INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

November 2026

SP5 - Investment and Finance

Time allowed: 3 Hours 15 Minutes

Total Marks: 100

Q.1) You are an investment analyst at a firm advising a large institutional investment fund. The fund currently invests only in listed equities, government bonds and corporate bonds. It has long-term liabilities, but it must meet regular monthly benefit payments, and it reports asset values to its members every quarter. The Chief Investment Officer (CIO) is considering an allocation to alternative asset classes and has asked you to prepare a briefing note for the investment committee.

i) Describe the main forms in which private equity investment may be made, and outline the advantages and disadvantages of private equity as an asset class for the fund. **[6]**

ii) The CIO is also considering a hedge fund that has the following terms:

Term	Detail
Management fee	1.5% a year of opening net asset value (NAV), deducted at the end of the year
Performance fee	20% of any gain above the high-water mark, calculated after deducting the management fee, at the end of each year
Liquidity	One-year lock-up, then quarterly redemption with 90 days' notice; the manager can impose redemption gates
Gross returns	Year 1: −8%; Year 2: +18%
Correlation with equities	About 0.3 in normal markets, rising to about 0.7 in stressed markets

Calculate the fund's net asset value at the end of each year, starting from an initial NAV of 100 and a high-water mark of 100. Compare the result with the gross return and with the outcome if there were no high-water mark. Assess whether this hedge fund is suitable for the fund. **[7]**

The high-water mark is the highest NAV previously achieved at a year end, after all fees, and is initially 100. No performance fee is payable until the NAV, after deducting the management fee, exceeds the high-water mark.

The fund operates in a jurisdiction where the regulator imposes statutory restrictions on the assets held by institutional investors.

iii) List the types of statutory investment restriction a regulator might impose. **[4]**

[17 Marks]

Q.2) You are a fixed income analyst at an asset management firm. The following zero-coupon spot rates, expressed as continuously compounded rates per annum, have been derived from the government bond market:

Term to maturity (years)	Zero-coupon spot rate (% pa)
1	6.0
2	6.5
3	7.0

Your firm is considering the purchase of a corporate bond with a face value of ₹1,000, paying an annual coupon of 8%, redeemable at par in exactly three years' time. The bond is currently trading in the market at ₹975. The issuer is rated BBB. Historically, BBB-rated issuers have defaulted at an average rate of 0.4% a year, with an average recovery rate of 40% of face value.

i) Calculate the theoretical price of the corporate bond, showing all workings. Comment on the price. **[4]**

ii) Calculate the implied one-year forward rates for the second and third years, and comment on what the pattern of forward rates suggests about future short-term interest rates. **[4]**

iii) The bond trades below the theoretical price you calculated in part (i)

a) State the components of the additional yield that investors require from corporate bonds. **[2]**

b) State why these components are not independent of one another. **[2]**

[12 Marks]

Q.3) The investment committee of a large institutional fund is reviewing the performance of its domestic corporate bond portfolio over the past year. The portfolio is managed against a benchmark which allocates between three credit rating bands. The fund was valued at ₹500 crore at the start of the year, and there were no cashflows into or out of the portfolio during the year.

Credit rating band	Benchmark weight (%)	Actual weight (%)	Index return (%)	Actual portfolio return (%)
AAA	50	60	6.0	6.8
AA	30	25	7.5	8.0
A	20	15	9.0	9.5

i) Explain what is meant by sector selection performance and stock selection performance, and describe why notional funds are required in order to separate the two. **[3]**

ii) Calculate the sector selection performance and the stock selection performance achieved over the year, in rupee terms, showing all workings. **[7]**

iii) Using your results from part (ii), assess which of the manager's decisions added value over the year, and which detracted from performance. **[3]**

iv) Outline the limitations of drawing conclusions about a manager's skill from a single year's attribution analysis. **[2]**

[15 Marks]

Q.4) The Chief Risk Officer (CRO) of a general insurance company has asked you to prepare a note for the board on how the company measures and controls the market risk arising from its investment portfolio.

The portfolio has a market value of ₹800 crore, split as follows:

Asset class	Market value (₹ crore)	Annualised return volatility (Std Deviation)
Government and corporate bonds	600	5%
Domestic equities	200	20%

The correlation between bond and equity returns is 0.2. Assume that returns are normally distributed with a mean of zero.

The company's free surplus is ₹150 crore. The board's risk appetite states that the 1-year 99% Value at Risk (VaR) for market risk must not exceed 50% of free surplus. The company's investment regulations permit derivatives for hedging purposes only.

You may use the following values:

- The one-tailed standard normal percentage point at the 99% level is 2.326.
- The standard normal density at that point is $\varphi(2.326) = 0.0267$.

i) Explain what is meant by Value at Risk, and outline its limitations as a measure of investment risk. Explain how expected shortfall (also called tail VaR) addresses some of these limitations. **[5]**

ii) Calculate, for a 1-year horizon at the 99% level:

a) the stand-alone VaR of each asset class
b) the diversified VaR of the whole portfolio

Comment on the diversification benefit and on how reliable the normality assumption is likely to be. **[6]**

iii) Assess whether the portfolio is within the board's risk appetite. Explain how VaR could be used to set and monitor the company's investment risk budget. **[4]**

[15 Marks]

Q.5) A large endowment fund has assets of ₹40,000 crore. Its trustees have set a strategic benchmark and an **active risk budget**: a tracking error of no more than 1.5% a year relative to the strategic benchmark. Tracking error here means the annualised standard deviation of the fund's return minus the benchmark return. The strategic benchmark has an expected return of 9.0% a year and a volatility of 11.0% a year.

The fund's assets are delegated to three external managers:

Manager	Mandate	Share of fund	Average annual active return (%)	Annual tracking error (%)
A	Domestic equity, large-cap active	40%	1.2	4.0
B	Domestic equity, concentrated high-conviction	20%	1.5	6.0
C	Government and corporate bonds	40%	0.5	1.0

Assume each manager's benchmark matches the corresponding part of the strategic benchmark, so there is no tracking error from the overall asset mix.

The trustees have recently been told that:

- Managers A and B both have a persistent tilt towards mid-cap stocks.
- Manager B uses a third-party administrator for valuation and has had two pricing errors in the past year.
- The fund's risk function reports to the Chief Investment Officer (CIO).

For the purposes of part (ii), assume the managers' active returns are uncorrelated with one another.

i) Describe the risks the fund faces from delegating its assets to external managers, and explain how the trustees should control them. Refer to the specific information given above where relevant. **[6]**

ii) Calculate:

a) the information ratio of each manager, and of the fund as a whole **[2]**

b) the fund's total risk, assuming strategic risk and active risk are independent, and the share of total variance that comes from strategic risk. **[2]**

c) Comment on what these results suggest about the managers' skill, and on how the trustees should divide their attention between strategic and active risk. **[5]**

iii) Given the governance issues being flagged across Banking, Financial Service and Insurance sector, explain the "three lines of defence" model of risk governance. Assess whether the fund's current reporting arrangements for its risk function are appropriate. **[4]**

[19 Marks]

Q.6) A large Indian life insurer holds ₹18,000 crore of domestic listed equities across three portfolios: a participating fund, a shareholders' fund, and unit-linked funds benchmarked to a broad large-cap index. All three are managed actively by a single external manager, appointed eight years ago on the recommendation of the current chair of the investment committee.

Over that period the manager has achieved a gross excess return of 0.9% a year, with a tracking error of 4.0% a year, and charges a fee of 0.40% a year. In the last 12 months the manager outperformed by 3.1%. Several peer insurers have recently moved to passive management.

The Chief Investment Officer (CIO), a voting member of the committee, proposes a core-satellite structure: an internally managed passive core of 70%, with 30% remaining actively managed. The benchmark is concentrated. Its largest stock makes up 12% of the index, while the company's investment regulations cap any single company at 10% of each fund.

For this question, assume that policyholders' investment income and gains are taxed at a concessional rate, shareholders' income and gains at the full corporate rate, and that long-term gains are taxed less heavily than short-term gains.

i) Calculate the manager's information ratio net of fees and comment on whether it provides convincing evidence of skill. **[3]**

ii) Describe the methods by which the passive core could be constructed, and recommend an approach given the regulatory limit. **[5]**

iii) Discuss the merits of the core-satellite proposal compared with retaining the current arrangement. Your answer should consider the differing needs of the three portfolios and how the tax position should influence both the decision and the timing of any transition. **[7]**

iv) Identify the behavioural biases and governance weaknesses evident in the facts above. Recommend practices that would improve the effectiveness of investment decision-making. **[7]**

[22 Marks]

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