INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

08th November 2007

Subject CA1 – Core Applications Concepts

Paper II

Time allowed: Three Hours (14:15 - 17:30 Hrs)

Total Marks: 100

INSTRUCTIONS TO THE CANDIDATE

1. *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.*
2. *You must not start writing your answers until instructed to do so by the supervisor.*
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. *Mark allocations are shown in brackets.*
5. *Attempt all questions, beginning your answer to each question on a separate sheet.*
6. *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 answer sheets and this question paper to the supervisor separately

Q. 1) A financial conglomerate that has a general insurance company subsidiary is raising capital by issuing a 5 year catastrophe bond. This bond will pay the capital with accumulated interest on maturity if there are no catastrophes during the period.

Discuss the factors that need to be considered in designing this bond.

[6]

Q. 2) You have been approached to take over the role of Project Owner of a project in your organization.

a. Describe the role and responsibilities of a Project Owner (2)
b. Outline the key factors in managing a successful project (3)
c. List the contents of the written strategy document (6)

[11]

Q. 3) An infrastructure company is considering bidding for a green field project for construction of an airport in a city. The project is expected to cost 1000 and take 12 months to complete. If however, the land acquisition is delayed, the project is expected to cost 1225 and take 18 months to complete. There is a 30% chance that the land acquisition could be delayed.

Once completed, the expected revenue is 110 in year 1 growing at an annual compounded rate of 15% every year. The company expects to sell off the property for 1300 at the end of 7 years of completion of the project.

a. Describe how the risk discount rate to be used in evaluating this project should be derived (8)
b. Calculate the net present value under each scenario and the expected net present value of the project using a discount rate of 13% p.a. Assume that the cost and each year's revenue occur at the mid point of their respective time periods. Comment on your results. (6)
c. Identify the major risks facing the project and describe how these could be mitigated. (10)

[24]

Q. 4) **a.** Define immunization in the context of investment of assets (1)
b. Outline the limitations of immunization theory (5)

[6]

Q. 5) A charity trust that provides monetary support to deserving students every year has asked for your assistance to design a suitable investment portfolio.

a. Describe how the process of risk budgeting could help you achieve this task. (5)
b. Explain the two key advantages of the risk budgeting approach to asset allocation. (2)

[7]

Q. 6) A global life insurance company that operates in different countries is starting operations in a developing country. One of its initial products is a 10 year regular premium paying product that offers a lump sum benefit on death or critical illness. If no claim is made during the policy term all premiums paid are returned on maturity.

The country has published mortality tables that are ten years old. However, there are no such published tables of critical illness incidence rates. During the last five years the country has made rapid progress in its economy.

a. Describe how you would estimate the mortality, critical illness and withdrawal assumptions for pricing the product. (8)

b. State with reasons which of the pricing assumptions could be modeled stochastically. (4)

c. The marketing director is keen that the company gets some quick sales in the first year of the company. She has suggested that product be underwritten based on the information on the application form alone. Note that all other companies in the market insist on medical examination of the applicant depending on the applicant's age and sum assured. Discuss the implications of this suggestion for the company (8)

[20]

Q. 7) **a.** List the roles of capital in the banking industry. (3)

b. A newly established bank is about to start its operations and is recruiting the senior management staff. In order to encourage retention of these staff, the bank is offering them, on completion of five years of service with the bank, a lump sum of Rs. 5 mn or a deferred life annuity of Rs. 60,000 per month from age 55. The employee can elect the type of benefit on completion of four years of service.

i). Describe the different approaches to the timing of the bank's payments to meet these benefits (4)

ii). Describe how surpluses or deficits can be met under each approach in i) above. (3)

iii). Discuss the effect of this on the amount of capital that the bank requires in order to operate its business (6)

[16]

Q. 8)

a. Outline the main features of an aggregate excess of loss reinsurance arrangement (3)

b. Explain with reasons the type and extent of reinsurance that would be most suitable for

- **i.** a general insurance company writing health insurance
- **ii.** a large insurance company writing marine insurance (4)

c. A general insurance company has the following reinsurance arrangements:

- **i.** Quota share : 40% of the risk is retained
- **ii.** Risk excess of loss : Rs. 2 mn in excess of Rs. 3 mn
- **iii.** Aggregate excess of loss: Rs. 4 mn in excess of Rs. 5 mn

Three policies gave rise to claims as follows:

- Rs. 3 mn
- Rs. 8 mn
- Rs. 12 mn

Calculate the total claim amount recoverable from each reinsurer and the final amount retained by the ceding company. (3)

[10]

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