INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

18th May 2011

Subject SA5 – Finance

Time allowed: Three hours (9.45* - 13.00 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 expected to be India Specific application for the syllabus and corresponding core reading. However, substantially the core reading material is still taken from material supplied by Actuarial Education Company which are meant for UK Fellowship examination. The core reading also contains some material which is India Specific, mostly the IRDA regulation. In view of this, it should be noted that focal point of answers is expected to be India Specific application. However if application specific to any other country is quoted in the answer the same should answer the question with reference to Indian environment.***

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

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

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

Q. 1) XYZ is a medium sized power producing company with a capacity of 500 MW. It has drawn out plans to expand the capacity to 1000MW by implementing a green field project of 500 MW. The debt equity ratio of the company is currently 1:1 and is listed. The Company is contemplating to come out with long term bonds of 10 to 15 years to finance the expansion. The CFO of the Company has approached the CIOs of Life Insurance Companies for their suggestions to structure the bonds as she believes that life insurance companies have appetite for such long term bonds.

You are the CIO of a medium sized life insurance company and you have to give your suggestions/recommendations to the CFO.

i) Discuss the key factors you would consider and provisions you would like to see in the bonds in order to enable you to subscribe to them. (8)

The Company has approached the credit rating agency for rating of its bonds.

ii) Discuss briefly the factors /information the credit rating agency would take into consideration before assigning the rating. (7)

The power company XYZ buys gas from Shello at current market prices every 3 months, but is concerned that this causes volatility in earnings. The CFO of the company wants to make a proposal to suggest one of the following:

a) A yearly fixed price for gas.

b) A price which is the lesser of the current market and fixed price, for which XYZ will pay Shello an amount U.

The agreement would be reviewed for renewal after a year. The investment team produces the following information to aid the CFO to make an appropriate decision:

- The price of gas is almost perfectly correlated with the stock price of Shello.
- Stocks of Shello are traded in the option market and both in-the-money and out-of-the-money options are available in the market.
- Implied Volatility of stock price of Shello is determined to be 30%, risk free discount rate is 7%.
- The stock price of Shello follows a geometric Brownian motion with constant drift and volatility.
  - The stock does not pay dividends.
  - Perfect capital market assumptions apply.

iii) If you are the CFO, how will you go about proposing what the fixed price of gas should be in a) above? How would you calculate the amount U in b)? (4)

iv) Now, you have a concern that the investment department has not given you a projection of the increase in stock price of Shello (which is assumed to be correlated with growth rate of gas prices). Explain why you may or may not need that information. (2)

v) Shello accepts your proposal for the fixed rate @ a slightly higher rate than you have proposed. You want to improve your financial statements and the investment team strongly advises you that gas prices will not increase more than 20% of the current levels during the year. What course of action can you take? (3)

The Company has a strong R&D department. The R&D department has come up with a device which could reduce the transmission losses very significantly . The Company is in the process of patenting the device and wishes to commercialise its production. The product is at the testing stage. It needs significant investments.

vi) What factors does the company take into consideration to decide whether to make the investments from the existing company or to create a new company and transfer the technology to the new company? (6)

The Board of the Company has decided to create a new power technology company, Innovative transmission Ltd. to pursue the innovations in power generation and transmission. As part of this the patent it is hoping to get for the new device will also be transferred to the new company.

The Company Board has asked the CFO to come up with alternative financing modes other than debt.

vii) Suggest various options available for the company to raise the finance. (4)

A venture capital fund which specializes in investing in power related technology companies has evinced interest to invest in the company.

viii) Describe the factors the venture fund would take into consideration while evaluating its investment in this new company. (6)

ix) How would the venture fund like to structure its investments in the company and what are the likely exit routes for the fund? (7)

[47]

Q. 2) You have been recently appointed as a product development actuary at Bharat Life Insurance Company which started its operations last year. Anuj, a recently qualified actuary, has finished the development of a non-participating traditional endowment product and the report is pending with you for your approval. You went through the report and you found the following:

a) Profit After Tax and Solvency Margin has been used to calculate all the profit parameters

b) Discount rate used is 15% with assumed market equity risk premium of 5%

c) Corporate tax rate used is 14.1625%

d) Cut off parameters for pricing used were VNB margin of 3%, discounted payback period to be less than 8 years, IRR > 12%

e) Other parameters like mortality, withdrawal rates, expenses etc have been padded by 5% margin compared to the mean estimates.

Critically evaluate the pricing approach used by Anuj and propose the modifications you would do to the above approach. [VNB Margin = present value of future profits as defined / First year premium]

[10]

Q. 3) There are many examples of sovereign defaults over the years – for example Poland (1981), Romania (1981), Turkey (1978), Ukraine (2000), Peru (2000), Argentina (2001), Uruguay(2003) etc. These were defaults of the foreign currency loans. However, there are also examples of sovereign default for local currency loans like Argentina (2002), Russia (1998), Madagascar (2002) etc. Just like corporate debt ratings we also have sovereign debt ratings and recently the rating for US debt was downgraded.

i) What is a risk free interest rate? (2)

ii) Why is it different for different countries and is there any arbitrage opportunity? (3)

iii) Discuss the significance of risk free interest rate in finance? (4)

iv) Discuss possible reasons for countries to default on foreign currency and local currency debt? (5)

v) How would you go about estimating risk free interest rate if sovereign is also risky? (3)

vi) What would happen if investors believe that risk free asset does not exist? (4)

[21]

Q. 4) The ABC Company, which has 300 Cr in assets, intends to take over SOS Co which has 100 Cr in assets. ABC has 200 Cr in zero coupon debt maturing in three years and SOS has 50 Cr in zero coupon debt maturing in three years. The combination is expected to generate 20 Cr in cost-reducing synergies. Assume that all Black-Scholes assumptions apply to each of the two firms and their securities. The standard deviations of asset returns for ABC and SOS are, respectively, 0.5 and 0.7 and the synergies will have no impact on either the individual or combined firm standard deviations. The riskless return rate is currently 0.05. The correlation coefficient between asset returns for the two firms is 0.1.

i) What will be the post merger debt and equity values of the combined firm? (5)

ii) By how much will the merger change overall equity value? (2)

iii) Is it possible for shareholders of both firms to benefit from the takeover? (2)

iv) Comment on your results. (1)

[10]

Q. 5) There are two proposals in front of you for your consideration as a chairperson of SEBI. The proposals are -

a) Allow stock exchanges to raise equity/debt finance from public and allow them to be listed.

b) Stock exchanges are to be financed by various banks/financial institutions and their profitability should be tightly controlled.

Discuss both the proposals and the decision that you are going to take. **[12]**

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