

INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

31st March 2021

**Subject CP1 – Actuarial Practice
(Paper A)**

Time allowed: 3 Hours 30 Minutes (14.30 - 18.00 Hours)

Total Marks: 100

Q. 1) List down the various restrictions that can be imposed on the investments of financial institutions managing customer funds. [4]

Q. 2) In the current times, the market has seen significant increase in prices of gold. The Government has announced gold bonds backed by sovereign guarantee. The bonds have a fixed period of holding of 8 years and coupons are payable annually at the rate of savings bank rate minus 1%. Price at redemption will be linked to the price of gold prevailing in market at that time. Discuss the pros and cons of investing in physical gold versus sovereign gold bonds for a retail investor. [6]

Q. 3) You are working in a small newly established life insurance company which only sells term insurance products through digital medium. The risk monitoring team has done an analysis of potential and existing risks in the company for the upcoming financial year.

The team has identified the following key risks based on expected severity and frequency.

- Risk I – lack of cash in paying off claims
- Risk II- liability from loss of key customer information through hacking
- Risk III- significant default in its Non-Government securities portfolio

For each of these risks, identify its risk type [as credit, market, business, operational, liquidity or external etc.] and describe how you would evaluate the extent of the internal capital to hold. [9]

Q. 4) A small pension scheme has decided to use data from an industry-wide collection for setting its mortality assumption in order to estimate the employer contribution rate to a defined benefit pension scheme. Discuss the risks and issues arising from the use of this data. [9]

Q. 5) Environmental pollution caused by coal based power plants is a significant cause of concern to the Government of a developing country. A proposal which is under consideration of the Government is setting up a fund called “Pollution Management Fund”. An annual special pollution control tax shall be levied on all citizens/corporations and the same shall be transferred to this Fund. The Fund shall invest excess amounts if any in short term Government bonds. The Fund shall be used to compensate owners of coal based power plants for cost of shut down and decommissioning the power plants. It is expected that it would take 10 years to complete this initiative. Simultaneously, renewable sources of power like solar, wind etc. shall be encouraged by giving 10 year-tax holiday, interest subsidies on loans etc. Outline the risks to the Government that could arise from this proposal. [10]

Q. 6) A large company offers the following employee benefit scheme. Any employee who has been in service for at least 10 years with the company will be eligible for the following benefits.

- A death benefit equal to 3 times annual salary applicable at the time of death if death happens in service.
- At retirement/resignation, a starting monthly pension of $X \times 3\%$ of the last drawn monthly salary subject to maximum of 50% of last drawn monthly salary, where X is

based on number of years of accrued service. Thereafter, the monthly pension increases every year by 3%. In case of death post retirement, the monthly pension continues in same manner but reduced to half for spouse, if alive, and paid till death of spouse and thereafter stops.

- Anyone who does not want pension benefit at retirement shall be given 100% of present value of future annuity payments, determined using actuarial principles.
 - i) List down the various data items needed to establish the current value of liabilities under the scheme. (4)
 - ii) Explain the process of determining the current value of liabilities of this scheme. (14)
- [18]**

Q. 7) A trust, managing retirement benefits (defined benefits) for a rapidly growing company, has seen its fund growing significantly over the last 3 years.

In this context,

- i) Outline the factors the trustees of the scheme need to consider while formulating their risk appetite? (3)
- ii) What should be the investment principles of this retirement benefit scheme? (2)

The trust is working towards setting up a separate ALM team to monitor fund's assets and liabilities and to achieve investment principles of the scheme.

- iii) Outline the various activities that ALM team should perform to achieve its objectives? (5)
 - iv) The investment manager of the scheme has proposed that the scheme should consider investing in commercial properties through buying them directly. Discuss the key characteristics of such investments including risks as well as rewards associated with it, from an ALM standpoint. (10)
- [20]**

Q. 8) Y Electronics, runs a chain of electronic goods retail stores in the country. To boost sales, it had launched a credit scheme 5 years ago, wherein customers could buy goods on credit and repay the same back through equated monthly instalments (EMIs) of varying durations. Recently Y Electronics has approached AACL, a company specializing in buying existing books of debt. AACL will pay a lump sum to Y Electronics and in return AACL will take over a defined block of the existing debt owed to Y Electronics. Customers will continue paying their EMIs as usual, but Y Electronics will just transfer it over to AACL as the payments come in.

- i) Explain why this deal might be attractive to both the parties. (4)

You are working in the credit modelling team of AACL and your team has developed a deterministic model for valuing a book of debt. The model parameters are based on in-house

experience data over the last 8 years for similar schemes across all industries, and AACL is considering using the model to value the Y Electronics deal.

- ii)** Discuss the key points that you will consider before using the deterministic model for this purpose. (6)

The Head of your Department has requested you to build a stochastic model that can be used to determine the lump sum AACL will offer for Y Electronics block of business.

- iii)** State the key features of a “deterministic model”. (2)

- iv)** State the key features of a “stochastic model”. (2)

- v)** Outline the steps that you will follow to build a stochastic model for the purpose of determining the lump sum that AACL could offer for Y Electronics’s block of business. (10)

[24]
