Course Coverage

Question	Units	Syllabus Performance Outcome	Total Marks
1 (a)	1, 2, 5	1-1, 2-4, 5-10, 5-11	6
1 (b) (i)	1, 2	1-1, 2-4	3
1 (b) (ii)	1, 2, 3, 6	1-1, 2-4, 3-6, 6-12	4
1 (b) (iii)	2, 3, 5	2-4, 3-6, 5-10, 5-11	2
1 (c)	1, 2, 3, 5	1-1, 2-4, 3-6. 5-10, 5-11	3
1 (d)	2, 6	2-4, 6-10	5
TOTAL			**23**

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QUESTION 1: SOLUTIONS

Question 1(a):

Refer to the model spreadsheet solution for a completed version of the balance sheet and capital figures. Working as follows:

COMPONENTS OF POLICY LIABILITY (Figures at End of Year)

- PV(Gross or Net Future Profit) = PV(gross or net claims) * Gross or Net MoS Margin

Marking Guide

0.5 marks for correct calculation of gross 'PV(Net Future Profit)' and/or net 'PV(Gross Future Profit).

An error in the above item that results in the policy liability not matching the solution should not result in further marks being deducted, where this policy liability flows into other calculations.

FORECAST PROFIT AND LOSS

- Claims paid = total premiums received * -1 * claims assumption (30%)
- Reinsurance Recoveries = -1 * Claims Paid * reinsurance ceded (50%)
- Expenses paid = in force premiums received * -1 * renewal expense assumption (15%) + new business premiums received * -1 * initial expense assumption (80%)
- Commission paid = total premiums received * -1 * commission rate (15%)
- Less Increase in Net Policy Liability = (EOY Net Policy Liability for current year – EOY Net Policy Liability for previous year) * -1

Marking Guide

Starting with 1.5 marks total, deduct marks as follows:

- **0.5 marks each for incorrect calculation of '*Claims Paid*', 'Reinsurance Recoveries', '*Expenses Paid*' or '*Commissions Paid*'**
- **0.5 marks for incorrect calculation of '*Less Increase in Net Policy Liability*'**

Minimum of 0 marks applies.

BALANCE SHEET + CAPITAL (Figures at End of Year)

- Ceded Liabilities = EOY Gross Policy Liability – EOY Net Policy Liability
- Policy Liability = EOY Gross Policy Liability
- Retained Earnings = Previous Year Retained Earnings + Previous Year Dividends Paid + Current Year Profit After Tax

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- The capital requirement is specified in the outline for the question as:

  PCA + Special Adjustment
  = Stressed Net BEL + 0
  = Net Policy Liability – 95% * (PV(net claims) + PV(net expenses))

  subject to a minimum of $10m (as stated in the question).

  If calculated correctly, this should result in a PCR which is less than $10m for all current and projected years and hence, the $10m minimum capital requirement applies. Thus the following formula results:

  Capital Requirement = MAX(10,000, Net Policy Liability – 95% * (PV(net claims) + PV(net expenses)))

  Whilst in part (a) the $10m requirement drives the results, it is important that students have the above formula for the various components of part (b).

- Target Capital = 1.2 * Capital Requirement, as outlined in the question.

- Capital Base = Net Assets – Adjustments to Net Assets, as per LPS112.
  In the absence of deferred tax and other adjustments, this becomes:

  Capital Base = Net Assets – (Adjusted Net Policy Liability – Net Policy Liability)

  Adjusted net policy liability = 0, since RFBEL < CTV = 0 as provided in the assumptions in the spreadsheet.

  So, Capital Base = Net Assets – Net Policy Liability = Cash + Investments

- Capital in Excess of Target = Capital Base – Target Capital

  Marking Guide

  - **0.5 marks for correct calculation of '*Ceded Liabilities*' & '*Policy Liability*'.**
  - **0.5 marks for correct calculation of '*Retained Earnings*'.**
  - **0.5 marks for calculating PCA as per question outline**
  - **0.5 marks for recognising that a $10m minimum applies and hence correctly calculating '*Capital Requirement*'**
  - **0.5 marks for correct calculation of '*Target Capital*' as per question outline**
  - **0.5 marks for correct calculation of *'Capital Base'***
  - **0.5 marks for explanation of capital base calculation**
  - **0.5 marks for correct calculation of *'Capital in Excess of Target'***

  Deduct
  - **0.5 marks for students that present a solution where '*Total Capital*' <> '*Total Assets*' – '*Total Liabilities*' AND do not make a comment showing that they've recognised this is not allowable.**

Up to a maximum of 4 marks.

An error in earlier parts that flows to another line in the balance sheet should not result in further marks being lost, unless this results in a noticeable issue (e.g. negative capital requirement, capital base far in excess of requirements, etc.) and students do not comment on it.

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Question 1(b) (i):

Refer to the model spreadsheet solution for a completed version of the stress test.

For this part of the question, students should have applied the stresses as outlined by the question. This includes:

- Increasing the 'Claims' assumption from 30% to 36% of premium.
- Increasing the 'Lapse Rate – Thereafter' assumption from 20% to 25%.
- Decreasing the 'Cash + Investment Return' assumption from 8% to 4% p.a.
- Reducing the 'Sales p.a.' assumptions from $50,000k, $60,000k and $72,000k to $25,000k, $30,000k and $36,000k respectively.
- Reducing the 'Investments' balance sheet item at the valuation date from $13,000k to $10,400k.
- Reducing the 'Gross In Force Premium' item in the components of policy liability from $50,000k to $40,000k
- Adjusted the Present values of various cashflows.

It is assumed that the student has transferred their results from Q1(a) over. If they have completed both sections correctly, they should observe a breach of capital requirement by the end of year 3.

Marking Guide

The solution spreadsheet has highlighted the changes required from Question 1 (a) to Question 1 (b)(i) in red.

- **1 mark for applying the effect of the revised assumptions into the Gross Inforce premium (cell B82) and the present values of the cashflows (cells B84-B87). Deduct 0.25 for each error.**
- **2 marks for correctly adjusting the assumptions and balance sheet. Deduct 0.5 mark for each error.**
- **Hopefully students will update the assumptions directly in the current cells rather than introduce an additional table for the stresses and then adjust formulae to reference both the original assumption and the stress. This approach is OK but requires more than the "red cells"to be changed. Markers will need to ensure that all formulae are corrected (e.g. parts of the cashflow and balance sheet). Each Items not updated correctly under this approach should have 0.25 marks deducted.**
- **No marks should be awarded if the student has failed to copy their results from Question 1(a) over to the Question 1(b) template as instructed.**

Up to a maximum of 3 marks.

Any errors made in Question 1(a) should not result in further marks being deducted from Question 1(b).

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Question 1(b) (ii):

Ideally, students will have picked up the hint in the question and in the outline that a change of best estimate assumptions would arise during the scenario. That is, the Appointed Actuary ('AA') would act on unfavourable experience and expectations of a prolonged impact by increasing best estimate claim and lapse rate assumptions.

The model solution assumes that the change is made at the end of year 2, (the question states that the AA would act after at least 2 years of consistently unfavourable experience). It calculates the impact by:

- Assuming the lapse rate is increased by 25% (the amount of the stress). This impacts the PV(Premium) i.e. a reduction of 16.3% is provided in the spreadsheet.
- Since all other cashflows are premium-based, the other gross PV elements reduce by a similar amount.
- The claims assumption is also increased to the level of the stress (i.e. by 20%), which is applied after accounting for the fall in PV driven by lapse changes.
- The cumulative increase in claim and lapse assumption changes is offset by reductions in PV future profit to leave policy liabilities unchanged.
- Net policy liability is then calculated using the reinsurance terms provided in the assumptions section.
- The gross and net margin for year 3 is then altered in line with the assumption changes, using claims as the profit carrier.

This has the impact of increasing Target Capital (due to increases in PV expenses and PV claims) putting further strain on the results of the scenario.

The timing and magnitude of the changes are subject to judgement. So long as the student proposes that an assumption change is made in either year 2 or year 3, and that the change is reasonable (i.e. either the full impact of the stress, or a point half way between the old and stressed experience) then marks should be awarded. Unless well justified, deduct marks if students assume an instantaneous or year 1 assumption change.

Bonus marks should be given to students that comment on the likely differences in New Business and In Force MoS margins following the changes, but that there is not enough information provided in the question to calculate these differences.

Students should also be granted bonus marks if they point out that reductions in sales should lead to increases in the initial expense assumption – as a portion of those expenses would be fixed costs. While there is not enough information to determine the impact of this, any reasonable estimates should be rewarded.

Marking Guide

- **0.5 marks each for suggesting and justifying the need for a change to lapse and claim assumptions.**
- **1 mark for correctly calculating the impact of a change in lapse assumptions.**
- **1 mark for correctly calculating the impact of a change in claim assumptions.**
- **1 mark for correctly calculating the impact on profit margins, including for subsequent projected years.**
- **1 mark for reasonable estimates of the impact of increasing initial expense assumptions.**
- **0.5 marks for identifying likely discrepancies between In Force and New Business margins following the change in lapse or expense assumptions.**

Up to a maximum of 4 marks.

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Question 1(b) (iii):

If students have completed Question 1(a) → 1(b)(ii) correctly (and possibly even if they haven't), they should notice that a breach of Target Capital occurs in year 2 and a breach of Regulatory Capital Requirements occurs in year 3 following the stress and changes to assumptions.

If students have taken the hint about dividends provided in the question outline, they should then recognise that management would limit or eliminate dividends in response to the stress and to avoid breaching capital requirements. Again, judgement is applicable – as some students may estimate that management may not reduce dividends in year 1 unless prompted to by the severity of the economic downturn.

Students could also suggest other reasonable actions that management would need to consider, for instance:

- Whether they would initiate a repricing of the portfolio to offset the impacts, and when they would do / be able to implement this,
- Whether they would limit new business sales to improve capital strength,
- How these considerations feed into their goal of growing their business, and whether the resulting profit margins are still favourable enough for them to consider continuing,
- Consideration of capital raising during the scenario, this could include Tier 2 capital, particularly as the existing shareholders are not in a position to inject additional capital.
- How the changes in market conditions may impact on their capital management going forward.

Marking Guide

- **0.5 marks for identifying the need for management action given capital breach.**
- **1 mark for recognising, justifying and applying a reduction in dividend payout.**
- **0.5 - 1 marks for each additional, reasonable management action or consideration provided.**

Up to a maximum of 2 marks.

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Question 1(c):

There are a number of reasonable scenarios that could lead to BOI breaching the Regulatory Capital Requirement over the three year period. To get full marks, a student's suggested scenario must be:

1) Plausible.
   A student should support their scenario with a brief narrative to explain why the combination of stresses occurs (e.g. "New competitor enters market, resulting in increased lapses", or "Lack of expertise leads to discovery that claims will be higher than priced", etc.).

2) Demonstrated to breach the Regulatory Capital Requirement.
   The student should provide ranges for the impacts on key assumptions required to replicate the scenario (e.g. a '25% increase in sales' would be acceptable, whereas 'a large increase in sales' is not).

3) Unavoidable.
   The student should have considered what reasonable actions management would take in response to the stresses (e.g. suspending sales, reducing dividends, etc.) and made a comment on why insolvency would not be avoidable.

A sentence on each point would be sufficient for full marks.

Ideally, the student will have recognised from Question 1(b) that the biggest strains on BOI come from new business and increasing claim and/or expenses. Small tweaks to the regulator's prescribed scenario would be sufficient to force insolvency.

For example, if the regulator's prescribed stress test had decreased sales by 25% rather than 50%, then solvency would have been breached by the end of Year 2 following the changes to best estimate assumptions. Management may have been able to recognise this and halt sales to avoid it in the scenario, but this would only be true if management had recognised earlier than assumptions would need to be changed which – based on the question outline – is unlikely to have happened until after the sales were made.

Some other suggested stresses and/or scenarios are provided below as examples.

- Example narratives that stress multiple assumptions:
  - Economic downturn
  - Introduction of new competitors
  - Fraud / issues related to the sales through the supermarket chain
- Example stresses (either long-term increases or unexpected one-off impacts)
  - Increases in sales / decreased first year lapse rate
  - Increased lapses on in force business
  - Increased claims
  - Increased initial / renewal expenses, including increases driven by spread of costs over a smaller portfolio of business
  - Assumption changes that increase BEL (particularly claims and expenses) that result in increased capital requirements

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  - Loss of reinsurance support for new or existing business (e.g. reinsurer default)
  - Decreased or negative investment return
- Management actions that could be considered:
  - Reduction or cancellation of sales. This would take time to implement, as would need consideration and approval from multiple stakeholders (management, potentially shareholders, the national supermarket partner, reinsurers, etc.). Would also need to allow time for issues to be discovered.
  - Reduction in dividend payout.
  - Capital raising through sub-ordinated debt or otherwise. This would take time, and consideration has to be given to how this could be done given the scenario (e.g. in economic downturn it would be unlikely to be an available option).
  - Increased pricing of the product. This would need to be delayed so that management could recognise deterioration, reprice, and push changes to market. It could be used to reduce sales and/or offset impacts of shocks.
  - Changes to best estimate assumptions (likely to increase the stress impact). Professional implications are included in this, as students that suggest unreasonable best estimate assumption changes could be made to offset emerging problems should receive 0 marks on professionalism grounds.
  - Improvements to expense management. This would be hard to argue, given the timeframe and the difficulty in realising savings even outside of a scenario. Improvements in retention or claim management would be similarly difficult to justify.
- Why management actions may not be successful in preventing a breach:
  - management takes at least 2 years of consistently adverse experience before changing assumptions by which time it will be too late (e.g. paying dividends for 2 years before management realizes how bad things are)
  - the owners are not in a position to inject additional capital if scenario happens (which can be the only way to prevent a breach when assumption changes occur that increase the BEL, especially given the regulator's requirement of determining the PCA)
  - BOI doesn't hold a large margin of Capital over the Capital Requirements especially relative to the size of PV Claims. That is, their Target Capital policy is not "risk based", so does not reflect how vulnerable BOI is to increasing claims/expenses.

Marking Guide

Marks	Requirements
3	Provides a plausible narrative, considers management actions, and outlines assumptions that would lead to a breach of the Regulatory Capital Requirements.
1 – 2	Fails to meet one or two of the requirements outlined above.
0	Fails to provide a scenario that breaches the Regulatory Capital Requirements.

Question 1(d)

The CEO has asked has asked for your view on BOI's capital position. Specifically, they want to know:

- The results of the stress test scenario prescribed by the regulator; and
- Whether BOI's current Target Surplus is appropriate.

Hence a complete answer should comment upon:

- The existing capital position;
- Results of the stress test scenario; and
- The appropriateness of the target surplus policy.

This should all be done in a language appropriate for the CEO.

A guideline for each of these components follows:

Existing Capital Position

Here, students should comment on the existing position and what this means for the business.

Marks	Requirements
1	Clearly outlines the results from part a) with a comment about the implications for the business e.g. the company has sufficient capital to fund planned growth and dividend payouts. The projected results indicate the company could support either higher sales or a larger dividend payout to shareholders.
0.5	Outlines the results, but does not comment about the implications for the business,
0	Fails to adequately comment on the existing position.

Results of Stress Tests

Here, students should at least comment on the risks of capital requirement / target surplus breach, and the risks this involves.

Marks	Requirements
1	Clearly outlines the results of the test, including a comment on capital requirement / target surplus breach.
0.5	Outlines the results but does not comments on the results,
0	Fails to adequately comment on the prescribed scenario results.

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Appropriateness of Target Surplus

To get full marks, students will need to put forward a view of whether or not the target surplus policy is sufficient and justify this appropriately, preferably using the results of the previous questions.

Ideally, students will suggest a 20% target is insufficient, and raise elements of LPS 110 / CPG 110 in a discussion of how to set a good target surplus policy. E.g.

- Considers the risk appetite of BOI,
- Considers the dividend policy and business plans of BOI (i.e. the capital strain of business growth against the willingness to forgo dividends when required),
- Considers the lack of access to new injections of shareholder capital for BOI,
- Uses stress testing or risk-based approaches to determine appropriate levels of target capital (e.g. setting a target surplus that aims to reduce the risk of breach to 5% over a 3 year period).

Marks	Requirements
2	Provides a clear view on the current target surplus and justifies this with a discussion of risks specific to BOI and/or the results of previous questions.
0.5 – 1	More generic discussions about target surplus, possibly without a firm view on the target surplus policy.
0	Fails to provide a view and justify convincingly.

1 mark for use of appropriate language to the CEO.

Maximum 5 marks.

END OF MARKING GUIDE – Question 1

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