EXAMINATIONS

17 September 2002 (am)

Subject 304 — Pensions and Other Benefits

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*

2. *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.*

3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*

4. *Mark allocations are shown in brackets.*

5. *Attempt all 8 questions, beginning your answer to each question on a separate sheet.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

In addition to this paper you should have available Actuarial Tables and your own electronic calculator.

1 Discuss the issues an actuary to a final salary pension scheme should take into account in setting the factors for the commutation of retirement pension benefits for cash. [6]

2 (i) Define the term "net replacement ratio". [2]

(ii) List the reasons why a net replacement ratio of less than 100% may be sufficient to maintain living standards in retirement. [3]

(iii) List the possible form of benefits that a government can provide through a state pension scheme which would cause the net replacement ratio for individual retirees to be high for low earners and low for high earners. [2]

[Total 7]

3 An employer offers a generous life assurance scheme to its staff. The nature of the employments is such that mortality rates are high and the cost of the scheme is a material part of the employer's total operating costs.

Explain the alternative methods of funding the life assurance benefit, and how the annual cost to the employer would be calculated in each case. [7]

4 You are the actuary to a well-funded final salary pension scheme. The finance director is keen to limit the amount of the employer's contribution rate and reduce the future volatility of the contribution rate.

Outline the changes that could be made to the existing pension scheme and the other options available to achieve the finance director's objective. [10]

5 You are the government actuary for a developed country's state pension scheme. The scheme has a normal retirement age of 60. Every three years, you undertake a mortality investigation of the experience of the state scheme. The results of the most recent investigation, together with the results of the investigation, conducted 12 years ago for deaths in the age range 60 to 65 are presented below:

Age last birthday	N_t	E_t	N_{t-1}	E_{t-1}	N_{t-2}	E_{t-2}
60	8	1,000	9	1,000	10	1,000
61	9	1,000	10	1,000	11	1,000
62	11	1,050	11	1,000	12	1,000
63	11	1,000	12	1,000	13	1,000
64	12	1,000	13	1,000	13	950

Age last birthday	N_{t-12}	E_{t-12}	N_{t-13}	E_{t-13}	N_{t-14}	E_{t-14}
60	13	1,000	15	1,000	13	1,000
61	14	1,000	17	1,000	19	1,000
62	17	1,050	19	1,000	21	1,000
63	19	1,000	21	1,000	23	1,000
64	21	1,000	22	950	25	1,000

Where N_t equals the number of deaths in period $t - 1$ to t in thousands and E_t equals the exposed to risk in the period $t - 1$ to t in thousands.

(i) Calculate the average mortality rate for each age 60 to 64 from the two tables above for both investigations. Give possible reasons why the more recent mortality rates are lower than the rates 12 years ago. [5]

(ii) Comment on and compare the results of the two mortality investigations. [7]

(iii) Suggest how you could use the results of these mortality investigations to assist in determining a mortality table for use in funding the state scheme. [3]
[Total 15]

6 You are the actuary to a long established final salary pension scheme. Very few new entrants have joined the scheme in recent years. The trustees have asked you to produce a short report outlining the impact of either closing the scheme to new entrants or ceasing future benefit accrual.

The report should cover the issues surrounding:

- investment strategy [5]
- valuation method and bases [5]
- impact of funding on the company [2]

Draft your report. [3 marks are available for drafting]
[Total 15]

7 (i) A member of a defined contribution pension scheme, where there is a choice of investments, has requested an estimate of the pension which may be secured from the scheme at normal retirement age.

List the assumptions that need to be made in determining such an estimate. [5]

(ii) You have been asked to draft a suitable letter to be sent to the member with the result of the calculation. Outline the points you would make in your letter including comments on the effect of the assumptions that have been made. [7]

(iii) Explain the risks that a member would face if he chose not to convert the fund value at retirement into a pension, but instead kept the money invested in assets of his own choosing and drew an income from the fund every year. [3]

[Total 15]

8 A company operates a defined benefit pension scheme for its employees. The actuary has recently presented the results of the valuation to the trustees and the company.

The company is concerned that the cost of the scheme as disclosed in the company's accounts is stabilised as much as possible going forward. The relevant accounting standard values all liabilities by reference to yields available on corporate bonds of appropriate duration. The company's finance director has suggested that the pension scheme's investments be moved wholly into a portfolio of corporate bonds, from the current mix of equities, government bonds and cash.

The recent valuation revealed a surplus on the basis adopted for the ongoing funding of the scheme, but a past service deficit in the company accounts disclosure. To assist with the decisions on future investment strategy, it has been agreed that an asset liability modelling exercise be carried out to determine a suitable investment mix.

(i) Discuss whether the proposed change in investment strategy is appropriate from the trustees' point of view. [4]

(ii) Compare the main characteristics of corporate bonds with the characteristics of the other investments already held by the trustees. [6]

(iii) Describe the additional information the actuary will need to perform the asset liability modelling exercise. [4]

(iv) List four measures of risk that could be used when setting the objective of the asset liability modelling exercise. [2]

(v) Describe the processes involved in carrying out an asset liability modelling exercise, and comment on any limitations on the results. [9]

[Total 25]