

INSTITUTE OF ACTUARIES OF INDIA
EXAMINATIONS

November 2025

SP5 - Investment and Finance

Time allowed: 3 Hours 15 Minutes

Total Marks: 100

Q.1) You have just attended a Boombrg seminar on investments. One of the sessions related to behavioral finance was an interesting one, covering the concepts below. What are the key aspects you will cover in your update to your team as part of a training session (specifically cover points related to implications of these concepts for investment decision making)?

- i) Herding (3)
 - ii) Cross-sectional momentum (3)
 - iii) The influence of mood in investment performance (3)
 - iv) Belief preservation (3)
- [12]**

Q.2) A large insurance company is reviewing its strategic asset allocation (SAA) policy. The investment committee wants to align the portfolio with principles derived from the theory of finance, while considering the firm's long-term liability profile and solvency constraints.

Chief Investment Officer (CIO) has asked you to prepare a note for internal discussion. CIO has listed below the key theories which he wants in the note.

- i) Explain how the following theories of finance influence the company's asset allocation decisions:
 - a) Modern Portfolio Theory (MPT)
 - b) Capital Asset Pricing Model (CAPM)
 - c) Efficient Market Hypothesis (EMH)
 - d) Liability-Driven Investment (LDI) framework (8)
 - ii) Chief Risk Officer (CRO) also wants a discussion on how real-world factors such as market frictions, behavioural biases, and regulatory capital requirements may lead the company to deviate from the theoretically "optimal" portfolio to be part of the note. (6)
 - iii) For the note to be comprehensive, using the above concepts, outline how the insurer might balance return-seeking and liability-matching assets in its long-term strategic asset allocation. Also comment on the consequent impact on the overall portfolio. (6)
- [20]**

Q.3) You have recently joined a boutique investment advisory firm. IBS Life has asked for a review of its investment fund's performance over the last year, against its strategic benchmark. Factsheet with all the details are below.

- The fund benchmark and portfolio are both composed of four main asset classes: equities, government bonds, corporate bonds, and property.
- The portfolio manager has discretion to deviate modestly from benchmark weights to enhance returns.
- The total fund size is INR1,000 cr.

The following data are provided for the last financial year:

Asset Class	Portfolio Weight (%)	Benchmark Weight (%)	Portfolio Return (%)	Benchmark Return (%)
Equities	45	40	9.0	8.0
Gov. Bonds	30	35	4.0	4.5
Corp. Bonds	15	15	6.0	5.5
Property	10	10	7.0	6.0

i) For each asset class, calculate:

- Allocation effect
- Selection effect
- Interaction effect

Then, compute the total contribution from each effect across all asset classes. Also convert the above into monetary value added. (12)

Hint: Interaction effect = (Portfolio weight – Benchmark weight) × (Portfolio return – Benchmark return)

ii) Identify which asset class contributed most positively and which detracted most from performance. (4)

iii) Discuss how the results could feed into investment manager performance fees and bonus pool allocations in a life insurance context, ensuring fairness across time horizons. (4)

[20]

Q. 4) Environmental, Social, and Governance (ESG) is a hotly debated topic within the investment domain. Many insurance companies have started introducing ESG mandated funds, just to cater to growing demand for such mandates while making investment decisions.

i) Explain why Environmental, Social, and Governance (ESG) considerations are important when making investment decisions. (3)

ii) As an investment actuary you are comparing two portfolios for a pension company.

Portfolio	Expected annual return	Expected volatility	Carbon intensity (tons CO ₂ per £m revenue)	ESG rating (1 = low, 5 = high)
A: Conventional portfolio	7.0%	10%	200	2
B: ESG-integrated portfolio	6.5%	8%	100	4

Assume the insurer's liability discount rate is 4% and the company has a moderate risk appetite.

a) Calculate the expected risk-adjusted return (ESG-adjusted Sharpe ratio), using risk-free rate = 2% for both portfolios. Make suitable assumptions for the ESG-adjustment. (3)

b) Comment briefly on which portfolio would be more suitable for the insurer, considering both financial and ESG factors. (3)

Because of the above assessment, you have been further asked to review the “mandate” for both the funds and give suggestions.

- iii) What is a “mandate” in respect to investment agreements? (2)
- iv) Discuss the advantages and disadvantages of appointing investment managers with “specialized mandates”, compared with appointing managers who have an overall “mandate”, that you will cover in your report. (7)
- [18]**

Q. 5) A life insurance company has a large portfolio of participating whole-life policies. Whole life policies have the following characteristics:

- Average policy duration: 25 years
- Guaranteed minimum return to policyholder: 3.5% per annum
- Policyholder bonus rate: Based on actual investment performance above the guarantee
- Surrender options: Policyholders can surrender after 10 years with a guaranteed cash value
- Liabilities are sensitive to both interest rate and equity market movements

The company’s asset portfolio consists of:

- 50% long-term government and corporate bonds (average duration 10 years)
- 30% equities
- 15% real estate
- 5% cash and short-term instruments

The company’s economic environment outlook:

- Interest rates are expected to rise sharply over the next two years and then stabilize.
 - Equity markets are expected to remain volatile with a potential 10–15% downside risk in the near term.
 - The company is subject to RBC (Risk Based Solvency) requirements, and its current Solvency ratio is at 165%, close to the regulatory threshold.
- i) Discuss the key ALM risks the company faces under these conditions, highlighting mismatch risk, optionality, *and* regulatory capital implications. (5)
- ii) Propose a comprehensive ALM strategy to manage these risks, including:
- Duration and convexity matching approaches
 - Use of derivatives (e.g., FRAs, Bond forward, Swaps, Swaptions, Equity options)
 - Dynamic rebalancing or immunization tactics
 - Considerations for participating policy bonus management
- (14)
- iii) Evaluate how your proposed strategy might impact the company’s profitability and solvency ratio over a 5–10 year horizon. (6)
- iv) Critically assess the limitations of traditional ALM techniques in this scenario, especially under non-parallel interest rate shifts and policyholder behavioural uncertainty. (5)
- [30]**
