INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

30th May 2012

Subject ST5 - Finance and Investment A

Time allowed: Three hours (14.45* – 18.00 Hrs)

Total Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. ***Please read the instructions on the front page of answer booklet and instructions to examinees sent along with hall ticket carefully and follow without exception***

2. **** You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.***

3. ***You must not start writing your answers in the answer sheet until instructed to do so by the supervisor***

4. ***The answers are not expected to be any country or jurisdiction specific. However, if Examples/illustrations are required for any answer, the country or jurisdiction from which they are drawn should be mentioned.***

5. ***Attempt all questions, beginning your answer to each question on a separate sheet.***

6. ***Mark allocations are shown in brackets.***

7. ***Please check if you have received complete Question Paper and no page is missing. If so, kindly get new set of Question Paper from the Invigilator.***

AT THE END OF THE EXAMINATION
Please return your answer book and this question paper to the supervisor separately.

Q. 1) You are an actuarial investment consultant to the Trustees of a large defined benefit pension fund in India. They have approached you to review the strategic asset allocation of the fund.

i) Outline a suitable process for undertaking the review which makes use of appropriate modelling techniques. Comment on any limitations of your modelling approach. (3)

The trustees have set the investment policy of the fund, which specifies that a significant component of the fund is to be invested in domestic equity markets.

For the domestic equity component, the trustees have specified the benchmark as the BSE 200 Index operated by Bombay Stock Exchange. The manager of the domestic equity portfolio has been given the objective to track this index. He has decided to construct a portfolio which tracks the benchmark without necessarily investing in all the 200 stocks in the same proportion as they comprise in the index. As part of this strategy, the fund manager will match the index weight for each industrial sector, but will not necessarily include every stock in the sector to achieve that sector weight.

ii) Describe the key differences between passive and active investment strategies. (3)

iii) Discuss the fund manager's proposal, and outline the investigations you would recommend on an ongoing basis to ensure that the portfolio continues to meet the given objective. (4)

The fund manager has provided data in the table below for another one of its managed equity portfolios. All data is expressed relative to the above benchmark index.

Metric	**Value**
2 year information ratio (exactly 12 months ago)	-0.27
2 year information ratio (current value)	0.73
Beta (current value)	0.89

iv) Explain the meaning of the metrics in the table, and state what conclusions, if any, can be drawn from them regarding this particular portfolio (3)

v) The BSE 200 index value was 2,550 a year back while current value is 2,100. The fund manager is projecting the index to rise to 2,500 in a year’s time. Explain what, if any, changes in strategy may be recommended for this portfolio (2)

[15]

Q. 2) **i)** Outline various methods that can be used by the holder of a diversified equity portfolio to limit the downside risk from a market fall in equities, and outline the key problems with each method. (3)

An investor holds 100 shares of Skyfall stock currently priced at INR 102. He wishes to hedge the downside risk and needs to structure an appropriate hedge. However, he has these constraints:

- The hedge needs to be structured to ensure that in one year time, the downside losses will be limited to 20% of the current portfolio value, after allowing for the upfront costs of hedging.
- Investor is bullish on the stock, but still wants to limit downside losses as described above. As the investor is hoping for an increase in stock price, he wants to make some gains as the stock price increases.
- He will only pay a maximum of 5% of the current portfolio value for the upfront costs of hedging.

The protection can only be structured from below mentioned 1 year options on Skyfall stock. Each option is on 1 share.

Strike Price	Put Option Premium (INR)	Call option Premium (INR)
82	4	25
87	5	21
92	6	17
102	9	10
112	14	5
117	17	4

ii) Using these options, structure three suitable strategies of protection that meet his constraints. In each case, draw a diagram of the final portfolio value (allowing for the impact of the attaching hedges and their resulting costs) against the level of the stock price in 1 year. State any assumptions. (6)

iii) Briefly outline the relative advantages and disadvantages of your chosen strategies, and outline the factors that may influence which strategy the investor may finally prefer. (2)

iv) Describe reasons why valuing fixed income derivatives are more difficult than valuing equity derivatives. (2)

v) A fixed interest swap market has a term structure defined by the spot rates below (all spot rates are annually compounded).

Term	Spot rate
1	6.8%
2	7.0%
3	7.2%
4	7.4%
5	7.6%
6	7.8%
All durations **greater** than 6 years	8%

A swaption gives the holder the right to receive a fixed rate of 7.6% in a five year swap starting in four years. Payments are made annually. The volatility for the swap rate is 25% pa and the principal is INR 1 million.

Using an appropriate model, calculate the price of the swaption and state relevant assumptions. (4)

[17]

Q. 3) Smersh Enterprises is a listed large consumer products company specializing in two principal product categories: hair care & home care products. Currently Smersh Enterprises is considering a sizeable stock - for - stock acquisition of another listed company in the Indian market called Alba Hair Care which manufactures hair colours.

Smersh is currently trying to determine how many shares to offer for each share in Alba (i.e the exchange ratio). One option is to determine the exchange ratio based on either of the metrics below:

- Earnings per Share
- Market Price Per Share

i) Describe how each metric could be used to determine the exchange ratio, and describe the general advantages and disadvantages of using each metric for this purpose (5)

After the market closed on April 3 2012, Smersh and Alba announced a proposal which specified that, upon successful completion of the merger, each share of Alba would be exchanged for 0.63 shares of Smersh.

The merger is expected to be completed between 4 and 7 months. Both companies will soon declare a dividend, which they expect to repeat every 3 months prior to merging. Interest earned on cash deposits is typically 6-8% per annum.

On April 4, 2012, Alba closed at Rs 11.08 and Smersh closed at Rs 18.87. Immediately before this close, a particular hedge fund manager executed a strategy aiming to lock into a profit (or spread) that would be realised when the merger is completed. No leverage was used in the trade.

ii) Describe an appropriate strategy the hedge fund could have executed to meet its objective, and explain the major risk in the strategy. In addition, outline how other significant cash-flows could have impacted the ultimate profit generated by the trading strategy. (4)

iii) Describe the factors which the hedge fund manager would need to consider if he applied this strategy (or a similar one) to a portfolio of merger and acquisition deals, particularly describing the factors which relate to the individual deals. (4)

A conventional, long-only equity investor is deciding how much (if any) of his portfolio could be switched out of equity and instead allocated to strategies which are similar to that employed by this hedge fund manager.

To help him decide, he has been given annual returns of a world equity index (a measure of the equity market performance of the developed markets) and those from a Hedge fund Merger Arbitrage Index (a broad composition of un-leveraged returns from merger arbitrage strategies which are similar to the hedge fund manager's strategy).

Annual Returns		
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%

iv) Explain how key behavioural biases may influence the investor if he uses these statistics to help him decide an appropriate allocation. (3)

[16]

Q. 4) Describe the advantages and disadvantages of using swaps rather than government bonds to hedge a pre-specified stream of future fixed payments.

[4]

Q. 5) **i)** The fund manager managing the unit funds of a life insurance company has a mandate to achieve at least 13.5% return. The annual return for the fund is measured as money weighted rate of return.

The following details are available at the end of the year.

Date	**Cashflow (INR millions)**	**Fund Value after cash flows (INR millions)**
01 Apr 2011		20000.00
30 Jun 2011	5000.00	27000.00
31 Aug 2011	4000.00	32000.00
31 Oct 2011	-8000.00	25000.00
29 Feb 2012	3000.00	29000.00
31 Mar 2012		27000.00

Has the fund manager met his target? (3)

ii) The fund manager in his appraisal has pointed out that had the measure been time weighted rate of return, his performance would seem much better. What is the time weighted rate of return? (3)

iii) Why is the time weighted rate of return higher than the money weighted rate of return? (3)

iv) You start with a fund F1 and have a cashflow C2 after time t1. The fund value just after the cashflow is F2. After a further time period t2, the fund value is F3. Show that the money weighted and time weighted returns are same if the cash flow C2 is equal to 0 or the cashflow is injected at a time such that

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

(5)

v) What are the limitations of using money weighted and time weighted rate of return for measuring the performance of a fund manager? (2)

[16]

Q. 6) You are considering buying a flat in Andheri (West), Mumbai. The builder is quoting a price of INR 80 lakhs for the flat. You will have to take a loan to buy the flat. ABC bank is quoting an interest rate of 12% per annum fixed for a term of 20 years on the loan. The repayments start at the end of the year and are payable on an annual basis. The bank will only fund 80% of the loan. You will be able to earn an interest rate of 8% if you put money in a fixed deposit. The current rental income on a similar flat is INR 350,000 per annum. The flat will be ready for possession in 3 years time. The rental income is expected to grow at 1% per annum.

i) Discuss the suitability of measures that you may use to determine if you should buy this flat. (3)

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. (5)

iii) Describe the common themes in behavioural finance. (4)

iv) How would you use the themes in behavioural finance to decide if you would be willing to make a property investment at a given price? (4)

[16]

Q. 7) You are the fund manager for ABC life insurance company in India. You have just been told that the Company had received a premium income of INR 23 Millions in the participating policyholder fund.

i) What are the restrictions that you need to consider before investing the funds received?

The Company has been using value at risk to measure the riskiness of its investment strategy. (4)

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. (2)

iii) What are the options available to the fund manager to reduce the value at risk

a. if he does not have new funds to invest? (2)

b. if he has new funds to invest? (2)

[10]

Q. 8) **i)** Describe the key principles underlying financial services regulation. (4)

ii) Under the corporate governance framework, what is the role of directors. (2)

[6]

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