INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

8 October 2015 (am)

Subject ST4 – Pensions and other Benefits
Specialist Technical

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 before 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 six questions, beginning your answer to each question on a new page.

6. Candidates should show calculations where this is appropriate.

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 the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved list.

1 (i) Define the term Net Replacement Ratio. [1]

In a developed country, no income tax is levied on the first $15,000 per annum of an individual's income, which includes income from pensions. A 30% rate of income tax is levied on income in excess of $15,000 per annum. There is no income tax relief given for pension contributions or repayments on house loans.

Adam is currently working and earns a pre-tax income of $60,000 per annum. He pays pension contributions of 10% of pre-tax earnings and repayments on house loans of $1,000 per month, both of which will cease on retirement.

(ii) Calculate the Net Replacement Ratio if Adam's pre-tax pension in retirement is $30,000 per annum. [2]

Adam has been targeting a Net Replacement Ratio of 1.

(iii) (a) Explain why this may be an inappropriate target in order to sustain his living standards after retirement.

(b) Propose, with reasons, a more appropriate Net Replacement Ratio for Adam. [6]

[Total 9]

2 Company A is a large national business. It provides its employees with a death in service benefit equal to four times salary. You may assume the employees have the same salary and probability of death, and the lives are independent.

In your answers to parts (i) – (iii) below, define all symbols used and state any key assumptions.

(i) Write down a formula for the expected cost over the next year of the benefit expressed as a proportion of total salary. [1]

(ii) Derive a formula for the standard deviation of the cost over the next year of the benefit expressed as a proportion of total salary. [3]

(iii) Write down a formula for the probability that there is at least one death in a given year. [1]

Company B is a family business employing 50 employees, with an average age 45, in one factory. It provides the same death in service benefit as Company A. The business is managed by a husband and wife, who are also employees each aged 63 with a salary that is 10 times greater than the average of the rest of the employees.

(iv) Discuss whether it will be preferable for Company B to insure the benefit rather than meeting the cost of claims out of business cashflow.

Your answer should make reference to, but is not restricted to, your answers to parts (i) – (iii) above. [6]

[Total 11]

3 The HR Director at a large employer is considering establishing an arrangement to meet in full all post-retirement medical fees and healthcare costs of its employees.

(i) List the assumptions that would need to be made in order to estimate the cost of the arrangement. [5]

(ii) Discuss three approaches the employer could take to financing the arrangement. [10]

The Managing Director is concerned by the affordability of such an arrangement. He takes advice from an actuary on ways to control the cost, whilst still offering a benefit that is attractive to current and prospective staff.

(iii) Discuss four key aspects of benefits design that could be adjusted to achieve the employer's objective. [12]
[Total 27]

4 An employer in a developed country operates a revalued average earnings pension scheme. Pensions are revalued in line with price inflation before and after retirement. The majority of the scheme's assets are invested in domestic investment grade corporate bonds.

(i) List the main investment characteristics of corporate bonds. [3]

The managers of the pension scheme are concerned about the risks of domestic inflation and are proposing switching their fixed interest corporate bond holdings into domestic inflation-linked government bonds.

(ii) Outline the advantages and disadvantages of this proposal. [4]

(iii) Suggest, with reasons, other asset classes that the pension scheme's managers could adopt in order to reduce the risk to the scheme of domestic inflation. [6]
[Total 13]

5 An employer currently sponsors a defined benefit pension scheme which is fully funded on an ongoing basis. It wishes to discontinue the scheme and has approached the scheme's managers to consider this.

(i) List six ways that the managers of the scheme could achieve this. [3]

The managers of the scheme wish to continue running the scheme, funding it on a self-sufficiency basis, without the further accrual of benefits.

(ii) Discuss the factors that the managers should consider in their approach to the following aspects:

- funding;
- investment strategy; and
- provision of discretionary benefits. [7]

[Total 10]

6 A triennial actuarial valuation of a final salary pension scheme is due. The scheme provides the following benefits:

Accrual Rate:	1/60th of basic salary for each year of pensionable service
Normal retirement age:	65
Leaving service benefit:	Deferred pension based on basic salary at leaving and pensionable service completed
Pension increases in deferment:	Price inflation
Pension increases in payment:	Price inflation
Death before normal retirement age:	Lump sum equal to 5 times the member's contributions to the scheme
Death after retirement age:	Spouse's pension equal to 50% of the member's pension at the date of death
Member contributions:	5% of basic salary

(i) List the items of membership data the actuary will require to complete the actuarial valuation. [7]

(ii) Describe the data checks that the actuary should carry out on the membership data. [10]

An early retirement option is to be introduced. The sponsoring employer has asked for the terms to be set so that the actuarial value of the early retirement pension is equivalent to the actuarial value of the deferred member's pension. Active members are assumed to have left the at the point of early retirement.

(iii) Set out a formula for the early retirement pension, defining any terms you use. [4]

The sponsor does not wish the early retirement option to introduce significant additional risk into the scheme.

(iv) Describe the risks introduced by the early retirement option. [4]

(v) Discuss ways these risks can be managed. [5]
[Total 30]

END OF PAPER