

INSTITUTE OF ACTUARIES OF INDIA
EXAMINATIONS

07th November 2007

Subject ST5 — Finance and Investment A

Time allowed: Three hours (9.45* pm – 13.00 pm)

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer sheet.*
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. *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.*
4. *You must not start writing your answers in the answer sheet until instructed to do so by the supervisor.*
5. *Mark allocations are shown in brackets.*
6. *Attempt all questions, beginning your answer to each question on a separate sheet.*
7. *Candidates should show calculations where this is appropriate.*
8. *Fasten your answer sheets together in numerical order of questions. This, you may complete immediately after expiry of the examination time.*

Professional Conduct:

It is brought to your notice that in accordance with provisions contained in the Professional Conduct Standards, If any candidate is found copying or involved in any other form of malpractice, during or in connection with the examination, disciplinary action will be taken against the candidate which may include expulsion or suspension from the membership of ASI.

Candidates are advised that a reasonable standard of handwriting legibility is expected by the examiners and that candidates may be penalized if undue effort is required by the examiners to interpret scripts.

AT THE END OF THE EXAMINATION

Please return your answersheets and this question paper to the supervisor separately.

<p>In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator.</p>

- Q. 1)** Steel Co Ltd is an AAA rated company with a sales of Rs.1500 Cr per annum. The company has been financing its working capital requirements through working capital loans from major banks. The interest rate on working capital loans is currently 10%pa. The rate is reviewable at the beginning of every financial year. In recent times, the yields on short term bonds and treasury bills have declined to 6%.

Since 9 months are left before the rate on working capital loan can be reviewed, the company wishes to explore alternative sources of working capital finance.

- a) List the money market instruments available in the market (3)
- b) Name and describe the instrument that Steel Co. can issue as an alternative to replace the working capital loan for the balance period of 9 months. (4)
- c) Why do you think the company will make use of this alternative when bank credit is already available? How will the cost of borrowing through this alternative instrument compare with yield on treasury bills and the interest rate on working capital loans? (3)

[10]

Q. 2)

- a) What is meant by bootstrapping? Describe how would you construct a zero coupon yield curve using the technique of bootstrapping. (4)
- b) The following data are available on three quoted Central Government securities:
 - Gilt 1: coupon of 6.75%pa; remaining term to maturity of 1 year; market price 102.01
 - Gilt 2: coupon of 9.50%pa; remaining term to maturity of 2 years; redemption yield 4.90%
 - Gilt 3: coupon of 7.75%pa; remaining term to maturity of 3 years; market price 110.41

Calculate the spot yields for the next 3 years. State assumptions made (4)

[8]

Q. 3)

- a) Company A, a AA+ rated manufacturer, is able to get quotations at 10% fixed and floating 6 month MIBOR [Mumbai Inter Bank Offered Rate] plus 0.3% for an unsecured loan for a tenor of 3 years denominated in Indian Rupees. Company B, a AA rated exporter, has got quotations at 11.20% fixed and floating MIBOR plus 1% for a similar rupee denominated loan with a tenor of 3 years. Both these companies have approached Bank C at the same time to negotiate a swap wherein the Company A wishes to have floating exposure loan while Company B wishes to have fixed rate exposure. The bank needs at least 0.05% to cover its expenses. The notional principal amount is Rs.100 million. The interest is payable on a half-yearly basis.
 - i) Explain the two main risks the bank C will face. Can these risks be mitigated? If so, how? (4)

ii) Why could Company A and Company B not directly borrow in the market on floating and fixed interest loans respectively? Design a swap such that Company A and Company B will benefit from the swap with the bank being the intermediary. The profit the bank wants is 0.05% after meeting its expenses. Assume that the bank does not have credit or market risk. Explain the gains/losses made by each of the companies and bank C in this transaction. (5)

iii) The swap has an outstanding term of 9 months. What is value of the swap to Company A and Company B? Assume that the 6 month MIBOR was 5% at the last payment date. The risk discount rates for AA and AA+ bonds are 7% and 6.75% for 3 months and 7.25% and 7.00% for 9 months respectively. Assume the discount rates are continuously compounding. State other assumptions, if any, (5)

b) Assume that the LIBOR yield curve is flat at 8% pa with annual compounding. A swaption gives the holder the right to receive 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 USD 1 million.

Calculate the price of the swaption using the Black's model. State assumptions, if any. (5)

[19]

Q. 4)

a) Describe how the economic cycle can impact companies' price/earnings ratios (4)

b) The value of a highly rated pharmaceutical company is derived almost entirely from a single drug which has not yet gone on sale and is still in test. Pharmaceutical press commentators anticipate that it should be an effective treatment for a relatively common and serious condition.

The results of the field trials have just been released by the company to the press. These results show that the drug is not effective against this condition

i) State with reasons the direction and the extent of any change you might expect in the share price of the company immediately following the announcement. (3)

ii) Outline the factors you would consider when assessing the value of the shares after the company's release of the results of the field trials. (5)

[12]

Q. 5)

a) Give three reasons as to why the CFO [Chief Financial Officer] of a company might not hedge the company's exposure to a particular risk. (3)

b) Derive the formula for an optimal hedge ratio if futures are used a hedging strategy. Define all symbols you use. (4)

c) Comment on the following statements:

[i] If the minimum variance hedge ratio is calculated as 1.0, the hedge must be perfect.

[ii] If there is no basis risk, the minimum variance hedge ratio is always 1.0.

[iii] A perfect hedge always succeeds in locking in the current spot price of an asset for a future transaction.

(5)
[12]

Q. 6) The trustees of a pension fund whose assets have a market value of Rs.2 billion have mandated that 60% of the fund be invested in equities tracking the All Share Index and 40% be invested in a bonds tracking the All Bond Index.

During 2006, the fund manager believed that equities will perform better than debt as growth prospects for the economy are improving. Hence at the start of the year he placed Rs, 1600 million in equities and Rs.400 million in short term bonds. He reinvested dividends and coupons in the respective sectors as soon as they were received. New money was invested in the ratio of 80: 20 for equities and debt.

The following data has been provided:

Fund Values		[Amounts are in millions of rupees]	
Date	Fund Value- Equities	Fund Value – Bonds	Net Contributions Received
1/1/06	1600	400	+ 400
31/03/06	1770	460	+ 360
30/06/06	2060	490	-200
30/09/06	2000	460	-300
1/1/07	2300	550	

Assume that the net contributions are received at the beginning of the respective quarters.

Bench Mark Returns [% per Quarter]

Quarter	Equities [Income Reinvested]	All Bonds	Bonds < 5 years
Q1 -06	10 %	-9 %	-5 %
Q2 -06	-2 %	-15 %	-8 %
Q3 -06	5.7 %	-3 %	2 %
Q4 -06	3.5 %	2 %	6 %

(a) Calculate the money-weighted rate of return and the time-weighted rate of return for the overall fund in 2006, State all assumptions made.

(4)

(b) For each quarter allocate the difference between the fund's rate of return and the return on the benchmark between

- (i) that which is attributable to stock selection
- (ii) that which is attributable to asset allocation
- (iii) that which is attributable to bond duration selection. (12)

(c) Briefly comment on the performance of the fund manager (3)
[19]

Q.7)

(a) Discuss the methods that are available for controlling the four key financial risks faced by an institutional investor (10)

(b) The trustees of a pension fund are anticipating substantial cash outgo over the next few years, the first payment being due two years from now. They want to allocate a part of the existing portfolio of Government bonds to meet these liabilities and to immunize as far as possible against interest rate fluctuations. Explain briefly how you would determine an appropriate mix of 3-year, 10-year and 15-year coupon bearing Government bonds to satisfy the requirement. (5)

(c) A life insurance company which sells retirement annuities in a very competitive market is exploring ways of enhancing the total return on the fixed interest portfolio backing the existing portfolio of retirement annuities. Briefly discuss the methods available for meeting the requirement of this company. (5)
[20]
