

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

19 April 2013 (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 seven questions, beginning your answer to each question on a separate sheet.*
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.

<p><i>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.</i></p>
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- 1 A non-contributory final salary pension scheme only has active and deferred members. The funding valuation is due as at 1 January 2013. The results from the previous valuation as at 1 January 2010 were as follows:

	<i>£m</i>
Liabilities:	
Actives	50
Deferred pensioners	<u>20</u>
Total liabilities	70
Assets	<u>65</u>
Surplus/(deficit)	(5)

Standard Contribution Rate: 24% of pensionable salaries

The Standard Contribution Rate was calculated using the Projected Unit Method with a three-year control period.

Total pensionable salaries as at 1 January 2010 were £8m.

The key financial assumptions used for the valuation as at 1 January 2010 were:

Interest rate = 6% per annum
Salary increases = 4% per annum
Pension increases = 3% per annum
(in deferment and payment)

The following additional information is available regarding [the scheme's experience during](#) the three year period to 1 January 2013:

Average salary increase = 3% per annum
Average investment return = 7% per annum
Average deferred revaluation = 3% per annum
Employer contributions paid = £5m per annum
No membership movements

- (i) Estimate the actuarial gain/loss arising over the inter-valuation period in relation to active member liabilities, stating any further assumptions that you make. [4]
- (ii) Estimate the surplus or deficit in the scheme as at 1 January 2013, stating any further assumptions that you make. [4]
- [Total 8]

2 In a developed country, investment income and capital gains from savings are subject to tax. The government of the country operates the following method of taxing pension schemes:

- Employee and employer contributions are exempt from income tax.
- Investment returns within pension schemes are exempt from tax.
- Benefits taken from pension schemes are subject to income tax.

(i) Explain why the country might have adopted such a system of pension taxation. [3]

The country has a progressive income tax system whereby income (from both earnings and pensions) is taxed at the rate of:

- 20% of income up to \$100,000 per annum, known as the “higher income threshold”; and
- 40% of income above \$100,000 per annum

(ii) Set out the advantages and disadvantages of contributing to a defined contribution pension scheme, compared with the alternative of saving taxed income, for an employee earning:

- (a) \$70,000 per annum
- (b) \$140,000 per annum [3]

The government wishes to reduce costs and is considering restricting the tax relief currently enjoyed by citizens earning more than \$100,000.

(iii) Discuss four different methods by which the government could control this cost, including the practical advantages and disadvantages of each. [8]

The government has now changed the taxation system so that pension contributions will no longer be exempt from income tax; however future benefits accrued in pension schemes will be tax-free. The government’s president states that the change will raise a considerable amount of extra tax revenue.

(iv) Comment on the president’s statement in relation to future contributions and accumulated pension funds. [4]

[Total 18]

3 A large defined benefit pension scheme holds 100% of its assets in equities.

- (i) Outline the possible impact of poor equity returns on the scheme members' benefits. [4]

The managers of the scheme wish to reduce investment risk. They are considering moving a significant proportion of the scheme assets into a fixed interest bond fund which invests in global government bonds.

- (ii) Set out the reasons why this bond fund may not be the most appropriate investment for the scheme. [3]

The managers have yet to agree on a particular bond fund but have asked the actuary advising the scheme to determine an appropriate proportion of the fund to be invested in bonds.

- (iii) Describe how an asset-liability modelling exercise could be carried out to assist the managers in deciding the proportion to be invested in bonds. [5]

In light of the asset-liability modelling exercise, the scheme managers have decided to move 50% of the scheme's assets into bonds.

- (iv) Discuss the practical issues that the managers should consider in making the switch to the chosen bond fund. [5]
[Total 17]

4 A final salary defined benefit pension scheme provides an option for its members to take a retirement benefit at a date earlier than normal retirement age. The following information is available:

Normal retirement age:	65
Benefits payable on death:	nil
Funding assumptions:	
Discount rate:	7% per annum
Pension increases in payment:	3% per annum
Revaluation of deferred pensions:	4% per annum
Mortality table:	PMA92C20

The early retirement factor at age x is expressed as a percentage of the member's accrued pension revalued to age x .

- (i) Calculate, using an equation of value, the early retirement factor for a deferred pensioner aged 58, stating any additional assumptions that you make. [5]
- (ii) Discuss why different early retirement factors may be adopted for active members compared with deferred pensioners. [5]

[Total 10]

- 5** An actuarial valuation for a defined benefit pension scheme is now due. The following market yields are prevailing as at the actuarial valuation date:

Long dated fixed interest government bond yield	3.0% per annum
Long dated index-linked government bond real yield	0.5% per annum
Long dated investment grade corporate bond yield	4.0% per annum
Equity market dividend yield	3.5% per annum

The scheme's assets are invested 25% in government bonds, 25% in investment grade corporate bonds and 50% in equities.

- (i) Suggest, with reasons, assumptions for the discount rate and price inflation under the following approaches:

- (a) mark to market method
- (b) asset-based discount rate

For each approach, you may assume that the same single discount rate is to be used both pre-retirement and post-retirement. [6]

The scheme provides annual pension increases in line with price inflation, subject to a cap of 3% and a floor of 0%.

- (ii) Discuss how the pension increase assumption may be derived from the price inflation assumption. [4]

- (iii) Discuss whether the sponsoring employer might prefer the scheme to be funded using best estimate funding assumptions or prudent funding assumptions. [4]

[Total 14]

- 6** The regulator of a country requires sponsors of pension schemes to disclose information to members of pension schemes. This includes publishing audited scheme accounts including information about the scheme's investment strategy and funding level, and the provision of annual benefit statements to members.

- (i) Explain why the regulator may require this information to be disclosed. [5]

A sponsoring employer of a defined contribution scheme is preparing benefit statements for its members. Under the provisions of the scheme, both employer and members contribute and members can choose from a range of funds in which to invest the contributions. Each year, the benefit statements will include a single projection of the pension that the member's fund accumulated to date is expected to provide at normal retirement age. The projection is based on an assumed investment return of 7% per annum and current annuity rates.

- (ii) Outline the shortcomings of this approach to benefit statements. [4]

- (iii) Suggest improvements that could be made to the benefit statements to overcome these shortcomings. [4]

[Total 13]

- 7** A defined benefit pension scheme has assets of £100m and an accounting deficit of £45m. The scheme is managed by a board of trustees.

The balance sheet position of the sponsoring employer can be summarised as follows:

<i>Assets</i>		<i>Liabilities</i>	
Intangible assets	£50m	Debt	£90m
Property	£25m	Pension deficit	£45m
Cash	£5m	Trade creditors	£15m
Stock	£40m	Shareholder funds	£5m
Debtors	£35m		
<i>Total</i>	<i>£155m</i>	<i>Total</i>	<i>£155m</i>

Last year, the sponsoring employer made pre-tax profits of £10m.

- (i) Discuss whether the sponsoring employer should be assessed by the trustees as “viable ongoing” or “in distress”. [10]

As a result of further information received, the trustees have concluded that the sponsoring employer is “in distress”.

- (ii) Describe the courses of action that the trustees should consider as a result of their conclusion. [6]

Pensions in payment are currently increased annually in line with inflation. The sponsoring employer is proposing to offer members, at the point of retirement, the option of exchanging their inflation-linked pension for a higher pension without pension increases. Current pensioners will not be included in the exercise. The conversion factors are determined so that the actuarial value of the uplift to the pension is expected to be 90% of the value of the pension increases surrendered.

- (iii) Outline the advantages and disadvantages to the sponsoring employer of this proposal. [4]
[Total 20]

END OF PAPER