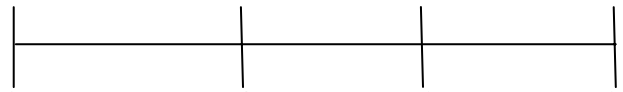
INV2601 OCT/NOV 2011 EXAM MEMORANDUM

Question	Correct Option	Solution
1.	3	Systematic risk
2.	1	$E(r) = 8(0.4) + 10(0.35) + 12(0.25)$ $= 3.20 + 3.50 + 3$ $= 9.70\%$ $\sigma_p = \sqrt{0.40(8-9.70)^2 + 0.35(10-9.70)^2 + 0.25(12-9.7)^2}$ $= \sqrt{1.1560 + 0.0315 + 1.3225}$ $= \sqrt{2.5100}$ $= 1.5843\%$ $Coefficient\ of\ variation\ (CV) = \frac{\sigma_p}{E(r)}$ $= \frac{1.5843}{9.70}$ $= \mathbf{0.16}$
3.	1	$HPR = \frac{Ending\ value\ (including\ cash\ flows)}{Beginning\ value}$ $= \frac{43+2}{35}$ $= 1.2857$ $Real\ rate\ of\ return = \left[\left(\frac{HPR}{1 + rate\ of\ inflation} - 1\right)\right] \times 100$ $= \left[\left(\frac{1.2857}{1.06} - 1\right)\right] \times 100$ $= 0.2129 \times 100$ $= \mathbf{21.29}\%$
4.	2	Secondary market
5.	4	Nominal risk-free rate of return

6.	1	A highly risk averse investor prefers an investment that has a low rate of return and therefore low risk. Investment A would be the optimal investment for this investor as it has the lowest rate of return and risk.
7.	2	(i) Maximum (ii) Minimum
8.	4	$k = r_f + \beta(r_m - r_f)$ $15 = 6 + \beta(12 - 6)$ $\beta = \frac{15 - 6}{12 - 6}$ $\boldsymbol{\beta = 1.50}$
9.	1	$Estimated\ rate\ of\ return\ = 14\%$ $Required\ rate\ of\ return\ = r_f + \beta(r_m - r_f)$ $= 8 + 1.3(10 - 8)$ $= 10.6\%$ Estimated rate of return is greater than the required rate of return therefore the share is **undervalued**. The difference between the estimated rate of return and the required rate of return is (=14 – 10.60) **3.40%.**
10.	3	$CF_0 = -200\ 000$ $CF_1 = 50\ 000$ $CF_2 = 80\ 000$ $CF_3 = 100\ 000$ $CF_4 = 20\ 000$ $I/YR = 7\%$ $\boldsymbol{COMP\ NPV = R13\ 491.76}$ The investment is acceptable because the NPV is greater than R0 thus it will add value to the firm.
11.	2	$PMT = 1\ 000$ $N = 5$ $I/YR = 25\%$ $COMP\ PV = R2\ 689.28$

		$FV = 2\,689.28$ $N = 2$ $I/YR = 25\%$ $\boldsymbol{COMP\ PV = 1\,721.14}$
12.	2	$Growth\ rate = \ retention\ rate\ (RR) \times return\ on\ equity\ (ROE)$ $Retention\ rate\ (RR) = 1 - Dividend\ payout(\ {}^{D_0}/_{E_0})$ $= 1 - 0.4$ $= 0.6$ $ROE = net\ profit\ margin\ \times total\ asset\ turnover\ \times financial\ leverage$ $= 16\% \times 1.2 \times 0.8$ $= 15.36\%$ $g = RR \times ROE$ $= 0.6 \times 15.36\%$ $= \mathbf{9.22}\%$
13.	1	The formula for the three stage dividend model is as follows: $V_0 = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \frac{P_3}{(1+k)^3}$ $Where: P_3 = \frac{D_4}{k-g}$ **Step 1:** Calculate the expected future cash flows: $D_0 = 1.00$ $D_1 = 1.00(1.20) = 1.20$ $D_2 = 1.20(1.15) = 1.38$ $D_3 = 1.38(1.10) = 1.518$ $D_4 = 1.518(1.04) = 1.5787$ $P_3 = \frac{D_4}{k-g}$ $= \frac{1.5787}{0.10 - 0.04}$ $= R26.312$

		Step 2: Calculate the intrinsic value: $V_0 = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \frac{P_3}{(1+k)^3}$ $= \frac{1.20}{(1.10)^1} + \frac{1.38}{(1.10)^2} + \frac{1.518}{(1.10)^3} + \frac{26.312}{(1.10)^3}$ $= 1.0909 + 1.1405 + 1.1405 + 19.7683$ $= \boldsymbol{R23.14}$ Or Having completed the first step, you can also use your financial calculator to complete the second step as follows. 26.312 ← P_3 +1.518 ← D_3 0 R1.20 R1.38 R27.83 ← $Cash\ flows$  0 1 2 3 ← Years $CF_0 = 0$ $CF_1 = 1.20$ $CF_2 = 1.38$ $CF_3 = 27.83\ (1.518 + 26.312)$ $NB: CF_3 = D_3 + P_3$ $I/YR = 10\%$ $\boldsymbol{COMP\ NPV = R23.14}$
14.	4	$V_P = \frac{D}{k}$ $= \frac{0.065 \times 100}{0.05}$ $= \boldsymbol{R130}$
15.	3	Selling previously bought government securities

16.	4	c, a and b. Analysis of macroeconomic factors, industry analysis and company valuation.
17.	1	Pioneering development.

18.	4	$Growth\ rate\ (g) = RR \times ROE$ $= 0.50 \times 20\%$ $= 10\%$ $P_0/_{E_1} = \dfrac{D_1/_{E_1}}{k-g} = \dfrac{1-RR}{k-g}$ $= \dfrac{0.50}{0.14-0.10}$ $= 12.50$ $E_1 = E_0 \times (1+g)$ $= 5.00(1.10)$ $= R5.50$ $P_0 = {}^{P_0}/_{E_1} \times E_1$ $= 12.50 \times 5.50$ $= \boldsymbol{R68.75}$ $Where$: $Dividend\ payout\ ({}^{D_1}/_{E_1}) = 1 - Retention\ rate(RR)$ $= 1 - 0.50$ $= 0.50$ $D = dividends\ per\ share$ $E = earnings\ per\ share$ NB: $Dividend\ payout\ is\ the\ percentage\ of\ firm's\ earnings\ that\ are\ being$ $paid\ out\ as\ dividends.$
19.	3	$V_0 = \dfrac{D_1}{k-g}$ $= \dfrac{D_0(1+g)}{k-g}$

		$= \frac{1.50(1.04)}{0.09 - 0.04}$ $= \frac{1.56}{0.09 - 0.04}$ $= \boldsymbol{R31.20}$
20.	2	$Return\ on\ assets\ ratio = \frac{Net\ profit\ after\ tax}{Tot\ al\ assets}$ $= \frac{3\ 850}{265\ 000}$ $= \mathbf{1.45}\%$ $Debt\ to\ equity\ ratio = \frac{Long\_term\ debt + short\_term\ debt}{Total\ owners'equity}$ $= \frac{95\ 500 + 14\ 500}{155\ 000}$ $= \mathbf{70.97}\%$
21.	3	Changes in trends are caused by shifts in the supply and demand relationship.
22.	1	Ratio of the price of the share to a market index has trended upward.
23.	2	Calculate the yield to call: $FV \quad 1\ 220$ $PV \quad -1\ 461.87$ $PMT \quad 35 \quad (0.14/4 \times 1\ 000)$ $N \quad 32 \quad (8\times 4)$ $\boldsymbol{COMP\ I/YR} \quad 2.0214$ $= \quad 2.0214 \times 4$ $= \mathbf{8.09}\%$
24.	1	The duration of a zero-coupon bond will always be greater than its term to maturity.
25.	3	Calculate the yield to maturity: $FV \quad 1\ 000$ $PV \quad -1\ 200$ $PMT \quad 90$

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$N \quad 30$
$COMP\ I/YR\ 7.33\%$

Calculate the bond equivalent yield:
$= \left[(1 + EY)^{\frac{1}{2}} - 1\right] \times 100 \times 2$
$= \left[(1 + 0.0733)^{\frac{1}{2}} - 1\right] \times 100 \times 2$
$= 0.036 \times 100 \times 2$
$= \mathbf{7.20}\%$
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$= \frac{(1.1340)^3}{(1.092)^2}$
$= \frac{1.4583}{1.1925}$
$= 1.2229$
$= (1.2229 - 1) \times 100$
$= \mathbf{22.29}\%$
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<td>27.</td>
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<tr><td></td><td>$\boldsymbol{V_-}$</td><td>$\boldsymbol{V_0}$</td><td>$\boldsymbol{V_+}$</td><td></td></tr>
<tr><td>FV</td><td>1000</td><td>1000</td><td>1000</td><td></td></tr>
<tr><td>PMT</td><td>50</td><td>50 $(0.10/2 \times 1\,000)$</td><td>50</td><td></td></tr>
<tr><td>I/YR</td><td>$4.75\%\ (9.5 \div 2)$</td><td>$5.50\%\ (11 \div 2)$</td><td>$6.25\%\ (12.5 \div 2)$</td><td></td></tr>
<tr><td>N</td><td>30</td><td>30 (15×2)</td><td>30</td><td></td></tr>
<tr><td>COMP PV</td><td>R1 039.5510</td><td>R927.3313</td><td>R832.4461</td><td></td></tr>
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$Duration = \frac{1\,039.5510 - 832.4461}{2 \times 927.3313 \times (1.5/100)}$
$= \frac{207.1049}{27.8199}$
$= \mathbf{7.44}$
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$Convexity = \frac{1\,039.5510 + 832.4461 - (2 \times 927.3313)}{2 \times 927.3313 \times (1.5/100)^2}$

$= \frac{17.3345}{0.4173}$
$= \mathbf{41.54}$
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29.	4	They are highly liquid owing to the standardised nature of all contracts.
30.	1	Lower bound $c \geq S - X(1+r)^{-t}$ $\geq 325 - 330(1.08)^{-0.5}$ $\geq 325 - 317.5426$ $\geq \boldsymbol{R7.46}$ Upper bound $c \leq S$ $\leq \boldsymbol{R325}$
31.	4	Value of a call option = max [0; S - X]. A decrease in X will increase the value of the call option. Value of a put option = max [0; X – S]. A decrease in X will decrease the value of the put option.
32.	3	an option's sensitivity to changes in the spot price of the underlying
33.	4	Straddle
34.	2	$Put - call\ parity$: $S + p = c + X(1+r)^{-t}$ $102 + p = 6 + 100(1.07)^{-0.5}$ $p = 6 + 96.6736 - 102$ $\boldsymbol{p = R0.67}$
35.	2	$Standard\ deviation\ of\ a\ portfolio$: $= \sqrt{(0.18^2 \times 0.7^2) + (0.15^2 \times 0.3^2) + (2 \times 0.18 \times 0.15 \times 0.7 \times 0.3 \times 0.65)}$ $= \sqrt{(0.0159 + 0.0020 + 0.0074)}$ $= \sqrt{0.0253}$ $= 0.0159 \times 100$ $= \boldsymbol{15.90}\%$
36.	3	Equally invested in B and C
37.	4	$Correlation\ coefficient = \frac{Covariance}{\sigma_M \times \sigma_N}$ $= \frac{0.07}{0.32 \times 0.24}$

		$= \frac{0.07}{0.0768}$ $= \mathbf{0.91}$
38.	2	Passive portfolio management
39.	4	$Treynor = \frac{r_p - r_f}{\beta_p}$ $= \frac{15 - 9}{0.85}$ $= \frac{6}{0.85}$ $= \mathbf{7.06}$
40.	3	$Sharpe = \frac{r_p - r_f}{\sigma_p}$ $= \frac{23 - 9}{\sqrt{2.20}}$ $= \frac{14}{1.4832}$ $= \mathbf{9.44}$