

Institute of Actuaries of India

Subject ST5 — Finance and Investment A

May 2012 EXAMINATION

INDICATIVE SOLUTIONS

Solution 1 :

(i) The process for undertaking a review:

- The assets and liabilities of the fund need to be projected forward using stochastic modeling techniques.
- Each of the variables like salary progression, interest rates, withdrawals and asset returns etc. has to be modeled using its historical values and its relationship with each other variable.
- The model should be run many times over different time periods and with a variety of appropriate asset distributions
- The aim is to determine a spread of possible values over say a 5 year period & give Trustees an idea of consequences of various actions or decisions.
- Thus it will be possible to adopt a strategy that will have the highest possibility of achieving the desired objective.

Limitations of the model:

- The model will be as good as the assumptions.
- Results may be difficult to interpret and explain to the clients
- Once the concept is understood by the client, he may take the model as precise and accurate than is justified and rely on it too much when making decisions.

(ii) Differences between active and passive fund management strategies:

The manager's strategy is a passive strategy.

- Passive management is based on the belief that the markets are efficient; active management is based on the belief that the markets are not efficient and it is possible to out-perform the indices/benchmarks
- Passive investment manager selects an appropriate target and buys a portfolio designed to closely track the performance of that target; Active management involves a systematic effort to exceed the performance of a selected target
- Passive management involves a long-term, buy-and-hold approach ; once the portfolio is purchased, little additional trading occurs, beyond reinvesting investment income or minor rebalancing necessary to accurately reflect the target. However, active management entails the search of these mis-priced securities or group of these securities, and in this process the active investment manager involved in buying and selling frequently in the hope of achieving higher return

(iii) Advantages the managers strategy

- The fund manager only has to track the performance of the index, so replicating the index is not essential.
- Investing in many stocks for full replication and having relatively small individual holdings in each stock will result in higher dealing costs (necessary each time the relative sector weightings change). This could reduce the performance of the fund and cause underperformance relative to the index.
- Holding some stocks in each of the industry sector that constitute the index may well replicate the performance of the index rather than including all the stocks. This is because the price movements of stocks in the same industry may be similar, since the macro economic factors impact all the companies in the same industry in a similar fashion.
- Stratified sampling of the performance of each sector may have shown that the performance of the chosen stocks in the sector is a very accurate measure of the performance of the sector as a whole.
- Less forced buying and selling in this method compared to a strategy involving full replication.

Disadvantages include:

- Selecting a few stocks may lead to a greater tracking error in the performance measurement of the fund against the index.
- Substantial statistical analysis/research is needed to find most appropriate sample of stocks

Investigations/Monitoring the manager against his objective

- Compare dividend yields, earnings growth and price earnings ratios of the portfolio with the Index.
- For example, within each sector for the fund and the index you would periodically rank the holdings by increasing yield, split each sector into an equal number of holdings (e.g. quintiles) and calculate the weighted average yield of each quintile allowing for the value of shareholdings as weights. This will help to determine features such as consistency with the index, identify any style biases (e.g. growth or value), how risky the portfolios are relative to the index
- Historic comparison of the fund performance with the index, quarterly over a period of around three years to determine how well the fund has tracked the index.
- Comparison of risk adjusted performance measures(e.g. Sharp or pre-specified standard deviation) of the portfolio vs index.

(iv)

- The information ratio evaluates the return a manager adds given the risk they assume. The information ratio takes a fund's excess return over benchmark and divides it by the tracking error. The higher the information ratio the more successful the fund manager has been at adding value without taking excessive risk.
- A figure of 0.73 would be considered quite good because it means that the manager has achieved a performance better than the benchmark, and done so with relatively little risk(relative to the benchmark). Previous year figure of -0.27 is poor as it implies an under-performance relative to the index.
- Such a sharp improvement in the 2-year Information ratio suggests excellent relative performance in the last year, and the reasons for this must be investigated.
- Beta measures a stock's volatility relative to movements in the whole market. The beta of 0.89 shows that, overall the portfolio currently has a defensive stance indicating that it should outperform a falling market and underperform a rising market.

(v)

- Assume the managers objective is to simply outperform the index.
- If market rises over next year, the current defensive stance of the portfolio (beta = 0.89) will mean portfolio will underperform the index. To outperform, manager would need to increase portfolio beta (market risk) and invest in stocks whose beta is more than 1. These may be cyclical/aggressive stocks (i.e less defensive stocks)
- The change to high beta stocks would also indirectly impact his active management strategy - in terms of the individual stocks which may need to be traded to generate relative profits

[15]**Solution 2 :****(i)**

- Sell equities – market risk, if equities rise then miss out on the upside; riskssell at the wrong time. Lose out on dividends.
- Short equity index futures

- cross hedging risk and any basis risk between index future and underlying stocks;
- investment performance risk if market rises and alpha in the portfolio is poor, since beta has been given away from short futures.

- Buy put options

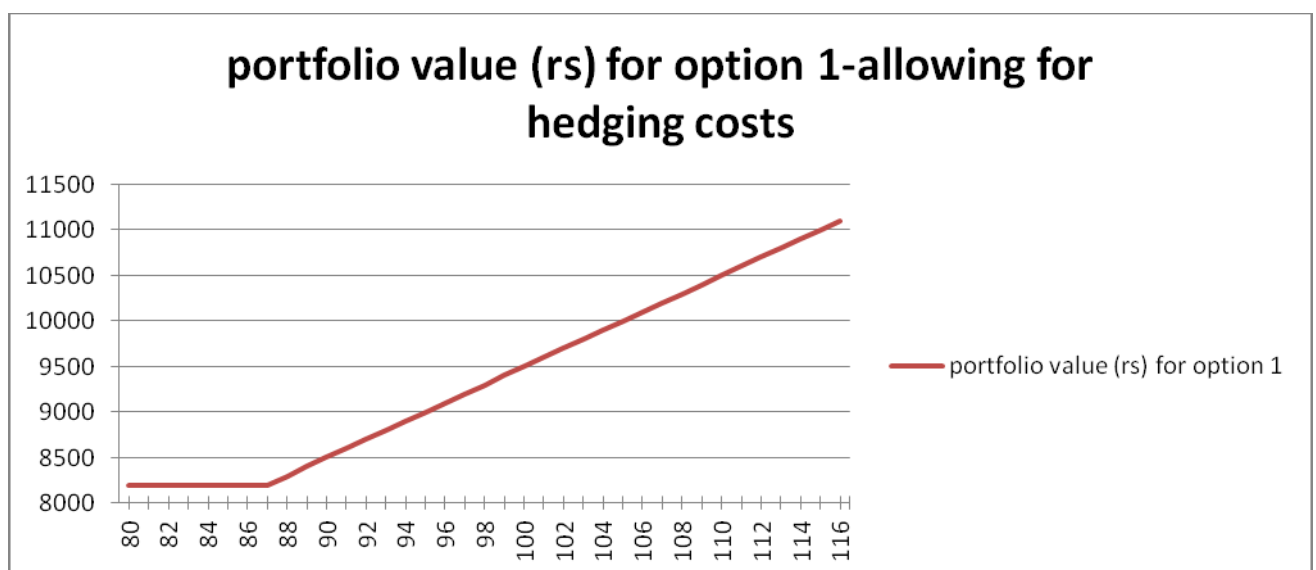
- might not be able to buy puts for all shares in portfolio.
- Need to pay a premium upfront which needs to be allowed for in transaction costs and may filter into net performance figures.
- Counterparty / default risk is a further issue for over the counter approaches. Basis risk on any index options.

(ii)

- Assume current stock price =102, shares=100, portfolio value = 10,200
- The diagrams show portfolio+hedging strategy, allowing for hedging costs
- give credit for any other strategies which are **relevant** to the question.

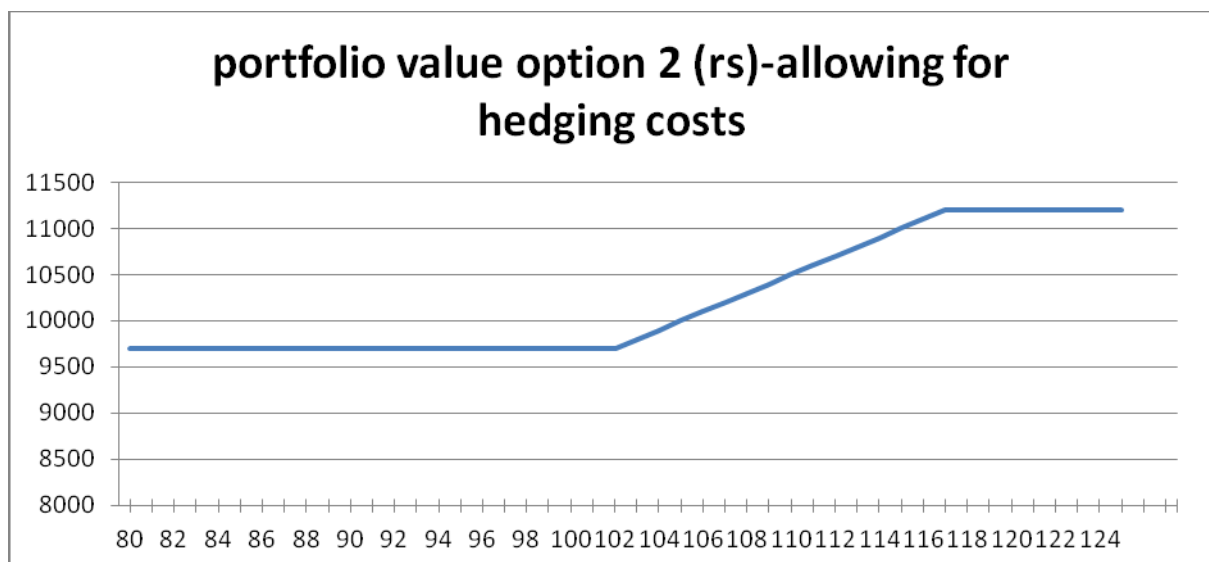
Option 1 - Buy 100 put options strike 87, premium = 5

- Total cost (% portfolio) = $500/10200 = 4.90\%$
- Portfolio floor (after hedging cost) = $8700 - 500 = 8200$
- Max percentage loss allowing for hedging costs = $(10,200-8200)/(10,200)=19.6\%$



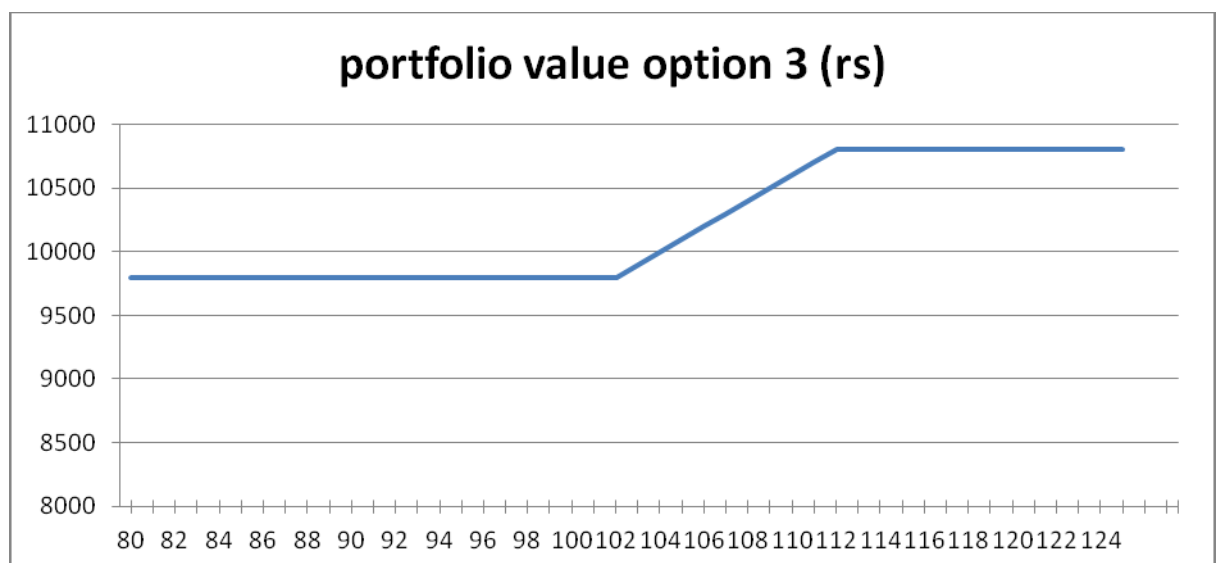
option 2 -Buy 100 put options strike 102, sell 100 call options strike 117

- Total cost = $100*(9-4)=500$ so cost = $500/10200 = 4.90\%$ of portfolio
- Portfolio floor (after hedging costs) = $10,200-500 = 9700$
- Maximum loss (allowing for hedging costs) = $(10,200-9700/10,200)=4.90\%$



Option 3 - Buy 100 put options strike 102, sell 100 call options strike 112

- Total cost = $100 * (9-5) = 400$ which = $400/10200 = 3.9\%$ of portfolio.
- Portfolio floor (allowing for hedging costs) = $10,200 - 400 = \text{Rs}9800$
- Max loss after hedging costs $(10,200 - 9800) / (10,200) = 3.9\%$.



(iii) Summary/Relativities

- Option 1 and 2 cost the same. Option 1 has more downside risk but has unlimited upside. Option 2 has lower downside risk, but has limited upside potential (capped at Rs 117).
- Option 3 is the cheapest option, has the least downside risk, but it has the lowest upside potential (caps upside at Rs 112).
- Decision may be influenced by cost (how much investor is prepared to pay up front) and his desired risk/return trade off.
- For the collar strategies (options 2 and 3), he must consider the amount of upside he is prepared to sacrifice to pay for downside protection.

(iv) Fixed income derivative payoffs will be dependent in some way on the level of interest rates. They are therefore more difficult to value than equity derivatives, since:

- The behaviour of an individual interest rate is more complicated than that of a stock price.
- For the valuation of many products, it is necessary to develop a model describing the behaviour of the entire yield curve.
- The volatilities of different points on the yield curve are different.
- Interest rates are used for discounting as well as for determining payoffs from the derivative.

(v)

This is a RECEIVER swaption - entitles holder to enter a swap and receive fixed rate.

Payoffs from the swaption is a series of five cash flows equal to $\text{Max}[0.076 - S(t), 0]$ in million of rupees where $S(t)$ is the five year swap rate in four years

Term (t)	r	D(t) = discount factor (assuming annual compounding)
1	6.80%	0.93633
2	7.00%	0.873439
3	7.20%	0.811738
4	7.40%	0.751593
5	7.60%	0.693328
6	7.80%	0.637217
7	8.00%	0.58349
8	8.00%	0.540269
9	8.00%	0.500249
10	8.00%	0.463193

$$L * A [X N(-d2) - F N(-d1)]$$

A = The value of an annuity that provides Rs 1 per year at the end of years 5,6,7,8 and 9 is $d(5) + d(6) + d(7) + d(8) + d(9) = 2.954553$

F = forward swap rate = $(d(4) - d(9)) / A = 0.0850$

L	1,000,000
A	2.954553
F	0.08507
X	0.076
Sigma	0.25
T	4
d1	0.475486
d2	-0.02451
N(-d1)	0.31722
N(-d2)	0.509779

Swaption value=0.034737 mln (or) Rs 34,737

[17]

Solution 3 :

• Earnings Per Share:

- The relative earnings per share of the two companies can be used to determine the exchange ratio. For example, if the EPS of the acquiring firm (Smersh) is Rs. 5.00 and the EPS of the target firm (Alba) is Rs. 2.00 the exchange ratio based on EPS will be 0.4 (=2/5)
- The advantage of using EPS as a base is that it reflects prima facie the earning power of the two companies
- However an exchange ratio based solely on the current EPS of the merging companies can be inappropriate because it fails to take into account the following:

-The difference in the growth rate of the earnings of the two companies

-The gains in earnings arising out of merger

-The differential risks associated with the earnings of the two companies

- There is a measurement problem of defining the normal level of current earnings. The current EPS can be influenced by certain transient factors like: a windfall profit, or an abnormal labour problem or a large tax relief
- It will be difficult to use EPS as a basis if EPS is negative

Market Price per Share

- The relative market prices of the shares of the two companies can be used for setting the exchange ratio. For example if the market price per share of the acquiring company (Smersh) is Rs. 18; and the market price per share of the target company (Alba) is Rs. 11, the exchange ratio is 0.61 (=11/18)
- If the shares of the acquiring company and the target company are actively traded, using the relative market prices has considerable merit. This is because market prices will reflect current earning power, growth prospects and risk characteristics.
- However when trading is meagre, market prices may not be very reliable.
- Another problem with market prices is that they may be manipulated by those who have a vested interest

(ii)

- The hedge fund would sell short 0.63 shares of Smersh, generating Rs11.94 (0.63* Rs18.87), and purchase one share of Alba, costing Rs11.08. The Rs 0.86 difference is the arbitrage spread.
- Upon successful completion of the merger, the prices would converge.
- Each of the Alba shares is replaced with 0.63 Smersh shares. The hedge fund would then be long 0.63 shares in Smersh and short 0.63 shares of Smersh. the long and short positions cancel out, and this leaves the hedge fund with a profit equal to the original spread.
- (Note this is described per share - in practice, the positions would be relative, allowing for the exchange ratio)
- The event risk here is that the merger doesn't complete (e.g blocked by regulator, or shareholders do not approve it). Instead of converging, prices could then revert to pre-announcement levels, and hedge fund loses on long and short positions.
- Impact of other cashflows on return are described below - (note similar examples were given in ST5 May 2011 Q6)
- Net dividend received = dividend paid on the Smersh short position to the stock lender whereas dividends are received by hedge fund on the Alba long position
- Interest earned on proceeds that were generated from short position in Smersh stock (short interest rebate).

(iii)

- In the area of portfolio diversification, manager would need to look at maximum position sizes in deals that are defined in terms of the risk/reward ratio as well as monetary limits.
- There should be a reasonable spread of deals in the portfolio by industry and type of consideration (cash offers or stock-for-stock offers)
- Manager should preferably avoid deals that are subject to a large combination of the following: Financing, regulatory approval, approval of competition watchdogs, due diligence, long time delay from announcement to close.
- Manager should make a thorough analysis of the what could cause the deal to break.
- Analyse the risk that an acquirer becomes a target during a merger or takeover of another company. This may cause the deal to break with serious losses as the price of the original acquirer's shares rises (as it becomes a target itself) hitting the manager's short position in the deal and the price of the original target collapses hitting the corresponding long position.
- Avoid deals in highly regulated industries where approval of the deal might require clearance from competition regulators and industry regulators
- Look for acquirers where there is a plentiful supply of stock which can be borrowed in order to establish a meaningful short position (for stock-for-stock considerations)

(iv)

ANNUAL RETURN		
Year	World Equity Index	Hedge Fund Merger Arbitrage Index
2010	11.76%	3.16%
2009	30.01%	8.69%
2008	-40.71%	-3.93%
2007	9.04%	4.52%
2006	20.06%	10.32%
2005	-12.50%	-1.10%
CAGR	-0.22%	3.49%
Stdev	25.63%	5.49%

CAGR = compound annual return = $(1+11.76\%)(1+30.01\%)(1-40.71\%)(1+9.04\%)(1+20.06\%)(1-12.50\%)^{1/6} - 1$

- **Regret aversion** - Investor may focus on the 4/6 years where equity index outperformed merger arbitrage index when stock market returns good. This may force him to then favour equity, because he may want to "avoid the regret" of being exposed to merger arbitrage type strategy instead of equity in years where market returns turn out to be good.
- **Mental Accounting** - Investor may have tendency to focus on only 4/6 good years where equity outperformed and ignore the whole picture, thereby favouring equity. But if he aggregated over all years and invested over a longer horizon, the average annual return (e.g compare the CAGR figure above) from merger arbitrage strategy has outperformed equity.
- **Framing** - Return statistics presented may force investor to focus on superior equity returns in 4/6 years and thus favour equity. However, if risk-based statistics were presented, this could force a different perspective and decision (e.g standard deviation of merger arbitrage returns is lower). These may indicate that an allocation to a merger arbitrage strategy actually improves return/risk trade off in investor's portfolio compared to equity.
- **Past performance** - usual behaviour of relying too much on past performance data to guide future decisions;

[16]

Solution 4 :

Advantages of synthetic portfolio management

The use of swaps rather than bonds has the following advantages:

- Interest rate and inflation swap markets may have longer maturities available than bond markets.
- Swap markets may have greater liquidity and lower transaction costs than bond markets.
- Swaps permit hedging to be achieved without full asset cover being required, as they are a contract for difference rather than a funded asset.
- Swaps are in most cases bespoke contracts that are agreed with a single counterparty, rather than a standardised listed security (like a bond). Therefore greater flexibility is possible within the schedule of payments.

Disadvantages of synthetic portfolio management

The use of swaps does create the following complications and disadvantages:

- If the investor wishes to enter into a swap contract directly then they will need to have ISDA documentation in place with one or more market counterparties (typically investment banks), which is a legal document that is negotiated and can be expensive and time consuming to set up.
- If the swaps are subject to collateralisation (to mitigate credit risk), then this will require the movement and investment of collateral on a daily or weekly basis.
- The bespoke nature of a swap means that closing out a swap position is more complex than selling a bond. However, in a liquid market closing out a swap may in fact have lower transaction costs than selling a government bond.
- Swaps are subject to counterparty risk, if the counterparty bank defaults. Whilst collateralisation will limit losses, if this happens a new swap will need to be put in place at potentially higher cost (replacement risk) or the hedge lost.
- Under an interest rate swap, the receiver of the fixed interest rate will need to pay a floating interest rate to the counterparty. To the extent that there is investment risk in the assets that are used to generate the floating rate (eg cash or other assets), the swap will not mitigate these risks, whereas a government bond portfolio is intrinsically low risk from a credit standpoint.
- If the swap interest rate curve moves differently to the government bond interest rate curve, this can create a basis risk, which could lead to a mark to market loss.

[4]

Solution 5 :

(i)

If the fund manager had earned 13.5%, the accumulated value at 31 March 2012 will be equal to

Date	Fund Value / Cashflow (INR millions)	Accumulated value as at 31 March 2012 (INR millions)
01 Apr 2011	20000.00	22700.00
30 Jun 2011	5000.00	5498.15
31 Aug 2011	4000.00	4306.66
31 Oct 2011	-8000.00	-8433.44
29 Feb 2012	3000.00	3031.83

31 Mar 2012		27103.20
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As the accumulated value of 27103.20 at 13.5% is higher than the actual fund value of 27000.00, the fund manager has not met his target.

(ii)

Date	Fund Value - Beginning (INR millions) (A)	Fund Value - End before cashflows (INR millions) (B)	Return for the period (B) / (A) - 1
01 Apr 2011 - 30 Jun 2011	20000.00	27000 – 5000 = 22000	10.0%
30 Jun 2011 - 31 Aug 2011	27000.00	32000 – 4000 = 28000	3.7%
31 Aug 2011 - 31 Oct 2011	32000.00	25000 + 8000 = 33000	3.1%
31 Oct 2011 - 29 Feb 2012	25000.00	29000 – 3000 = 26000	4.0%
29 Feb 2012 - 31 Mar 2012	29000.00	27000	-6.9%
Total Return			13.9%

The total return is calculated as the product of the return for the intermediate periods. The time weighted rate of return for the period is 13.9%.

(iii)

Date	Fund Value - Beginning (INR millions) (A)	Return for the period (B) / (A) - 1	Monthly return
01 Apr 2011 - 30 Jun 2011	20000.00	10.0%	3.2%
30 Jun 2011 - 31 Aug 2011	27000.00	3.7%	1.8%
31 Aug 2011 - 31 Oct 2011	32000.00	3.1%	1.6%
31 Oct 2011 -	25000.00	4.0%	1.0%

29 Feb 2012			
29 Feb 2012 - 31 Mar 2012	29000.00	-6.9%	-6.9%

- MWRR is lower than bench mark return of 13.5% per annum and 1.06% per month.
- The period returns for the fund is higher than 1.06% for 7 months and is close to 1.06% for the next 4 months. It is significantly lower than the 1.06% for only one month.
- This results in the TWRR being higher than the MWRR.

(iv)

SOL:

$$\frac{F2 - C2}{F1} \times \frac{F3}{F2} = (1 + TWRR)^{t1+t2} \quad \text{.....(a)}$$

$$F1 \times (1 + MWRR)^{t1+t2} + C2 \times (1 + MWRR)^{t2} = F3 \quad \text{.....(b)}$$

If C2 is equal to 0, then from (a) and (b) we get,

$$(1 + TWRR)^{t1+t2} = (1 + MWRR)^{t1+t2} = \frac{F3}{F1}$$

implies TWRR = MWRR.

Otherwise, from (a) and (b) we get

$$F1 \times \left(\frac{F2 - C2}{F1} \times \frac{F3}{F2} \right) + C2 \times \left(\frac{F2 - C2}{F1} \times \frac{F3}{F2} \right)^{\frac{t2}{t1+t2}} = F3$$

$$C2 \times \left(\frac{F2 - C2}{F1} \times \frac{F3}{F2} \right)^{\frac{t2}{t1+t2}} = F3 - F1 \times \left(\frac{F2 - C2}{F1} \times \frac{F3}{F2} \right)$$

$$C2 \times \left(\frac{F2 - C2}{F1} \times \frac{F3}{F2} \right)^{\frac{t2}{t1+t2}} = F3 - ((F2 - C2) \times \frac{F3}{F2})$$

$$C2 \times \left(\frac{F2 - C2}{F1} \times \frac{F3}{F2} \right)^{\frac{t2}{t1+t2}} = C2 \times \frac{F3}{F2}$$

$$\left(\frac{F2 - C2}{F1} \times \frac{F3}{F2} \right)^{\frac{t2}{t1+t2}} = \frac{F3}{F2}$$

$$\left(\frac{F2 - C2}{F1} \right)^{\frac{t2}{t1+t2}} = \left(\frac{F3}{F2} \right)^{\frac{t1}{t1+t2}}$$

$$\left(\frac{F2 - C2}{F1}\right)^{t2} = \left(\frac{F3}{F2}\right)^{t1}$$

$$\frac{t2}{t1} = \frac{\ln\left(\frac{F3}{F2}\right)}{\ln\left(\frac{F2 - C2}{F1}\right)}$$

$$\frac{t2}{t1} = \frac{\ln(F3) - \ln(F2)}{\ln(F2 - C2) - \ln(F1)}$$

(v)

MWRR

- MWRR may not have a unique solution.
- Intermediate cashflows may bias the MWRR which are not control of the fund manager.

TWRR

- Data requirement is significantly higher as the fund values need to be recorded every time a cashflow occurs.
- Is indifferent to the size of the fund and the cashflows.

[16]**Solution 6 :****(i)**

- Net present value:
 - o Based on the return expected on this investment, the investor will expect the net present value of this investment to be positive.
 - o The net present value can be used to compare against an alternative investment.
 - o However, this does not take into account the amount of money available to you for making investment.
- Internal rate of return
 - o This is the interest rate that results in the present value of cashflows to be 0.
 - o This is then compared to the required return to determine if the investment meets the return requirement.
 - o This can be used to compare two investments of different sizes.
 - o The IRR can be difficult to calculate and may not be unique.
- Discounted payback period
 - o The time period at which the accumulated cashflows are positive for the first time. The accumulation can be at required rate of return.
 - o This measures how quickly you can get your money back from the investment.

(ii)

Use one of the measures to determine if you should buy the flat? Ignore any tax implications. Please state any additional assumptions you make.

Let us assume the following.

- We will use net present value as the measure.
- The only alternative investment is fixed deposits.
- The rental income is earned at the start of the year.
- The payment for the flat needs to be made at time 0.

First we calculate the repayment (r) on the loan.

$$6400000 = r * (1 - (1.12)^{-20}) / 0.12$$

$$\text{implies, } r = 6400000 / 7.47$$

$$= 856760$$

Given that the alternative investment is fixed deposit and it earns 8%, we need to evaluate if the property investment earns at least 8%.

$$\text{Present value of loan at 8\%} = 6400000 - 856760 * (1 - (1.08)^{-20}) / 0.08$$

$$= 6400000 - 856760 * 9.82$$

$$= 6400000 - 8413383$$

$$= - 2013383$$

$$\text{Present value of the rental income} = (1.01/1.08)^3 * 350000 * 1 / (1 - (1.05/1.08))$$

$$= 4416585$$

$$\text{Net present value from property investment} = 8000000 - 2013383 + 4416585$$

$$= 10403202$$

$$\text{Net present value from investment in fixed deposit} = 1600000 + 8413383$$

$$= 10013383$$

So it is better to invest in the property rather than investing in the fixed deposits.

(iii)

- Anchoring and adjustment :
 - While producing estimates, people start with an initial idea of the answer
 - They will then adjust this initial estimate based on evident differences to current estimates.

- Prospect theory :
 - How people make decisions when faced with risk and uncertainty
 - Concept of value defined in terms of gains and losses relative to a reference point.
- Framing :
 - The way a choice is presented will have enormous impact on the answer given or the decision made.
 - Changes in a word or two can have profound impact.
- Myopic loss aversion :
 - Similar to prospect theory involving repeated choices.
 - People become less risk averse when faced with multi-period choices.
- Estimating probabilities :
 - Investors probability estimates may be influenced by certain issues
 - The issues may be dislike for negative events, representative heuristics and availability
- Overconfidence :
 - People tend to overestimate their own abilities, knowledge and skills.
 - This can be influenced by hindsight bias and confirmation bias.
- Mental accounting :
 - People tend to separate related events and decisions and find it difficult to aggregate events
 - People set up mental accounts and view individual decisions as relating to these accounts.
- The effect of options :
 - The decisions can be influenced by the range of choices or options provided.
 - The way the options are provided can also influence the decision made.

(iv)

- The investor will start with an initial price in mind. This may be based on the quoted price for similar properties.
- This will then be adjusted for the builder, location, layout and accessibility.
- Based on his views, he will evaluate the gains or losses from the property investment.
- The decision may be influenced by if would purchase the property for living or investing.
- This is more likely to be a one-time investment and hence he is likely to be more risk averse than if he was buying smaller units over a period of time.
- The probabilities of certain future events while arriving at the gain losses may be influenced by the historical events or experience of personal acquaintances rather than future prospects. For example, he may estimate the property prices to increase at a rate of 20% just because it has done so in the last 5 years rather than looking at the potential for a 20% increase in the next 5 years.
- He may be overconfident about the value he has placed on this particular property due to his previous successful investment in other properties.
- He may also be overconfident about the value placed on the property as he is able to justify the value using his own calculations.
- In his mental accounting he may only be looking at only one aspect of the investment rather than looking at the opportunity cost of making this investment.
- His decision will also be influenced by the various options he has. He may put a higher value on this property, if similar properties are not available.
- People tend to put a low value on the first property they see, as they assume better deals are available in the market.

[16]

Solution 7 :**(i)**

- The benchmark strategic allocation.
- Extent to which the manager is allowed to depart from the benchmark strategic allocation.
- Asset classes that are entirely prohibited
- Limitation on the use of assets and asset classes, like investment in derivatives
- Maximum permissible holding in particular asset or asset class
- Prohibitions on self investment in sponsor's own securities
- Ethical or social limitations
- Requirements to hold government bonds or bills
- Requirement to match assets and liabilities by currency
- Requirement on the any equities to have paid dividends in recent years
- The legislative framework specifying admissible assets for demonstrating solvency

The Company has been using value at risk to measure the riskiness of its investment strategy.

(ii) The fund manager has been told that the value at risk of the participating policyholder fund is greater than the historical trend. Describe the reasons why this might have happened.

- VaR would increase when increase in liabilities is not compensated with increase in assets.
- This may be due to liability duration having increased.
- This may be due to long term products having been written, for example annuities or whole life.
- The company might have consciously invested the premium in short term assets to enhance returns.
- Long term assets of matching duration may not be available.

(iii) a.

- The fund manager will need to change the asset mix. The asset mix will need to be changed so that the duration of assets match the duration of liabilities closely.
- Given that no new funds are available, he will have sell short term assets to buy long term assets.
- This may need to be done over a period of time, so that the returns of the funds are not affected significantly.
- The cash generated from maturing assets or from the income of existing assets into long term securities.

b.

- The fund manager needs to invest the new funds to match the duration of the liabilities closely.
- This can be done by investing the new funds in longer term assets.
- The cash generated from maturing assets or from the income of existing assets into long term securities.

- However, depending on the size of the funds or cashflow available, and the size of the mismatch, existing asset portfolio may need to be changed.

[10]

Solution 8 :

(i)

- The firm should observe high standards of integrity and fair dealings
- The firm should act with due skill, care and diligence.
- The firm should observe high standards of market conduct.
- The firm should seek relevant information from customers to enable it to fulfil its responsibilities to them.
- The firm should take reasonable steps to provide information to customers to enable them to make balanced and informed decision.
- A firm should avoid conflict of interest.
- A firm should safeguard assets belonging to a customer.
- A firm should ensure that it maintains adequate financial resources.
- A firm should organise and control its internal affairs in a responsible manner and keep proper records.
- A firm should deal with the regulator in an open and cooperative manner.

(ii)

- Responsible for overall direction of the company
- Ensure company meets all its legal obligations
- Responsible for solvent trading of the company
- Arrange that accounts are produced
- Appoint the management
- Approve dividend payments
- Take reasonable steps to safeguard assets of the company
- Prevent and detect fraud and other irregularities.

[6]

[Total Marks – 100]
