

INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

29th November 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) Describe the features that characterize each of the following economic groups within the FTSE industry classification system:

- [i] Consumer Goods;
- [ii] Industrials;
- [iii] Utilities.

[6]

Q.2) An investor is looking to maximise his after-tax return on the investment whilst taking minimum risk.

- [i] Outline the tax related factors he should consider before making the investment. (3)
- [ii] Describe the financial risks that the investor is exposed to when making this investment. (2) [5]

Q.3) [i] Briefly describe the following terms or concept:

- [a] Asset Liability Mismatch Reserving;
- [b] Dynamic Liability Benchmark;
- [c] Liability Hedging;
- [d] PV01.

(4)

An insurance company has a block of equity linked insurance contracts which have a minimum guarantee based on the level of the underlying NSE NIFTY index. The liability value for the minimum guarantee is mainly influenced by movements in the absolute level of the NSE NIFTY and by movements in the implied volatility of the NSE NIFTY.

A grid showing how the liability value is affected by these variables is shown below. The current level of the NSE NIFTY is 2700 and the current implied volatility is 19%.

All liability values are shown in INR Crores (10 millions) (so 89.4 means INR 89.4Crores)

		Level of NSE NIFTY		
		Implied volatility		
		20%	19%	18%
Nifty increase (+) from current level	+2.00%	89.4	83.3	74.8
Nifty increase (+) from current level	+1.00%	90.4	84.3	75.8
Current level of NSE NIFTY	2700	92.7	85.3	78.2
Nifty decrease (-) from current level	-1.00%	95	86.4	80.6
Nifty decrease (-) from current level	-2.00%	96.1	87.4	81.7

The company is considering hedging the liability against movements in the level ("delta") of the NSE NIFTY and/or against changes in implied volatility ("vega") of the NSE NIFTY.

You know that the NSE NIFTY futures contracts available have a term of 3 months. Each futures contract is on 50 times the index. Assume a dividend yield of 3% per annum on the index. Assume a risk-free rate of 5% per annum.

- [ii] Determine the position required to hedge only the "delta" in the liability. State any assumptions. (3)
- [iii] Describe how you would expect the composition and upfront cost of your proposed hedging portfolio to change if there was an additional requirement to also hedge the "vega" in the liability. (3) [10]

Q.4) [i] Describe the key problems an investor may encounter when using forward contracts to hedge the currency risk in his overseas equity portfolio. (2)

Royale Enterprises needs to convert US \$ 2 million into INR (Rupees) in six months time. The current \$/INR spot exchange rate is 0.01950. To manage this exposure, an investment bank has offered the Company a special type of structured forward contract which expires in 6 months. Under this contract, if the spot rate after 6 months is less than $X1 = 0.018868$, the Company sells its dollars at the rate of $X1$. If the spot rate after 6 months is greater than $X2 = 0.02$ then the Company sells its dollars at the rate of $X2$. If the spot rate after 6 months is between $X1$ and $X2$, then the company sells its dollars at the prevailing spot rate.

- [ii] Draw an appropriate diagram to illustrate Royale's payoff from this contract in INR (Rupees). State any assumptions. (4)
- [iii] Companies A and B face the following interest rates (adjusted for the differential impact of taxes)

	A	B
US Dollars (floating rate)	LIBOR+0.5%	LIBOR+1.0%
Canadian Dollars (fixed rate)	5%	6.5%

Assume that A wants to borrow U.S. dollars at a floating rate of interest and B wants to borrow Canadian dollars at a fixed rate of interest. A financial institution is planning to arrange a swap and requires a 50 basis point spread. Design a swap that will net the financial institution 50bp pa and will appear equally attractive to companies A and B. (3)

[iv] Explain the specific risks that the financial institution may encounter in providing the swap. (2)

[11]

Q.5) [i] Explain whether the expected loss from default on an interest rate swap will be higher or lower than the expected loss from default on a loan with the same principal. (2)

You have been asked to assess key risks (primarily credit risks) within various derivative based transactions undertaken by a global bank called Alpha. It operates in a country where there is a highly developed, liquid spot and derivatives market.

Alpha is negotiating a swap agreement with Beta (another bank). Under the terms, Alpha will lend cash to Beta. In return, Alpha will receive a portfolio of bonds from Beta. Both parties are to repay each other at the end of the term of the swap.

[ii] Describe the key credit and market risk exposures faced by Alpha under this swap agreement, and the various actions it can take to mitigate these risks. (4)
(For the purposes of this question, do not consider any mitigating solutions which involve credit derivatives)

Alpha has a book of derivative transactions with several counterparties. It has legally enforceable netting agreements with each counterparty in respect of credit exposure. All amounts are shown in local currency.

Counterparty	Derivative	Notional (Millions)	Mark to Market Value (Millions)
MegaBank	Interest Rate Swap	100	-7
MegaBank	FX Currency Swap	70	35
MegaBank	Put Option (on domestic index)	40	3
Gamma	Interest Rate Futures	40	4
Gamma	Inflation Swap	50	-10
Kappa	Interest Rate Swap	120	8
Kappa	FX Currency Swap	40	5

- [iii] Calculate the impact of the netting arrangements on Alpha's credit exposure in respect of this entire book of transactions. State any assumptions. (3)

Alpha has a sizeable holding of an unquoted bond issued by a medium sized manufacturer of Personal Computers (PCs). To hedge against the risk of default, it has bought a credit default swap from another bank called Icarus. Under the terms of the swap, Icarus will take delivery of the bond and pay Alpha the par value of the bond in the event that the PC manufacturer fails to meet its interest or capital repayment obligations on any of its publicly quoted bonds.

- [iv] Describe the concerns you may have with this hedging arrangement. (2) [11]

Q.6) A fund has a mandate to track a benchmark index. The benchmark return is uniformly distributed between 3% and 7%. The risk free return in the country where the fund manager operates is 4.5%. He is planning to follow either one of the following strategies described below:

Strategy A: Track the benchmark index as per the mandate.

Strategy B: Invest the fund in a special asset that gives twice the growth in the benchmark index with probability 0.5 and half the growth in the index with probability 0.5.

- [i] Use the Sharpe ratio to determine the strategy that provides a higher risk-adjusted return. (5)
- [ii] Will your answer change, if the special asset were to give twice the return on the benchmark with probability 0.8 and half the return on the benchmark with probability 0.2. (2)
- [iii] Discuss the possible reasons why the fund manager may deviate from the mandate of tracking the benchmark index. (2) [9]

Q.7) You are an investment consultant to the trustees of a defined benefit scheme in country X, responsible for advising the scheme on manager selection and monitoring, fee based arrangements and de-risking strategies.

The scheme's liabilities are discounted using a risk-free swap curve, and the scheme is slightly underfunded on this basis. The scheme's assets are 60% invested in bonds (conventional and index linked) with the remainder invested in equities. All the assets are held amongst several active and passive managers.

You have recently prepared some analysis for the trustees detailing the performance of the active equity managers against the relevant benchmarks.

- [i] Discuss the key issues the trustees should consider when reviewing this analysis. (2)

The scheme's trustees are considering ways to reduce the risks relating to volatility of the funding level. One option being considered is to more closely hedge the market risks impacting the value of the liabilities.

- [ii] Briefly describe suitable derivative transactions that could be implemented to construct suitable hedging strategies. In addition, describe which risks may not be addressed and may still remain within the scheme after implementing these transactions. (5)

The scheme's equity portfolio has a volatility of 13% and the trustees wish to reduce this to 11%. They are therefore considering making a hedge fund investment which has a volatility of 18% and a correlation with the existing equities of 0.08.

- [iii] Determine the changes in investment strategy which may be required to achieve this objective. State any assumptions. (5)

- [iv] Briefly discuss the key factors the trustees should consider before implementing this new investment strategy. (2)

[14]

- Q.8)** [i] Describe the characteristics of an infrastructure asset. (3)

- [ii] List eight examples of an infrastructure asset (2)

- [iii] The government is considering building a highway between Mumbai and Ahmedabad. The government has decided not to fund the project, but the project will instead be funded by private investment. The government is considering various options for funding the project and it has issued a tender. Under the arrangement, tolls will be collected from the users of the highway and used to deliver the return to private investors (for a period of 10 years from the completion of the highway). The following investors have responded to the tender.

- (a) An investor which plans to raise the money to fund the project through private debt.
- (b) A hedge fund.
- (c) A venture capitalist.
- (d) A mutual fund.

(e) A company specializing in securitization which plans to securitize the income stream from the highway.

Discuss, giving suitable reasons, whether it is appropriate for each investor to consider funding the project. (10)

[15]

Q.9)

You are a consultant working with an investment bank. Most of the private life insurance companies in the country have been in operation for more than 10 Years. First India Life Insurance Company Limited is planning an Initial Public Offering (IPO). You have been asked to determine the share price for this offering.

[i] Describe the process you will undertake to determine the share price for this company. (6)

[ii] Describe the factors that will affect the share price of the company.

An analyst has been following the IPO of the First India Life Insurance Company Limited and has been asked by a client to advise him on the suitability of investing in the offering. (5)

[iii] Outline the sources of information which are available to the analyst to help him form a recommendation. (3)

[iv] The analyst has noticed that the price-to-earnings ratio is quite high for this company. The price is the quoted price in the prospectus and the earnings are that for the last financial year. Discuss possible reasons for the high price-to-earnings ratio. (5)

[19]
