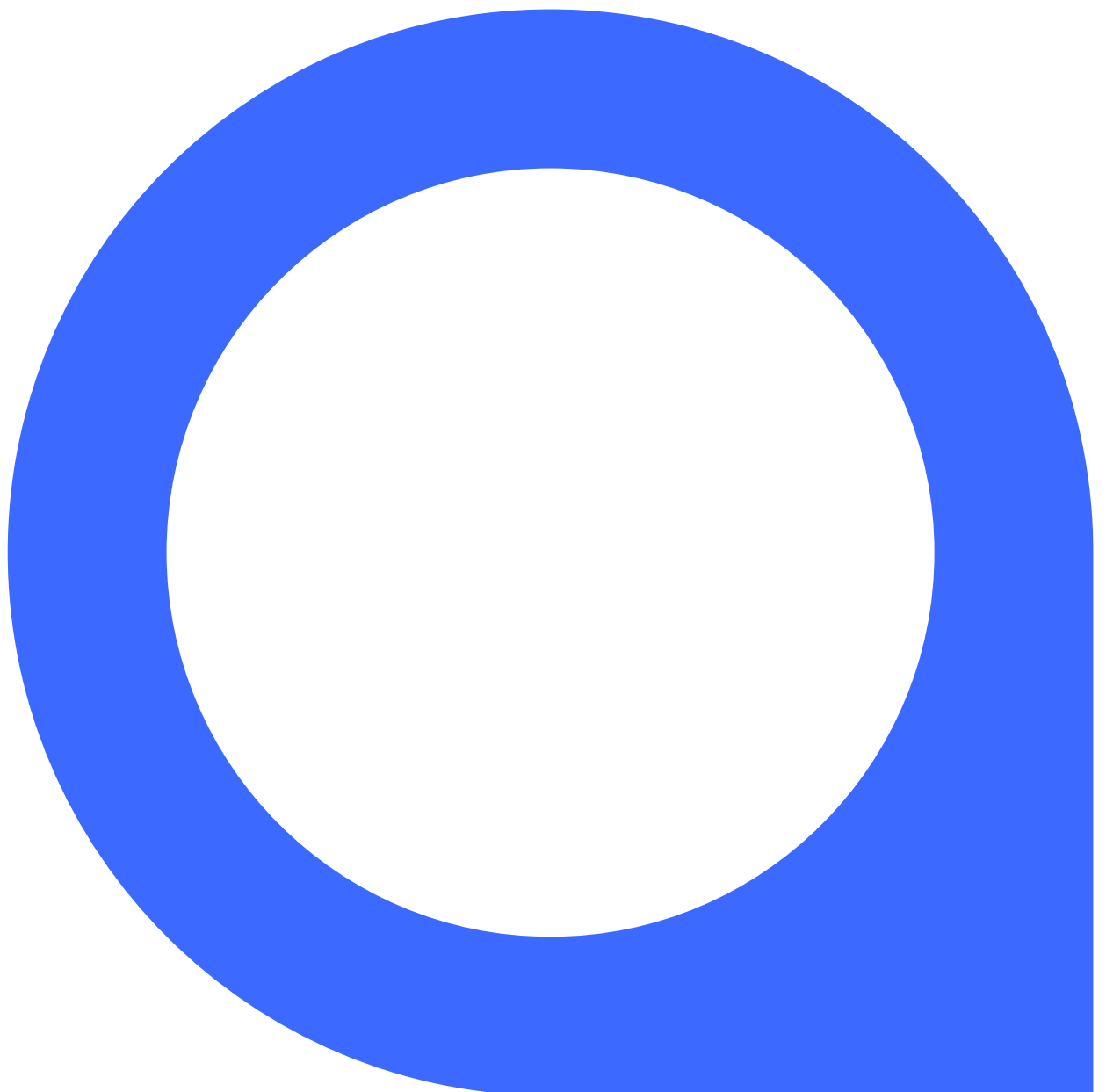


Asset Liability Management

Exam Marking Guide Semester 2 2025





Marking Guide

This exam represents 80% of the available marks for the ALM subject.

Question	Syllabus Learning Objective	Total Marks	SA	A	H
Q1a	2.2	3	3		
Q1b	6.6	2	2		
Q1c	3.1	6		6	
Q1d	6.2	5		5	
Q1e	6.7	4			4
Q2a	2.3	3	3		
Q2b	2.8	4		4	
Q2c	1.4	7		7	
Q2d	5.3	6			6
Q3a	4.1	3	3		
Q3b	4.3	4	4		
Q3c	6.7	6		6	
Q3d	4.5	4		4	
Q3e	4.4	3			3
Q4a	6.3	3	3		
Q4b	1.3	3	3		
Q4c	6.2	2	2		
Q4d	3.2	7		7	
Q4e	6.4	5			5

SA – Simple Application 29%

A – Application 49%

H – Higher order/ Judgement/Evaluation 22%



Note to Markers:

An overarching principle is that marks should be awarded for necessary work undertaken by a student to arrive at an answer to a question. You may think of this as telling a story to answer the question that is asked. In respect of marking, please award marks for defining terms, describing background and context which is relevant to 'telling a story' to answer the question.

*We give guidance to students that copying and pasting is allowed but they need to address the specified scenario to pass the examination. The marking guide for each question generally states whether marks can be awarded for generic points or whether the points given must be linked to the given problem context. If the marking guide does not specify otherwise, marks **SHOULD** be awarded for relevant comments that may appear to have been copy pasted from either the modules or another resource, such as a prudential or professional standard.*

Marks may also be awarded for any other relevant point not included in the marking guide.

Where any such marks are awarded, the relevant point should be reported to the Chief Examiner so that they can confirm the validity, include it into the final version of the marking guide and ensure any other marker(s) for that question are aware of the change and award the mark to all candidates making the additional point.

As a rule, a complete sentence should be awarded 1 mark.

A complete sentence includes a clause and a connecting clause. An example sentence is 'The insurer pays a benefit on death' (½ mark for the clause) provided the premiums are paid (½ mark for connecting clause)'.

The exam questions each start with a 'command verb' that provides information to students and markers about what is expected in an answer to the question. Please watch the following short video for information about the learning levels and command verbs used by the Institute:

https://www.youtube.com/watch?v=g1Oyv_RpfU4. Definitions of each of these command verbs is also provided within this marking guide.

Please note that many of the answers in this marking guide go well beyond what is required to gain full marks in the question. This is done deliberately to give students and markers a sense of the wide range of acceptable answers that students might give to a question.



QUESTION 1: MARKING GUIDE (20 marks)

a)

Question	Describe how issuing a \$2 million loan to a small business causes the creation of money in the financial system.
Total marks	3
Command verb	Describe (simple application)
Command verb definition	Provide information about specific items, showing that you understand what those items mean. A description is not a list; each item needs supporting information.
Primary learning objective	2.2: Explain how the majority of money is created in the modern economy (M3)
Note to markers	<p>Students may also correctly describe the balance sheet impacts showing assets and liabilities both increasing by \$2 million, but must still relate to the creation of money.</p> <p>Some students might mention that this process reverses when the loan is repaid, destroying money - this shows good understanding and should be credited.</p>

When the commercial bank approves a \$2 million loan to a small business:

- The bank creates new money by making a digital bookkeeping entry, [0.5 mark] crediting the borrower's account with a \$2 million deposit. [0.5 mark]
- This simultaneously creates an asset for the bank (the loan of \$2 million) [0.5 mark] and a liability (the deposit of \$2 million owed to the customer). [0.5 mark]
- The bank does not transfer existing deposits or reserves from other customers, [0.5 mark] nor does it require physical cash from the central bank. [0.5 mark]
- The money is created 'out of nothing' (ex nihilo) through the act of lending, [0.5 mark] instantly expanding the broad money supply in the economy by \$2 million. [0.5 mark]
- The small business can now use this newly created deposit to make payments, [0.5 mark] which may transfer to other banks but remains in the banking system as deposits. [0.5 mark]



b)

Question	Discuss why ActBank would need to hold more capital proportionately than other banks, given its risk profile
Total marks	2
Command verb	Discuss (simple application)
Command verb definition	Write about a subject or topic in detail taking into consideration issues and ideas. Provide more than one fact or observation relevant to the topic.
Primary learning objective	6.6: Discuss the relationships between capital requirements, risk and investment strategy
Note to markers	<p>Students should explain both the general principle and the specific application to lending. Accept alternative valid points that demonstrate understanding of the capital-risk relationship.</p> <p>A key point of this question is how ActBank's risk profile is different than other banks. This is primarily on the asset side (small business loans and recent growth), though comments on the liabilities can be accepted if clearly justified.</p>

- Small business borrowers have higher default rates/are riskier than larger corporations [0.5 mark]
- Maturity mismatch creates liquidity and/or interest rate risk [0.5 mark]
- Concentration in one customer segment reduces risk diversification [0.5 mark]
- Small businesses are more sensitive to economic cycles/monetary policy changes [0.5 mark]
- Higher risk lending requires additional capital buffers/reserves [0.5 mark]
- Capital requirements increase with the risk profile of the loan portfolio [0.5 mark]
- Regulators require banks to hold more capital for riskier activities [0.5 mark]
- Capital acts as a buffer against unexpected losses [0.5 mark]
- Banks must internalise the cost of risk-taking through higher capital [0.5 mark]



c)

Question	Examine small business loans as an asset class from the bank's perspective. Note: You should consider risk, return, and marketability. Marketability refers to the ability to sell or trade these loans in secondary markets (liquidity), not the ability to market them to customers.
Total marks	6
Command verb	Examine (application)
Command verb definition	Inspect (something) thoroughly in order to determine its nature or condition.
Primary learning objective	3.1: Examine the characteristics of the three asset classes
Note to markers	<p>Students should address risk, return, and marketability as specified in the question.</p> <p>However, students may use the SYSTEM T framework or another organised approach.</p> <p>Full marks should only be awarded if each of risk, return, and marketability is inspected.</p> <p>It is not necessary to include numeric values; qualitative commentary can be sufficient.</p>

Risk Characteristics: Small business loans carry significant credit risk as:

- Small businesses have higher failure rates than larger corporations, with many failing within the first five years [0.5 mark], leading to potential losses of both interest and principal [0.5 mark]
- Limited financial history and less sophisticated financial reporting make credit assessment more challenging [0.5 mark], increasing uncertainty about the borrower's ability to service debt [0.5 mark], requiring banks to implement internal credit scoring systems that are regularly reviewed to improve assessment accuracy and ongoing monitoring [0.5 mark]
- Often secured by business assets, which may have limited resale value or personal guarantees from owners [0.5 mark], resulting in lower recovery rates in default compared to residential mortgages [0.5 mark]
- Concentration risk may arise if the bank lends predominantly to businesses in similar industries or geographic regions [0.5 mark], and banks must be aware of corporate parent-child relationships to avoid overexposure to any one group of companies [0.5 mark]
- Banks implement lending limits and exposure caps to manage overall portfolio risk [0.5 mark], ensuring diversification across sectors and borrower types.



Return Characteristics: Returns on small business loans are structured to compensate for higher risks:

- Interest rates are typically set at a significant margin above the bank's cost of funds (e.g. cash rate + 4-8% p.a.) [0.5 mark] to compensate for credit risk and operational costs [0.5 mark]
- Arrangement fees and ongoing service fees provide additional income [0.5 mark], often representing 1-2% of the loan amount upfront [0.5 mark]
- The return must cover the bank's operational costs, which are proportionally higher for small loans [0.5 mark] due to the fixed costs of credit assessment and ongoing monitoring [0.5 mark]
- Expected returns need to account for probable default rates, which may be 2-5% annually [0.5 mark] compared to less than 1% for prime mortgages [0.5 mark]

Marketability Characteristics: Small business loans have limited marketability.

- These loans are typically held to maturity by the originating bank [0.5 mark] as there is no active secondary market for individual small business loans [0.5 mark]
- The heterogeneous nature of small businesses makes standardisation difficult [0.5 mark], preventing the development of liquid trading markets [0.5 mark]
- Securitisation is possible but less common than for mortgages [0.5 mark] due to higher due diligence costs and information asymmetries [0.5 mark]
- The relationship aspect of small business banking (knowing the customer) makes loans less transferable [0.5 mark]
- Banks may need to hold these assets until maturity or default, creating liquidity constraints [0.5 mark]



d)

Question	Explain the asset-liability mismatches and risks that arise from funding long-term small business loans with demand deposits
Total marks	5
Command verb	Explain (application)
Command verb definition	Give an account of something with the goal of clarifying it to someone or making something easier to understand. Calls for even more information than describe, showing that you can convey 'why' or 'how' or 'so what'. A connection is expected between the item(s) and something else.
Primary learning objective	6.2: Examine the factors that influence investment strategies
Note to markers	<p>Students may also discuss credit risk concentration, basis risk between deposit and loan rates, or operational challenges. Award marks for any reasonable mismatch or risk explanation up to a maximum of 5 marks.</p> <p>While a wide range of commentary can be acceptable, to meet the definition of the command verb, the response should have clarify aspects such as characterising the mismatches or risks.</p>

Maturity mismatch: The bank faces a significant maturity mismatch with assets (5-year loans) having much longer terms than liabilities (70% withdrawable on demand). [0.5 mark] This creates refinancing risk as deposits may be withdrawn before loans mature, forcing the bank to find alternative funding sources. [0.5 mark] The weighted average maturity of liabilities is approximately $0.7 \times 0 + 0.3 \times 1.5 = 0.45$ years versus 5 years for assets. [1 mark]

Interest rate risk: When interest rates rise, the bank must increase deposit rates to retain customers, while loan rates may be fixed or adjust more slowly. [0.5 mark] This compression of net interest margin affects profitability as the cost of funds increases faster than asset yields. [0.5 mark] The longer duration of assets means their market value falls more than liabilities when rates rise. [0.5 mark]

Liquidity risk: Demand deposits can be withdrawn immediately, while small business loans are illiquid and difficult to sell quickly without significant discounts. [0.5 mark] During stress periods, deposit withdrawals may accelerate while loan prepayments slow, creating severe liquidity pressure. [0.5 mark] The bank cannot easily convert its loan assets to cash to meet withdrawal demands. [0.5 mark]

Cash flow timing mismatch: Loan repayments follow scheduled amortisation over 5 years, while deposit withdrawals are unpredictable and can spike suddenly. [0.5 mark] This creates uncertainty in cash flow planning and requires maintaining larger liquidity buffers. [0.5 mark]



e)

Question	Propose two strategies to manage these mismatches with justification
Total marks	4
Command verb	Propose (higher order)
Command verb definition	Select and communicate a solution, action or range of possible solutions/actions. Rationale, reasons or justification must be included.
Primary learning objective	6.7: Demonstrate how actuarial techniques and asset/liability modelling may be used to develop an appropriate investment strategy
Note to markers	<p>Students must provide two distinct strategies with clear justification for each. Maximum 2 marks per strategy.</p> <p>These responses should follow on from part d, so if the strategies are consistent with the challenges raised by the student in that part, they should generally be accepted (to avoid double penalising).</p>

Strategy 1: Implement interest rate swaps: The bank could enter fixed-for-floating interest rate swaps where it receives fixed rates matching its loan portfolio and pays floating rates linked to deposit costs. [0.5 mark] This transforms the fixed-rate loan income into floating-rate income that moves with deposit rates, reducing margin compression risk. [0.5 mark] The notional amount would match the loan portfolio size with a declining schedule matching loan amortisation. [0.5 mark] This hedges interest rate risk while maintaining the customer relationships and loan portfolio. [0.5 mark]

Strategy 2: Diversify funding sources with longer-term wholesale funding: Issue medium-term notes or bonds with 3-5 year maturities to better match asset maturity. [0.5 mark] This reduces reliance on volatile demand deposits and provides more stable funding that aligns with loan maturities. [0.5 mark] Target a funding mix of perhaps 40% demand deposits, 30% term deposits, and 30% wholesale funding to balance cost and stability. [0.5 mark] While wholesale funding may be more expensive, it reduces refinancing risk and provides certainty for business planning. [0.5 mark]



Example alternative strategies (may be awarded up to two marks each when supported):

- Securitisation: Package and sell portions of the loan portfolio to free up capital and reduce mismatches
- Loan syndication: Originate loans but sell participations to other banks, earning fees while reducing balance sheet exposure
- Adjustable-rate loans: Shift to variable-rate lending to match floating deposit costs
- Liquidity facilities: Establish committed credit lines with other banks as contingent funding

END OF QUESTION 1: MARKING GUIDE



QUESTION 2: MARKING GUIDE (20 marks)

a)

Question	Describe how this tokenised market combines characteristics of property and securities markets.
Total marks	3
Command verb	Describe (simple application)
Command verb definition	Provide information about specific items, showing that you understand what those items mean. A description is not a list; each item needs supporting information.
Primary learning objective	2.3: Describe the main characteristics of asset markets (M4)
Note to markers	Allow half a mark for defining tokenisation or other fundamental ideas Any reasonable characteristics are acceptable. Max of 2 marks for each of property specific or securities.

The tokenised property market combines physical property characteristics with securities market features:

Property market characteristics retained:

- The underlying assets remain physical real estate generating rental income [0.5 mark] with returns dependent on occupancy rates, tenant quality, and property location [0.5 mark]
- Valuations still based on property fundamentals like rental yields, capital appreciation potential, and market conditions for commercial real estate [0.5 mark] and likely still requires a traditional property valuation management process that includes lengthy professional valuations, multiple methods beyond DCF/cap rates (such as 'comparables'), and committee/audit approvals
- Economic factors affecting traditional property (supply cycles, occupational demand, investment market levels) continue to influence token values [0.5 mark]

Securities market characteristics introduced:

- Tokens can be traded on a platform providing price discovery and liquidity [0.5 mark], similar to how shares trade on stock exchanges with transparent pricing [0.5 mark]
- Standardised units (\$1,000 minimum) enable divisibility [0.5 mark], overcoming the traditional indivisibility and large capital requirements of direct property investment [0.5 mark]
- Electronic settlement and lower transaction costs (2% vs typical 5-6% for direct property) [0.5 mark] with the platform acting as an intermediary matching buyers and sellers [0.5 mark]



b)

Question	Distinguish between the primary and the secondary market characteristics and functions for the tokenised property.
Total marks	4
Command verb	Distinguish (application)
Command verb definition	Perceive and describe a difference between two or more things such that the implications of the difference are made clear.
Primary learning objective	2.8: Distinguish between primary and secondary markets (M4)
Note to markers	Students should clearly differentiate between initial issuance (primary) and subsequent trading (secondary) aspects. Award marks for relevant points showing understanding of both markets' distinct roles and characteristics.

Primary market considerations:

- Initial token issuance at Net Asset Value based on independent property valuations [0.5 mark], requiring accurate pricing to attract initial investors [0.5 mark]
- Capital raising function where property owners receive funds in exchange for fractional ownership [0.5 mark], similar to an IPO but for property assets [0.5 mark]
- Due diligence requirements, including property condition reports, rental agreements, and financial projections [0.5 mark] must be disclosed to potential token purchasers [0.5 mark]
- Regulatory compliance for initial offering, potentially requiring prospectus or product disclosure statements [0.5 mark]

Secondary market considerations:

- Ongoing price discovery through platform trading [0.5 mark] where token prices may diverge from underlying property NAV based on market sentiment [0.5 mark]
- Liquidity provision allowing investors to exit positions [0.5 mark] without waiting for property sale or finding direct buyers [0.5 mark]
- Transaction costs of 2% apply to secondary trades [0.5 mark] creating a bid-ask spread consideration for traders [0.5 mark]
- Market depth and trading volumes will determine ease of buying/selling [0.5 mark] with potential for price volatility if trading is thin [0.5 mark]



c)

Question	Analyse, using Kuhn's concept of paradigm shifts, whether tokenised assets represent a new paradigm or merely an evolution within the existing property investment paradigm.
Total marks	7
Command verb	Analyse (application)
Command verb definition	Write about a topic methodically and in detail, typically to explain and interpret it. This involves breaking down the topic into its components, understanding relationships, and providing insights based on evidence.
Primary learning objective	1.4: Discuss the complexity of competing investment theories through describing Kuhn's philosophy, the roles of exemplars, distinguishing between causation and correlation, and the Duhem-Quine thesis
Note to markers	<p>Up to one mark for discussion of generic concepts such as Kuhn's concepts of paradigm shift before analysing.</p> <p>Students may argue either position. Credit should be given for a coherent application of Kuhn's framework, accompanied by supporting evidence. The quality of analysis matters more than the conclusion reached.</p> <p>Grouping of concepts is set out below, but students are not required to have a similar breakdown.</p>

To determine whether tokenised assets represent a paradigm shift, students should apply Kuhn's framework systematically:

Current Property Investment Paradigm The existing paradigm for property investment includes these fundamental elements:

- Direct ownership or pooled funds (REITs, unlisted trusts) are accepted methods [0.5 mark]
- Valuation based on capitalisation rates and DCF methods [0.5 mark]
- High barriers to entry (large capital requirements, illiquidity) [0.5 mark]

Signs of Crisis in Traditional Property Investment [1.5 marks] Anomalies accumulating in the current paradigm include:

- Inability of retail investors to access quality commercial property directly [0.5 mark]
- Liquidity mismatches in unlisted property funds during market stress (1990s, GFC) [0.5 mark]
- High transaction costs exclude smaller investors from diversification benefits [0.5 mark]



Revolutionary elements of tokenisation Features suggesting a new paradigm:

- Blockchain technology fundamentally changes record-keeping from centralised to distributed ledgers [0.5 mark]
- Fractional ownership at \$1,000 minimum versus traditional minimums of millions [0.5 mark]
- 24/7 global trading potential versus traditional market hours [0.5 mark]
- Smart contracts automating distributions and governance [0.5 mark]

Evolutionary elements Features suggesting evolution within the existing paradigm:

- Underlying assets remain traditional property with the same valuation methods [0.5 mark]
- Legal structures still require traditional ownership frameworks [0.5 mark]
- Regulatory oversight follows existing securities laws rather than new frameworks [0.5 mark]

Conclusion

Tokenisation represents evolution rather than revolution because the fundamental nature of property investment (seeking rental yield and capital growth) remains unchanged[0.5 mark], even though the mechanism of ownership has been transformed. [0.5 mark]

OR

Tokenisation represents a paradigm shift because it fundamentally redefines property ownership from physical/legal rights to cryptographic tokens[0.5 mark], making previous models of exclusivity obsolete. [0.5 mark]



d)

Question	Evaluate how behavioural finance principles should influence: i. how investment options are structured and presented to investors (3 marks) ii. strategies investors should adopt when selecting and allocating these assets (3 marks)
Total marks	6
Command verb	Evaluate (higher order)
Command verb definition	Assess a topic or subject by considering its strengths, weaknesses, and implications. This involves making judgments based on criteria and standards, and supporting these judgments with evidence and reasoning.
Primary learning objective	5.3: Consider how the critiques of the theories will influence the design of methods of selection for assets and asset allocation
Note to markers	<p>Description of <i>relevant</i> behavioural finance principles can be awarded up to 1 mark.</p> <p>Award marks for correctly identifying biases and proposing relevant solutions. Maximum 3 marks for structured and presented, and 3 marks for investor strategies.</p> <p>Full marks require students to link specific behavioural concepts to the unique features of tokenised property markets, showing deeper application of Chapter 9 material.</p> <p>The synthesis is not required for full marks.</p> <p>Inappropriate or unethical strategies should not be awarded any marks</p>

Structured and presented:

Behavioural finance shows investors make predictable errors that may be affected by how investment options are structured or presented.

- Herding bias: limit visibility of peer trading behaviour to prevent herding behaviour where investors follow the crowd rather than making independent decisions [0.5 mark]
- Overconfidence bias: set maximum investment limits per property (e.g. 20% of portfolio) to combat overconfidence bias and force diversification [0.5 mark]
- Loss aversion: display total portfolio performance rather than individual property gains/losses to address loss aversion where investors hold losing investments too long [0.5 mark]
- Short-term focus/myopic bias: show long-term returns (5-10 years) prominently instead of daily price movements to counter short-term focus and reduce overtrading [0.5 mark]
- Default new investors into diversified property baskets rather than individual property selection, using choice architecture principles from behavioural finance [0.5 mark]



- Provide automated rebalancing options to remove emotional decision-making and help overcome the disposition effect [0.5 mark]
- Include clear risk disclosures about property cycles and behavioural biases to increase investor self-awareness [0.5 mark]
- Frame fees and lock-in periods as 'protecting long-term value' rather than costs, recognising how framing affects investor perception [0.5 mark]

Investor Strategy Recommendations:

Investors should recognise their biases and adopt disciplined approaches:

- Commit to minimum holding periods (e.g. 3 years) before purchasing to avoid impulsive trading based on short-term market movements [0.5 mark]
- Use calendar-based rebalancing (e.g. quarterly) rather than trying to time the market, acknowledging the overconfidence bias in market timing ability [0.5 mark]
- Diversify across property types and locations rather than concentrating in familiar areas, recognising the familiarity bias that leads to home bias [0.5 mark]
- Set investment rules when calm and follow them during market stress, understanding that emotional states affect decision quality [0.5 mark]
- Focus on property fundamentals (yield, occupancy) rather than anchoring on purchase prices when making sell decisions [0.5 mark]
- Limit property token allocation to a reasonable percentage of total wealth (e.g. 10-20%) to manage overconfidence in this new asset class [0.5 mark]
- Consider the tax implications of realising losses rather than holding indefinitely due to loss aversion [0.5 mark]
- Track investment predictions and outcomes to learn from mistakes and calibrate confidence levels [0.5 mark]

Synthesis and evaluation:

- The structure can use 'nudges' and choice architecture to guide better decisions without removing investor autonomy [0.5 mark]
- The continuous trading and real-time price visibility of tokenised property may amplify behavioural biases compared to traditional property investment [0.5 mark]
- Success requires both well-designed structures that protect investors from their biases and investor self-awareness to implement disciplined strategies [0.5 mark]



END OF QUESTION 2: MARKING GUIDE



QUESTION 3: MARKING GUIDE (20 marks)

a)

Question	Describe three characteristics that an oil derivative must have to effectively hedge the fund's exposure in this scenario.
Total marks	3
Command verb	Describe (simple application)
Command verb definition	Provide information about specific items, showing that you understand what those items mean. A description is not a list; each item needs supporting information.
Primary learning objective	4.1: Describe the characteristics of derivatives
Note to markers	Students should identify at least three characteristics with supporting explanations. Accept any reasonable characteristics such as contract size, currency, settlement type, or credit.

Key characteristics for oil hedging derivatives:

- Underlying asset specification: Derivatives should reference benchmark crude oil prices (e.g. Brent or WTI) that correlate closely with the sovereign's oil revenue stream. [0.5 mark] The contract specifications need to match the grade and delivery location of the country's oil production to minimise basis risk. [0.5 mark]
- Maturity profile: Given the 10-year transition plan, the derivatives need various maturities from short-term (monthly/quarterly) to long-term (multi-year) to provide continuous protection. [0.5 mark] Exchange-traded futures typically extend only 2-3 years, so OTC forwards or swaps may be needed for longer-dated hedging. [0.5 mark]
- Volume scalability: With 3 million barrels daily production (approximately 90 million barrels monthly), the derivatives must accommodate large notional amounts. [0.5 mark] This favours liquid exchange-traded futures for near-term hedging and OTC contracts for customised longer-term positions. [0.5 mark]
- Settlement features: Financial settlement is preferable to physical delivery, given that the fund's objective is financial hedging, not operational management. [0.5 mark] This allows the fund to maintain its oil revenue stream while receiving compensating cash flows when prices fall. [0.5 mark]



b)

Question	Discuss two hedging approaches: i. Oil futures - monthly rolling of short positions ii. Put options - buying downside protection
Total marks	4
Command verb	Discuss (simple application)
Command verb definition	Write about a subject or topic in detail taking into consideration issues and ideas. Provide more than one fact or observation relevant to the topic.
Primary learning objective	4.3: Compare forwards, futures, swaps and options
Note to markers	<p>i. Students should explain both the mechanics of rolling futures and at least one advantage and one disadvantage.</p> <p>ii. Students should explain how put options work and identify at least one advantage (upside participation) and one disadvantage (premium cost).</p> <p>For both: award 0.5 marks per valid point up to 2 marks.</p>

i. Oil futures - monthly rolling of short positions (2 marks)

Mechanics and implications: Selling oil futures creates an obligation to deliver oil at the contracted price, effectively locking in revenue levels. [0.5 mark] Monthly rolling involves closing expiring contracts and opening new positions in the next available month, maintaining continuous hedge coverage. [0.5 mark]

This approach offers high liquidity and transparent pricing through exchange trading, with daily mark-to-market settlements that ensure no credit risk accumulation. [0.5 mark] However, rolling creates transaction costs and basis risk as futures prices may not perfectly track the sovereign's realised prices. [0.5 mark]

ii. Put options - buying downside protection (2 marks)

Mechanics and implications: Put options give the right to sell oil at a predetermined strike price, providing insurance against price declines while preserving upside participation. [0.5 mark] The fund pays an upfront premium to establish a price floor, protecting against adverse movements below the strike. [0.5 mark]

This asymmetric payoff structure is attractive during transition periods as it allows the fund to benefit if oil prices rise while limiting downside risk. [0.5 mark] However, option premiums can be expensive (potentially 5-10% annually for at-the-money protection), creating a significant cost drag on returns. [0.5 mark]



c)

Question	Explain how asset-liability modelling techniques would be used to develop a dynamic hedging strategy for the fund's 10-year transition from oil to renewable energy.
Total marks	6
Command verb	Explain (application)
Command verb definition	Give an account of something with the goal of clarifying it to someone or making something easier to understand. Calls for even more information than describe, showing that you can convey 'why' or 'how' or 'so what'. A connection is expected between the item(s) and something else.
Primary learning objective	6.7: Demonstrate how actuarial techniques and asset/liability modelling may be used to develop an appropriate investment strategy
Note to markers	<p>Students should demonstrate understanding of how ALM models project and manage changing cash flows over time.</p> <p>The question permits a wide range of responses. Any relevant commentary that demonstrates understanding of asset and liability modelling, such as explaining the modelling process or its key components, can earn up to 3 marks.</p> <p>To be awarded full marks, students must tailor their responses to include developing dynamic hedging strategies.</p>

Asset-liability modelling techniques for developing a dynamic hedging strategy:

Model construction and cash flow projection:

- Project declining oil revenue cash flows over 10 years as production reduces by 50% [0.5 mark], incorporating uncertainty in oil prices, production volumes, and timing of reduction [0.5 mark]
- Model increasing capital requirements for renewable energy investments [0.5 mark] and their expected future cash flows once operational [0.5 mark]
- Include correlation structures between oil prices and renewable energy returns to understand natural hedging effects [0.5 mark]



Dynamic Strategy Development:

- Model tests different hedge amounts that decrease over time as oil exposure reduces [0.5 mark], optimising the trade-off between protection and cost [0.5 mark]
- Incorporate rebalancing triggers based on oil price movements or time elapsed [0.5 mark] to ensure hedges remain appropriate as transition progresses [0.5 mark]
- Evaluate rolling shorter-dated hedges versus longer-term hedges [0.5 mark] to balance protection needs with flexibility as circumstances change [0.5 mark]

Risk assessment and optimisation:

- Use scenario analysis to test strategy robustness under different transition speeds and market conditions [1 mark]
- Model liquidity requirements, ensuring sufficient cash for renewable investments while maintaining oil revenue hedges [0.5 mark]
- Assess basis risk between hedging instruments and actual oil revenue exposure [0.5 mark]

Implementation framework:

- Develop decision rules for when to adjust hedges based on model outputs [0.5 mark]
- Create a monitoring framework comparing actual versus projected transition progress [0.5 mark]
- Build in flexibility to accelerate or decelerate transition based on market conditions [0.5 mark]

Alternative approaches focusing on technical aspects include:

- Using stochastic projections for oil prices and renewable returns
- Applying maturity matching concepts adapted for commodity exposures
- Implementing value-at-risk constraints while optimising expected returns
- Developing a replicating portfolio of derivatives to match the liability profile



d)

Question	Analyse whether the advisor's strategy represents true arbitrage or a directional investment strategy.
Total marks	4
Command verb	Analyse (application)
Command verb definition	Write about a topic methodically and in detail, typically to explain and interpret it. This involves breaking down the topic into its components, understanding relationships, and providing insights based on evidence.
Primary learning objective	4.5: Discuss the implications of arbitrage
Note to markers	<p>Students must demonstrate understanding that this is NOT arbitrage. Key points include: arbitrage requires risk-free profit, these are different assets with different risks, and correlation is not perfect. Award marks for clear reasoning, even if technical terminology is not used perfectly.</p> <p>A clear definition of arbitrage should be awarded half a mark.</p>

The advisor's claim of 'perfect arbitrage' through selling oil futures and buying renewable energy stocks is fundamentally flawed for several reasons:

Violation of arbitrage definition: True arbitrage requires identical cash flows with different prices or a risk-free profit with zero initial investment. [0.5 mark] Oil futures and renewable energy stocks have entirely different risk-return profiles, market drivers, and cash flow patterns, making them non-comparable instruments. [0.5 mark] This is a directional bet on energy transition, not arbitrage. [0.5 mark]

Lack of perfect negative correlation: While oil and renewable energy may seem inversely related, their correlation is unstable and influenced by different factors. [0.5 mark] Oil prices respond to immediate supply-demand dynamics, geopolitical events, and economic cycles. [0.5 mark] Renewable energy stocks reflect technology advancement, regulatory support, and long-term growth expectations. [0.5 mark]

Unhedged risks remain: The strategy leaves multiple risks unhedged, including basis risk between futures and actual oil revenue, equity market risk in renewable stocks, and timing mismatches between oil revenue declines and renewable investment returns. [0.5 mark] Credit risk, liquidity differences, and operational risks further invalidate any arbitrage claim. [0.5 mark]



Correct interpretation: This is a transition strategy combining risk reduction (oil hedging) with directional investment (renewables), not arbitrage. [0.5 mark] It may be sensible portfolio management, but calling it 'perfect arbitrage' demonstrates a fundamental misunderstanding of derivative principles. [0.5 mark]



e)

Question	Propose an improved hedging strategy for the fund's transition from oil to renewable energy.
Total marks	3
Command verb	Propose (higher order)
Command verb definition	Select and communicate a solution, action or range of possible solutions/actions. Rationale, reasons or justification must be included.
Primary learning objective	4.4: Discuss the use of derivatives to manage asset risks and asset-liability mismatches
Note to markers	<p>Award marks for any reasonable improved strategy that demonstrates understanding of proper hedging principles and addresses the fund's specific needs. 0.5 marks for the proposal and up to 2.5 marks for the rationale.</p> <p>While a put option or rolling short positions were mentioned in part b, these can be valid strategies but only with adequate rationale.</p>

A better approach would combine multiple elements:

- **Graduated hedging:** Reduce oil hedge ratios over time as the country reduces oil dependence. [0.5 mark] Start with 80% hedged, declining to 0% over 10 years. [0.5 mark]
- **Use collar strategies:** Buy put options for downside protection, but sell call options to reduce cost. [0.5 mark] This provides protection while making it affordable. [0.5 mark]
- **Diversify transition investments:** Instead of individual renewable stocks, invest in renewable energy funds or indices. [0.5 mark] This reduces single-company risk while capturing the energy transition theme. [0.5 mark]

Alternative approaches could include:

- Using long-dated OTC swaps for more certain hedging
- Combining physical oil reserves reduction with financial hedges
- Creating natural hedges by investing in oil-consuming industries

END OF QUESTION 3: MARKING GUIDE



QUESTION 4: MARKING GUIDE (20 marks)

a)

Question	Describe asset-liability matching requirements for disability schemes.
Total marks	3
Command verb	Describe (simple application)
Command verb definition	Provide information about specific items, showing that you understand what those items mean. A description is not a list; each item needs supporting information.
Primary learning objective	6.3: Describe the asset/liability matching requirements of the main providers of benefits on contingent events
Note to markers	Students should address the specific characteristics of disability scheme liabilities. General ALM principles should be linked to the disability context.

Asset/liability matching requirements specific to disability schemes:

- **Nature of liabilities:** Benefits are long-term and indexed to wages [0.5 mark], requiring assets that provide real returns above wage inflation over extended periods [0.5 mark]
- **Uncertainty considerations:** High uncertainty in both timing and amount of support payments [0.5 mark], necessitating liquid assets to meet unpredictable cash flow needs [0.5 mark]
- **Maturity matching:** Very long liability terms (45-year average life expectancy) [0.5 mark] creates challenges in finding sufficiently long-dated matching assets [0.5 mark]
- **Inflation protection:** Need for explicit wage inflation linkage in asset selection [0.5 mark] as disability support costs typically grow faster than CPI [0.5 mark]
- **Cash flow matching:** Combination of regular annual payments and irregular equipment grants [0.5 mark] requires both income-generating and liquid capital assets [0.5 mark]



b)

Question	Outline elements of investment governance unique to government social schemes compared to commercial insurers.
Total marks	3
Command verb	Outline (simple application)
Command verb definition	Describe briefly without elaboration or explanation.
Primary learning objective	1.3: Outline the elements of effective investment governance
Note to markers	Students need to clearly differentiate government scheme governance from commercial insurer governance. Generic governance points without this distinction should not receive marks. Consistent with the command verb definition, only a brief description of the elements are required.

Key governance elements unique to government social schemes:

Political and Social Objectives Government schemes must balance financial objectives with broader social policy goals [0.5 mark], such as maintaining public confidence in the social safety net or ensuring equitable access to services, whereas commercial insurers focus primarily on profitability and shareholder returns. [0.5 mark]

Stakeholder Accountability

- Accountability to parliament/legislature and ultimately taxpayers [0.5 mark]
- Requirement for transparency in investment decisions subject to freedom of information laws [0.5 mark]
- Public scrutiny of investment choices (e.g. ethical investing requirements) [0.5 mark]

Risk Appetite Constraints Government schemes face political pressure to minimise investment risk even when longer time horizons might justify higher risk strategies [0.5 mark], as investment losses become political issues rather than just commercial ones. [0.5 mark]

Additional Unique Elements [alternative points worth 0.5 mark each]

- Potential government guarantee reducing the need for conservative strategies [0.5 mark]
- Inability to wind up or transfer liabilities, unlike commercial insurers [0.5 mark]
- Investment decisions may be subject to government-wide policies on sustainability or domestic investment [0.5 mark]



c)

Question	Identify two main financial challenges for the scheme based on the information provided.
Total marks	2
Command verb	Identify (simple application)
Command verb definition	Recognise, name and/or characterise.
Primary learning objective	6.2: Examine the factors that influence investment strategies
Note to markers	<p>This is a straightforward identification question. Only the 'main' challenges should be awarded marks.</p> <p>0.5 marks for recognising a challenge and 0.5 for characterising it briefly.</p>

The two main financial challenges are:

- Significant funding deficit [0.5 mark]: \$6 billion gap between assets (\$12 billion) and liabilities (\$18 billion) [0.5 mark]
- Rapid growth in participants [0.5 mark]: Expected increase from 180,000 to 250,000 by 2030 (39% growth) will strain resources [0.5 mark]

Any other reasonable alternative may be awarded 0.5 marks for naming and 0.5 marks for characterising.



d)

Question	Analyse risk and return components of at least three asset classes for this scheme (e.g. cash, bonds, equities, properties).
Total marks	7
Command verb	Analyse (application)
Command verb definition	Write about a topic methodically and in detail, typically to explain and interpret it. This involves breaking down the topic into its components, understanding relationships, and providing insights based on evidence.
Primary learning objective	3.2: Analyse the components and drivers of the three asset classes' risk and return
Note to markers	<p>Students should analyse at least three asset classes (typically cash/bonds, equities, and property).</p> <p>Award up to 2.5 marks per asset class with a maximum of 7 marks total. Students should relate the analysis to the scheme's specific context of long-term disability support liabilities.</p> <p>At least half of the awarded marks should relate to the specifics of the context rather than generic descriptions.</p>

Cash and Short-term Fixed Interest:

- Return: Currently offering low returns, potentially below inflation [0.5 mark], which fails to address the funding gap or match wage-indexed liability growth [0.5 mark]
- Risk: Minimal capital risk and high liquidity [0.5 mark] but significant reinvestment risk as rates change over a long-term liability horizon [0.5 mark]
- Suitability: Appropriate for meeting near-term benefit payments and equipment grants [0.5 mark], but excessive allocation would guarantee continued underfunding [0.5 mark]

Government and Corporate Bonds:

- Return: Higher yields than cash (e.g. 10-year government bonds at 3-4% p.a.) [0.5 mark] but still likely below long-term wage growth expectations [0.5 mark]
- Risk: Interest rate risk increases with duration, creating volatility in market values [0.5 mark], while long-term bonds may not be available for liability matching [0.5 mark]
- Inflation-linked bonds could provide better liability matching [0.5 mark] as disability support costs typically grow with wages, which correlate with inflation [0.5 mark]
- Credit risk for corporate bonds requires careful selection given the scheme's public purpose [0.5 mark]



Equities (Domestic and International):

- Return: Historical long-term returns of 7-9% p.a. provide potential to close funding gap [0.5 mark] and exceed wage growth over extended periods [0.5 mark]
- Risk: High short-term volatility conflicts with political pressure to minimise risk [0.5 mark], though a long-term investment horizon allows recovery from market downturns [0.5 mark]
- Dividend income can help fund ongoing payments [0.5 mark] while capital growth addresses long-term liability increases [0.5 mark]
- International equities add diversification [0.5 mark] but introduce currency risk, requiring hedging decisions [0.5 mark]

Property (Direct and Listed):

- Return: Historical returns between bonds and equities (5-7% p.a.) [0.5 mark] with rental income typically indexed to inflation, providing liability matching characteristics [0.5 mark]
- Risk: Illiquidity of direct property may conflict with benefit payment needs [0.5 mark], while listed property (REITs) exhibits equity-like volatility [0.5 mark]
- Commercial property returns are linked to economic activity [0.5 mark], which correlates with employment and wage growth, providing some natural liability hedging [0.5 mark]

Overall Assessment for Scheme Context:

- The funding gap requires growth assets despite political pressure for low risk [0.5 mark]
- The relatively young average age indicates a long investment horizon (e.g. 40+ years), which further supports higher equity allocation than typical for government schemes [0.5 mark]
- Need for regular cash flows to pay benefits suggests barbell approach: liquid assets for near-term needs, growth assets for long-term [0.5 mark]
- Wage-indexation of liabilities favours real assets (equities, property, inflation-linked bonds) over nominal bonds [0.5 mark]



e)

Question	Propose appropriate investment objectives addressing the scheme's context.
Total marks	5
Command verb	Propose (higher order)
Command verb definition	Select and communicate a solution, action or range of possible solutions/actions. Rationale, reasons or justification must be included.
Primary learning objective	6.4: Propose appropriate investment objectives based on the liability profile of a fund or situation
Note to markers	Objectives should be specific, measurable, and reflect the scheme's unique constraints, including political pressure, funding gap, and social purpose. Credit proposals that balance competing needs realistically.

Proposed investment objectives for the disability scheme:

- **Primary return objective:** Achieve CPI + 3% p.a. (or wage inflation +1%) over rolling 10-year periods [0.5 mark] to provide real returns while acknowledging the funding gap requires growth above inflation [0.5 mark]
- **Risk parameters:** Limit probability of negative returns to no more than 2 in 10 years [0.5 mark], balancing political pressure for low risk with need for growth to address funding gap [0.5 mark]
- **Liquidity requirement:** Maintain a minimum of 15% in liquid assets (cash, government bonds) [0.5 mark] to ensure the ability to meet unpredictable equipment grants and support payment variations [0.5 mark]
- **Liability matching focus:** At least 40% of portfolio in assets with explicit or implicit wage inflation protection [0.5 mark] to match the wage-indexed nature of support payments [0.5 mark]
- **Time horizon:** Long-term focus of 20+ years reflecting participant demographics [0.5 mark] while maintaining medium-term stability for political acceptability [0.5 mark]

Alternative valid objectives might include:

- ESG/social investment mandate aligned with scheme purpose [0.5 mark]
- Specific volatility constraints to manage reputational risk [0.5 mark]
- Staged approach to close funding gap over a defined period [0.5 mark]



END OF QUESTION 4: MARKING GUIDE

END OF MARKING GUIDE