COURSE COVERAGE

Question	Unit	Key performance outcome	Learning objective	Page Reference in Course Notes/Textbook	Marks
1 a (i) (ii)	3, 4	3.9, 4.14	3.9.2, 4.14.6	1.3.3 Risk business 7.6.1 Practical question 1 17.6 Principles of product advice 18.3 Projection techniques 18.3.1 Traditional and risk business 19.3 Trauma insurance	12
1 b	3, 4	3.9, 3.10, 4.14	3.9.3, 3.10.3, 4.14.6		9
1 c	2, 3, 4	2.5, 3.9, 4.12, 4.14	2.5.1, 2.5.5, 3.9.1, 4.12.3, 4.14.6		9
2 a	2, 4	2.6, 4.12	2.6.5, 4.12.5	7.3.2 Risk management 7.4 Risk classification 10.3.1 Investment linked business with guarantees 16.6 Asymmetric risks 16.7 Volatility 17.4.2 Screening 19.14.1 Case study 1	5
2 b	2, 3	2.4, 2.6, 3.9	2.4.2, 2.4.3, 2.6.4, 3.9.1		15
2 c (i) (ii)	1, 3, 4	1.2, 3.11, 4.13, 4.14	1.2.6, 3.11.5, 4.13.1, 4.14.1, 4.14.2		10
3 a (i) (ii)	2, 3	2.5, 3.8	2.5.5, 3.8.1, 3.8.3	8.5 Claims management 14.3 Disability insurance	12
3 b (i) (ii)	1, 2	1.11.1.2, 1.3, 2.5	1.1.2, 1.2.6, 1.3.3, 2.5.2, 2.5.5	5.5 The Regulators 7.5.2 Role of other stakeholders 8.5 Claims management	12
3 c (i) (ii)	3. 4	3.9, 4.13	3.9.5, 4.13.1, 4.13.2	1.3.3 Risk business 12.2.1 Factors affecting lapse rates 17.6.5 Consistency 18.2.2 Capital requirement 18.3.1 Traditional and risk business 19.2.1 Stepped premium term insurance 19.2.2 Level premium term insurance 20.5 Risk business	6

AS CW

QUESTION 1 MARKING GUIDE

a)

(i)

See C2A_S1_2017_Q1_Solutions.xlsx, tab Q1a

Year	Age	Prem YRT boy	Prem CI boy	Death Claims eoy	CI Claims eoy
	PV	**2,779**	**7,699**	**1,048**	**4,705**
1	40	362.5	975.00	116.00	472.20
2	41	373.60	1002.19	131.22	633.06
3	42	342.11	915.66	148.76	714.98
4	43	330.55	879.97	144.94	677.68
5	44	316.78	850.10	139.74	646.84
6	45	309.52	831.38	137.51	624.34
7	46	300.36	826.79	134.25	611.93
8	47	298.43	825.74	134.34	602.74
9	48	298.82	818.50	135.45	590.44
10	49	298.17	824.64	135.97	587.48
11	50	296.42	845.43	135.87	590.53
12	51	291.67	861.92	134.90	595.91
13	52	287.85	871.93	133.60	597.68
14	53	282.95	874.29	131.73	595.01
15	54	278.36	867.20	129.96	586.71
16	55	274.96	853.58	128.72	574.61
17	56	272.12	834.51	127.71	559.36
18	57	272.23	814.78	128.07	544.01
19	58	271.44	798.21	127.98	530.95
20	59	270.36	783.14	127.71	519.10
21	60	266.62	768.30	126.15	506.98
22	61	261.28	755.19	125.07	496.89
23	62	253.44	744.96	121.34	488.81
24	63	245.99	737.98	117.81	482.96
25	64	239.82	727.73	114.87	475.17

- Derivation of incidence rates for disease (A, B & C) / 100,000 (1 mark)
- Decrement table, allowing for:
  - current CI incidence rates and allowance for selection (1 mark)
  - incidence rates for diseases A, B & C (1 mark)
  - inclusion of selection effect in line with proposed assumption outlined in Q1a(ii) (1 mark)
  - current mortality rates and allowance for selection (1 mark)
  - reduction in mortality rates for incidence of Disease C (1 mark)
  - reduction in mortality rates in time t by incidence of Disease C in time t-1 (1 mark)
  - lapse rates (1 mark)

AS CW

- Using a $500,000 SI and a RDR of 12%, PV of premiums and claims for YRT and CI (1 mark)
- Timing of premiums at BOY and claims at EOY (1 mark)

Award full marks if student adjusts decrement rates for other claims and lapses.
Allow 1 mark for any other assumption in part (ii) that is modelled correctly, up to a maximum of 2 marks.

(10 marks)

(ii)

Assumptions

- In the absence of information about the impact of smoking, incidence rates for Disease A, B and C have been applied equally to smokers and non-smokers. (1 mark)
- Given we do not have information about the impact of underwriting on screening for Diseases A, B and C assumed claims rates are the same as for the general population with no allowance for selection. (1 mark)

Award 1 mark if students use same selection factors as main benefit provided a reasonable justification is provided.
1 mark for any other assumption that is reasonably justified.

(Max 2 marks)

Total 12 marks

b)

(i)

See C2A_S1_2017_Q1_Solutions.xlsx, tab Q1b

	PV Premium $	PV Claims $	Loss ratio
YRT	6,391,832	2,409,437	38%
CI rider	17,707,810	10,822,355	61%
Total	**24,099,641**	**13,231,792**	**55%**

1 mark for each of Total PV Premium, PV Claims and Loss ratio

(Total 3 marks)

(ii)

Movement	PV Premium $	PV Claims $	Loss ratio
YRT	822,859	173,975	-2%
CI rider (current)	2,278,489	2,818,491	9%
Total	**3,101,348**	**2,992,466**	**6%**

- PV of premiums has increased as sales of YRT with a CI rider are expected to increase by 15%. (1 mark)

AS CW

- PV of claims for YRT increased due to the increase in volumes offset by the fact claims relating to Disease C are now being paid under the CI rider policy. (1 mark)
- PV of claims for CI have increased due to both higher claims cost arising from paying claims for Diseases A, B and C and the 15% uplift in sales volumes. (1 mark)
- PV of cash flows are marginally reduced due to the second order impact of lower in force volumes being projected due to higher CI claims. (1 mark)
- The loss ratio for YRT has decreased by 3% meaning claims as a proportion of premiums have reduced as deaths related to Disease C are now being paid under the CI rider policy. (1 mark)
- The loss ratio for CI has increased by 9% as premium rates remain unchanged despite the fact claims cost has increased. (1 mark)

(6 marks)

Total 9 marks

c)

Pros for not increasing premium rates

- Competitors currently include Diseases A, B and C in their definitions so this enhancement would align LifeCo with the rest of the market. This could help with marketing LifeCo's products which could have a positive impact on market share. (1 mark)
- Also there may be reputational considerations for LifeCo as it may not want to appear to be excluding conditions that are covered across the industry. (1 mark)
- Assuming premium rates are not guaranteed, LifeCo will have the option to increase premium rates in the future for existing business as well as new business should claims experience be worse than expected. (1 mark)
- Disease A only affects males. Estimated results at a portfolio level are based on a male model point. In reality the financial impact could be less once the actual gender split is considered. (1 mark)
- Increased claims cost relating to Disease C represent an accelerated benefit as LifeCo would currently pay out on YRT when the life insured dies within a year of diagnosis. (1 mark)
- From a cash flow view, due to the 15% sales uplift, at an aggregate level, premium income has increased marginally more than claims cost. (1 mark)

AS CW

Cons for not increasing premium rates

- The combined loss ratio for Life with CI rider has increased from 49% to 55% meaning the profitability of the portfolio has reduced. It would not be acceptable to shareholders if profit falls below LifeCo's hurdle rate. (1 mark)
- The uncertainty surrounding setting best estimate assumptions for this offering could justify seeking a higher profit margin than is currently sought for the product. (1 mark)
- LifeCo should undertake a pricing exercise to confirm what increase in premiums for CI would be required in order to achieve profitability targets and then assess what impact this might have on sales volumes. (1 mark)
- The suggestion by the Head of Sales that LifeCo should not increase premiums as competitors already cover these conditions does not consider whether LifeCo's premium rates are appropriate for its target market. Instead, LifeCo should compare its premiums to its competitors who cover the same list of conditions as LifeCo, to ensure a like-with-like comparison. (1 mark)
- If LifeCo does not increase premium rates it may increase its anti-selection risk whereby people at risk of Disease A, B or C might seek cover from LifeCo if it is cheaper than its competitors. LifeCo would need to ensure its underwriting practices appropriately screen for these diseases. (1 mark)
- LifeCo may choose to pass back the enhancement to existing policy holders. Without an increase in premium rates, profitability for in force policies with CI rider benefits may reduce. (1 mark)
- LifeCo could consider offering cover for Disease A, B and C as an option that policyholder can elect to include in their cover and pay accordingly for it. (1 mark)

1 mark for any other reasonable point

Max 9 marks

Total 30 marks

END OF MARKING GUIDE QUESTION 1

AS CW

QUESTION 2 MARKING GUIDE

a)

See C2A_S1_2017_Q2_Solutions.xlsx
Let X be a simulation of investment returns.
For each of simulated values of investment returns provided for Capital Stable and Growth, calculate

- value of the account balance with the guarantee using Y = MAX (X,0) (0.5 mark)
- determine the cost of the guarantee using Z = Y – X (0.5 mark)

Calculate the average cost of the guarantee as AVERAGE (1,000 simulations of Z) (0.5 mark)

The expected cost of the guarantee is:

- 1.2% for Capital Stable; and (1 mark)
- 3.6% for Growth. (1 mark)

(Max of 2.5 marks each for Capital Stable and Growth)

Award full marks if students get the correct answers using a different but valid approach

(Total 5 marks)

b)

Key risk	**Mitigation**
In the event of a market shock InvestwithUs's losses could be significant. If capital is insufficient to cover losses, then LifeCo's solvency could be at risk. (1 mark)	Use a static hedge by purchasing options as premiums are received. (1 mark) Use a dynamic hedging program which aims to rebalance the asset portfolio in response to changing market conditions. This strategy is more suitable for complex guarantees that cannot be readily matched with a static hedge. (1 mark) Both static and dynamic hedging would introduce counterparty risk, i.e. risk that the issuer of the option will default on its payments. This risk would need to be managed, e.g. choosing a partner with a strong credit rate or use of collateral. (1 mark)
In the event of favourable investment returns over the year, investors may attempt to lapse and re-enter so as to lock in investment gains. (1 mark)	Charge an annual fee for the guarantee in advance that is non-refundable. (1 mark) Restrict withdrawals so investors who purchase the investment guarantee cannot withdraw before their policy anniversary. (1 mark)

AS CW

	The use of ratchets that increase the guaranteed benefit at a specific date if the account value is higher than the guarantee could be considered. However, given this is a 1 year guarantee, providing a monthly, quarterly or half yearly ratchet would be costly for investors. (1 mark)
During times of good market returns, the value of the guarantee, from an investor's perspective is lower, as the likelihood of the guarantee paying out is lower. As such investors are less likely to value the guarantee and may be more willing to withdraw their funds. (1 mark) Conversely during periods of poor market returns, the guarantee becomes more valuable to investors for the opposite reason meaning they are less likely to exit. (1 mark)	The risk could be managed by restricting withdrawals. (1 mark) Pricing could also allow for assumptions about selective lapsation by varying the cost of the guarantee with market conditions. (1 mark)
The guarantee may be too expensive resulting in inadequate sales. (1 mark)	Limit the guarantee to less risky investment options, such as Capital Stable, which would reduce the required fee. (1 mark) The expected cost of the guarantee depends on the nature of the guarantee. A less frequent guarantee (e.g. 5 yearly) would allow more time for markets to recover meaning a lower likelihood of the guarantee biting and hence a lower fee could be charged. (1 mark)
The product may not be priced correctly due to inexperience and lack of knowledge in the business, as past investment performance is not necessarily a reflection of the future. (1 mark)	Engage investment specialists to assist in setting the price. (1 mark)
There is increased operational risk in managing the proposed investment guarantee. (1 mark)	Ensure sufficient testing is performed on the unit pricing and administration systems to appropriately allow for the application of the guarantee. (1 mark)

1 mark for any other valid point

(i) Max 5 marks for risks

(ii) Max 10 marks for mitigations

(15 marks)

AS CW

c)

MEMO
To: Appointed Actuary
From: An Actuary
Date: DD/MM/YYYY
Subject: Proposal to launch a new investment-linked product with a capital guarantee.
InvestwithUs is considering launching a new investment-linked product that guarantees the initial investment after one year. More specifically, if the account balance at the end of the policy year is less than the account balance at the start of the policy year due poor investment performance then InvestwithUs will top up the difference.
Investors will have a choice between a Capital Stable and a Growth investment option. The Head of Marketing has proposed InvestwithUs charge the same fee regardless of investment option.
This memo discusses this proposal with reference to the appropriateness of fees and provides a recommendation in relation to the Head of Marketing's proposal.

(i) Appropriateness of fees

- The fee that needs to be charged to cover the expected cost of the guarantee depends on the assets underlying the policy. To demonstrate this, the expected cost of the guarantee for the Growth option is higher than the expected cost for Capital Stable. (1 mark)
- Pricing of guarantee also needs to allow for the cost of capital. Capital requirements are higher for a guarantee associated with a Growth option (22.6% of FuM) versus a Capital Stable option (8.3% of FuM) because the expected loss in an adverse situation is greater. (1 mark)
- The expected loss in adverse situations is greater as the Growth option is more volatile (25%) than the Capital Stable option (10%) meaning the likelihood of negative returns is higher and the potential size of the loss is greater. (1 mark)
- To charge the same fee regardless of investment option requires a business mix assumption. The appropriateness of the business mix assumption needs to be considered, and actual business mix should be monitored. (1 mark)
- Charging the same fee regardless of investment option is effectively having the Capital Stable option subsidise the Equities option. The level that the single annual fee is set at may not be appropriate if the business mix is materially different from the assumed business mix.

(1 marks)

1 mark for any other valid point

(Max 5 marks)

AS CW

(ii) Opinion in relation to the proposal

Guarantees are an attractive marketing feature, although if they are not allowed for correctly in the pricing of the product, it is possible InvestwithUs may incur severe losses. (1 mark)

The key issue with the Head of Marketing's proposal is the significant reliance on cross-subsidy. (1 mark)

As the cost of the guarantee for the Growth option is being subsidised by the cheaper cost for the Capital Stable option, it is under-priced and so is likely to sell in much greater volumes than the Capital Stable option. Whereas, the Capital Stable option is overpriced and so investors may not be willing to pay for this guarantee. As a result, profits for the product as a whole may fail to meet expectations. (2 marks)

For this reason the suggestion to use a single price regardless of investment option is not appropriate. (1 mark)

1 mark for any other reasonable point

Yours sincerely, An Actuary
(Max 5 marks)

(1 mark memo format)

Max 10 marks

END OF MARKING GUIDE QUESTION 2

AS CW

QUESTION 3 MARKING GUIDE

a)

(i)

- The statement by the Head of Claims could be analysed by undertaking an experience analysis to assess actual versus expected termination rates for income protection benefits. (1 mark)
- Based on this comment we would expect to see A/E ratios less than 1 which would indicate that actual claims terminations are less than expected. (1 mark)
- In order to understand the drivers for poor termination rates, Claim for Life Co may wish to break down the analysis into sex, waiting period, occupational class and cause of claim. Analysis could also be broken down into cohorts of when the claim occurred to help examine trends. (1 mark)
- The degree to which Claim for Life Co can segment results will depend on there being sufficient data points to give a meaningful result. (1 mark)
- Claim for Life Co should try to determine if this issue is new or ongoing by reviewing both historical and current experience. (1 mark)
- Claim for Life Co could also undertake a review of sales practices, e.g. sales approach or target market. If the inherent risk of the portfolio has changes over time due to business practice without a corresponding change to claims assumptions or pricing, this might help to explain the observed longer claims. (1 mark)
- Claim for Life Co should also try to understand the reason for this experience by discussing results with various departments such as claims, underwriting and pricing. (1 mark)
- Claim for Life Co should also consider the impact of economic conditions and seasonality on its claims profile. If the economy is performing poorly meaning higher unemployment, then it may be more difficult to get people off claim. (1 mark)
- If this is a new issue, Claim for Life Co may opt to continue to monitor experience at the same time as seeking to improve claims handling practices. (1 mark)

1 mark for any other valid point

(Max 6 marks)

(ii)

- Some examples of ways to improve claims handling include
  - Ensuring the ratio of open disability claims per assessor is reasonable. If not, the number of claims assessors may need to be changed to provide a more reasonable workload per assessor.
  - Training and development of claims assessors in line with their responsibilities and tasks.
  - Senior management support and oversight.
  - Efficient and reliable IT systems to facilitate information sharing and improve management information.
  - Establishing a claims committee to assist in skill development and provide a forum to discuss difficult cases.
  - Early contact with claimants, a personalised approach and ongoing and planned contact.

AS CW

- Medical and occupational rehabilitation programmes that are tailored to specific claimants.
- Assist claimants to return to work part time where appropriate so as to reduce the claim amount that is paid out.
- Surveillance on claimants may be considered for cases suspected to be fraudulent, although there are limitations on this from recent negative media attention and the requirements of the Life Insurance Code of Practice.
- Lump sum commutations may be considered for long duration claims where the insured is not expected to ever return to work.

(1 mark per point to a max of 3 marks)

(For surveillance, award only half a mark if the candidate does not mention limitations)

- If this is an ongoing issue, Claim for Life Co may also need to review its best estimate assumptions and strengthen its morbidity claims termination rates. Lower termination rates may mean higher premium rates for income protection benefits. (1 mark)
- Claim for Life Co would also need to decide whether to increase premiums for both new business and in force business. (1 mark)
- Any change to pricing for existing business would not affect people already on claims as their premiums would be being waived while benefits are being paid. (1 mark)
- Product changes could be considered, for example reducing the maximum replacement ratio or having the benefits automatically commute to a lump sum payment after a certain claim duration. (1 mark)
- Any product change would apply to new business only, and consideration should be given to impact on the competitiveness of the product if the product terms and conditions are changed. (1 mark)

1 mark for any other valid point

(Max 6 marks)

Total 12 marks

b)

(i)

- Insurers could review the appropriateness of policy definitions, including assessing whether they are aligned with current medical practices. (1 mark)
- Insurers could review marketing materials to ensure they are aligned with policy definitions. (1 mark)
- Insurers could educate advisers and customers to better manage their expectations. (1 mark)
- Insurers could review practices in relation to supervision to ensure claims assessment decisions are peer reviewed and appropriate internal audit is in place. (1 mark)
- Insurers could review claims practices to ensure they treat customers fairly and consider policyholder reasonable expectations. (1 mark)

AS CW

- Insurers could review incentives and performance measures for claims-handling staff to ensure they are aligned with assessing each claim on its merit. (1 mark)
- Insurers could improve access to and marketing of mechanisms for customers to raise disputes. (1 mark)
- Insurers could set up principles governing the industry's practices in relation to benefit design, claims practices and other aspects which have an impact of consumers. For example, the Life Insurance Code of Practice.
  (1 mark. No need to specifically mention the LICOP to get the mark)
- Insurers could agree to industry standard minimum medical definitions to help improve consistency and ease of understanding. (1 mark)

1 mark for any other valid point

(Max 6 marks)

(ii)

ASIC and APRA could:

- Undertake a review of definition for decline across the industry to ensure consistency in allocation to declined, withdrawn etc to ensure denial rates across insurers are comparable. (1 mark)
- Recommend or require insurers undertake a claims practices review and report back to it on outcomes. (1 mark)
- Undertake a targeted review of practices and procedures for individual insurers that have substantially higher decline rates than their competitors. (1 mark)
- Assess whether there are known or acceptable reasons for differences between insurers, e.g. small portfolios with higher variation, different target markets. (1 mark)
- Establish industry claims reporting requirements so as to help it monitor trends and identify issues in a timely way, e.g. denial / acceptance rates, processing times. (1 mark)
- In collaboration with insurers, establish and publish 'claims handling good practice standards.' (1 mark)
- Increase requirements for advisers at point of sale to explain terms and conditions, e.g. pre-existing conditions, definitions, exclusions. (1 mark)
- Strengthen the legal framework covering claims handling, e.g. use of penalties for misconduct, increase its powers for monitoring and intervention. (1 mark)
- Strengthen the industry consumer dispute resolution framework. (1 mark)

1 mark for any other valid point

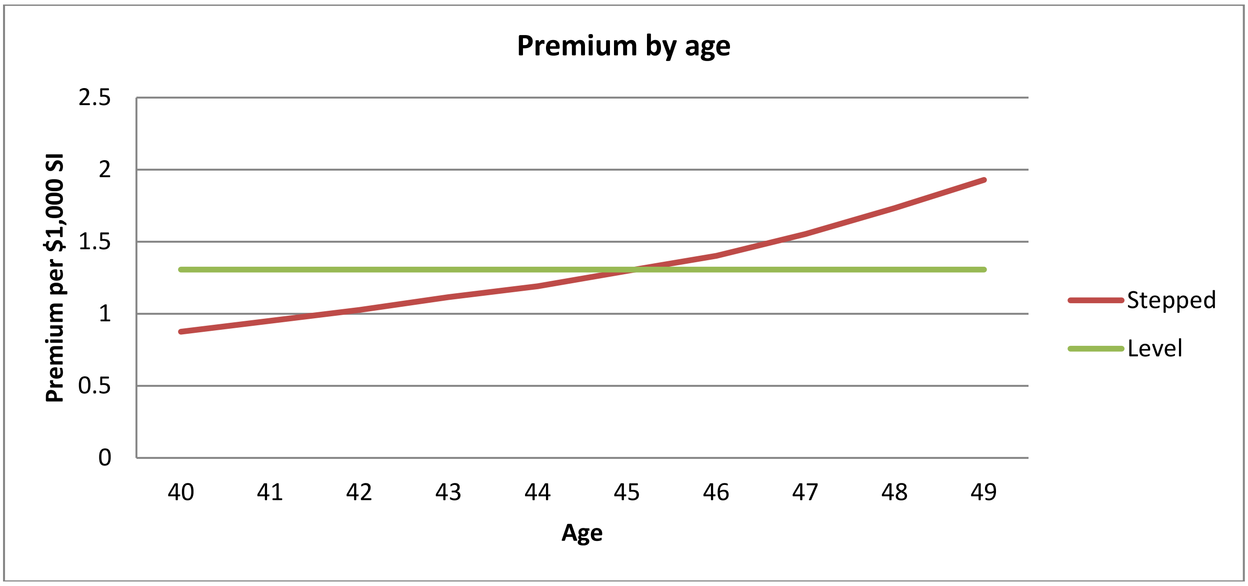
(Max 6 marks)

Total 12 marks

AS CW

c)

(i)



- Stepped premiums: increasing trend between ages 40 and 49 (1 mark)
- Level premiums: unchanged for all ages and higher than stepped premiums in the earlier years but lower in the later years (1 mark)
- Presentation of graph with titles / labels (1 mark)

(Max 2 marks)

(ii)

- Given level premiums are higher in year one than stepped premiums the new business strain is smaller for level premium business. (1 mark)
- Stepped premium rates increase in line with expected claims costs. As mortality risk increases with age, premium rates increase to reflect this. (1 mark)
- This means stepped premium rates are set so as to be sufficient to cover expected claims payments for the life insured each year. (1 mark)
- Conversely, for a given level of cover, a level premium structure charges the same premium over time. (1 mark)
- This means that expected claims cost is spread over the duration of the policy and as a result premium rates in the earlier years subsidise claims cost in the later years. (1 mark)
- Ignoring the impact of the policy valuation basis, profits for level premium business are expected to be higher at the start of the policy than at the end of the policy. (1 mark)
- The timing of lapses also impacts profitability. For both stepped and level business a lapse prior to recovery of the new business strain means a loss would be realised for the business. (1 mark)

AS CW

- Level premium business is sensitive to interest rates. In low interest rate environments, with all other things being equal, higher level premium rates are required to generate the same level of profitability as stepped premium business. (1 mark)

1 mark for any other reasonable point

(Max 4 marks)

Total 6 marks

END OF MARKING GUIDE QUESTION 3

AS CW