$$C = 50000 / \left[\frac{(1+0.08/1)^{5\times 1}}{0.08/1} \right] = \$8{,}522.82$$

Question 19

Correct answer: D. We first need the effective annual interest rate as the stated rate is compounded quarterly but the cash flows occur annually. The effective annual interest rate is:

$$\left(1+\frac{0.08}{4}\right)^4-1=8.2432\%$$

We next the future value of an annuity earning a compounded return of 8.2432% per annum at the end of 5 years, which is:

$$F_n=A\times\frac{(1+r)^n-1}{r}=10000\times\frac{(1+0.082432)^5-1}{0.082432}=\$58,951.19$$

Question 20

Correct answer: C. The annual payment C on the ten-year loan with an interest rate of 12%and monthly compounding is;

$$250000=C\times\frac{1-(1+r/m)^{-n\times m}}{r/m}\Leftrightarrow 250000=C\times\frac{1-(1+0.12/12)^{-10\times 12}}{0.12/12}$$

$$C=250000/\left(\frac{1-(1+0.12/12)^{-10\times 12}}{0.12/12}\right)$$

$$C=250000/69.7005=\$3,586.77$$

Question 21

Correct answer: B. The annual payment C on the ten-year loan with an interest rate of 12% and monthly compounding was computed as $3,586.77 in the previous question. Since there are four years remaining on the loan, the principal outstanding P now is:

$$P=3,586.77\times\frac{1-(1+0.12/12)^{-4\times 12}}{0.12/12}=\$136,204$$

Question 22

Correct answer: D. The effective annual interest rate on this loan is:

$$\left(1+\frac{0.12}{12}\right)^{12}-1=12.68\%$$

Question 23

Correct answer: C. Based on the current dividend yield and market price we can get the current dividend per share as:

Current dividend per share = 0.04 (15.00) = \$0.60

A retention ratio of 60% implies a payout ratio of: 1-0.60 = 40%

This implies that the earnings per share of the firm is: 0.60/0.40 = \$1.50

So, the P/E ratio = 15.00/1.50 = 10.0

Question 24
Correct answer: B. the information given is D_5 = \$1.00, g=5%, K_e=15%

$P_4 = D_5 / (k_e - g) = 1.00 / (0.15 - 0.05) = \$10.00$

So, $P_0 = P_4/(1+K_e)^4 = 10.00/1.15^4 = \$5.72$

Question 25
Correct answer: A. This is an efficient portfolio with a standard deviation that is half that of the market portfolio since the portfolio's standard deviation is $\sigma_P = W_m \sigma_m$ where $W_m = 0.5$. It will lie to the left of the market portfolio on the CML as we are lending half of our funds at the riskfree rate and investing the remaining funds in the market portfolio. So statement III is true and I and II are false.

Question 26
Correct answer: A. You need to think through the problem. Right now the yield to maturity is 10% (why?). the yield to maturity on the bonds has to be 10% if they are selling at par and the deferred coupons are being 'reinvested" (that is the penalty of 10% p.a.) at the firm's promised (coupon) rate which equals the yield to maturity right now. One can compute the cash flows and show this to be the case but that is not really required. That is:

$P0 = 1000 = 1000 + [100 (1.10)^3 + 100 (1.10)^2 + 100 (1.10) +100] / (1+r)^4$

Note that the cash flows in the square brackets above are what the firm has to pay (coupon plus the penalty paid by the firm on each coupon) at the end of year 4. Solving for r gives a rate of return of 10%.

Question 27
Correct answer: B. An expected return on the portfolio of 10% implies the following weights in securities B (W_B) and C (W_c).

$E (r_P) = 0.50 (0.08) + W_B (0.10) + (0.5 - W_B) (0.15)$

So, $W_B = 0.30$ and $W_C = 0.20$

$\sigma_P^2 = 0.5^2 (0.040) + 0.3^2 (0.250) + 0.2^2 (0.090) + 2 (0.5) (0.3) (0.015) + 2 (0.5) (0.2) (0.030) + 2 (0.3) (0.2) (0.060)$

$\sigma_P^2 = 0.0538$

Question 28

Correct answer: D. All three expressions are correct. The first expression uses the covariance formula. The second expression uses the correlation formula (where the correlation is +1.0). The third expression also uses the correlation formula and simplifies the second expression.

Question 29

Correct answer: D. The return distribution for the stock is as follow.

State of the Economy	Probability	Total Cash Flows	Rate of return
Boom	0.25	$8.00	60.0%
Normal	0.50	$7.00	40.0%
Recession	0.25	$4.00	-20.0%

The rates of return are computed $(P_t + D_t + P_{t-1}) / P_{t-1}$

$E(r) = 0.25 (0.60) + 0.50 (0.40) + 0.25 (-0.20) = 30\%$

$\sigma_P^2 = 0.25 (0.60 – 0.30)^2 + 0.50 (0.40 – 0.30)^2 + 0.25 (-0.20 – 0.30)^2 = 0.09$

So, $\sigma_P = 0.09^{1/2} = 30\%$