INV2601 2011 MAY JUNE EXAM MEMORANDUM

Question	Answer	Solution
1.	**1**	Asset allocation
2.	**1**	$HPR = \frac{Ending\ value}{Beginning\ value}$ $Annual\ HPY = HPR^{1/N}$ $1.0456 = X^{1/5}$ $1.0456 = X^{0.20}$ $X = 1.0456^{5}$ $X = 1.25$ $1.25 = X = \frac{Ending\ value}{Beginning\ value}$ $1.25 = \frac{1\ 500}{?}$ $Beginning\ value = \frac{1\ 500}{1.25}$ $= R1\ 200$
3.	**4**	Unlimited. Short sales involve the sale of shares the investor does not own with the intention of buying them back at a lower price at a later stage. If the price of the shares increases and the short seller wants to buy back the shares, he would be make a loss because he would be buying the shares at a higher price than he initially sold them for. The loss is dependent on how high the price increases. Therefore, the maximum possible loss is unlimited.
4.	**3**	Stop buy order
5.	**2**	Market value weighted series
6.	**1**	There are two versions of the formula, portfolio standard deviation (δ_{P}): $1. Portfolio\ standard\ deviation\ (\delta_p)$ $= \sqrt{[\mathrm{w_{SI}}^2 \times \delta_{\mathrm{SI}}{}^2] + [\ \mathrm{w_{RFA}}^2 \times \delta_{\mathrm{RFA}}{}^2] + \ [2 \times \mathrm{w_{SI}} \times \mathrm{w_{RFA}} \times \mathrm{COV_{SI,RFA}}\ ]}$

		OR $2. Portfolio\ standard\ deviation\ (\delta_p)$ $= \sqrt{[w_{SI}^2 \times \delta_{SI}^2] + [\ w_{RFA}^2 \times \delta_{RFA}^2] + [2 \times w_{SI} \times w_{RFA} \times r_{SI,RFA} \times \delta_{SI} \times \delta_{RFA}}$ NB: $COV_{SI,RFA} = r_{SI,RFA} \times \delta_{SI} \times \delta_{RFA}$ $Note\ that\ the\ 2nd\ formula\ is\ an\ expansion\ of\ the\ 1st\ formula.$ $\boldsymbol{Where}$: $w_{SI} = weight\ of\ the\ share\ index$ $w_{RFA} = weight\ of\ the\ risk\ free\ asset$ $\delta_{SI} = standard\ deviation\ of\ the\ share\ index$ $\delta_{RFA} = standard\ deviation\ of\ the\ risk\ free\ asset$ $COV_{SI,RFA} = covariance\ of\ the\ share\ index\ and\ risk\ free\ asset$ $r_{SI,RFA} = correlation\ coefficient\ between\ the\ share\ index\ and\ the\ risk\ free\ asset$ A risk free asset has no risk therefore its standard deviation [δ_{RFA}] is 0 because its expected return will equal its actual return. If you insert 0 to replace δ_{RFA} in the above formulas, the only remaining part of the formula will be $= \sqrt{w_{SI}^2 \times \delta_{SI}^2}$. This is because the other two parts of the formula will be cancelled off to 0. $Portfolio\ standard\ deviation\ (\delta_P) = \sqrt{w_{SI}^2 \times \delta_{SI}^2}$ $= \sqrt{0.3^2 \times 100}$ $= 3.00\%$
7.	**4**	Changes in the market premium
8.	**3**	Undiversifiable risk and return for all assets

9.	**2**	FV 1000 PMT 25 (100 $\div$ 4) I/YR 2 (8 $\div$ 4) N 28 (7 $\times$ 4) $COMP\ PV\ R$1 106.41
10.	**2**	$\boldsymbol{BEG\ MODE}$ PMT 10 000 N 40 (10 $\times$ 4) I/YR 2.25 (9 $\div$ 4) $COMP\ PV\ R$267 828.76 FV 267 828.76 N 20 (5 $\times$ 4) $I\ YR$ 2.25(9 $\div$ 4) $COMP\ PV\ R$171 629.08

11.	**4**	$Retention\ rate\ (RR) = 1 - dividend\ payout\ \left({}^{D}/_{E}\right)$ $= 1 - 0.40$ $= 0.60$ $growth\ (g) = RR \times ROE$ $= 0.60 \times 30\%$ $= 18\%$ $k = \frac{D_1}{P_0} + g$ $= \frac{2.50}{15} + 0.18$ $= 0.1667 + 0.18$ $= 34.67\%$ $The\ expected\ return\ (34.67\%)\ is\ greater\ than\ the\ required\ rate\ of$ $return\ (27\%). The\ share\ is\ therefore\ undervalued.$
12.	**3**	The formula for the two stage dividend growth model is as follows: $V_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{P_2}{(1+r)^2}$ $Where: P_2 = \frac{D_3}{k-g}$ Step 1: Determine the expected future cash flows: $D_0 = R1.00$ $D_1 = 1.00(1.20) = R1.20$ $D_2 = 1.20(1.20) = R1.44$ $D_3 = 1.44(1.05) = R1.512$

$$P_2 = \frac{1.512}{0.08 - 0.05}$$

$$= R50.40$$

Step 2: Calculate the intrinsic value of the share:

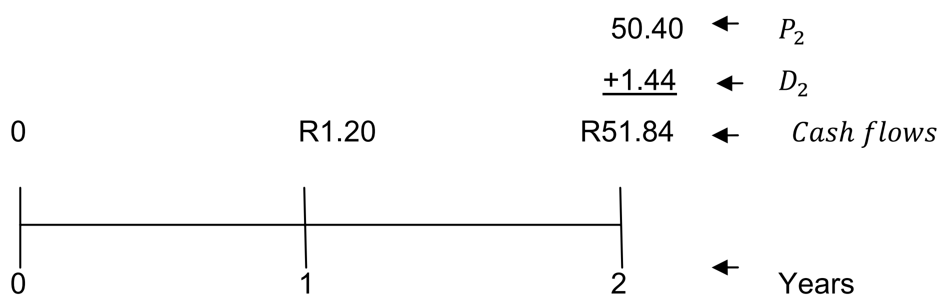
$$V_0 = \frac{1.20}{1.08} + \frac{1.44}{(1.08)^2} + \frac{50.40}{(1.08)^2}$$

$$= 1.1111 + 1.2346 + 43.2099$$

$$= R45.56$$

OR

Having completed the first step, you can also use your financial calculator to complete the second step as follows.



CF_0 0

CF_1 1.20

CF_2 51.84

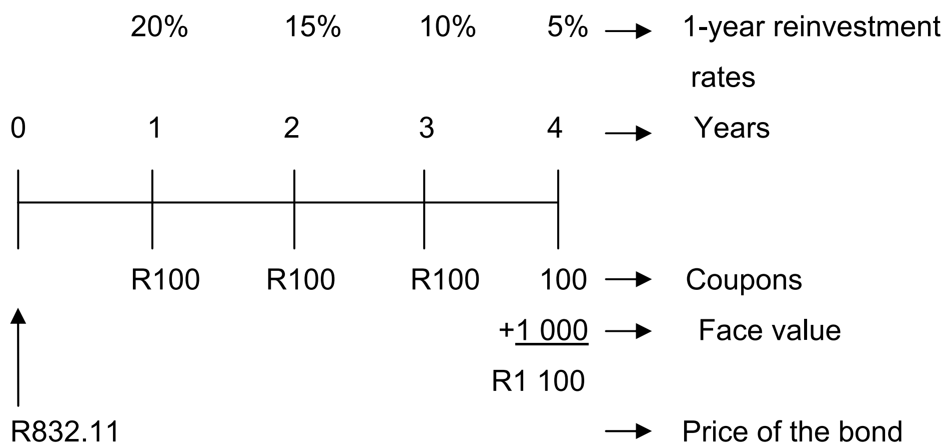
I/YR 8%

$COMP$ $\boldsymbol{NPV}$ $R45.56$

13.	**2**	$growth\ (g) = RR \times ROE$ $= 0.75 \times 20\%$ $= 15\%$ $Required\ rate\ of\ return = 18\%$ $V_O = \frac{D_1}{k - g}$ $= \frac{1.00}{0.18 - 0.15}$ $= R33.33$
14.	**2**	$NAV = \frac{50\ 000\ 000 - 20\ 000\ 000}{6\ 000\ 000}$ $= R5$ $= \frac{7.25 - 5}{5} = 45\%$ The share is trading at a premium of 45% compared to similar companies trading at a premium of 30% to NAV. At the NAV of R5 and a premium of 30% regarded as the norm, the share should trade at R5 (1.30) = R5.60 and not R7.25. The NAV indicates the share is overvalued and offers an opportunity to sell.
15.	**4**	Slow growth of income, lower inflation rates and higher domestic real interest rates relative to trading partners
16.	**2**	Changes in consumer price index for services, average prime rate charged by banks and ratio of trade inventories to sales
17.	**3**	Mature growth
18.	**1**	$Inventory\ turnover = \frac{cost\ of\ sales}{inventory}$

		$= \frac{30\ 500}{74\ 500}$ $= 0.41 \times$ $Debt\ to\ equity = \frac{long\ term\ debt + short\ term\ debt}{total\ owners\ equity}$ $= \frac{95\ 500 + 14\ 500}{155\ 000}$ $= 70.97\%$
19.	**3**	Capital employed
20.	**4**	Defensive shares and growth companies
21.	**4**	$growth\ (g) = Retention\ rate\ (RR) \times ROE$ $= 0.50 \times 20\%$ $= 10\%$ $k = 8 + 1.2(12 - 8)$ $= 12.80\%$ $P_0/E_1 = \frac{D_1/E_1}{k-g} = \frac{1-RR}{k-g}$ $= \frac{0.50}{0.128 - 0.10}$ $= 17.86 \times$ $P_0 = P_0/E_1 \times E_1$ $= 17.86 \times 5.50$ $= R98.23$

		$Where:$ $Dividend\ payout\ \left({}^{D_1}/_{E_1}\right) = 1 - Retention\ rate\ (RR)$ $= 1 - 0.50$ $= 0.50$ $D = dividends\ per\ share$ $E = earnings\ per\ share$ $NB: Dividend\ payout\ is\ the\ percentage\ of\ firm's\ earnings\ that\ are\ bein$ $paid\ out\ as\ dividends.$ $E_1 = E_0\,(1+g)$ $= 5(1.10)$ $= R5.50$
22.	**2**	The price confirms the trend
23.	**1**	$FV\ 100\ 000$ $PMT\ 0$ $N\ 50\ (25\ \times 2)$ $I/YR\ \ 7\%\ (14\ \div 2)$ $COMP\ PV\ R3\ 394.78$
24.	**2**	$Yield\ to\ call:$ $FV\ 860$ $PV - 828.41$

		$N\ 24\ (12\ \times 2)$ $PMT\ 40\ (80\ \div 2)$ $COMP\ I/YR\ 4.915\%$ $=\ 4.915\%\ \times 2$ $= 9.83\%$
25.	**3**	 Step 1**:** Calculate the future value of the coupon payments received. $= 100(1.15)(1.10)(1.05) +\ 100(1.10)(1.05) + 100(1.05) +\ 100$ $= 132.825 + 115.50 + 105 + 100$ $= R453.325$ Step 2: Add the face value of the bond to the future value of the coupon payments. $= 1000 + 453.325$ $=\ R1\ 453.325$ Step 3: Calculate the actual yield received. $FV\ 1\ 453.325$ $PV - 832.11$

		$N\ \ 4$ $COMP\ I/YR\ \ 14.96\%$
26.	**3**	$\boldsymbol{6\ month\ spot\ rate}$: $\frac{104}{(1+x)} = 98.50$ $\frac{104}{98.50} = 1 + x$ $1.0558 = 1 + x$ $x = (1.0558 - 1) \times 2\ \times 100$ $= 11.17\%$ In the case of Bond A with 6 months to maturity, the annual coupon rate and the yield to maturity do not have the same rate. *Hence you first have to calculate the 6 month spot rate* before you proceed to calculate the 12 month spot rate. If the annual coupon rate and the yield to maturity have the same rate, you will take the *6 month spot rate to be equal to the yield to maturity* and you do not have to calculate the 6 month spot rate. $\boldsymbol{12\ month\ spot\ rate}$: $\frac{5}{1.0558} + \frac{105}{(1+x)^2} = 99.20$ $4.7357 + \frac{105}{(1+x)^2} = 99.20$ $\frac{105}{(1+x)^2} = 94.4643$

		$\frac{105}{94.4643} = (1+x)^2$ $1.1115 = (1+x)^2$ $1.1115^{0.5} = 1 + x$ $1.0543 = 1 + x$ $x = (1.0543 - 1) \times 2 \times 100$ $= 10.86\%$
27.	**1**	A 2% coupon, 20 year bond with a yield to maturity of 8%
28.	**3**	$Total\ \ effect = \ \ duration\ effect + convexity\ effect$ $\%\Delta P_{\ T(-1)} = -D(-\Delta y) + \left[C\left(\frac{\Delta y}{100}\right)^2 \times 100 \right]$ $= -11.53(-1) + [93.07(0.01)^2 \times 100]$ $= 11.53 + 0.9307$ $= 12.46\%$ $\%\Delta P_{\ T(+1)} = -D(\Delta y) + \left[C\left(\frac{\Delta y}{100}\right)^2 \times 100 \right]$ $= -11.53(+1) + [93.07(0.01)^2 \times 100]$ $= -11.53 + 0.9307$ $= 10.60\%$
29.	**3**	Market price (R105) > Theoretical futures price (R102) Cash and carry arbitrage Sell futures, buy spot and borrow money
30.	**4**	Value of a call option = max [0; S - X]. An increase in X will decrease the value of the call option. Value of a put option = max [0; X – S]. An increase in X increases the value of the put option.

31.	**3**	$Break\ even = X + p$ $= 60 + 3$ $= R63$ $Profit = 80 - 63$ $= R17$
32.	**3**	Put option is in the money when X > S. Therefore; $X = 65 + 3$ $= R68$
33.	**1**	$c - p \leq S - X(1 + r)^{-t}$ $5 - 1.50 \leq 45 - 40(1.12)^{-0.25}$ $3.50 \leq 45 - 38.88$ $3.50 \leq 6.12$ $Arbitrage\ profit = 6.12 - 3.50$ $= R2.62$
34.	**2**	$p \geq X(1 + r)^{-t} - S$ $\geq 210(1.08)^{-0.5} - 200$ $\geq 202.07 - 200$ ≥ 2.07
35.	**2**	Long call and Short put
36.	**4**	Protective put
37.	**4**	$K_P = (0.4 \times 11) + (0.6 \times 18)$ $= 4.40 + 10.80$ $= 15.20\%$

38.	**3**	Fixed 7.20 - 5.60 1.60 Floating 10.80 – 10.20 <u>(0.60)</u> Advantage ....1.00 Intermediary ....<u>(0.50)</u> Advantage for both P & Q 0.50 $Advantage\ for\ P = \frac{0.50}{2} = 0.25\%$ $Advantage\ for\ Q = \frac{0.50}{2} = 0.25$ $Effective\ interest\ for\ P = 5.60 - 0.25$ $= 5.35\%$ $Effective\ interest\ for\ Q = 10.80 - 0.25$ $= 10.55\%$
39.	**3**	Yield spread analysis
40.	**1**	$Portfolio\ X = 25 - [6 + 0.7(16 - 6)$ $= 25 - [\ 6 + 7]$ $= 25 - 13$ $= 12\%$ $Portfolio\ Y = 28 - [6 + 1.2(16 - 6)]$ $= 28 - [6 + 12]$ $= 28 - 18$ $= 10\%$ $Portfolio\ X\ has\ an\ excess\ return\ of\ 12\%.$