



ASSET LIABILITY MANAGEMENT

EXAM MARKING GUIDE SEMESTER 1 2022



Asset Liability Management

Exam Marking Guide Semester 1 2022

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 Objective	Section Reference in Modules	Total Marks	K	A	H
1	1.3, 3.2, 3.3, 5.1, 5.2, 5.3, 6.2, 6.5	See below	18	0	16	2
2	1.1, 1.2, 1.3, 3.4, 5.3, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7	See below	22	10	5	7
3	3.1, 3.2, 3.4, 6.1, 6.2, 6.4, 6.5, 6.6	See below	19	10	5	4
4	3.1, 3.2, 3.3, 3.4, 6.3, 6.6, 6.7	See below	21	4	13	4
Total			80	24	39	17
% Allocation to learning levels				30	48.75	21.25

K – Knowledge 30%

A – Application 50%

H – Higher order 20%



QUESTION 1: MARKING GUIDE

(18 marks)

A life insurance company has an asset portfolio which has an allocation to global listed equities managed by external investment managers. The Board's investment beliefs are:

- the investment strategy should minimise unrewarded risks in the asset portfolio;
- capital markets are fairly efficient over time; and
- adopting environmental social and governance (ESG) risk factors in the investment strategy is likely to add to returns over time.

The Board has asked you to assist it as it prepares to review the current and potential global equity managers.

a)

- i. Distinguish between active and passive management styles for an equity portfolio. (4 marks)
- ii. Explain technical analysis and fundamental analysis as they apply to active management of an equity portfolio. (4 marks)

b) Given the board's stated beliefs,

- i. Explain the relevance of each of the three forms of the Efficient Market Hypothesis when selecting the most appropriate management style. (4 marks)
- ii. Explain how past performance of the investment managers should be taken into account by the Board when selecting an investment manager. (4 marks)
- iii. Propose two specific questions for the Board members to ask each active global equity manager that will assist in selecting managers aligned to the board's investment beliefs. (2 marks)

Marks, Syllabus Learning Objectives and References in Modules

Question	Syllabus Learning Objective	Reference in Modules	Total Marks	K	A	H
A(i)	6.2	6.6, 9.3.3, 9.4.3	4	0	4	0
A(ii)	3.3,5.1,5.2	6.4.2, 6.4.4, 6.4.6, 9.3.1,9.3.2,9.4.1, 9.4.2	4	0	4	0
B(i)	5.1,5.2,5.3, 6.2	6.6,9.3.3,11.5.2, 11.4.1	4	0	4	0
B(ii)	5.3,6.2,	11.5,11.10	4	0	4	0
B(iii)	1.3,3.2,5.3,6.2,6.5	11.4,11.5,11.6,11.7	2	0	0	2
Question 1			18	0	16	2



Sample answer and marking guide

a) Prepare a short answer to each question below:

i. Distinguish between active and passive management styles for an equity portfolio. (4 marks)

- Passive styles are based on a belief that markets are efficient **(0.5 mark)** and that active approaches to investing cannot consistently add value after costs of investment management have been taken into account. **(0.5 mark)**
- Passive styles are usually much less expensive than active styles **(0.5 mark)** because they require less detailed security or stock research and analysis **(0.5 mark)**
- A passive strategy for an equity portfolio is any strategy that matches the portfolio weights to the weights in a specified index or benchmark, **(0.5 mark)** and does so by replicating the index weights or using a method which minimises the divergence (tracking error) of the returns from that of the index. **(0.5 mark)**
- Passive strategies focus on achieving the market return **(0.5 mark)** by holding securities that match the market index that is being tracked **(0.5 mark)**, and do not attempt to beat the market return. **(0.5 mark)**
- active styles are consistent with the belief that markets are not efficient **(0.5 mark)** and that it is possible to identify mispricing and use portfolio weights that diverge from those in the index (active weighting) to outperform the market and earn an additional active return (sometimes referred to as Alpha). **(0.5 mark)**
- active styles require significant amounts of research and analysis to support a decision-making process to determine the portfolio weights which diverge from that of the index. (Active weights) **(0.5 mark)** Active styles are therefore usually more expensive to operate. **(0.5 mark)** Active styles do not guarantee any outperformance (alpha) and may underperform the market. **(0.5 mark)**
- there is significant evidence that many active investment managers have failed to outperform their benchmark indices. **(0.5 mark)**

Maximum 4 marks. The answer given needs to distinguish between active and passive management styles by making at least four 0.5-mark points for each of passive and active management in order to get full marks.

ii. Explain technical analysis and fundamental analysis as they apply to active management of an equity portfolio. (4 marks)

- Technical analysis for equity securities is a process of looking at historical data on prices and trade volumes to forecast future prices of a security and then making decisions to buy, hold or sell the security. **(1 mark)**
- Technical analysis is based on the assumptions that all available information is incorporated into market price (i.e., there is no other relevant information); **(0.5 mark)** and that historical data on prices and trade volumes can be used to forecast future prices of a security i.e., history is a guide to the future of security prices. **(0.5 mark)**



- Evidence suggests that technical analysis has limited ability to reliably predict the future **(0.5 mark)**, but it is nevertheless used widely, including as a 'second check' on other forms of analysis, to select a stock for an actively managed portfolios **(0.5 mark)** or to change its weight in the portfolios relative to the stock's weight in the benchmark. **(0.5 mark)**
- Fundamental analysis (for equity securities) is a process of collecting all available information, making assumptions about the future level of factors such as revenue earnings and dividends, and calculating a value for a security (sometimes referred to as the intrinsic value). **(0.5 mark)** This intrinsic value is then compared with the current market price to make decisions about whether to buy, hold, or sell the security, **(0.5 mark)** or to change its weight in the portfolios relative to the stock's weight in the benchmark. **(0.5 mark)**
- Fundamental analysis is based on the assumption that the equity market is not perfectly efficient **(0.5 mark)** and that some information that is not available to (or not used by) all market participants can be found and used to derive the true intrinsic value of the security. **(0.5 mark)**
- Decisions using fundamental analysis are based on the assumptions made about the future and these may prove to be incorrect or incomplete, and so the estimate of the intrinsic value may not be close to the true value **(0.5 mark)** or may change if yet more information becomes available. **(0.5 mark)**

Maximum 4 marks. The answer needs to show application of both technical analysis and fundamental analysis to active management in order to get full marks.

b) Given the board's stated beliefs,

- Explain the relevance of each of the three forms of the Efficient Market Hypothesis to selecting the most appropriate management style. (4 marks)**
 - the EMH proposes that the market incorporates new information rapidly and rationally when pricing securities, and it incorporates all relevant information that is available into the price of securities. **(1 mark)**
 - there are three forms of the EMH that have been described weak, semi strong and strong each of which have different implications for the type of analysis which may successfully add value in investment management. **(0.5 mark)**
 - the **weak** form of the EMH states that the market price of an investment incorporates all information contained in the price history of that investment. **(0.5 mark)** Knowledge of an investment's price history cannot produce excess performance as this information is already incorporated in the market price. **(0.5 mark)** This form, if true, means that **technical analysis** (i.e., analysing charts of prices to find patterns that will predict future prices) will not produce excess returns when used in an active investment management process. **(0.5 mark)**



- the **semi-strong** form of the EMH states that the market price of an investment incorporates all publicly available information. **(0.5 mark)** Knowledge of any public information cannot produce excess performance, as this information is already incorporated in the market price. **(0.5 mark)** This form, if true, means that **fundamental analysis** will not produce excess returns when used in an active investment management process. **(0.5 mark)**
- There is a cost involved in obtaining and using even publicly available information. **(0.5 mark)** Any advantage achieved by acting on price-relevant information could well be eroded by the cost of obtaining and analysing that information **(0.5 mark)** so that an active investment management process is not worth using **(0.5 mark)**
- The **strong** form of the EMH states that the market price of an investment incorporates all information, both publicly available and that available only privately or to insiders. **(0.5 mark)** Knowledge available only to insiders cannot produce excess returns, as this information is already incorporated in market prices. **(0.5 mark)** so that a passive investment management style ought to be used rather than an active investment management style. **(0.5 mark)**
- The Board believe that the equity market is “fairly efficient”. **(0.5 mark)**
- Therefore, it could be inferred that the Board's believes is that the market is at least weakly efficient and so there is no gain for the board in hiring a manager that relies on technical analysis **(0.5 mark)** It is also possible that the Board's belief implies that the market is semi-strong efficient and that there is likely little or no gain from fundamental analysis. **(0.5 mark)** especially after costs of transactions are taken into account. **(0.5 mark)**
- The decision to employ active managers will depend on a better understanding of the Board's belief about the level of efficiency of the equity market **(0.5 mark)** and the nature of the analysis used by the active managers. **(0.5 mark)**
- If the Board were to believe in the strong form of the EMH then only passive managers should be used. **(1 mark)**
- If the Board is uncertain about which form of the EMH applies in practice, then a mixture of active and passive managers could be used. **(1 mark)**

Maximum 4 marks. The answer needs to show the relevance of the Board's view of the efficient market hypothesis to the selection of an investment manager, such as shown in the last two points above in order to get full marks.

- ii. **Explain how past performance of the investment managers should be taken into account by the Board when selecting a manager. (4 marks)**
- The board's belief in “fairly efficient” markets **(0.5 mark)** would be consistent with a view that any investor can match the market index returns over time (before fees) by holding the index i.e., using a passive approach to investment. **(0.5 mark)**
 - “Fairly efficient” but not “perfectly efficient” indicates that it is possible to use information to make decisions that add to returns. **(0.5 mark)**
 - Past performance may be a useful guide to whether an active manager can consistently add value (in the form of excess returns above the index) over various timeframes. **(0.5 mark)**



- An active manager that has not exceeded the index or benchmark in the past may not be able to do so in the future and therefore may be less likely to be considered for selection. **(0.5 mark)**
- An active manager should be able to demonstrate above index performance over their stated target timeframe over successive periods if they claim to be able to add value over the index in the future. **(0.5 mark)**
- The belief that it is important to **minimise unrewarded risks (0.5 mark)** can be applied by using past performance to test retrospectively the degree of risk taken by each manager relative to return achieved. **(0.5 mark)** Active managers that have demonstrated a high probability of underperforming the relevant benchmark could be excluded because they exhibit unrewarded risk. **(0.5 mark)** Active managers that have demonstrated a high volatility of their excess returns relative to the excess returns may be too risky and exhibit unrewarded risk.
- The board believes that adopting environmental social and governance (ESG) risk factors in the investment strategy is likely to add to returns over time. **(0.5 mark)** When considering a manager who says that they take ESG risk factors into account in their investing approach, analysis of their past performance may show where they have applied this approach and it has added value **(0.5 mark)** and whether it has added value as the Board would expect. **(0.5 mark)**
- It may not be possible to use past performance alone to determine if the manager followed their stated ESG approach. **(0.5 mark)** The portfolio composition will need to be examined, **(0.5 mark)** or an attribution analysis conducted on the past performance. **(0.5 mark)**
- If a manager focuses on investing in companies that meet the ESG criteria in the investment management process then it is likely that there will be variation in the portfolio weights from the market index weights (assuming the index was not constructed with ESG factors incorporated) and this will have performance implications **(0.5 mark)** The manager may not have tracked the index especially if there were some large companies in the index that may have been excluded from the portfolio (e.g. alcohol/tobacco/weapons) which either outperformed or underperformed the index. **(0.5 mark)** The performance relative to the index may reflect the ESG process and not be entirely reflective of the manager's skill in stock selection. **(0.5 mark)**

Maximum 4 marks. The answer needs to indicate how past performance can be taken into account in the process of selection of an investment manager in order to get full marks.

- iii. **Propose two questions for the board members to ask each active global equity manager that will assist in selecting a manager aligned to the board's investment beliefs. (2 marks)**
- Explain your beliefs about how equity markets behave and how your method of trying to outperform the benchmark is likely to succeed. **(1 mark)**
 - Show how your method of security analysis has added value to the portfolio over time. **(1 mark)**



- Explain your fee structure and what the net return will be if your portfolio achieves the benchmark return. **(1 mark)**
- Explain your application of (ESG) parameters and whether you will invest differently to the benchmark (i.e., actively) after taking into account environmental social, and governance (ESG) factors. **(1 mark)**
- What assessment of ESG factors do you carry out, how are they integrated into valuation and selection of securities and what weight does this have on your investment decisions. **(1 mark)**
- What were the contributors to and detractors from your past performance relative to the benchmark the last 5 years- what decisions added or detracted value? **(1 mark)**
- Do you believe the market has now priced in ESG factors, or is there room for value add by carrying out additional analysis? **(1 mark)**
- This portfolio supports our global insurance business, which has a very long-term average term of its liabilities. Please comment on how the potential returns and risks in a global equity's portfolio over the next ten years may affect the ability of the asset portfolio to meet the needs of our liability portfolio. **(1 mark)**

**1 mark per sensible question that is related to one of the three stated beliefs of the Board.
Maximum 2 marks**

END OF QUESTION 1: MARKING GUIDE



QUESTION 2: MARKING GUIDE

(22 marks)

The Trustee Board of a defined-contribution superannuation fund intends to carry out asset liability modelling to test investment strategies.

There are no guarantees of investment return on members' accounts.

If the fund fails an annual performance test (APT) in two consecutive years, then they cannot receive contributions from existing or new members. A fund fails the APT if the net return on members' accounts is more than 0.5% p.a. below a benchmark return set in advance by the Trustee Board.

All superannuation funds are required to offer a Retirement Income Plan (RIP) to their retiree members. The RIP must provide an income payment each year from a member's account that is at least 4% per annum of the member's account balance at the time of retirement. There is no guarantee that the member's account will not reach zero before death.

Members may choose:

- their retirement age from which the Retirement Income Plan starts, provided that it is at least 60 years;
- at any time after their Retirement Income Plan (RIP) has commenced, to transfer their entire RIP to another superannuation fund;
- at any time after age 80, to withdraw up to 50% of their account balance (for example, to fund expenditures such as aged care)

a)

- i. Describe three broad types of asset liability matching which may be applied to the fund. **(3 marks)**
- ii. Select one of the three broad types of asset liability matching which is most applicable to the fund **(1 mark)**
- iii. Explain how the fund's liabilities may affect the investment strategy of the fund **(4 marks)**
- iv. Propose an investment risk objective and an investment return objective for the fund with reference to the assets supporting the RIP. **(4 marks)**

b) In relation to the model used to test the investment strategies for this fund:

- i. Describe the advantages and disadvantages of using a deterministic model compared with a stochastic model. **(4 marks)**
- ii. List six key assumptions required to model the fund's future cash flows. **(3 marks)**

c) Assess the implications of the Annual Performance Tests on the investment strategy of the fund, having regard to the members' financial interests and the interests of the Board and management of the Fund. **(3 marks)**



Marks, Syllabus Learning Objectives and References in Modules

Question	Syllabus Learning Objective	Page Reference in Course Notes	Total Marks	K	A	H
A(i)	1.1,6.2,6.3	11.3, 11.10	3	3	0	0
A(ii)	1.1,6.2,6.3	11.3,11.10	1	0	1	0
A(iii)	6.1,6.2,6.4	11.3,11.4,11.5	4	0	4	0
A(iv)	1.2,1.3,3.4, 6.2,6.4,6.5, 6.6	11.5.1,11.5.2, 11.4.1	4	0	0	4
B(i)	1.1,1.2,6.7	2.2.1,2.2.2,2.5	4	4	0	0
B(ii)	6.7	2.2.2,2.2.3,11.7	3	3	0	0
C	1.2,1.3, 6.2,	11.3,11.4,11.5	3	0	0	3
Question 2			22	10	5	7

Sample answer and marking guide

a)

- i. Describe three types of asset liability matching that may be applied to the fund. (3 marks)

There are three broad types of asset liability matching:

- Exact, where assets are selected to deliver cash flows that replicate the liabilities cash flows exactly. (1 mark)
- Approximate, where assets are selected to deliver cashflows that approximately replicate the liability cash flows noting that asset values will not necessarily move in line with shifts in the value of the liabilities. (1 mark)
- No matching strategy, where the assets are intentionally not matched to the liabilities because it is not possible to do so given the uncertainties in either the liabilities or the assets or both. (1 mark)

1 mark for describing each broad type of asset liability matching.
Maximum 3 marks

- ii. Select one of the three broad types of asset liability matching which is most applicable to the fund. (1 mark)

The appropriate type to use is no matching strategy given the extent of the uncertainties in both the value of the liabilities and the value of the assets.



iii. Explain how the fund's liabilities may affect the investment strategy of the fund. (4 marks)

The role of the fund is to accumulate contributions made by a member over a working life to retirement age (0.5 mark) and then pay a retirement income over remaining life in line with the rules of the Retirement Income Plan. (0.5 mark)

The characteristics of the fund's liabilities that may affect the investment strategy of the fund are:

- they are very long **term** as:
 - members may join at a young age and have many years before retirement age in which their contributions are accumulating with investment returns. (0.5 mark)
 - retired members may receive a retirement income under the RIP from their account for many years until their death; and (0.5 mark)
 - if the fund continues to have new young members joining the average term of the investment may become longer. (0.5 mark)
 - **(Maximum 1 mark for points related to the potential term of the liabilities)**
- the Fund will:
 - continue to have cash flow in from contributions as long as it does not fail the APT in two consecutive years (0.5 mark)
 - have cash flow paid out under the RIP, (0.5 mark)
 - have net **cash flow** that could be positive or negative depending on the balance of contributors and retirees (0.5 mark)
- The cash outflows are **uncertain (0.5 mark)** as members may:
 - choose to move to another fund anytime or (0.5 mark)
 - withdraw up to 50% of their account balance if they are aged 80 or over (0.5 mark)
 - start their RIP at any time after they are 60 years old, (0.5 mark)
 - have their income payments cease on death, the timing of which is also uncertain (0.5 mark)
- Inflows are also **uncertain** because:
 - a member may stop contributing anytime due to unemployment or retirement (0.5 mark)
 - the Fund may be prohibited from receiving contributions if it fails the APT two years in a row (0.5 mark)
- The long-term nature of the liabilities is likely to lead to a significant asset allocation to equities (0.5 mark) which have historically had higher returns than cash or fixed interest
- The uncertainties in the future cash flows should lead to a minimum level of liquid assets such as cash, government bonds and listed equities (0.5 mark), and a maximum limit on less liquid assets such as private equity, private debt, unlisted property and unlisted infrastructure. (0.5 mark)



- The application of the APT on an annual basis may lead to the asset allocation being close to that implied in the benchmark **(0.5 mark)** in order to reduce the risk of failing the APT **(0.5 mark)**. It may also lead to the use of a passive investment style for assets such as equities rather than active investment style **(0.5 mark)** in order to reduce the risk of failing the APT. **(0.5 mark)**
- There are no guarantees of investment return on members' account **(0.5 mark)** so the value of the liabilities will not exceed the value of the assets **(0.5 mark)**, so that there is no tight constraint on the asset allocation of the fund. **(0.5 mark)**
- Although there are no guarantees of investment returns, it is likely that members will have a reasonable expectation that the investment returns on of their account during the accumulation phase before retirement and in the RIP phase after retirement, will at least match inflation, **(0.5 mark)** which will lead to a need to invest in assets which have demonstrated returns above inflation in the longer term, such as equities, property. **(0.5 mark)**

Maximum 4 marks. To obtaining full marks the candidates must relate the implications of the APT and the RIP to the investment strategy.

iv. Propose an investment risk objective and an investment return objective for the fund with reference to the assets supporting the RIP. (4 marks)

The required income payment rate is not less than 4% p.a. of the initial account value at retirement. **(0.5 mark)** It is feasible that up to 2% p.a. could be covered by investment income and the rest would be covered by payment out of the account value which will diminish over time (at a rate of say 2% p.a.) **(0.5 mark)** It could be argued that there is a need to preserve the purchasing power of the account balance. **(0.5 mark)** This could imply a need for a total return on the account value expressed in terms of the CPI plus a margin of $x\%$ p. a, over rolling T-year periods, **(0.5 mark)** of which 2% p.a. would be investment income and CPI plus ($x\%$ minus 2%p.a.) would be capital growth. **(0.5 mark)**

Return objective in the form of a total return of CPI plus $x\%$ per annum over a rolling T-year time frame may be a reasonable objective. **(1 mark)**

(1 mark for background reasoning and 1 mark for any plausible return objective)

The main risk is that the retiree's account value reaches zero before they die. There is no protection against longevity risk in the design of the RIP. **(0.5 mark)**. A major cause of the account value reaching zero before death of the member would be an inadequate long-term rate of return **(0.5 mark)**. There needs to be a risk objective stated in terms of the probability that the long-term rate of return achieved being less than the long-term rate of return objective, is no more than a stated percentage (such as 20%). **(0.5 mark)**

(This will demonstrate the candidate's understanding of how to define and measure risk in terms of the investment return objective rather than using the volatility of returns as a measure of risk)

Risk objective in the form of the probability of the T-year rolling rate of return being less than CPI plus $x\%$ p.a. is less than $P\%$. **(1 mark)**



(1 mark for background reasoning and 1 mark for any plausible risk objective)

Maximum 4 marks

b) In relation to the model used to test the investment strategies for this fund:

i. Describe the advantages and disadvantages of using a deterministic model compared with a stochastic model. (4 marks)

Deterministic models tend to be simpler to build and use. **(Advantage 1 mark)** with variations from a single set of assumptions being tested via rerunning the model with new parameters. **(Advantage 1 mark)**. They may also be easier to explain to stakeholders such as the Board of the Fund. **(Advantage 1 mark)** In practice it is often difficult to determine the single set of assumptions **(Disadvantage 1 mark)** The likelihood of the single set of assumptions may be overestimated **(Disadvantage 1 mark)** and lead to over confidence in the outputs from the model. **(Disadvantage 1 mark)**

Because the future is uncertain, there are two approaches used to test sensitivities for deterministic models:

- Apply a fixed percentage stress test to test the sensitivity of results to each assumption. **(0.5 mark)**
- Apply a stress test to material assumptions in line with the uncertainty in those assumptions. **(0.5 mark)**

In practice it is difficult to judge how much to vary the assumptions in the sensitivity or stress tests **(Disadvantage 1.0 mark)** and a lot of experience is required to use deterministic models effectively. **(Disadvantage 1.0 mark)**

A stochastic model may:

- Allow a more detailed understanding of the uncertainty relating to key assumptions in the model. **(1.0 mark)**
- Help the Board understand a wider range of possible outcomes than is seen in a deterministic model to which sensitivity or stress tests have been applied **(Advantage 1.0 mark)**
- Be more difficult to explain to stakeholders such as the Board of the Fund. **(Disadvantage 1.0 mark)**

In addition, specifying future distributions of assumptions in the model, based on available (usually historical) data, can be difficult. **(Disadvantage 1.0 mark)** The validity of the assumed distributions selected may be overestimated **(Disadvantage 1.0 mark)** and lead to over confidence in the outputs from the model. **(Disadvantage 1.0 mark)**

In practice may be difficult to judge how to specify the distributions needed as assumptions in the model **(Disadvantage 1.0 mark)** and a lot of experience is required to use stochastic models effectively. **(Disadvantage 0.5 mark)**



4 marks maximum. Expect to see at least 1 advantage and 1 disadvantage for each of the deterministic and stochastic models in order to get full marks.

ii. List six key assumptions required to model the fund's future cash flows. (3 marks)

Liability cash flows

- member age at entry
- member age at retirement
- member age at death/ mortality rates
- member exit rates/withdrawal rates
- inflation rate
- contribution rate as a proportion of salaries
- salaries of contributors
- retirement income payment value
- number of members at each age
- member balances now (by age)
- number of new members per year

Asset cash flows

- income rate on various assets:
 - interest coupons on fixed interest
 - dividends on equities
 - rent on property assets
- realised capital gains on assets
- tax rates on income and realised capital gains
- asset management expenses

0.5 mark for each assumption

Maximum 3 marks

c) Assess the implications of the Annual Performance Tests on the investment strategy having regard to the members' financial interests and the interests of the Board and the management of the fund. (3 marks)

Points that can be made comprise:

Members' financial interests are best served by maximising their returns, minimising the risk of losing their capital and providing an income that increases at least in line with inflation. **(1 mark)** This may lead to an investment strategy which has an asset allocation to both equities and fixed interest **(0.5 mark)** and the use of an active investment management style rather than a passive investment management style.

The interests of the Board and Management of the Trustee of the Fund may be best served by ensuring that the Fund does not lose its ability to grow through the addition of new members and contributions. **(1 mark)** This may lead to an investment strategy that keeps the asset allocation close to that implied in the benchmark **(0.5 mark)** and the use of a



passive rather than an active investment style within each asset class **(0.5 mark)** which may lead to lower long term returns to members. **(0.5 mark)**

The Annual Performance Test may lead to the Board and Management of the Trustee of the Fund reducing or eliminating the allocation to some asset classes (such as unlisted property or equity) which may have higher returns relative to the benchmark indices and higher volatility of returns. **(1 mark)** or have lower allocations to actively managed assets, which may outperform the benchmarks **(1 mark)**. Such decisions may be more in the interests of the management and Board than the members. **(1 mark)**

Maximum 3 marks

END OF QUESTION 2: MARKING GUIDE



QUESTION 3: MARKING GUIDE

(19 marks)

A Foundation has been set up to provide money for public health programs that help contain the spread of new diseases which could overwhelm the healthcare systems of wealthy countries as well as disrupt their economies. This aspect was instrumental in raising \$10 billion for the Foundation from donations by wealthy individuals and major corporations in wealthy countries. Fund raising from donors is expected to continue each year and be at least \$1 billion per annum.

It is expected that each year there will be up to 20 new programs starting. The funding for each would cost up to \$50 million per annum. Costs are expected to increase in line with health care inflation, which is expected to be of the order of CPI plus 5% per annum.

Money not spent yet on programs is invested in a fund. The aim is to use the income and realised gains of the fund together with a proportion of the ongoing donations to fund the programs while maintaining purchasing power of the Fund in line with health care inflation.

The Fund:

- may invest in equities listed on any major global exchange, fixed interest issued by sovereign governments and corporates which have investment grade credit ratings, and cash
- may not borrow
- pays no tax on income or capital gains

a)

- i.** Explain the liabilities that are being funded. **(5 marks)**
- ii.** Identify 5 components of an investment policy for the Fund which the Board should adopt. **(5 marks)**

b) Propose, with your reasoning, two investment objectives, one for risk and one for return, for the Fund's investment portfolio. **(4 marks)**

c) State 5 matters that should be included in the explicit written mandate between the Fund and the investment manager of a listed equities portfolio that is being managed as part of the Fund. **(5 marks)**



Marks, Syllabus Learning Objectives and References in Modules

Question	Syllabus Learning Objective	Page Reference in Course Notes	Total Marks	K	A	H
A(i)	6.2,6.6	11.2, 11.3,	5	0	5	0
A(ii)	1.3,6.2,6.4,6.5	2.4,11.4,11.5	5	5	0	0
B	6.1,6.4	11.4,11.5,11.7	4	0	0	4
C	1.3, 6.2, 6.5, 6.6	11.3,11.5,11.6,11.7	5	5	0	0
Question 3			19	10	5	4

Sample answer and marking guide

a)

- i. Explain the liabilities that are being funded. (5 marks)

The Foundation's liabilities are the annual expenses (0.5 mark) of the Programs which are expected to run for many years once they are approved (0.5 mark). Liabilities are likely to continue to grow rather than reduce (0.5 mark) in line with the number of programs (0.5 mark) and the rate of health care inflation (0.5 mark) which is usually higher than general inflation (0.5 mark). The number of Programs is expected to grow each year, with up to 20 new programs starting each year (0.5 mark) and may grow faster than the number of donors (0.5 mark) so that the funding of the programs becomes more dependent on the investment returns of the fund. (0.5 mark) The confidence of the donors needs to be maintained through a sound implementation of an investment process, (0.5 mark) which for example should avoid major losses of capital, (0.5 mark) achieve a return in excess of inflation and avoid controversial investments. (0.5 mark)

Maximum 5 marks

- ii. Identify 5 components of an investment policy for the Fund which the Board should adopt. (5 marks)

An investment policy should incorporate

- The Board's investment philosophy (or beliefs about investment markets and investment management)
- Measurable objectives for investment return and risk with a specified time horizon
- Delegations of authority and responsibility
- The investment process for;
 - Setting and reviewing strategic asset allocation
 - Managing tactical asset allocation (if applicable)
 - Asset selection within each asset class
 - Portfolio risk management limits such as the prohibition on borrowing or minimum limits on the proportion of assets which are listed or liquid



- The selection of external investment managers
- The selection of managed funds (if used)
- Any investment constraints or conditions or portfolio risk limits such as allowing for ESG risk factors and how they are considered and integrated into the investment process
- Investment performance analysis and reporting against investment objectives and related benchmarks
- Review and reporting frequency to meet the transparency needs of the Foundation to maintain the confidence of donors
- Reporting to authorities in various jurisdictions where donations occur

1 mark per point made from the list above

Maximum 5 marks

b) Propose, with your reasoning, two investment objectives, one for risk and one for return, for the Fund's investment portfolio.

The Fund's overall objectives are to provide funding for major public health programs in many countries extending over many years. **(0.5 mark)**

It is expected that program funding will be accommodated from the investment income of the Fund together with a part of the ongoing donation flow each year **(0.5 mark)** Therefore, depending on the flow of donations, the balance of the fund can be invested on a very long-term basis **(0.5 mark)**, and it will need to try to earn returns in excess the rate of inflation for health care.**(0.5 mark)**. This could lead to a higher allocation to equities than cash or fixed interest (0.5 mark) given the historically higher return on equities **(0.5 mark)** The fund needs to avoid the reputational risk of not being able to fund the programs as agreed to **(0.5 mark)** as this would impair its ability to continue to raise donations. **(0.5 mark)**

Considering the investment portfolio alone, then the investment objectives need to be consistent with these higher order objectives. **(0.5 mark)**

A certain amount of income is required every year (to meet the budgeted needs of the programs),**(0.5 mark)** and the capital value will need to be protected over longer term in absolute terms **(0.5 mark)** or relative to health care inflation **(0.5 mark)** and over shorter terms (absolute value) to retain confidence of donors, **(0.5 mark)** although some shorter-term fluctuations in the value of the Fund's portfolio can be tolerated as long as the cash flow needs of the programs are being met. **(0.5 mark)**

The following set of objectives could meet these needs:

- A real return of 5%p.a. (Inflation plus 5% p.a.) over rolling five-year periods. **(1 mark for sensible return objective)**



- The probability of the five-year rolling return being less than inflation plus 5% p.a. should be no more than 20% when assessed over any 20-year period and also avoiding assets which are the subject of controversy which would lead to a loss of confidence by donors.
(1 mark for sensible risk objective)

Maximum 4 marks Candidates need to show their reasoning for the investment objectives that they propose to obtain full marks. It is not sufficient to simply state the proposed objectives.

c) State 5 matters that should be included in the written mandate between the Fund and the investment manager of a listed equities portfolio that is being managed as part of the Fund.
(5 marks)

- The investment objective of the mandate and how it relates to the overall investment objectives of the Fund. **(1 mark)**
- Fees including base fees and performance fees and whether they have been reduced due to the charitable purpose of the JSF Investment Fund. **(1 mark)**
- The benchmark against which performance will be measured. **(1 mark)**
- Constraints on the selection of equity securities such as:
 - Investment in non-liquid assets must be limited having regard to the cashflow needs of the Foundation. **(1 mark)**
 - ESG risk factor-based exclusions, especially given the nature of the operations of the Foundation's programs that are being funded. **(1 mark)**
 - maximum weighting to any single
 - stock; **(1 mark)**
 - sector; **(1 mark)**
 - country; or **(1 mark)**
 - currency. **(1 mark)**
- Currency hedging requirements, given the potential sensitivity of donors to the Foundation to the risk of currency losses. **(1 mark)**
- Minimum and maximum (if any) of the number of stocks to be held in the portfolio **(1 mark)**
- Upper limit (if any) on the portfolio turnover. **(1 mark)**

1 mark for each item up to 5 items, maximum of 5 marks

END OF QUESTION 3: MARKING GUIDE



QUESTION 4: MARKING GUIDE

(21 marks)

A defined benefit pension fund provides retirement benefits for teachers. The retirement pensions are adjusted annually by the greater of the rate of inflation in the Teachers' Benchmark Salary (TBS) or zero. The Fund has a substantial surplus of assets over liabilities.

The Fund has the following investment objective:

- 1) achieving a return equal to the rate of inflation in the TBS plus 2% per annum after allowing for investment management cost over rolling 10-year periods.
- 2) the net return on the fund has an 80% probability of exceeding the rate of inflation in the TBS over rolling 10-year periods.

One asset in the Fund's investment portfolio is a 40% holding in an unlisted infrastructure company, Global Toll Roads (GTR).

The assets of GTR are long term operating leases from the local, state, or central governments, in a number of countries, which allow GTR to operate the toll roads for terms between 50 and 100 years.

The terms of the leases allow GTR to collect tolls, which may be increased in line with inflation, subject to certain rights of review by the lessors (the governments).

GTR has:

- its domicile in the same country as the Fund;
- been profitable since it was established;
- a policy of paying 66% of its net profit as dividends;
- a dividend yield that has averaged around 4% p.a. of the fair value of the shares for over 10 years
- dividends growth of 5% p.a. over 10 years versus inflation that has averaged less than 3 % p.a.
- operating leverage that assists growth of the profits and dividends relative to the rate of inflation
- a modest level of financial leverage with debt to gross assets being 30%.
- retains the balance of its profits to finance maintenance of the toll roads and growth of the business.

a) Analyse the 40% share of GTR as an asset of the Fund using the SYSTEM T tool. (7 marks)

b) Explain two characteristics of unlisted assets which lead to risks that need to be managed or mitigated. (2 marks)

c) Explain why this asset is suitable for the Fund having regard to the Fund's liabilities, its investment objective, and its current surplus position. (4 marks)

d) Describe the uncertainties that need to be addressed in the valuation of this asset. (4 marks)



- e) Propose, with reasons and examples, two other types of assets that may be suitable for the Fund having regard to the Fund's liabilities its investment objective and its current surplus position. **(4 marks)**

Marks, Syllabus Learning Objectives and References in Modules

Question	Syllabus Learning Objective	Section Reference in Module	Total Marks	K	A	H
A	3.1,3.2,3.3	7.2,7.3.1,7.4.2	7	0	7	0
B	3.1,3.2	6.2.5,7.3.1	2	0	2	0
C	3.1,3.2, 3.4,6.6	6.2.5,11.3	4	0	4	0
D	3.2,6.7	6.4,7.4	4	4	0	0
E	3.1, 3.2,6.3	5.5.5,5.5.2, 6.3, 7.2,7.3.1,11.3	4	0	0	4
Total Q4			21	4	13	4

Sample answer and marking guide

- a) Analyse the 40% share of GTR as an asset of the Fund using the SYSTEM T tool **(7 marks)**

S: Security: Regular dividends are expected to continue **(0.5 mark)** because GTR has long-term contracts **(0.5 mark)** which have been profitable. **(0.5 mark)** Capital is relatively secure as the long-term contracts are for the operation of essential infrastructure used by most people on a habitual basis. **(0.5 mark)** However the market valuation could decrease over time if conditions change (such as a switch to rail transport). **(0.5 mark)** Overall security depends on company's ability to continue to operate profitably. **(0.5 mark)**

Y: Yield: There is a history of profit and dividends growth above the rate of inflation suggesting a positive yield to date, **(0.5 mark)** which is expected to continue unless operating conditions change significantly. **(0.5 mark)** It is expected that revenue will be grow in line with inflation **(0.5 mark)** while profit and dividends will grow faster due to operating and financial leverage effects in the business. **(0.5 mark)**

S: Spread: The bid/offer spread for the shares in GTR could be quite wide, **(0.5 mark)** as it is an unlisted private equity **(0.5 mark)** and there are a limited number of interested buyers or sellers at any time. **(0.5 mark)** Price would have to be negotiated and this could widen the spread. **(0.5 mark)**

T: Term: There is no fixed maturity date **(0.5 mark)** as it is an equity investment **(0.5 mark)** but note that the contracts to operate the toll roads are not perpetual, **(0.5 mark)** even though they are long term (50 to 100 years) **(0.5 mark)**, and the product (offering convenience to transporters and travelers) should have a market for a very long time. **(0.5 mark)** If the operating leases are renewed the business could continue indefinitely. **(0.5 mark)** However,



the assets will have to be replaced eventually. The remaining working lifetime of the assets will limit the investment term (until the business implements a plan to replace or renew the leases). **(0.5 mark)**

E: Expenses: As a private equity investment, the direct expenses will be relatively low (participating in board meetings etc.) **(0.5 mark)** but the transactional expenses will be relatively high should the Fund wish to sell the 40% holding in GTR. **(0.5 mark)**

M: Marketability: Private equity can be difficult to sell quickly as it is not a liquid asset. **(0.5 mark)**

However, with several other shareholders there may be a party willing to transact. However, the price may not meet the Fund's expectations.

T: Tax: The dividends will be taxed as income of the Fund; any capital gains on sales of the shares in GTR may also be taxable depending on tax laws.

Award 1 mark maximum for each SYSTEM T item, with 0.5 for each point raised per item. Expecting 2 points per item leading to 1 mark per item, maximum of 7 marks for this question part.

b) Explain two characteristics of unlisted assets which lead to risks that need to be managed or mitigated. **(2 marks)**

The following characteristics of unlisted assets lead to risks that need to be managed or mitigated:

- **More uncertain valuation and dated pricing:** Assets that are not listed on an investment exchange will not have continual price discovery that arises from frequent trading of public market assets such as equities and some fixed interest securities. The lack of continual pricing leads to risk of inappropriate valuation of unlisted assets based on much less frequent transactions which can be very dated;
- **Hard to sell when needed:** The lack of liquidity may lead to difficulty of selling an unlisted asset at a time when cash flow is required to meet liabilities;
- **More difficult to value using a DCF approach:** Unlisted assets tend to be much less homogeneous than listed assets and have very idiosyncratic characteristics and so it may be difficult to formulate the assumptions needed in a discounted cash flow analysis;
- **Lack of widespread comparable research and analysis:** the lack of continual trading in unlisted assets may mean that there is a lack of incentive for many of the analysts with the knowledge and skills to evaluate such assets (such as those employed by investment banks and brokers) to publish research and analysis relating to the assets.

1 mark for each point made in the detail shown above. 2 marks maximum.



c) Explain why this asset is suitable for the Fund having regard to the Fund's liabilities its investment objective and its current surplus position. **(4 marks)**

- The asset provides regular income from dividends **(0.5 mark)** which matches regular payments to pensioners. **(0.5 mark)**
- Expected growth in dividends is expected to at least match salary inflation that applies to applies to indexation of pensions **(0.5 mark)** and the need for positive real returns on the portfolio. **(0.5 mark)**
- The company in which the investment is held is operating in local currency and dividends are paid in local currency **(0.5 mark)** which matches pension payments made in local currency. **(0.5 mark)**
- The business of GTR is very long term **(0.5 mark)** which matches the long-term nature of the Fund's liabilities. **(0.5 mark)**

Maximum 4 marks

d) Describe the uncertainties that need to be addressed in the valuation of this asset. **(4 marks)**

- The valuation may rely on assumptions that prove to be incorrect **(0.5 mark)** (e.g., toll prices may not increase as expected if the governments impose restrictions on increases for political reasons (sovereign risk)) **(0.5 mark)** so the valuation will be incorrect **(0.5 mark)** **(1 mark in total for the point about assumptions not working out as expected)**
- If the business cannot maintain or renew the toll road assets in a manner which maintains the useability of the roads, then it will lose customer and revenue and may close **(0.5 mark)** – if this becomes more likely for any reason then the valuation will become overstated. **(0.5 mark)**
- The market may change its views about the sustainability of toll roads designed for fossil fueled vehicles **(0.5 mark)** which will reduce the market valuation **(0.5 mark)** It may also lead to there being no buyers, implying zero value. **(0.5 mark)**
- The disruption to traffic during the COVID pandemic may have the effect of accelerating adverse changes in toll road usage. **(1 mark)**
- Carbon pricing or another external factors may require significant change to the business that is not factored into the valuation **(1 mark)**
- There are currency risks in the revenue that may not be hedged by GTR. **(1 mark)**

Looking for points that show why the valuation may be uncertain maximum 4 marks. Expecting specific links to the nature of the business to get full marks.

e) Propose, with reasons, two other types of assets that may be suitable for the Fund having regard to the Fund's liabilities its investment objective and its current surplus position. **(4 marks)**

The Fund has a long investment timeframe due to its pension liabilities and requires regular income, and a real return, in local currency. **(1 mark)**



Suitable assets to match this include:

- Inflation linked domestic government bonds (long dated) **(0.5 mark)** –the Fund can hold to maturity, so it receives an inflation linked return **(0.5 mark)** and has the security of real value of capital **(0.5 mark)** (actual return depends on purchase price but it should be noted when putting forward such an asset that real bond yields are currently negative. **(0.5 mark)** Currency would be matched. **(0.5 mark) (2 marks maximum for this asset)**
- Commercial real estate with very long leases to high quality tenants (i.e., those which are unlikely to default on the rent or go out of business, such as a government department) **(0.5 mark)** with inflation linked rental reviews each year **(0.5 mark)** and little or no maintenance outgoings paid by the owner. **(0.5 mark)**
- Examples of suitable types of real estate fitting this description:
 - Distribution centres
 - Warehouses
 - Childcare centres run by national chains of operators
 - Roadside retail (service stations) run by national organisations
 - **(0.5 mark for an example and 2 marks maximum for a real estate asset)**

1 mark for a statement of what the Fund might need based on its liability characteristics.
Maximum 4 marks

END OF QUESTION 4 MARKING GUIDE

END OF MARKING GUIDE