

# INSTITUTE OF ACTUARIES OF INDIA

## EXAMINATIONS

10<sup>th</sup> May 2010

### Subject CA1 – Core Application Concept (Paper I)

Time allowed: 3 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. *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)** (a) State the advantages of using a stochastic model rather than a deterministic model when carrying out an actuarial investigation?
- (b) List the disadvantages of using a stochastic model
- [4]
- Q. 2)** You are an actuary for a proprietary life insurance company that specializes in with profit business. You have been asked to produce a report setting out the recommended bonuses to be awarded to the with profit policies at the end of the year.
- List, with reasons, the parties you should consider when making this recommendation.
- [6]
- Q. 3)** (a) Outline the main attractions and drawbacks to an insurer of using facultative reinsurance as opposed to treaty based reinsurance?
- (b) An insurer enters into a treaty with a reinsurer on the below basis:  
“Proportional reinsurance of 40 % of the claim above the retention limit of 500,000 and the amount of claims in excess of 900,000 will fall back to the insurer”
- The following claims come in under each risk. What are the recoveries on each claim under this treaty?
- a) 800,000
  - b) 300,000
  - c) 1,000,000
- [8]
- Q. 4)** Describe the main features of the following asset classes that would be relevant to the investment of the funds of a large pension scheme
- a) domestic fixed-interest government bonds
  - b) overseas fixed-interest bonds
  - c) domestic shares
  - d) overseas shares.
- [8]
- Q. 5)** The life insurance company to which you are the actuary sells a regular premium unit-linked 7-year endowment assurance policy with a guaranteed minimum surrender value available to policyholders any time after first 2 policy years equal to the sum of regular premiums paid.
- The life office is considering the level of the provisions it should hold in respect of this guarantee together with the method and assumptions to be adopted in carrying out the necessary calculations.
- Discuss how a stochastic model could be used for these purposes
- [8]

- Q. 6)** a) Why is it necessary to regulate financial services markets? Why is this need greater than for other markets? (3)
- b) Outline the most significant costs of regulation. (3)
- c) Explain how regulation of financial markets could reduce information asymmetry? (2)  
[8]
- Q. 7)** A trustee of a small charitable organization has been given the task of setting the investment mandate for the charitable organization for the next 5 years.
- a) Describe the principles that should be considered when setting the investment mandate (6)
- b) Specify the details that should be included in the mandate with regards to the process of managing the assets of the charity.
- You do not need to cover issues relating to professionalism or codes of conduct governing the trustee's behavior. (3)  
[9]
- Q. 8)** a) Write down equations for the expected return and the required return for both property and conventional government bonds. (2)
- b) Derive an equation to compare the relative levels of property rental yields and conventional government bond yields. State the key assumption for this equation to hold. (2)
- c) Explain briefly the circumstances in which property yields may exceed yields on conventional government bonds. (5)  
[9]
- Q. 9)** A company has approximately 1000 employees. About 80% of the employees are aged between 25 and 35. The employer is considering how best to provide retirement benefits for all his employees.
- The employer is considering two options:
- provide a pension from retirement linked to final salary
  - set up a money purchase scheme in which the pensions savings will be invested, and use the accumulated fund to purchase an annuity at retirement.
- Explain the differences between the two approaches in respects of the following issues –
- a) Nature and suitability of the benefit to the employee (3)
- b) Risk to the employer (4)

- c) Administration systems and costs of management (2)
- d) Subsequent transfer out (2)

[11]

- Q. 10)** A life insurance company has recently designed a new product, a without profit decreasing term assurance, for sale to customers with housing mortgages. A policy provides life cover to the extent of outstanding housing loan.

Discuss the factors that the life insurance company should take into account when deciding on an appropriate administration system

[13]

- Q. 11)** An insurance company writes a large volume of personal motor insurance business.

- a) Explain the risks that could be caused by worse than expected claims experience from this line of business. (4)
- b) Describe why uncertainty in claims experience may arise under this line of business. (12)

[16]

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