INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

05th May 2015

Subject CA1 – Actuarial Risk Management (Paper I)

Time allowed: 3 Hours (14.45* - 18.00 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 you are required 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.*
6. *Please check if you have received complete Question Paper and no page is missing. If so kindly get new set of Question Paper from the Invigilator*

AT THE END OF THE EXAMINATION

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

Q. 1) An investor has the following views about various asset classes

Expected Future Inflation	=	5%
Inflation risk premium	=	1%
Equity risk premium	=	4%
Property risk premium	=	6%
Real future dividend growth	=	3%
Real future rental growth	=	1.5%

The above rates are average annual rates over the long term

The current returns available on the major assets are as follows:

Property rental yield	=	4.5%
Gross Redemption yield on government bonds	=	9%
Gross dividend yield	=	5.5%
Real yield on index-linked government bonds	=	2%

Purely based on this information and incremental absolute returns, rank the assets in order of cheapness based on this investor's view **[4]**

Q. 2) **i)** A student has commented as under:

"The buyer of a futures contract has a potentially unlimited upside as well as potentially unlimited downside".

Do you agree with the student? Comment. (2)

ii) Fill the following table with "Unlimited" or "limited". If "limited" specify the extent to which it is limited.

Party to transaction	**Downside**	**Upside**
Seller of put option		
Buyer of put option		
Seller of call option		
Buyer of call option		

(7)

[9]

Q. 3) A life insurance company writes only group term insurance business insuring members of a group for whole of life for a sum assured equal to 5 times the last annual salary drawn. There is neither any exclusion to payment of benefits nor any initial underwriting of members of the group.

Discuss briefly how well the risk taken by the insurer fits the desirable criteria of risk to be insurable. **[10]**

Q. 4) **i)** Outline some restrictions that may be imposed on the investments of an insurance company by the regulator. (4)

In a particular country, the regulator has increased the minimum required investment in fixed interest government bonds for a general insurance company from 40% to 55% of the total funds under management. Simultaneously, the tax regime in the country has changed wherein tax rate applied on capital gains on sale of investments has been reduced.

ii) **a)** Discuss how the above changes would impact general insurance companies. (6)

b) Explain how would the demand and supply of various asset classes would get affected due to the above 2 changes. (3)

[13]

Q. 5) **i)** List and explain briefly 4 financial criteria for evaluating the cash flows of a project. (4)

ii) Mention one advantage and one disadvantage of each of the above 4 criteria (4)

An institute is planning to conduct a competitive examination for students for a fee of Rs. 50 per student payable on 01st April 2015. Assume that all students pay the fees on this date. The examination is to be conducted on 01st September 2015 for which the institute would incur a cost of Rs. 100,000 payable on the date of examination itself.

iii) The probability of the number of students who would enroll for the exams are as under :

No. of students who might enroll	Probability
3,000	30%
4,000	50%
5,000	20%

The top ten scorers would get a cash prize of Rs. 10,000 each which would be payable on 31st December 2015.

Calculate the Expected net present value of this project at a risk discount rate of 10% p.a as at 01st April 2015. (4)

iv) Without performing further calculations, comment on the rate of interest which the institute should earn on the fees collected on 01st April 2015 in order to avoid making a loss. (2)

[14]

Q. 6) Describe the risks faced by a small health insurance company selling only individual health insurance policies **[14]**

Q. 7) A fund management company manages the retirement fund of a large company ABC Ltd. The retirement scheme offers lump sum benefits on death, early retirement and superannuation.

As per agreement between the 2 parties:

- The fund management company has to provide a minimum guaranteed return of 3% per annum on funds invested by ABC Ltd.
- The fund manager can charge a fund management fee of 1% per annum at the end of every financial year subject to fund earning a minimum return of 3% per annum.
- At the beginning of every financial year, the fund management company has to declare investment returns on the fund for the next year subject to a minimum of 3% per annum
- ABC Ltd can withdraw money from the fund at any time without any penalty for paying benefits to its employees. Once the total withdrawn amount in any one year exceeds 25% of the total funds under management at the beginning of the year, the fund manager can impose a penalty on all subsequent withdrawals.
- ABC Ltd can pay contributions into the fund at any time.

i) Discuss the risks to the fund management company of offering such a product. (6)

ii) Discuss how these risks could be managed. (6)

iii) How will the penalty to be levied for withdrawals from the fund be determined? (2)

[14]

Q. 8) A large pension fund has large chunks of prime property all over the country which amounts to about 25% of its total funds. It has now decided to dispose off 50% of its property holdings for the sake of diversification. It has the options of investing either in property funds or in other financial instruments.

i) What are the advantages and disadvantages of indirect property investments for this fund over its alternative? (10)

ii) What are the other financial instruments suitable for this fund for diversification? (3)

This pension fund has been advised by its fund manager to consider investments overseas.

iii) What could be the reasons for the fund manager making this suggestion? (3)

iv) Discuss the drawbacks of the proposal to the pension fund. (6)

[22]

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