ACTUARIAL SOCIETY OF SOUTH AFRICA

# COMPUTER-BASED EXAMINATION

5 OCTOBER 2023 (pm)

# Subject A213 — Contingencies Intermediate Technical

*Time allowed: One hour and forty-five minutes (which includes 15 minutes of reading time)*

*Total marks: 50*

***INSTRUCTIONS TO THE CANDIDATE***

1. *Ensure that you are logged in and authenticated through Examity before you attempt the examination.*
2. *You are strongly encouraged to use the first 15 minutes as reading time only, however, you may start answering the paper whenever you are ready.*
3. *The question paper is only available on the ASSA Exam Platform as a PDF download and may not be printed.*
4. *An Excel answer template will be available for download on the ASSA Exam Platform.*
5. *Ensure that you have your exam permit handy. It reflects your candidate number to input on the first tab sheet within the Excel answer template. Do not use your name or member number anywhere on your answer script.*
6. *You may not access any file from your computer, use any other computer program (e.g. Email, MS Word or Excel) or open any other browser during the examination. The use of Grammarly and Grammarly Premium or similar is also not permitted in examinations.*
7. *Mark allocations are shown in brackets.*
8. *Attempt all questions. Each question must be answered on a separate Excel sheet as per the provided template.*
9. *You may not use any other material (e.g., a Formulae and Tables book) during the examination. Any such information that may be required will be provided to you in the examination.*
10. *Save your work throughout the examination. Save your file using your candidate number as file name. Do not use your name or member number anywhere in your answer script nor as file name.*
11. *Upload your Excel answer file to the ASSA Exam Platform before the examination time expires. Take this into account when planning your review and submission. There will be no time announcements.*
12. *Once you have added your file, you must click on **Finish Attempt** to save your file. You will still be allowed to go back and make changes **(Review Attempt)** if you have time.*
13. *Once you are satisfied with your uploaded file, click **Finish Attempt** and **Finish All and Submit**. No further changes will be possible.*

**Note: The Actuarial Society of South Africa will not be held responsible for any late submissions or loss of data where candidates have not followed instructions as set out above.**

***END OF INSTRUCTIONS***

## QUESTION 1

i. Explain the most important difference between a simple accumulating with-profits (AWP) contract and a unitised with-profits (UWP) contract.

[4]

A life insurance company has launched a unitised with-profits savings product. At the end of the term of 10 years the fund balance will be paid to the policyholder if he or she is still alive.

In the event of death, the company will repay a portion of the premiums received, at the end of the year of death, as follows:

| Year | Proportion % |
|---|---|
| 1 and 2 | 25% |
| 3 and 4 | 50% |
| 5+ | 80% |

The product rules specify that no surrenders are allowed.

The following charges apply to the unit-fund:

- Policy fee R500 p.a. deducted at the start of each year.
- Policy management fee 2.2% p.a. deducted at the end of each year.

The company declares bonuses at the end of every year. The company's bonus policy states that bonuses declared will be equal to the investment return of the year but subject to the bonus not exceeding 3% or be lower than the guaranteed rate of 1% in that year. It also states that terminal bonuses might be declared at the discretion of the company.

A policyholder has paid R30 000 a year at the start of the last ten years into the unitised with-profits contract. The policyholder was aged 50 at the start of the last policy year.

The investment return of the underlying assets has been as follow:

| Year | Growth % per annum |
|---|---|
| 1 | 2.34 |
| 2 | 4.07 |
| 3 | -0.84 |
| 4 | 5.9 |
| 5 | 1.65 |
| 6 | 6.46 |
| 7 | 5.82 |
| 8 | 5.76 |
| 9 | 7.39 |
| 10 | 2.95 |

**REMEMBER TO SAVE**

**PLEASE TURN OVER**

 

The policy is now maturing. A terminal bonus of 0.75% of the fund value at the end of the tenth year has been declared.

ii. Determine the maturity value that this policyholder will receive.

[7]

iii. Suggest two possible reasons why this product might not be popular with prospective clients. For each of the reasons, also provide a possible solution to make the contract more attractive to prospective clients.

[4]

iv. Determine the net present value of profit on the basis set out below, in respect of a unitised with-profit contract with a R30 000 annual premium. The policy is sold to policyholder aged 40 exactly. Assume the same investment growth of the past ten years and that no reserves are set up other than the unitised with-profit fund.

[13]

The insurance company also sells conventional 10-year endowment assurances. For a similar premium of R30 000 per year, a policyholder receives R350 000 death cover in the first year, increasing from the start of the second year by a factor of $0.01\times(t-0.5)$. $t$ is the number of complete years which the policy has been in force for and $t\geq 1$. The policyholder will receive a maturity value of R415 000 if still alive at the end of the term of the contract.

v. Determine by how much the R3 500 p.a. renewal expense, in the basis below, should be reduced by for a R30 000 conventional endowment contract to have a net present value of profit of R10 000. Use the basis below for all other assumptions.

[7]

Basis:

| | |
|---|---|
| Mortality | 130% of AM92 Ultimate in the first policy year, 120% of AM92 Ultimate in the second policy year and 110% of AM92 Ultimate thereafter |
| Initial expense | 2% of the first premium |
| Renewal expense | R3 500 p.a. at the start of each year, increasing by expense inflation from the second year onwards |
| Expense inflation | 4.2028% per year |
| Non-unit growth rate | 5% p.a. on positive balances<br>8% p.a. on negative balances |
| Risk discount rate | 10% p.a. for conventional policies<br>13% p.a. for with-profits policies |

[Total 35]

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**QUESTION 2**

A couple has purchased a single premium reversionary annuity contract from a life insurance company. The contract specifies that annuity payments will begin at the end of the year of death of the female, if the male is then alive, and is then paid annually in arrears thereafter during lifetime of the male. However, if the female dies during the first three policy years, the first annuity payment to the male, if alive, will be at the end of the third policy year. At inception, the female is aged 66 and the male is aged 59, exactly.

The annuity payment structure is as follow:

| **End of Policy year** | **Annual Annuity** |
|---|---:|
| 3 to 4 (inclusive) | R120 000 |
| 5 to 7(inclusive) | R190 000 |
| 8 to 11(inclusive) | R250 000 |
| thereafter | R280 000 |

i. Calculate the gross premium prospective reserve exactly two years after inception in respect of a contract where both lives are alive at that time.

Basis:

| | |
|---|---|
| Male mortality | 120% of AM92 Ultimate |
| Female mortality | 90% of AM92 Ultimate |
| Interest rate | 6% p.a. for the first five policy years, 5% p.a. thereafter |
| Initial expense | R7 000 |
| Renewal expense | R1 000 p.a. at inception incurred at the start of each year |
| Expense inflation | Interest rate *less* 2% |

[13]

ii. Explain whether the reserve calculated in (i) above is overstated or understated given that no allowance has been made for future mortality improvements.

[2]

[Total 15]

[GRAND TOTAL 50]

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**END OF EXAMINATION**

 