INV2601 2010 MAY JUNE EXAM MEMORANDUM

Question	Correct Option	Solution
1.	2	$HPR = \frac{Ending\ value}{Beginning\ value}$ $= \frac{1540}{1200}$ $HPR = 1.2833$ $Annual\ HPR = 1.2833^{1/4} = 1.2833^{0.25}$ $= 1.0644$ $Annual\ HPY = 1.0644 - 1$ $= 0.0644$ $= 6.44\%$
2.	1	$E(r) = 0.3(10) + 0.5(15) + 0.2(18)$ $= 3 + 7.5 + 3.6$ $= 14.10\%$ $\delta = \sqrt{0.3(10-14.10)^2 + 0.5(15-14.10)^2 + 0.2(18-14.10)^2}$ $= \sqrt{(0.3 \times 16.81) + (0.5 \times 0.81) + (0.2 \times 15.21)}$ $= \sqrt{5.043 + 0.405 + 3.042}$ $= \sqrt{8.49}$ $= 2.9138\%$ $Coefficient\ of\ Variation\ (CV) = \frac{\delta}{E(r)}$ $= \frac{2.9138}{14.10}$ $= 0.206$
3.	3	$HPR = \frac{82+3}{75}$ $= 1.1333$ $Real\ rate\ of\ return = \left[\frac{HPR}{1+rate\ of\ inflation}\right]$ - 1×100 $= \left[\frac{1.1333}{1.05} - 1\right] \times 100$

		$= 7.93\%$
4.	3	Third market
5.	2	beta
6.	2	(a) Maximum (b) Minimum
7.	1	$Portfolio\ A = 0.1(1.65) + 0.3(1.00) + 0.2(1.3) + 0.2(1.1) + 0.2(1.25)$ $= 0.165 + 0.3 + 0.26 + 0.22 + 0.25$ $= 1.195$ $Portfolio\ B = 0.1(0.85) + 0.1(1.0) + 0.2(0.65) + 0.1(0.75) + 0.5(1.05)$ $= 0.085 + 0.1 + 0.13 + 0.075 + 0.525$ $= 0.915$
8.	3	$Required\ rate\ of\ return\ (k) = 8 + 1.35(15 - 8)$ $= 8 + 9.5$ $= 17.45\%$ $Estimated\ rate\ of\ return > Required\ rate\ of\ return$ $20\% > 17.45\%$ The estimated rate of return is greater than the required rate of return therefore the share is **undervalued**. It is undervalued by **2.55%,** the difference between the estimated rate of return and the required rate of return (=20 – 17.45).
9.	2	**BEG MODE** PV R15 000 N 16 I/YR 8 COMP **PMT** R3 004.38

10.	3	$CF_0\ -20\ 000$ $CF_1\ \ 4\ 000$ $CF_2\ 7\ 000$ $CF_3\ \ 9\ 000$ $CF_4\ \ 12\ 000$ $CF_5\ \ 16\ 000$ $I/YR\ \ 10\%$ $COMP\ \boldsymbol{NPV}\ \ R14\ 314$ $Investment\ is\ acceptable\ as\ it\ is\ greater\ than\ R0.$
11.	2	Growth rate (g) = Retention rate (RR) × ROE RR = 1 – dividend payout ($^D/_E$) =1 – 0.3 = 0.7 g = 0.7 × 25% =17.50%
12.	4	$Dividend\ (D_P) = 0.1\ \times R40$ $= R4$ $V_p = \frac{D_P}{k_P}$ $= \frac{4}{0.05}$ $= R80$
13.	4	$V = \frac{D_1}{k-g}$ $= \frac{2.00}{0.15 - 0.10}$ $= R40$

14.	4	$Growth\ rate\ (g) = RR \times ROE$ $= 0.80 \times 20\%$ $= 16\%$ $P_0/E_1 = \frac{D_1/E_1}{k-g} = \frac{1-RR}{k-g}$ $= \frac{0.20}{0.18-0.16}$ $= 10 \times$ $P_0 = P_0/E_1 \times E_1$ $= 10 \times R5.80$ $= R58$ $Where:$ $Dividend\ payout\ (D_1/E_1) = 1 - Retention\ rate$ $= 1 - 0.80$ $= 0.20$ $D = dividends\ per\ share$ $E = earnings\ per\ share$ $NB: Dividend\ payout\ is\ the\ percentage\ of\ firm's\ earnings\ that\ are\ being\ out\ paid\ out\ as\ dividends.$ $E_1 = E_0(1+g)$ $= 5(1.16)$ $= R5.80$

15.	3	Reduced reserve requirements, purchasing additional government securities and decrease in the repo rate.
16.	4	Customers tastes may change and wipe out the competitive advantage.
17.	4	$Current\ asset\ ratio\ = \dfrac{Current\ assets}{Current\ liabilities}$ $= \frac{1070}{745}$ $= 1.44 \times$ $ROE = \dfrac{Net\ Income}{Total\ Equity}$ $= \frac{98}{1105}$ $= 8.87\%$
18.	3	The yield differential between high-quality and low-quality bond increases
19.	3	Price risk
20.	3	$Current\ yield\ = \dfrac{Annual\ coupon\ payment}{Bond\ price}$ $= \dfrac{60}{800}$ $= 7.50\%$
21.	3	N 20 (10 × 2) PMT 60 (120/2) FV 1000 PV -950 COMP **I/YR** 6.4521 × 2 = 12.90%
22.	4	Coupon rate > yield to maturity, then price < face value

23.	2	**Step 1**: Calculate the future value of reinvested coupons N 4 (2×2) PMT 50 000 I/YR 10% (20/2) COMP FV R232 050 **Step 2**: Calculate the total future value Total FV = FV of reinvested coupons + face value of the bond = 232 050 + 1 000 000 = R1 232 050 **Step 3**: Calculate the realised yield FV 1 232 050 PV -916 267 N 4 COMP **I/YR** 7.6841 × 2 = 15.37%
24.	3	$Forward\ rate = \frac{(1.05)^2}{1.04}$ $= \frac{1.1025}{1.04}$ $= (1.0601 - 1) \times 100\ \times 2$ $= 12.02\%$
25.	1	Duration effect = - duration × % change in yield to maturity = -1.71 × 1% = -1.71%

<table>
<tr><td>26.</td><td>3</td><td>
<table>
<tr><th></th><th>V-</th><th>V0</th><th>V+</th></tr>
<tr><td>FV</td><td>1000</td><td>1000</td><td>1000</td></tr>
<tr><td>N</td><td>4</td><td>4</td><td>4</td></tr>
<tr><td>PMT</td><td>50</td><td>50</td><td>50</td></tr>
<tr><td>I/YR</td><td>6.50%</td><td>7%</td><td>7.50%</td></tr>
<tr><td>COMP PV</td><td>948.61</td><td>932.26</td><td>916.27</td></tr>
</table>

$$Convexity = \frac{948.61 + 916.27 - (2 \times 932.26)}{2 \times 932.26 \times (0.01)^2}$$

$$= \frac{0.36}{0.1865}$$

$$= 1.9303$$
</td></tr>
<tr><td>27.</td><td>1</td><td>Forward contract</td></tr>
<tr><td>28.</td><td>2</td><td>

$F = 80(1.07)^{0.25}$

$= 80 \times 1.0171$

$= R81.36$
</td></tr>
<tr><td>29.</td><td>2</td><td>

$Effective\ price = R45 + R5.25$

$= R50.25$
</td></tr>
<tr><td>30.</td><td>3</td><td>Gives the holder the right to buy a certain quantity of an underlying security.</td></tr>
<tr><td>31.</td><td>3</td><td>The exercise price is greater than the spot price.</td></tr>
<tr><td>32.</td><td>2</td><td>

$Profit\ /Loss = 70 - 50 - 6 - 5$

$= 20 - 11$

$Profit = R9$
</td></tr>
</table>

33.	2	Put-call parity: $S + p = \frac{X}{(1+r)^T} + c$ $42 + p = \frac{40}{(1.08)^{0.5}} + 5$ $p = \frac{40}{1.0392} + 5 - 42$ $p = R1.49$
34.	1	$\text{Delta } (\Delta) = \frac{\text{f}^+ - \text{f}^-}{\text{S}^+ - \text{S}^-}$ $\text{S}^+ = 120 + 10 = 130$ $\text{S}^- = 120 - 10 = 110$ $\text{f}^+ = \text{p}^+ = \max\,(0; \text{X} - \text{S}^+)$ $= \max(0; 120 - 130)$ $= \max(0; -10)$ $= 0$ $\text{f}^- = \text{p}^- = \max\,(0; \text{X} - \text{S}^-)$ $= \max(0; 120 - 110)$ $= \max(0; 10)$ $= 0$ $\Delta = \frac{0 - 10}{130 - 110}$ $= \frac{-10}{20}$ $= -0.50$
35.	3	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 $2. Portfolio\ standard\ deviation\ (\delta_p)$ $= \sqrt{[\mathrm{w_{SI}}^2 \times \delta_{\mathrm{SI}}^2] + [\ \mathrm{w_{RFA}}^2 \times \delta_{\mathrm{RFA}}^2] + [2 \times \mathrm{w_{SI}} \times \mathrm{w_{RFA}} \times \mathrm{r_{SI,RFA}} \times \delta_{\mathrm{SI}} \times \delta_{\mathrm{RFA}}]}$ NB: $\mathrm{COV_{SI,RFA}} = \mathrm{r_{SI,RFA}} \times \delta_{\mathrm{SI}} \times \delta_{\mathrm{RFA}}$ $Note\ that\ the\ 2nd\ formula\ is\ an\ expansion\ of\ the\ 1st\ formula.$ $\boldsymbol{Where}$: $w_{SI} = weight\ of\ the\ share\ index$ $w_{RFA} = weight\ of\ the\ risk\ free\ asset$ $\delta_{SI} = standard\ deviation\ of\ the\ share\ index$ $\delta_{RFA} = standard\ deviation\ of\ the\ risk\ free\ asset$ $COV_{SI,RFA} = covariance\ of\ the\ share\ index\ and\ risk\ free\ asset$ $r_{SI,RFA} = correlation\ coefficient\ between\ the\ share\ index\ and\ the\ risk\ free\ asset$ 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. $Portfolio\ standard\ deviation\ (\delta_P) = \sqrt{w_{SI}{}^2 \times \delta_{SI}{}^2}$ $= \sqrt{0.6^2 \times 8^2}$ $= \sqrt{0.36 \times 64}$ $= 4.80\%$
36.	1	$E(A) = 0.6(12) + 0.4(10)$ $= 7.2 + 4$ $= 11.2\%$

		$E(B) = 0.6(6) + 0.4(9)$ $= 3.6 + 3.6$ $= 7.2\%$ $Covariance = 0.6(12 - 11.2)(6 - 7.2) + 0.4(10 - 11.2)(9 - 7.2)$ $= (0.6 \times 0.8 \times -1.2) + (0.4 \times -1.2 \times 1.8)$ $= -0.576 + -0.8640$ $= -1.44$
37.	1	Equally invested in M and N
38.	3	Consolidation phase
39.	4	(a) Superior (b) Undervalued
40.	3	$Treynor = \frac{r_p - r_f}{\beta_p}$ $= \frac{26 - 15}{1.25}$ $= 8.80\%$