

Asset Liability Management

Exam Marking Guide Semester 2 2024





Marking Guide

This exam represents 80% of the available marks for the Asset Liability Management subject. The remaining 20% comes from the assignment.

Question	Syllabus Learning Objectives	Total Marks	SA	A	H
1	2.11, 3.1, 3.2, 3.3	18	12	0	6
2	2.8, 3.4, 6, 6.2, 6.7	24	6	12	6
3	2.3, 2.5, 3.3, 4.2, 4.4, 6, 6.3	24	10	14	0
4	3.2, 5.2, 6, 6.3	14	4	4	6
Total		80	32	30	18

SA – Simple Application

A – Application

H – Higher order/ Judgement/Evaluation



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 that 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 context stated in the question. 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 chapters 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 in 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.

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 are also provided within this marking guide.

Please note that many of the answers in this marking guide may go 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.



Command Verbs used in this exam

Command Verb	Definition
Compare	Describe the similarities and differences between two or more items.
Describe	Provide information about specific items, showing that you understand what those items mean. A description is not a list; each item needs supporting information.
Discuss	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.
Identify	Recognise, name and/or characterise.
State	Express definitively with no analysis.
Examine	Inspect (something) thoroughly in order to determine its nature or condition.
Explain	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.
Assess	Judge the effectiveness, quality, implications, relevance, importance, suitability and/or value of something against a point of reference.
Consider	Think carefully and thoroughly, taking into account the information provided, such as in relation to taking some action.
Evaluate	Judge or assess the worth of.



QUESTION 1: MARKING GUIDE

(18 Marks)

Question

An investor is considering three specific investments with a view to choosing one to add to their portfolio.

1. Direct ownership of an industrial property (site and buildings) suitable for a manufacturing tenant. The investor will own 100% of the property.
2. Private equity investment into a company that is proposing to manufacture military drones on a commercial scale. The investor will own 33% of the shares in the company, the two entrepreneurs who started up the company will own the other 67%.
3. An investment into an unlisted infrastructure fund, managed by a professional infrastructure manager, expecting to hold around 25% of the units in the fund with another three co-investors each holding around 25%. The unlisted infrastructure fund owns seven assets in three countries.
 - a. State the counterparty risks arising for each of these three investments. [6 Marks]
 - b. Discuss the characteristics of the industrial property that will drive the risk and return from this investment, noting you do not need to discuss taxation. [Hint: Use System T] [6 Marks]
 - c. Evaluate the Financial Ratio Analysis and Dividend Discount Model approaches to equity for possible use with this **private equity** investment. [6 Marks]

Marking guidance

Learning Objectives

2.11	Discuss generic risks such as counterparty, disclosure, fraud, and system failure (C4)	SA
3.1.	Describe the characteristics of the three principal asset classes (C5, 6, 7)	SA
3.2.	Discuss the components and drivers of the three principal asset classes' risk and return (C5, 6, 7)	SA
3.3.	Compare valuation methods including discussing assumptions and evaluating limitations (C5, 6, 7)	SA/HO



Answer

a. State the counterparty risks arising for each of these three investments. **[6 Marks]**

Each point should name a counterparty [0.5] and a risk for the investor [0.5] and be clear which investment it is related to. Expecting at least 6 spread across the 3 investments. Don't pay duplicate points or points unrelated to the nominated investment. There may be others not mentioned in this list that are valid.

Industrial Property

- Seller [0.5] fails to complete the transaction [0.5 mark]
- Seller [0.5] provides misleading information [0.5 mark]
- The tenant [0.5] is unable to pay the rent [0.5 mark]
- Broker/real estate agent/lawyer (third party) [0.5] arranging sale mismanages the sale so it falls through [0.5] perhaps with loss of deposit [0.5]
- Or the Broker/real estate agent/lawyer (third party) [0.5] defrauds the buyer [0.5]
- On the LATER sale of property, there will be counterparty risks from the next buyer [0.5] defaulting so that sale falls through [0.5]
- Property damaged and insurer defaults on claim

Private Equity

- The two entrepreneurs [0.5] skill/ability to successfully running this business [0.5]
- Other shareholders/current owners [0.5] honesty/integrity in their dealings with investor [0.5 mark]
- Reliability of company financials [0.5] as presented by current owners [0.5 mark]
- Drones contract customer [0.5] may not fulfil/pay for the drones once manufactured [0.5 mark]
- On the LATER sale of equity, also counterparty risks from the next buyer [0.5] defaulting so that the sale falls through [0.5]

Unlisted Infrastructure

- The fund manager [0.5] does not provide the real (correct/true) details of the assets [0.5], i.e. may exaggerate the positives and minimise the negatives
- The fund manager [0.5] behaviour, skill and/or compliance [0.5]
- The reliability of the information [0.5] provided by other parties [0.5]
- The fund manager's [0.5] valuations quality/completeness/assumptions [0.5]
- The coinvestors [0.5] credibility [0.5]
- One or more of the coinvestors [0.5] behaviour after invested may be adverse [0.5]
- The tenants [0.5] of the properties may not fulfil the lease terms, ie not pay rent [0.5]



- On the LATER sale of units in the unlisted fund, also counterparty risks from the next buyer [0.5] failing to meet terms of sale so can't sell at time or price as planned [0.5]
- b. Discuss the characteristics of the **industrial property** that will drive the risk and return from this investment, noting you do not need to discuss taxation. (Hint use System T) **[6 Marks]**

Not essential they use the Mnemonic System T to organise points, marks are paid for the characteristics presented. Discuss requires more than one idea per topic expecting at least 2 ideas per topic, with links to the risk/return impact. There may be other ideas.

In this case, must have points on both risks and returns, if only risks or only returns, max 5.

Repeated ideas gain no further marks.

Just a list of 0.5 points, then max at 3, as not a discussion

Security

- Financial Security of the tenant [0.5 mark] and long term viability of their business [0.5] – contributes to default risk [0.5]
- Any planning/zoning changes planned [0.5] that will affect the use of the property for industry [0.5] potentially changing future income [0.5]
- Government/sovereign intervention is a risk [0.5]
- Potential for disasters eg floods, trees falling, pests, power or water cuts and so on [0.5] which will affect rental income [0.5] and may require further capital investment [0.5] unless insured [0.5]
- Cost of insurance of building should be allowed for [0.5] when determining net return [0.5]

Yield

- Is rent indexed [0.5] will it protect a real return [0.5] over time
- Rent compared to similar industrial properties [0.5] might indicate opportunity to increase rent [0.5]
- A more attractive property should have higher yield [0.5] , factors to consider:
 - Location - State; city & suburb [0.5 mark]
 - Accessibility to transport infrastructure (road, rail, port) [0.5 mark]
 - Size; [0.5 mark]
 - On site parking; delivery sites & facilities [0.5 mark]
 - Type of factory which can be located in the property [0.5 mark]
 - Building features, e.g. security, fire systems, airconditioning [0.5 mark]



- An industrial site has potential for additional income (in addition to tenant rent) [0.5] for example installing solar panels or mobile phone towers [0.5]

Spread

- A positive spread over risk free rate is expected [0.5] due to the accepted risks of this investment (e.g. vacant from time to time) [0.5]
- More attractive property will have higher spread (marks as per above, only pay once)
- Buy/sell transaction costs likely significant [0.5] impacting net return [0.5]

Term

- Rental lease term [0.5] is major factor for security of future income [0.5 mark]
- If freehold, then no expiry date on the investment [0.5]

Expenses

- Most Maintenance Expenses are the tenant's cost [0.5] so no impact on return [0.5]
- However capital works may be required [0.5] or potential for necessary improvements [0.5 mark] that will reduce return [0.5]
- Buy/sell transaction costs likely significant [0.5] impacting net return [0.5] (pay here if not already covered under spread)

Marketability

- More attractive property is easier to rent [0.5] improving returns [0.5] (marks as per above on attractive, pay only once)
- Property features that are attractive to potential buyers [0.5] will improve liquidity and achievable price [0.5] ie returns. (marks as per above on attractive, pay only once)

Taxation

- Not required to discuss no marks for any points here

- c. Evaluate the Financial Ratio Analysis and Dividend Discount Model approaches to equity for possible use with this **private equity** investment. **[6 Marks]**

Looking for answer that covers benefits/limitations of both models and draws a conclusion.

Financial Ratio Analysis [FRA]

Description of this approach

[1 max]

- Analyses key financial analysis results [0.5 mark]
- Determine ability to repay debts [0.5 mark] and generate profit [0.5]



- Extent of competition [0.5 mark]
- Look at future earnings per shareholder [0.5 mark]

Benefits of this approach

[1 max]

- Financials should be available for current year and perhaps previous years [0.5] preferably audited [0.5]
- Forecasts should be available, so can allow for future contract, expected demand for drones [0.5]
- Able to compare to other equity investments on common basis [0.5]
- Able to stress test assumptions about future for impact on financials [0.5]

Limitations of this approach

[1 max]

- As a start up, may be little or no past actual financial data [0.5]
- Any past data may be delayed and less relevant [0.5]
- Past data is not going to be a useful guide to future given growth and new contracts [0.5]
- Past accounts and/or forecasts may be unreliable or incorrect [0.5]
- Drone contract is not certain, either cost or revenue, so how to allow for this [0.5] eg demand depends on volume of wars [0.5 mark]

Other comments are possible but must be a sensible fit to scenario. [0.5 mark] each but maximum marks for question FRA are 3.

Dividend Discount Model [DDM]

Description

[1 max]

- Calculates present value of future dividends [0.5] and compares with share price [0.5]
- Requires assumptions on profits, discount rate, growth rate etc [0.5]

Benefits of this approach

[1 max]

- Enables comparison of PV of future dividends with share price [0.5]
- Enables testing of result with different assumptions [0.5]
- Doesn't require or rely on past data or financials [0.5]
- Investor can set assumptions [0.5]

Limitations of this approach

[1 max]

- Start up may not pay dividends for some time [0.5]
- How to set assumptions given start up with no track record [0.5]



- Eg What percent of profits will be paid out [0.5]
- How to allow for the skill (or lack of) of the other two shareholders as managers [0.5]
- What discount rate for future dividends should be used [0.5]
- What is the best estimate of future profit growth [0.5]

Other comments are possible but must be a sensible fit to scenario. [0.5 mark] each but maximum marks for question DDM are 3.

Concluding remarks:

[1 mark]

Preferred approach or approach that works best [0.5] + supporting reason [0.5 new points or good wrap up point] in context of drone business [1 mark]

If no concluding remarks then maximum overall mark is 5 out of 6

END OF QUESTION 1: MARKING GUIDE



QUESTION 2: MARKING GUIDE

(24 Marks)

Question

A mother aged 85 is setting up a trust for herself and one for her son aged 45. Each trust will commence with a 1/2 share of her current investment portfolio. The trust has taxation benefits while in operation provided drawdowns are allocated to living expenses and any residual is donated to charity on death. This arrangement motivates the beneficiaries to keep the capital invested within the trust while they are alive.

Mother: Will draw \$0.5million per annum for living expenses, indexed. On death the balance will be donated to charity.

Son: Cannot draw from the trust until age 65. From age 65 the son may select the drawdown rate required to meet living expenses. On death the balance will be donated to charity.

The mother has no other source of income. The son is currently employed.

The investment portfolio is \$30 million. It is currently invested as

- 50% long term government bonds;
- 5% across the 5 largest listed companies; and
- the remaining 45% in three large office blocks in one city.

All assets are domestic.

You have been retained by the mother to restructure the asset allocation of each trust to best align with the beneficiary and their time frame.

- a) Compare expected long term returns across the three asset types in the current portfolio [6 Marks]
- b) Assess each of the three asset types for suitability for the son's investment trust [6 Marks]
- c) Explain how actuarial techniques can be used to determine a suitable strategic asset allocation for the son's investment trust [4 Marks]
- d) Explain why the investment strategy should change over time for the son's trust [2 Marks]

The mother is considering selling the current assets, investing instead via investment trusts and employing an investment advisor to help her select the fund managers and asset classes.

- e) Explain three types of regulation that exist to protect the mother and son in this situation [6 Marks]



Marking Guidance

Learning Objectives

2.8.	Explain the role of regulators in competition, disclosure, and consumer protection (C4)	A
3.4.	Compare long-term returns across the three principal asset classes (C10)	SA
6	Apply the principles of asset liability management	A
6.2	Describe the factors that influence investment strategies	SA
6.7.	Demonstrate how actuarial techniques and asset/liability modelling may be used to develop an appropriate investment strategy (C11) Also C9	A

Answer

- a) Compare expected long term returns across the three asset types in the current portfolio

[6 Marks]

Similarities and differences can be discussed. Each type to correctly reflect the actual asset as described in order to get full 2 marks. Otherwise max 1.5.

Govt Bonds: **Long term bonds** will have return fixed for those terms. [0.5 mark] If buy and hold, will not match other Govt Bonds issued later with different coupon rates or terms [0.5 mark]. Returns could be improved by allowing sale [0.5] and reinvest in higher yield when conditions suit [0.5 mark] Generally returns should be risk free, at or above cash rate [0.5] This may not be a real (above inflation) return over the short or long term. [0.5] Indexed bonds will generate a real return over inflation if held to maturity [0.5] Tax payable on coupons and capital gains if sold before maturity.[0.5]

Equities: Expect higher returns than government bonds over long term [0.5] across the **five largest companies** [0.5] but with higher return volatility. [0.5 mark]. Dividend income more stable than price movements [0.5 mark] but potential volatility [0.5] in economic down turns. Any one individual stock can perform markedly differently [0.5] to the overall market. A portfolio of only 5 in one country is not diversified [0.5] so may experience more extreme movements in valuation than for example an index tracker fund. Any one of the 5 might be bought out by another company (or shift location to an international share market) or other structural change which might impact returns, either positive or negatively, in the short term. Tax payable on dividends and capital gains on sale (if sold) [0.5]

Property: Are office blocks all in one city. Expect long term leases to generate steady income [0.5] with inflation proofing [0.5]. Potential for capital gains [0.5] However, future expenses to maintain and redevelop the properties need to be allowed for. [0.5] Expect total returns less than equities



[0.5 mark] and higher than cash and government bonds [0.5] all else being equal. The properties may have lower volatility [0.5 mark] **while that city is in good economic conditions** but could see significant change in market prices in future, downward if local economy is suffering [0.5], ie higher volatility [0.5 mark] Also exposed to illiquidity risk, which may make a sale difficult to achieve for desired price (reducing returns). Tax payable on rental income less expenses, and on capital gains on sale (if sold).

Remarks must include comments on the specific assets mentioned to gain full 2 marks per asset type. Otherwise limit to 1 mark per asset type.

b) Assess each of the three asset types for suitability for the son's investment trust [6 Marks]

Bonds pay interest and may not have any capital gains [0.5], so would not be required immediately in the portfolio [0.5] as there are no drawings [apart from expenses] from the trust for 20 years [0.5] They would become useful again once over age 65. [0.5] A portfolio of bonds, with reinvestment of all coupons and principal on maturity until age 60 [0.5] could be used to provide a low risk albeit lower return [0.5] portion of the portfolio but may not provide real return above inflation [0.5]

Equities expected to generate higher returns [0.5 mark] than other classes although with more volatility [0.5]. Expected to generate a real return which protects the purchasing power of the portfolio. [0.5] As not touching the portfolio for 20 years [0.5] the volatility risk is acceptable [0.5] and equities should be held until the 20 years are up [0.5] (or beyond). Dividends can be reinvested [0.5], and used to rebalance the holdings in the 5 shares over time [0.5]. once in drawdown, the dividends can be used to generate the required income [0.5]

Properties generate reasonable long term real returns [0.5 mark] with lower volatility [0.5]. No need to sell the properties for the next 20 years [0.5] so appropriate now to build the value of the portfolio [0.5] over next 20 years and/or sell when market conditions give a favourable price. [0.5 mark] Not liquid [0.5] so may not be appropriate once the portfolio is in drawdown phase. [0.5] However the net rental income after expenses must be invested somewhere [0.5], so will have to hold at least one other asset class [0.5] until such time as sufficient retained earnings to renovate or buy another property [0.5].

Remarks must include comments on the specific needs of the son (no access for 20 years, then income required) to gain full 2 marks per asset type. Otherwise limit to 1 mark per asset type.



- c) Explain how actuarial techniques can be used to determine a suitable strategic asset allocation for the son's investment trust [4 Marks]

The actuarial techniques which are relevant include

Matching the characteristics of the asset type to the characteristics of the liabilities [0.5 mark] This includes modelling all the future cashflows that must be provided for the liabilities, noting there may be uncertainty on value and timing [0.5 mark].

Then a stochastic model is normally required to be able to match the volatility of both the assets and the liabilities [0.5 mark]

- The volatility of the asset type [0.5 mark] and its potential future returns [0.5 mark]
- The volatility of the liabilities [0.5 mark] and potential future liability cashflows [0.5 mark]

The assumptions of the model will then be derived from the past data of the assets and the potential future data of the liabilities. [0.5 mark].

When the model is run the probability of the assets to meet the requirements of the liabilities will be understood [0.5 mark]. The higher that probability the better the asset strategy [0.5mark]

Or (see Chapter 9 section 9.3.3)

A mean variance optimiser model could be used to determine the best fit [0.5]

The theory of MPT and utility functions leads to one modelling approach that relies on all investors being rational [0.5] called **mean-variance analysis**. [0.5] This involves the construction of portfolios that are efficient [0.5] in terms of maximising returns per unit of risk where risk was defined as the volatility of returns [0.5].

A **mean-variance model**, optimises the portfolio asset allocation based on a trade-off between expected return of the portfolio and variance of the portfolio return at a given risk tolerance, defined as a desired level of volatility in the portfolio return. [1.0]

Such a model would take a set of assumptions about each asset class future risk and return and correlations [0.5] and determine the expected future returns and volatility for a diversified portfolio, [0.5] enabling the investor to choose from the 'mean-variance-efficient' portfolios, which are defined as portfolios that:

- minimise the variance of portfolio return, for a given expected return [0.5]; or



- maximise expected return, for a given variance. [0.5]

Having determined the target return required for the son's portfolio, this model would then indicate the portfolio that would minimise the variance in returns. [1.0]

Or having determined the maximum volatility acceptable to the son (for example, between now and turning 65), this model would then indicate the portfolio that would maximise the expected return. [1.0]

d) Explain why the strategy should change over time for the son's trust

[2 Marks]

Expecting comment on change before/after 65 and possibly comment on further changes when very old

The strategy would have a defined asset allocation over the period to age 65 [0.5] as circumstances unchanging over this time and no income is being drawn [0.5] and then one applying after 65 as the trust has to pay a regular income. [0.5]

Once the son has no other income and draws more (age 65) [0.5] then strategy should be reviewed to add more income producing assets [0.5]

After age 65 as time passes the proportion held in the more volatile assets should be gradually reduced [0.5] but not to zero immediately [0.5] since will still have reasonable life expectancy at age 65. [0.5]

As reaches older ages, eg 85, strategy can change again to draw down on capital as well as income [0.5] as there is no need to preserve the initial capital value until death. [0.5]

e) Explain three types of regulation that exist to protect the mother and son in this situation

[6 Marks]

This is not Australia specific, expecting comments on TYPES of regulation not the names of regulators. 0.5 for naming a type of regulation, then marks for explaining how it would protect the mother/son (consumers) up to another 1.5 marks for explanation how it protects.

Max 2 marks per type, max 3 types.

- **Consumers** have specific legislated rights under consumer laws [0.5] that will ensure any product sold to them (mother and son) is fit for purpose [0.5] as the product provider would be fined or banned [0.5] if products not fit for purpose
- **Financial Advisors Must be Licensed** [0.5 mark] which should mean they (mother and son) are not victims of financial crime, fraud [0.5] or theft by the advisor [0.5]



- **Property advisor/real estate agent are licensed** [0.5] and therefore are required to give reasonable estimates of the property valuation [0.5] which will assist in ensuring they know a realistic market price [0.5] and don't sell too cheaply/get ripped off [0.5]
- Consumer **Data** Must be Protected [0.5] which should mean they are not victims of financial crime, fraud or theft by the companies [0.5] holding their data or any hackers [0.5]
- **Anti-competitive** behaviour is prohibited [0.5 mark]; e.g. Price Fixing [0.5 mark] so their advisor and manager should not be over charging [0.5]
- Full **disclosure** of all details of the investment product/arrangements is mandatory [0.5 mark] so that they are fully informed [0.5] and can ensure suitable for their portfolio [0.5]
- A financial/consumer regulator and/or regulation of the operation of financial markets and participants (manager, investment trusts) [0.5] which should mean they are not victims of financial crime, fraud or theft by the market participants [0.5]
- A stock market regulator controls the operation of the actual market for buying and selling listed investments [0.5 mark] This ensures fair pricing of the listed equities [0.5] and a liquid market [0.5] which ensures the clients can sell their equities at a fair price [0.5]
- A prudential regulator [0.5] regulates some entities who operate in the financial markets [0.5] ensuring they are solvent and able to deliver on their liabilities to clients [0.5] and therefore remain in business, benefiting our clients if they invest in these companies [0.5]

END OF QUESTION 2 MARKING GUIDE



QUESTION 3: MARKING GUIDE

(24 Marks)

Question

A University has received a \$2 billion donation from a successful graduate. The money has been placed into a Trust and will be used for a 4-year capital works project for a new building. The project is budgeted as \$500 million per annum for four years, plus an allowance for inflation. If the value of the Trust falls to zero during the four years, the capital works project must stop immediately even if building is incomplete. This would be very poor outcome for the University and the donor. Any surplus at the end of the four years will be reassigned for another project.

You are setting up the investment strategy for the Trust. The University has authorised listed equities, government bonds and corporate debt securities. You have suggested incorporating derivatives.

- a) **Explain** the asset/liability matching requirements of the University [4 Marks]
- b) **Compare** the features of exchange traded derivatives with over-the-counter derivatives, for use by the University [4 Marks]
- c) **Describe** the valuation approach to determine a fair value for the corporate debt securities for the Trust's annual financial statements. (Your answer should identify the key assumptions) [4 Marks]

During the first 12 months of the project, inflation is expected to remain steady at 3%pa and the central bank is expected to reduce its cash rates from 6%pa to 4%pa.

- d) **Explain** the likely direction of the impact on the valuations of (i) listed equities and (ii) corporate debt [4 Marks]
- e) **Examine** the three proposed asset types for suitability for the investment portfolio, applying the principles of asset liability management [6 Marks]
- f) **Identify** a potential benefit and a potential drawback of employing derivatives within the portfolio [2 marks]

Marking guidance

Learning Objectives

2.3.	Explain the implications of quantitative easing (C3)	A
2.5.	Explain the principal economic influences on investment markets (C4)	A
3.3.	Compare valuation methods including discussing assumptions and evaluating limitations (C5 Debt)	SA/HO



4	Describe the characteristics of, uses of, and compare types of derivatives (C8)	SA
4.2.	Compare exchange-traded derivatives and over-the-counter derivatives (C8)	SA
4.4.	Discuss the use of derivatives in hedging risks faced by insurance companies	SA
6	Apply the principles of asset liability management (C11)	A
6.3.	Describe the principles of investment and the asset/liability matching requirements of the main providers of benefits on contingent events (C11)	SA

Answer

a) Explain the asset/liability matching requirements of the University [4 Marks]

Each point to cover a what (eg term) and the requirement (eg 4 years) to gain a full mark. Other requirements are possible but must be a sensible fit.

The Matching Requirements are:

The investment period (term) [0.5] of each of the Trust assets must comply with the four year timeframe of the liabilities [0.5]

\$500 million must be available (cash out) in each of the next four years [0.5 mark] without impacting the subsequent years' \$500 million [0.5] to pay the construction costs

The expected asset returns must be sufficient to match inflation [0.5 mark] of the building costs [0.5 mark]

Assets must be such that realising them when required (liquidity) [0.5] is not compromised [0.5] or involve taking an unexpected loss [0.5 mark]

Capital losses [0.5] are not acceptable [0.5] to ensure the construction can be completed.

b) Compare exchanged traded derivatives and over-the-counter derivatives, for use by the University [4 Marks]

Compare means similarities and differences. See Chapter 8, section 8.2. 8.3.2, 8.3.3 Must have both a similarity and a difference to gain more than 3 marks.

Both are financial instructions via legal contracts between two parties, a buyer and seller, [0.5] that set the terms of a future transaction in advance [0.5]. The value of the derivative depends on the (expected) value of the underlying asset [0.5] at the transaction date. The derivative is purchased for premium or margin requirement [0.5], with final settlement (if any required) at the agreed transaction date [0.5].



Exchange-Traded

- They are standardised i.e. the terms & conditions are set by the exchange operator [0.5 mark]
- Quantum and amounts for trading lots are specified [0.5 mark]
- Market Makers [dealers] guarantee to make a market [0.5 mark]
- The Exchange Operator takes all the credit risk if a party to the trade cannot settle or provide the security [0.5 mark]
- The Exchange Operator settles trades overnight [0.5 mark]
- Regulated market [0.5] to ensure the exchange and market makers meet these requirements

Over-the-Counter

- The details of the trades are solely determined by the investors [0.5 marks]
- Each investor takes all the credit risk to itself [0.5 marks]
- There is no requirement of anyone to actually create a market [0.5 marks]
- While the GFC lead to some regulation of OTC derivatives it is still significantly less the that for Exchange-Traded [0.5 Marks]

c) Describe the valuation approach to determine a fair value for the corporate debt securities for the Trust's annual financial statements (don't forget to identify the key assumptions) **[4 Marks]**

Valuing Debt securities requires the following

- Method to determine the present values of future cash flows [0.5 mark] *[critical point, must say this to get full marks]*
- Cash flows (coupon and principal repayment) [0.5] amounts and timing [0.5].

Then assumptions are required:

Probability of receiving each future payment [0.5 mark]. Corporate debt should have a probability less than one [0.5mark]. How much less depends on the characteristics of the corporate [0.5 mark] e.g. profitability [0.5 mark] and previous track record of debt repayment [0.5 mark] or credit rating can be used as a guide [0.5].

Either an explicit probability applied or incorporate the uncertainty into the discount rate [0.5].



The **discount** rate is the expected future yield on the securities [0.5 mark] given the maturity date [0.5 mark] But the potential future movement in interest rates [0.5 mark] between now and maturity date [0.5] needs to be an assumption [0.5 mark]. This can be derived by the expected movement in the shape of the yield curve of bonds [0.5 mark].

All the assumptions must be separately derived for the maturity term [0.5 mark] of each debt security [0.5 mark]

Or,

Expected yield on corporate debt securities would be higher than for government bonds due to added credit [0.5] and liquidity [0.5] risks. These risks can be assessed by the credit rating of each bond. [0.5] This will mean a higher discount rate for corporate debt securities than government bonds [0.5].

The discount rate may therefore be the relevant government bond rate plus a margin to reflect credit rating [0.5], for each bond held. Higher margin for lower rating [0.5]

Or, a student may not look at the basic valuation approach, rather what the investor would do using market information, for example

Use valuations (comparative or direct) from either Bloomberg for the last traded price [0.5] or from market brokers [0.5] (1 to 3 taking an average) who would then use their database of comparative yields [0.5] etc to estimate the fair value. This would be more independent than doing one's own valuation. [0.5]

The methodology will be essentially a present value of cashflows [0.5] allowing for risk of default [0.5] and changes in interest rates over time [0.5], applying the markets implied assumptions or the broker's assumptions. [0.5]



- d) During the first 12 months of the project, inflation is expected to remain steady at 3%pa and the central bank is expected to reduce its cash rates from 6%pa to 4%pa.

Explain the likely direction of the impact on the valuations of (i) listed equities and (ii) corporate debt [4 Marks]

(i)

Listed equities are likely to see prices increase [0.5] as interest rates come down [0.5 mark] due to reduced financing costs [0.5] leading to expected profits increasing [0.5 mark]. However companies which provide credit (financial sector) may see prices stay steady [0.5 mark] or drop slightly [0.5 mark]

Stable inflation also assists companies to control input costs and profit margins [0.5], which should support or improve profits [0.5] and therefore increase dividends and share prices [0.5].

As interest rates fall, the discount rates of cashflows goes down [0.5] and the present value of future cashflows (dividends and capital) goes up [0.5] (so a secondary reason why share prices go up). Alternatively put, investors will see the dividend yield as more competitive vs interest rates [0.5], buy the shares and drive the share price up [0.5] until the yields are comparable [0.5].

(ii)

Existing **corporate debt** is likely to increase in market value [0.5 mark] as the existing debt will have been issued at higher yields [0.5 mark]. The market will reprice existing securities at lower yields, increase the trading price [0.5]

However inflation has not reduced, [0.5] so the required yields may stay higher (not reduce as far as cash rate) [0.5] to ensure a real return is obtained. So bond prices may not increase as much [0.5]

And/or

New corporate debt issues may offer lower nominal coupons [0.5] than previously, as cash rates have reduced [0.5]. Again, this leads to the market repricing all issued debt at a lower yield. [0.5] and therefore higher valuation [0.5]



- e) **Examine** the three proposed asset types for suitability for the investment portfolio, applying the principles of asset liability management **[6 Marks]**

Must assess the 3 named assets against the requirements relevant to the University (should have been covered in a). This sample answer is more comprehensive than expected from an individual student. Students should be assessing against the liability requirements they mentioned in part (a), up to 4 requirements.

0.5 per comment wherever a feature correctly assessed for suitability. Below is more than expected.

We have previously considered the asset/liability matching requirements in (a) so I will assess each asset type against those requirements.

Asset/liability matching requirements	Listed equities	Corporate Debt	Government Bonds
4 year time frame	Able to purchase and sell at any time on market (or use a trust) However returns meet expectations over the longer term (10+ years) and may not over 4	May have limited selection at time of purchase, should be able to sell at any time (or use a trust) Returns may vary over the four years	Should be able to purchase and sell a portfolio of bonds at any time (or use a trust) Returns fairly predictable over next 4 years
Liquid every 12 months or more often	Daily liquidity	Depends – direct holdings may be difficult to sell from time to time – trust would be more liquid	Yes – always a market
Inflation linked	Expected over longer term (more than the four years)	Some may have inflation linked coupon Market pricing would include an inflation premium	May have inflation linked coupon Market pricing would include an inflation premium



Minimal/No capital losses	May be capital losses at any time and even over entire four years	Some credit risk of default leading to loss of capital However, as only 4 years, may have to sell when market prices are lower leading to loss of capital	Government issued so close to zero risk of loss of capital over term of bond However, as only 4 years, may have to sell when market prices are lower leading to loss of capital
Conclusion	Either no, or a selection of major companies paying dividends	Not ideal due to credit risks and marking pricing volatility, or select only AAA rated securities with terms aligned to the required cash flow dates	Yes but only if portfolio maturities are aligned to the required cash flow dates

f) **Identify** a potential benefit and a potential drawback of employing derivatives within the portfolio **[2 marks]**

Up to 1 mark for benefits points and up to 1 mark for drawbacks. Not expecting all these answers but am expecting comments to relate to the proposed University portfolio in some way.

- An OTC derivative could be designed that provided **inflation matching** [0.5].
 - The cost will very likely be less than retaining the risk [0.5].
 - **But**
 - such matching always contains the risk that the chosen matching will not be adequate [0.5] ie not be a perfect hedge. [0.5]
 - OTCs have counterparty risk [0.5];
 - and there may be significant costs (legal, bank margin) [0.5]
- Derivatives can be used to **reduce credit risk** of the corporate debt securities [0.5]
 - by using a credit-default swap [0.5] which effectively allows the buyer (the University trust) of the swap [0.5] to obtain an effective guarantee of the full repayment of the credit [0.5].
 - This removes or minimises credit losses on the fixed interest portfolio [0.5] so protects University from a capital loss on the FI portfolio [0.5].
 - However, this comes at a cost [0.5] and may offset any additional returns achieved by taking on the higher risk of corporate debt [0.5].



- **Listed equity prices** can fall over the short term, and then recover, for reasons related to market sentiment rather than the value of the company [0.5].
 - Using derivatives will allow assets to be “held” while the risks of price changes can be covered by the relevant derivatives [0.5], e.g. a ‘put’ [0.5] will prevent losses if the asset’s price fall. [0.5]
 - This would protect the University against an equities capital loss while the project is underway [0.5]
 - However such put options can be very expensive [0.5]

END OF QUESTION 3: MARKING GUIDE



QUESTION 4: MARKING GUIDE

(14 marks)

Question

You are providing actuarial advice to a life insurance company in respect to their annuity product portfolio. The annuity product is increasing in sales and the liabilities are growing. Annuities have been priced using 30 year government bond rates at the date of purchase, while the investment portfolio has to date been entirely in cash and diversified fixed interest, with the company absorbing any mismatch losses out of shareholder capital.

The life insurer is reviewing the pricing basis for the annuity product and the investment strategy for the portfolio. The plan is to have a much closer match between the valuation of assets and the valuation of liabilities.

You are providing advice in respect to a range of specific questions.

- a) **Discuss** why expected returns from a diversified fixed interest portfolio are not the same as expected returns from 30 year government bonds [4 Marks]
- b) **Consider** the relevance of behavioural finance theory to
- i. Government bond pricing [2 Marks]
 - ii. Listed equity pricing [2 Marks]
 - iii. Demand for annuities [2 Marks]
- c) **Explain** one way to improve the matching of the assets to the liabilities [4 Marks]

Marking Guide

Learning Objectives

3.2.	Discuss the components and drivers of the three principal asset classes' risk and return (Debt C5)	SA
5.2.	Critique each of the theories of investment market behaviour (C9)	HO
6	Apply the principles of asset liability management (C11)	A
6.3.	Describe the principles of investment and the asset/liability matching requirements of the main providers of benefits on contingent events (C11)	SA



Answer

- a) **Explain** why expected returns from a diversified fixed interest portfolio are not the same as expected returns from 30 year government bonds [4 Marks]

The interest rates on 30 year Govt bonds are fixed [0.5 mark].

The market price (expected return) will vary according to the govt bond yield curve [0.5 mark]

The marketability will be strong/liquid [0.5 mark]

And the investment is secure given government backed [0.5]

In contrast the diversified portfolio has a potentially significant range of

- maturity terms [0.5 mark];
- credit risks [0.5 mark]
- interest rates [0.5 mark]
- yields [0.5 mark]
- marketability [0.5 mark]
- currencies [0.5 mark]

As a result, the risk/return profile of the diversified portfolio will be quite different [0.5] and the expected yield will likely be higher than government bonds [0.5] to reflect the additional risks and variations of the diversified portfolio [0.5].

- b) **Consider** the relevance of behavioural finance theory to

See Chapter 9 – students may draw out any reasonable example for each of these three. Looking for logical string of comments – Ok if they argue behavioural finance is not relevant. Identify a point relevant to behavioural finance and then link to how that point might influence pricing of the asset.

- i. Government bond pricing [2 Marks]

Behavioural Finance suggests investors underreact to new information [0.5 mark].

This means that when interest rates change or are predicted to change [0.5 mark] the price of government bonds may not move as quickly as possible [0.5 mark].

But with other investors operating on a financial analytical theory of pricing moving 'ahead of the market' ie more quickly [0.5 mark] there may be "confusion" in the market making others hesitate.



ii. Listed equity pricing

[2 Marks]

Behavioural Finance suggests that Markets are often found to join “the bandwagon” of positive information [0.5 mark] and do not necessarily react quickly to poor news [0.5 mark].

One conclusion of Behavioural Finance is that the “stock market has no memory” [0.5 mark] i.e. past price movements are not predictors of future price movements [0.5 mark]

i. Demand for annuities

[2 Marks]

Since Behavioural Finance is connected to people’s psychological situation it would follow [0.5 mark] that those who expect to have a longer life [0.5 mark] would be more likely to buy an annuity [0.5 mark].

However, behavioural finance also suggests people may ‘overvalue’ their own skill in investments [0.5] due to a bias (eg confirmation) [0.5] leading them to believe that they can achieve a better return than the professionals, that is, a better return on their portfolio than the annuity pricing indicates [0.5], so do not purchase annuities. [0.5]

Similarly, people may not believe they are going to live beyond the ‘expected’ age [0.5] perhaps based on historical family experience (hindsight) [0.5] rather than forward looking risk assessment [0.5] so they do not place any value on the insured element of an annuity. [0.5]

c) **Describe** one way to improve the matching of the assets to the liabilities

[4 Marks]

Marks for stating the problem and then for the improvement described in detail. Only asked for ONE way so mark the first one presented. Below are several alternatives. Expecting either a practical change to assets or a practical change to the product.

State the problem of the particular scenario max 1 mark

The annuities are priced using 30 year govt bond rates [0.5 mark]. The current investment portfolio of cash and diversified fixed interest is not matched to government bonds so asset value may move away from the value of liabilities [0.5 mark]. This impacts the shareholders net assets.

[0.5 for noting mortality is not something that can be matched]

[0.5 for general discussion on matching portfolios, quoting Redington on duration, convexity etc]

Describe one way to improve matching, relevant to this scenario. Four ways are shown below, the student is only marked for ONE way.



- A. Changing the investment strategy to 30 year government bonds** [0.5 mark] would provide better matching [0.5 mark] The bonds would be purchased at the same time [0.5 mark] as the new annuity single premium was received [0.5 mark]. Each new annuity would then be matched [0.5 mark] with a specific 30 year government bond [0.5 mark]
- B. Matching dollar duration of asset and liabilities** [0.5] instead of matching cashflows might be a more flexible [0.5] investment strategy than cash-flow matching each new annuity [0.5]. This means looking at the liability portfolio as a whole rather than the individual annuities. [0.5]
- The insurer cannot invest in assets that exactly match the term of each annuity [0.5] as the mortality experience for each annuity is unknown [0.5]. However considering the portfolio as a whole, future cashflow timing can be predicted [0.5] and government or corporate bonds selected to provide a close match of coupon/maturity to expected annuity payments [0.5].
- C. Change the product pricing and valuation basis for annuities** [0.5] to reflect the actual asset portfolio and its expected earnings [0.5]
- The annuities will have to be revalued on earnings assumptions [0.5] aligned to the actual investment portfolio. [0.5] This may crystallise a loss for the insurer (or a gain). [0.5] at the time of change but after that the value of the liabilities and assets should move together [0.5] as bond market conditions change [0.5].
- This also impacts pricing of new annuities [0.5], and as diversified fixed interest portfolio is expected to have higher returns than government bonds then the price of the annuities will reduce [0.5] (all else being equal) or a higher profit can be taken [0.5].
- D. Change the asset portfolio to improve inflation protection** [0.5] assuming the annuities are indexed. [0.5] As the diversified fixed interest holdings may not all have indexed coupons [0.5] So, add index linked bonds (govt or corporate) [0.5] and/or private credit (loans) with index linked terms (i.e. long term lending to corporations or infrastructure projects) [0.5] In both cases fairly long terms should be possible to align with the long term of the annuities [0.5]

Max 1 mark for the answer if there is no practical suggestion relevant to the scenario

END OF QUESTION 4: MARKING GUIDE

END OF MARKING GUIDE