

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2021

Subject CM1 – Actuarial Mathematics Core Principles Paper B

Introduction

The Examiners' Report is written by the Chief Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

Sarah Hutchinson
Chair of the Board of Examiners
December 2021

A. General comments on the *aims of this subject and how it is marked*

CM1 provides a grounding in the principles of modelling as applied to actuarial work - focusing particularly on deterministic models which can be used to model and value known cashflows as well as those which are dependent on death, survival, or other uncertain risks.

The worksheets provided to candidates for each question give a suggested format for part or all of the solution and the methodology used in the model solutions follow these suggested formats. Candidates are not penalised for using a valid alternative approach. The worksheets are also designed so that the final numerical answers for some questions are to be shown on a specified 'Answers' sheet. Candidates are not penalised for not using these sheets if their final answers are clearly shown on their working sheets.

Candidates may lose marks where insufficient working is shown.

The exam is not designed to be a test of Excel skills. Thus, some functionality which may be preferred in a real-world work environment is not necessarily required to answer the questions. However, some good practices are useful to the candidate e.g. including variables/parameters the question states will change as inputs rather than hard coding these into formulae.

Where a question specifies a method to use or not use (e.g. *without using a scenario solving tool such as Goal Seek or Solver*) then where a candidate does not follow that instruction they should not expect to be awarded full marks.

B. Comments on *candidate performance in this diet of the examination.*

The comments that follow concentrate on areas where candidates could have improved their performance. Where no comment is made, the question was generally well answered. The examiners look most closely at the performance of the candidates close to the pass mark and the comments therefore often relate to those candidates.

As in previous sittings, there appeared to be a large number of inadequately prepared candidates who had underestimated the quantity of study required for the subject and/or who had insufficient familiarity with Excel to make a meaningful attempt at the CM1B paper with 23% of candidates scoring 30 or less on the paper.

Candidates should pay attention to any instructions included in questions as this will provide key information as to where marks will be awarded.

C. Pass Mark

The Pass Mark for this exam was 53.

1344 presented themselves and 533 passed.

Whilst the paper was of a similar standard to previous sittings there were questions within this paper that covered areas of the syllabus which hadn't been examined recently. It was evident that many candidates were not adequately prepared for this and therefore the examiners took this into consideration when setting the pass mark.

Candidates need to be aware that examiners can ask questions from across the breadth of the syllabus and that they will be asked to apply their knowledge in different situations. Candidates are advised to access as much learning material as available to them and not rely on past papers alone when preparing to sit the examination.

Solutions for Subject CM1B – September 2021 – please refer to excel file

Q1

Part (i) Poorly answered.

Candidates missed out on marks by failing to identify the required elements to correctly value the expected present value of the monthly death payments. The failure to calculate the probability of survival to the start of each month and then calculate the probability of dying within that month also saw candidates missing out on marks.

A common error was to value the probability of death since the beginning of the year, and treat that as the probability of death within a given month.

Part (ii) Poorly answered.

Many candidates did not appear to appreciate that the CFM and UDD approaches only alter the timing of deaths over the year. (Therefore, the difference in EPV arises as a result of impact of discounting for differing time periods.) Marks were not awarded where candidates suggested that the total number of deaths in the year differed as a result of using the different methods as this was incorrect.

Q2

Part (i) Many candidates did not include the interest only repayments for time periods 6 months to 3 years. The question asked candidates to perform the calculations without using a scenario solving tool such as Goal Seek or Solver. However, many candidates used these tools, and marks were not awarded for this.

Part (ii) Well answered.

Part (iii) Poorly answered.

Common errors included not adjusting the interest due after allowing for the additional payments and not allowing for additional payments during the first 3 years of the loan.

Q3

Poorly answered.

Candidates who were inadequately prepared failed to make distinct points..

Comments in relation to Redington's theory of immunisation were not applicable to this question and were not awarded any credit.

Q4

Well answered.

Part (i) Common errors included missing the value of units at the start of the year when calculating unit growth, the management charge and/or the value of units at the end of the year.

Part (ii) Common errors included: -

Treating mortality and surrender as occurring throughout the year when calculating the multiple decrement table.

Ignoring the minimum sum assured on death, or ignoring the value of units when calculating the value of death benefits.

Deducting the value of surrenders rather than adding the profit on surrenders when calculating the profit vector.

Using an incorrect discount factor when valuing the present value of premiums.

[Paper Total 100]

END OF EXAMINERS' REPORT