EXAMINATION

3 June 2016 (am)

Subject F104 — *Pension and Other Benefits*
Fellowship Principles

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Use the instructions and password provided at the examination center to log in.*

2. *Submit your answers in Word format only using the template provided. You MAY NOT use any other computer program (e.g. Excel) during the examination.*

3. *Save your work regularly throughout the examination on the supplied computer's hard drive.*

4. *You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*

5. *You must not start typing your answers until instructed to do so by the supervisor.*

6. *Mark allocations are shown in brackets on exam papers.*

7. *Attempt all eight (8) questions, beginning your answer to each question on a new page.*

8. *Candidates should show calculations where this is appropriate.*

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

AT THE END OF THE EXAMINATION

Save your answers on the hard drive AND hand in this question paper.

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved list.

QUESTION 1

You are assisting the government of a certain country with assessing their social security system.

i. Provide formulae for calculating $P_x(n)$ and $P_0(n)$, the population aged x and 0 last birthday at time n respectively. Your answer should include the formula for $B(n)$, the number of births over the year to n. Define any other symbols used completely.

[7]

ii. This country uses an equalised Pay-as-You-Go (PAYG) financing system. What is the difference between equalised PAYG and General Average Premium Funding?

[2]

The government offers a national pension to all its citizens. The pension is payable from age 65, and is related to the total income tax, adjusted with inflation, paid by an individual over their life time. Marginal income tax rates in the country increase at higher earnings levels. Contributions towards the state fund are equal to 5% of salaries paid by all workers.

iii. Outline the various objectives of a government in setting up a social security pension scheme.

[4]

iv. Discuss how well this national pension scheme fulfils the purpose of a social security pension scheme.

[4]

[Total 17]

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QUESTION 2

You are the valuator to a small final salary pension fund which has only active members. The fund accrues a pension related to the length of service and the salary in the last year before retirement. The benefit on death or withdrawal is equal to the actuarial liability of the member.

You performed the last valuation of the fund 3 years ago, and have now been asked to perform another valuation.

i. Write down a formula for the calculation of a member's actuarial liability using the Projected Unit Method. Define all your terms.

[3]

However, it transpires that the administrator of the fund has been affected by a computer virus and as a result, has lost the valuation data for your fund.

ii. List the data sources which you could use to rebuild the data set you require, briefly outlining what data may be available from each source.

[6]

You have received new asset data, but the liability information is still being compiled. You only have aggregate information at the date of the current valuation (total salaries, membership numbers, and the average age and pensionable service of the members). The trustees of the fund have however requested that you estimate the funding level of the fund in the meantime, using the same assumptions as at the last valuation.

iii. Show, using a formula, how you could adjust the results of the previous valuation to estimate the current funding level.

[4]
[Total 13]

QUESTION 3

You are the newly appointed valuator on a defined contribution pension fund. The fund offers all members a return of their full accumulated credit plus an insured death benefit of twice annual salary. The Human Resources Director at the employer wants to introduce more flexible benefits and has thus suggested that the fund moves to a system where every member has a minimum insured death benefit of 1 times annual salary. Members can then choose to increase their cover to 2, 3 or 4 times annual salary. Your insurer, with whom you have a long-standing relationship, quotes you premium rates per multiple of salary that are much higher than what the fund is currently paying per multiple of salary. Explain why this may have happened and what could be done to try and reduce the premium rates.

[5]

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QUESTION 4

The board of an open retirement fund is reviewing the investment strategy of the assets backing the pensioner liability. Pension increases equal to a factor of inflation are granted annually. One of the trustees mentions that she has heard that bond prices are set to rise in the next few months. She suggests that all the relevant assets should be invested in long-term nominal bonds equally split between local and foreign currency.

Discuss the suggestion made by the trustee with reference to the pension liability.

[10]

QUESTION 5

In a certain country, defined benefit funds are required to submit statutory valuations to the regulator triennially. The actuary responsible for each fund has been allowed to set the pre-retirement and post-retirement discount rates and inflation rates based on current market conditions. The regulator has proposed a new solvency regime whereby the discount rates must be based on the bond yield curve. A risk premium of between 0% and 3% p.a. is allowed on any equity or property holdings. The inflation assumption is also derived from bond yields. Actuaries are expected to take assets at market level both in the old and new regime.

i. A regular check on the adequacy of assets relative to liabilities is one way that funds are financially regulated. List other means of financial regulation.

[3]

ii. As an actuary to a number of defined benefit funds, you have always used an asset-based approach for setting your discount rate assumptions. How might the new regulations affect the solvency level of these funds?

[7]

[Total 10]

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QUESTION 6

A board of trustees manages a pensioner-only fund. The pensioners are guaranteed level pensions in terms of the fund rules but the trustees have historically provided discretionary increases. The assets backing the pensioner liabilities are invested in a series of nominal bonds. Any assets in excess of the liabilities are invested in local equities to support future pension increases. The fund has been without any employer support for the past 15 years and the board intends to buy annuities for each of the pensioners from an insurance company in 5 years' time.

The trustees have requested that you set up a model that uses current data, and assumptions about the future to indicate the expected funding ratio at the point of insuring the pension benefits.

i. Describe the model that you would create indicating clearly the required output from the model, the data required and the parameters and assumptions that would be required to establish an appropriate model. Formulae are not required.

[12]

ii. Describe how you would set the investment return assumption for the assets and the discount rate for the liabilities with specific reference to the reliance you would place on the asset allocation as at the valuation date.

[4]
[Total 16]

QUESTION 7

i. Briefly explain why a surplus might arise on early retirements from a defined benefit pension fund where the early retirement benefit is not equal to the actuarial liability?

[2]

You are the newly-appointed actuary to a mature final salary pension fund. The benefit on retirement is an inflation-linked pension starting at 2.0% of final average salary per year of service subject to a maximum of 35 years service. Normal retirement age is 65. Early retirement is possible from age 55 and is subject to pre-defined penalties which are set out in the rules and communicated to members. When reviewing the last two statutory actuarial valuations, you notice that the analysis of surplus indicated significant surpluses arising on early retirements.

ii. Outline specific ways that this surplus could have arisen, given that the penalties have been applied correctly.

[3]

iii. Over the 6 year period covered by the last two valuations, the early retirement experience has generated a surplus of 10% of the fund liabilities. Briefly describe actions that could be taken.

[6]
[Total 11]

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QUESTION 8

A company with 500 employees has been operating a defined benefit (DB) fund for many years. However, it has now been decided to replace this with a defined contribution (DC) fund. The DB fund will be closed to new members, but members remaining in the fund will continue to accrue benefits on a DB basis. The employer is encouraging members to switch into the new DC fund.

i. Outline the factors that a member of the DB fund should take into account when deciding whether they should switch to the new DC fund or not.

[9]

The new DC fund has been launched and the majority of the members have switched to it. Only 50 members remain in the DB fund.

ii. Outline how the employer contributions to the DB fund, calculated using the Projected Unit Method, are expected to develop over the foreseeable future.

[3]

Several years have passed and the trustees are now considering closing down the DB fund.

iii. List the options available to the trustees for the provision of outstanding benefit payments, assuming no regulatory constraints.

[3]

A valuation of the DB fund has been performed on a discontinuance basis. The discontinuance funding level is 80%, much lower than the ongoing funding level which is 102%.

iv. Suggest reasons why this may be the case.

[3]

[Total 18]

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END OF EXAMINATION

