INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

27th May 2009

Subject CA1 – Core Application Concept (Paper I)

Time allowed: 3 Hours (9.45* - 13.00Hrs)

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. *Attempt all questions, beginning your answer to each question on a separate sheet.*
3. **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 3 hours to complete the paper.*
4. *You must not start writing your answers until instructed to do so by the Supervisor.*
5. *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) List the stakeholders that an actuary responsible for a retirement benefit plan is likely to advise. **[4]**

Q 2) Outline the attributes of a good asset model. **[4]**

Q 3)

a) State the key characteristics of money market instruments. (1)

b) Outline the reasons why a life insurance company might find investment in money market instruments attractive. (4)

c) Explain why life insurance companies would not normally invest a large proportion of their assets in money market instruments. (2)

[7]

Q 4)

a) Explain the difference between European and American options and how this is likely to be reflected in the relative pricing of the two types. (2)

b) Identify the profit or loss (ignore dealing costs) at expiry in each of the following cases:

i) Buying a call option for a premium of Rs3.20p per share and an exercise price of Rs48. The share rises to Rs 50 at the expiry date. (1)

ii) Buying a put option for a premium of Rs10 per share and an exercise price of Rs200. The share falls to Rs180 at the expiry date. (1)

iii) Sketch the profit/loss profile at expiry of writing a put option for a premium of Rs 2 per share and a call option for a premium of Rs 3 per share both with an exercise price of Rs150 and the same expiry date. (2)

[6]

Q 5) The Life insurance regulator of a country plans to allow insurance companies to issue residential mortgage loans and is planning to introduce suitable legislation to control the sale and risk management of residential mortgages.

a) Describe the sources of risks that will be faced by the insurance companies relating to residential mortgage business. (4)

b) Discuss the suitable regulatory framework that the Regulator should consider to monitor the insurance companies. (6)

[10]

Q 6) A large general insurance company writes product liability insurance business covering defects in manufacture of motor cars. The insurance covers against defects for a period of two years from date of sale. The company has been writing this business for the last ten years.

a) Outline the main data issues that will need to be considered when calculating a risk premium for this business. (4)

b) Outline the factors (other than the theoretical risk premium) that should be taken into account when determining the actual premium to be charged for this business. (4)

[8]

Q 7) **a)** Explain why market value is not always suitable to use when valuing an asset. (4)

b) Describe the following methods of valuing an asset:

i) Book value

ii) Smoothed market value

iii) Discounted cash flow value (3)

c) Outline the circumstances in which each of the methods in (ii) could be used. (3)

[10]

Q 8) A life insurance company is planning to enter the long term health care market and one of the products it wants to consider is a product which covers the cost of residential nursing care in old age. The 3 options it is looking at are –

- A single premium insurance policy which pays a fixed lump sum(chosen at the time of purchase) when the need for residential care arises.
- A regular premium insurance policy that pays a level annuity (fixed at time of purchase) throughout the remaining life. The annuity commences when a person fails to be able to perform certain specified activities of daily living.
- A single premium insurance policy that will cover the full cost of nursing home fees

a) Describe the risks avoided and accepted by the individual, and the risks transferred to the insurance company, for each option being considered. (6)

b) Outline the issues the insurance company will need to consider when pricing the insurance risk for each of the various insurance policies described above. Ignore expense and investment risk. (4)

[10]

Q 9) You are the investment manager of a financial institution whose entire fund of Rs 1000 crores is either invested in securities listed on the local stock exchange, in mutual funds or held as cash. The fund has 20% invested in the shares of property companies and a further 15% is invested in mutual funds which invest in overseas stock markets. It has been proposed that the fund should sell its holdings of property company shares and mutual funds. The money realized would be reinvested directly in property and overseas securities.

a) Discuss the merits of the current investment policy compared with the alternative of investing directly in property and overseas securities. (7)

b) Indicate the range of assets that the financial institution might consider if it were to invest directly in property and overseas securities. (4)

[11]

Q 10) Prospective and retrospective tracking errors can be used as measures of risk in investment portfolio construction.

a) Describe each of these two measures and explain how the two measures differ. (4)

b) Two equity funds that are of a similar fund size have given you the following information:

	One year information ratio	*Number of positive "active money" positions greater than Rs 1 crore in value*	*Total value of positive active money positions greater than Rs 1 crore*
Fund Z	1.5	*40*	Rs 73 crore
Fund A	0.7	*15*	Rs 56 *crore*

i) Describe what the above information means and the conclusions you would draw. (6)

ii) Discuss the limitations of an analysis based on the above data. (4)

[14]

Q 11) The government of a developing country is reviewing its system of state retirement benefits. The country currently has no formal state pension. It proposes to introduce a system of voluntary retirement savings by establishing a range of government-approved defined contribution pension plans. An individual can subscribe to any of the pension plans and has to contribute 10% of his income every year to the chosen Plan. On reaching age 60, he can use proceeds to purchase a fixed annuity for life at then available rates from approved annuity providers. The Pension plans can invest the monies collected in Debt instruments (issued by Government and Corporate) only. No equity exposure is allowed. The proceeds that a person will receive at age 60 will be dependent on market values of the underlying debt investments.

a) Comment on whether or not the new system will result in all individuals receiving an adequate income in retirement. (7)

b) Outline other events for which individuals might need to have long-term savings. (3)

c) Suggest ways in which the government's proposals could be adapted to meet other long term savings requirements. (3)

d) Comment on the proposed investment policy and suggest ways in which it could be improved to meet the requirements of the population. (3)

[16]

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