

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2017

Subject ST4 – Pensions and other Benefits Specialist Technical

Introduction

The Examiners' Report is written by the Principal Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

Luke Hatter
Chair of the Board of Examiners
July 2017

A. General comments on the *aims of this subject and how it is marked*

1. The aim of the Pensions and Other Benefits Specialist Technical subject is to instil in successful candidates the ability to apply, in simple situations, the mathematical and economic techniques and the principles of actuarial planning and control needed for the operation on sound financial lines of providers of pensions or other employee benefits.
2. This subject examines the ability of candidates to apply core actuarial techniques and concepts, together with specific knowledge of pensions and other benefit arrangements to simple, but practical situations.
3. The Examiners therefore look for candidates to apply their knowledge of the core reading to the specific situation that the Examiners asked, having read the question carefully. Too many candidates write around the subject matter of the question in more general fashion, or focus on one aspect of the issue at great length, in either case gaining few of the marks available.
4. Good candidates demonstrate that they have used the planning time well - an attempt to get a logical flow is a big advantage in making points clearly and without repetition. This also enables candidates to use the latter parts of questions to generate ideas for answers to the early parts (or use their solutions to earlier parts of questions to create a structure for latter parts). Time management is important so that candidates give answers to all questions that are roughly proportionate to the number of marks available.
5. Candidates who give well-reasoned points, not in the marking schedule, are awarded marks for doing so.

B. General comments on *student performance in this diet of the examination*

1. The overall standard of scripts was similar to the previous session, with candidates over recent years maintaining a very consistent level of performance. This paper was more challenging than ST4 papers in recent diets and so an adjustment was applied to every candidate's marks to allow for this.
2. It is very important that candidates consider all aspects of the question, and read the preamble fully. There is never superfluous information in the question, and by using all of the information available, candidates can ensure they give a full answer. Giving just a little more to clearly show depth can turn a close fail into a pass. The questions are set so that it should take approximately twice as long to answer a 10 mark question as a 5 mark one. Answers should therefore be similarly proportionate.
3. In addition, candidates should carefully consider the command verbs used to guide the depth given in their answers (a list of what is expected for each verb is available on the IFoA website).
4. Taking care in these points of technique will help students score better.

5. More detailed feedback is provided on each question below.

C. Pass Mark

The Pass Mark for this exam was 55.

Solutions

Q1 (i)

- an annuity at retirement [½]
 - which may be enhanced if the member is in poor health [½]
 - which is either fixed or varies during retirement [½]
 - and may have a dependant's pension on death before retirement [½]
 - and may also have a dependant's pension on death after retirement [½]
 - and may offer some capital protection on death (e.g. refund of member contributions) [½]
 - drawdown payments funded by the remaining DC assets of the member during retirement [½]
 - which may need to be converted to an annuity once a trigger point is reached (e.g. age or fund size related) [½]
 - Risk benefits (e.g. PMI, Ill health early retirement) [½]
 - a cash payment at retirement [½]
 - a payment to another approved pension arrangement either at or before retirement [½]
 - a loan backed by the DC assets of the member [½]
 - investment guarantees / underpins [½]
- [Max 4]

(ii) (a)

- Poor investment performance before retirement limits the size of the DC retirement fund but may only impact on DB members if the employer becomes insolvent and the scheme is underfunded [1]
- a lack of investment options limits the size of the retirement fund but would not directly affect DB scheme members [½]

- member makes poor investment choices limiting the size of the retirement fund [1/2]
 - Inflation risk - members of both the DB and DC scheme bear the risk of pensions reducing in real terms if they are not inflation-linked; but for DC members it is usually their decision as to how benefits are taken [1/2]
 - insufficient contributions are paid to the fund before retirement [1/2]
 - poor annuity rates at retirement (if annuity option selected) [1/2]
 - high longevity means that money runs out in retirement (if drawdown option selected) [1/2]
 - early death after retirement (if annuity option is selected) [1/2]
 - poor investment performance after retirement (if drawdown option selected) [1/2]
 - early death before retirement means only a small fund is available to finance dependants' benefits [1/2]
 - the provider defaults [1/2]
 - surrender penalties if the member transfers to a new arrangement [1/2]
 - high expenses diminish the fund value [1/2]
 - penal tax rates at the point at which benefits are taken may differ for DC and DB members [1/2]
- (b)
- uncertain cost if matching contribution structure is used [1/2]
 - cost of administration, communication and advice if employer runs own arrangement may differ for DC and DB pension schemes [1/2]
 - need to finance higher benefits if DC fund is inadequate for workforce planning reasons [1/2]
 - productivity risk if less productive employees cannot afford to retire [1/2]
 - uncertain cost of financing risk benefits for DB and DC members [1/2]

- providing compensation for member exit penalties if there is a need to change provider [1/2]
 - legislative risks may impact future costs e.g. introduction of minimum DC employer contribution rates [1/2]
 - the employer bears the investment risk in a DC scheme only to the extent that there are investment guarantees. For a DB scheme the employer bears all the investment risk. [1/2]
 - the employer bears salary risk only in a DC scheme to the extent that the contribution rates are linked to salary. The employer bears the salary risk in a DB salary-related scheme. [1/2]
 - the employer bears the inflation risk where benefits are linked to inflation in a DB scheme but does not in a DC scheme [1/2]
 - the employer bears the longevity risk in a DC scheme only to the extent that there are benefit guarantees e.g. guaranteed annuity rates. The employer bears the longevity risk in a DB scheme. [1/2]
 - the employer may face greater opportunity cost risk in a DC scheme than a DB scheme as contribution requirements are usually more inflexible. [1/2]
- [Max 7]

(iii) *Credit will be given for any reasonable assumptions and a suitable calculation methodology*

Assumptions

- Assume the estimate is required on a realistic basis and therefore there is no requirement for prudence in the assumptions [1/2]
- Consider current members only – no allowance for new entrants [1/2]
- And that members do not need to contribute [1/2]
- And that expenses are ignored [1/2]
- And that the DC scheme does not provide risk benefits in excess of the value of the fund [1/2]
- For the scheme in question, assume that the average period to NPA is 20 years [1/2]
- And that the discount rate is 4% p.a. [1/2]
- And that average salary increases to NPA are 3% p.a. [1/2]

- Assume members take maximum cash at NPA [½]
- Assume a £1 pension with increases at 3% p.a. and 50% contingent spouses is worth £30 [½]
- Assume a spouse's annuity is 30 and the average age of death is 50 [½]
- Assume a survivor probability to retirement of 0.95 [½]

Calculations

- The long term cost of the defined benefit scheme can be considered as the discounted value of prospective benefits (determined using the entry age or attained age method) [½]
- Calculated and summed on an individual basis [½]
- In this case the average long term expected cost per member for retirement benefits approximately equals;

$$0.95 \times 20/60 \times (1.03)^{19} / (1.04)^{20} \times (0.2 \times 12 + 0.8 \times 30) = 6.690 \quad [1]$$

- And the cost of risk benefits needs to be added to this [½]
- Which is approximately;

$$0.05 \times (5 + 1 / 3 \times 30) / 1.01^{10} = 0.679 \quad [1]$$

- So the total long term cost is $6.690 + 0.679 = 7.369$ [½]
 - The cost of the benefits then needs to equate to the value of contributions payable (represented as a flat rate of member's total pay) [½]
 - The discounted value of 1% p.a. contributions payable for 20 years is 0.182 [1]
 - So the long term contribution rate = $7.369 / 0.182 = 40.5 \%$ [½]
- [Max 8]

(iv)

- Although the employer is paying contributions at the expected long term rate for the defined benefit scheme, there are many reasons why the actual cost of the defined benefit scheme might turn out to be different to this [½]
- In particular, the assets supporting the defined benefit scheme may produce an investment return that differs from the discount rate [½]
- The salary experience of members may be different to the 3% p.a. assumed in the calculation [½]

- The cash commutation rate (less than 20% commuted) may be different in practice [1/2]
- The conversion terms (the trustee may review these) may be different in practice [1/2]
- There is pre-retirement longevity risk under the defined benefit scheme which could impact the cost of pensions payable under the defined benefit scheme [1/2]
- There is post-retirement longevity risk under the defined benefit scheme which could impact the cost of pensions payable under the defined benefit scheme [1/2]
- Dependant numbers and characteristics may be different than assumed [1/2]
- The trustees may award discretionary benefits [1/2]
- For example additional pension increases [1/2]
- There will be different levels of operating expenses [1/2]
- The cost of risk benefits could be different to the assumption made (e.g. if experience is worse than the assumption – even if the benefit is insured the adverse experience will lead to an increased cost) [1/2]
- There may be new entrants with a different demographic profile to the current membership [1/2]
- And they are likely to be younger meaning that the rate of 40.5% is higher than needed to provide a replacement benefit [1/2]
- There may be other changes to the demographic profile of the membership impacting a particular age group (e.g. redundancy exercise) meaning that the average long term rate is not appropriate for the remaining members [1/2]
- There may be more early leavers from the scheme with anticipated lower benefits as the salary-link is broken [1/2]
- ... for example if the scheme discontinues (e.g. due to employer insolvency) [1/2]
- The tax treatment of benefits/assets might change in a way that impacts DB and DC schemes differently [1/2]
- Other changes to regulation/legislation may have a differential impact (e.g. compulsory inflation indexation on pensions in payment) between DB and DC benefits [1/2]

- The actual cost of the DC scheme is the actual contributions paid, however they may be reasons why additional non-standard contributions may be required [½]
- ... for example if the DC scheme has investment or benefit guarantees or includes an element of matching contributions [½]

[Max 6]

[Total Max 25]

- | | |
|------------|--|
| Part (i) | Generally reasonably well answered. |
| Part (ii) | Generally well answered although many candidates simply listed DC and DB risks, rather than comparing the two. |
| Part (iii) | Poorly answered by most. Many candidates were unable to construct a reasonable equation of value. Many candidates did not use the information given on commutation and death benefits. |
| Part (iv) | Many candidates made a reasonable attempt but lacked detail about the experience items that could result in the costs differing. |

Q2 (i)

- At retirement age in good health (conversion to an immediate lump sum payment) [½]
- Transfer of individual accrued rights prior to retirement to another pension arrangement [½]
- Bulk Transfer of accrued rights prior to retirement to another pension arrangement [½]
- On grounds of triviality at any age (conversion to an immediate lump sum payment) [½]
- On grounds of serious ill-health (conversion to an immediate lump sum payment) [½]
- Buy out of the liabilities with an insurance company [½]
- Winding up lump sum [½]

[Max 2]

(ii) General points

- The trustees are particularly concerned with the security of the scheme and will not wish to set factors which lead to a reduction in security [½]

- The trustees will consider the best interests of all members and will wish to be fair to both those who choose to take the option and those who do not [1/2]
- Both these principles may lead to the use of best estimate assumptions [1/2]
- Consistency between the current and revised factors and different options may be considered [1/2]
- The trustees will need to consider administration issues [1/2]
- The trustees will need to consider communication issues [1/2]
- The calculation should be a type of equation of value where the cash payment reflects the value of the alternative pension payment using a set of assumptions [1/2]
- Should the assumptions be prudent or best estimate or use an alternative approach? [1/2]
- And to what extent should the discount rate reflect the investment strategy adopted by the scheme? [1/2]
- Should the lump sum vary in line with market conditions? [1/2]
- Should the factor be determined on a unisex basis or should different factors be used for males and females? [1/2]
- To what extent should the conversion include any contingent dependant's pension? [1/2]
- To what extent should the terms make an allowance for discretionary pension increases? [1/2]
- To what extent should the terms reflect the tax treatment of the benefit in the hands of the beneficiary in particular if they are tax exempt? [1/2]
- To what extent should the lump sum payment reflect the funding position of the scheme? [1/2]
- To what extent should the value reflect any change to scheme expenses? [1/2]
- Need to consider the details of trust deed and rules [1/2]
- And consider who has the power to set the terms [1/2]
- Consider the complexity of the calculation [1/2]

- And the associated administration cost involved [½]

(a) **Cash commutation factors**

- For cash commutation, use of prudent assumptions would provide a lump sum payment higher than the expected cost of providing the alternative pension through the scheme [½]
- Therefore it is more common to use best estimate assumptions [½]
- Which reflect the returns expected from assets that match the pensioner liabilities [½]
- These are often gilt based but there may be an element of growth assets [½]
- particularly if the scheme is supported by an employer with a strong covenant [½]
- For cash commutation, it is common to offer fixed factors in order to assist the member with retirement planning [½]
- Note there is a potential conflict between the use of non-market related and best estimate assumptions, and some prudence can be used so that the factors represent fair value across a range of different market conditions [½]
- Cash commutation is a member option and there is a potential selection risk if the member is not in good health [½]
- And therefore the use of relatively heavy mortality assumptions can be justified [½]
- Life expectancy for males and females is significantly different so often higher conversion factors are offered to females as a result [½]
- Life expectancy is also affected by other factors, such as age at retirement, whether the member is retiring on the grounds of ill-health and occupation, which may lead to the use of different factors [½]
- Discrimination legislative requirements need to be considered [½]
- In most circumstances, it is only the member pension that is commuted in order to retain the pension right for the spouse [½]

- Discretionary increases are often included if there is an established practice of awarding them [1/2]
- Although there is a risk of overpayment since an uncertain benefit is being capitalised [1/2]
- Prevailing legal requirements will determine whether it is permissible to offer a lower lump sum to 'share' the tax break with the scheme [1/2]
- Usually there is no adjustment for underfunding (particularly if pensions are not being reduced – as will often be the case if priority is given to pension benefits on a scheme wind-up) [1/2]
- And there is unlikely to be any increase to reflect funding surpluses [1/2]
- In practice, there is little impact on scheme expenses (a pension will still need to be paid, the calculation and payment processes are straightforward, and there may be no need for advice) so no adjustment is made [1/2]

(b) Transfer values

- Best estimate assumptions are usually used (as for cash commutation lump sums) [1/2]
- But there may be a higher discount rate to reflect the fact that the liabilities for deferred pensioners are more likely to be backed by growth assets [1/2]
- The value is often adjusted to reflect market conditions at the time of payment [1/2]
- Because the need for retirement planning is less clear cut, the payment is usually being made in relation to a former (rather than current) employee and there is a greater need to protect the funding position of the scheme since the entire benefit is being settled [1/2]
- The specifics of the transferring member are usually taken into account to the extent that is practical and permissible by legislation e.g. age, sex, status (i.e. staff, works, executive) [1/2]
- However selection risk may exist where this is not practical e.g. marital status where single members could benefit from taking a transfer value which includes an allowance for dependents benefits to convert to single life benefits only [1/2]

- Transfer values are often offered on a sex specific basis to reflect higher longevity for females (similarly to cash commutation factors) [½]
 - It is usual to include the spouse's pension in the transfer value calculation [½]
 - so that the whole benefit is settled and the scheme retains no further liability [½]
 - Similar considerations apply in relation to the inclusion of an allowance for discretionary benefits as for cash commutation factors [½]
 - Transfer values are usually made from one scheme to another with similar tax status so the potential for a change in tax treatment is unlikely to arise [½]
 - Transfer values are often adjusted to reflect the funding position of the scheme [½]
 - particularly if the sponsoring employer offers a weak covenant and there is a realistic prospect of the scheme not achieving full funded status in the long term [½]
 - There is an expense saving if a transfer value is taken (there is no longer any need to incur administrative expenses in paying the associated pension) [½]
 - but there is an expense cost in undertaking the calculation and making the payment (not straightforward if market conditions are reflected, and there may be the need for advice and due diligence on the receiving scheme) [½]
 - However, often these are seen as offsetting so that no adjustment is made [½]
 - The allowance for options needs to be considered, especially where these are favourable [½]
 - Value for money versus member contributions paid in [½]
 - Value for money compared to any previous transfer value paid in [½]
- [Max 16]

(iii)

- Setting the same terms would likely lead to changes to the factors for at least one of the options which will affect ... [1/2]
- ... the take up of the option ... [1/2]
- ... which will impact on the funding position and the contribution requirements of the scheme [1/2]
- Members may choose to take a transfer value near retirement (as the terms are the same as cash commutation) in order to access their entire liability ... [1/2]
- ... which increases members flexibility and choice [1/2]
- ... and reduces the risks to the scheme [1/2]
- The investment strategy may need to be reviewed if take up increases, in particular as more liquid and marketable and less volatile assets may need to be held [1/2]
- Note that cash commutation terms are only relevant for retirement benefits and there may be a minimum age (e.g. 55) below which retirement (in good health) is not an option, so that cash commutation terms are not applicable [1/2]
- In contrast, transfer values are often only available in relation to benefits that have not fallen due for payment (although it is possible that a transfer payment may be offered at retirement instead of a commutation lump sum) [1/2]
- The trustees' proposal to set the same terms may therefore only apply to a relatively small age range (where cash commutation and transfer values are both options) (although in practice to be consistent this approach is likely to constrain the factors that are used outside this age range) [1/2]
- In order to use the same factors, this will require either transfer values to be fixed or cash commutation factors to be market related [1/2]
- Fixed transfer values may mean that the payment causes a strain to the scheme during times when markets are depressed [1/2]
- Market related cash commutation factors will make it difficult for members to plan for their retirement [1/2]
- In order to use the same factors, the same discount rate will need to be used (i.e. either gilt based for transfer values or growth based for commutation factors) [1/2]

- In either case, there is a potential mismatch between the asset and the liability for the scheme which may lead to financial volatility [½]
- In order to use the same factors, this will require either transfer values to exclude allowance for spouses pensions or cash commutation factors to include an allowance for spouses pensions [½]
- As long as the terms are fair, this should have little impact from a scheme funding perspective although there will be administrative complications of creating and maintaining a spouses pension record (after the member has transferred) [½]
- From the member perspective, there may be a desire for a consistent approach to the inclusion or exclusion of spouses pensions between the two factors (although the preference of the actual approach may vary between members) [½]
- The opportunity for commutation factors to share tax breaks with the scheme is removed if the same terms are used (since similar tax breaks are unlikely to apply to the calculation of transfer values) [½]
- If the scheme is underfunded, the options would be for the cash commutation factors to reflect the underfunding or the transfer values to make no adjustment for underfunding [½]
- From the scheme's perspective, there is a risk that payments are made in excess of the share of the fund if transfer values are not reduced, which may benefit those members (particularly where the employer offers a weak covenant) [½]
- From the member's perspective, a reduction in cash commutation terms to reflect underfunding will be perceived to be unfair (particularly where pensions are not being reduced) [½]
- And make it less likely for the member to take the option [½]
- Which would have a cost implication for the scheme (loss of commutation profits compared to the prudent funding reserve) [½]
- However, despite the above issues, offering the same terms for cash commutation and transfer values is intuitively appealing to members, and can make communication simpler and more effective. [½]

[Max 7]

[Total Max 25]

<p>Part (i) Answered reasonably well with most candidates mentioning two or three unique situations.</p>
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Part (ii) Most candidates covered most of the general points but did not cover sufficient points to score well.

Part (iii) Generally well answered.

Q3 (i) Defined ambition schemes that are more defined benefit in nature include:

- Career Revalued Average Earnings (CARE) schemes [½]
- Cash balance schemes [½]
- Schemes where the retirement age is varied in line with changes to expected longevity [½]
- Schemes where the benefits may depend to some extent on the performance of underlying insurance or investment contracts [½]
- Schemes offer a minimum core defined benefit but funded to provide additional discretionary benefits (depending on scheme funding position) [½]
- Schemes offer a minimum core defined benefit but funded to provide additional discretionary benefits (depending on sponsoring employer business performance) [½]
- Schemes where benefits are converted to DC upon certain contingent events [½]
- Schemes where the retirement age varies in line with changes to State Pension Age [½]
- Defined benefit schemes with a minimum pension calculated on a DC basis [½]
- Final salary scheme with salaries subject to a maximum amount or level of increase [½]
- A shared cost scheme [½]

Defined ambition schemes that are more defined contribution in nature include:

- Defined contribution schemes with investment smoothing (such as with profit funds) [½]
- Defined contribution schemes with a minimum defined benefit pension [½]

- Defined contribution schemes where contributions vary in order to target a particular pension calculated on a defined benefit basis [1/2]
- Defined contribution schemes with minimum benefit (e.g. money back) or investment guarantees [1/2]
- Schemes where the premium is used to secure a with profit deferred annuity on prevailing market terms at the date the premium is paid [1/2]
- A collective DC scheme where risks are shared between the members [1/2]
[Max 6]

(ii) (a) In relation to longevity risks:

- CARE – no effective risk mitigation [1/2]
- Cash balance – effective [1/2]
- since fund is used to purchase benefits at retirement in the external market [1/2]
- Retirement age varies with longevity – partially effective – can mitigate pre-retirement longevity risk [1/2]
- but post-retirement risk remains [1/2]
- Benefits depend on performance of underlying insurance/investment contracts – insurance contracts where performance depends on changes to longevity (including swaps) are likely to be effective [1/2]
- Core DB with discretionary benefits from scheme surplus – partially effective [1/2]
- since surplus will be reduced if longevity improves [1/2]
- Core DB with discretionary benefits from company performance – no effective risk mitigation other than that created by having less DB [1/2]
- Benefits are converted to DC upon certain contingencies – effective [1/2]
- since conversion to DC should eliminate longevity risk [1/2]
- Retirement age varies with State Pension Age – minor mitigation of pre-retirement longevity risk [1/2]

- given loose correlation between longevity and State Pension Age [1/2]
 - Defined benefit schemes with a DC guarantee – only effective where the guarantee bites [1/2]
 - and on the assumption that the benefit is then secured outside the scheme [1/2]
 - Final salary scheme with salaries subject to a maximum amount or level of increase – no effective mitigation [1/2]
 - Shared cost scheme - partially effective [1/2]
 - since the increase in contributions if longevity improves will be shared with members [1/2]
 - Defined contribution scheme with investment smoothing – no longevity risk to mitigate [1/2]
 - Defined contribution scheme with a minimum defined benefit guarantee – introduces potential longevity risk [1/2]
 - and higher longevity will make the guarantee more valuable [1/2]
 - Targeted defined contribution scheme – may introduce a longevity risk [1/2]
 - if contributions increase because benefit target is more valuable as a result of increased longevity [1/2]
 - Defined contribution schemes with minimum investment or benefit guarantees – if guarantees are independent of longevity then no risk to mitigate [1/2]
 - With profit deferred annuity schemes – may introduce some longevity risk depending on the size of the guaranteed benefits [1/2]
 - and the operation of the with profits contract [1/2]
 - Collective DC scheme – no longevity risk to mitigate [1/2]
- (b) In relation to the risk of high salary inflation:
- CARE – largely effective [1/2]
 - since benefits are revalued in line with an index rather than individual salary progression [1/2]

- although annual accrual increases with salary inflation [½]
- Cash balance – largely effective [½]
- since benefits are determined by a fund value that increases in line with an index (or other measure not linked to personal salary inflation) [½]
- although annual accrual increases in line with salary inflation [½]
- Retirement age varies with longevity – unlikely to be effective [½]
- although salary inflation at older ages is likely to be modest [½]
- Benefits depend on performance of underlying insurance/investment contracts – no effective risk mitigation since contract performance will not be linked to salary experience (no market for this type of contract) [½]
- Core DB with discretionary benefits from scheme surplus – partially effective [½]
- since surplus will be reduced if salary inflation is high [½]
- Core DB with discretionary benefits from company performance – no effective risk mitigation other than that created by having less DB [½]
- Retirement age varies with State Pension Age – unlikely to be effective although salary inflation at older ages is likely to be modest [½]
- Benefits are converted to DC upon certain contingencies – effective as no salary risk with DC arrangements [½]
- Defined benefit schemes with a DC guarantee – largely ineffective since high salary inflation makes it less likely that the guarantee will bite [½]
- Final Salary scheme with salaries subject to a maximum amount or level increases – effective risk mitigation which will depend on how salaries are restricted [½]
- A shared cost scheme – partially effective [½]
- since the increase in contributions if salary inflation is high will be shared with members [½]

- Defined contribution scheme with investment smoothing – no salary risk to mitigate [½]
- Defined contribution scheme with a minimum defined benefit guarantee – introduces a salary risk and high salary inflation means the guarantee is more likely to bite [½]
- Targeted defined contribution scheme – introduces a salary risk since the target benefit will be higher [½]
- Defined contribution schemes with minimum investment or benefit guarantees – if guarantees are independent of salary then no risk to mitigate [½]
- With profit deferred annuity schemes – no salary risk to mitigate [½]
- Collective DC scheme – no salary risk to the sponsor to mitigate [½]
- For all the DC scheme in nature options, higher salary inflation will lead to higher salary-related sponsor contributions to the DC scheme [½]

[Max 14]

[Total Max 20]

- | | |
|-----------|---|
| Part (i) | Answers varied, with some candidates able to produce a reasonable list of defined ambition types but others not clear and sometimes listing investment choices or member options. |
| Part (ii) | Generally poorly answered, with many candidates failing to justify their assertions. |

Q4 (i)

- Pension at retirement [½]
- Lump sum payment at retirement [½]
- Long term care including nursing [½]
- Life assurance [½]
- Other financial and support benefits to survivors [½]
- Medical benefits (to cover accidents, critical and other illnesses) [½]

- Pension benefits if permanently disabled [½]
- Salary continuation (to cover holidays, sick leave, maternity/paternity leave) [½]
- Unemployment benefits [½]
- Financial compensation on redundancy [½]
- Subsidised healthcare (e.g. prescription drugs) [½]
- Payments on birth of a child [½]
- Child support payments [½]
- Free or subsidised education [½]
- Subsidies for other services/goods (e.g. transport, housing, access to IT, wellness) [½]
- Financial benefits on marriage e.g. tax concessions [½]
- Financial and support benefits to carers [½]
- Universal basic income [½]
- Lifetime ISA or similar savings arrangements where the State contributes [Max 6]

(ii) Relative effectiveness

- Not all adults are employed so employers will not be able to deliver to the entire target population [1]
- Centralised delivery through the State is more likely to minimise operational and administrative costs [½]
- Delivery by employers is likely to require some element of external insurance [½]
- perhaps to cover catastrophe risk or mitigate liquidity risk [½]
- The State should be able to absorb the cost without the need for external insurance although this could be channelled through a State sponsored insurance company [½]
- The employer will have more immediate information on deaths [½]

- and payments could be delayed if the State is the provider – this might be important if the benefit is intended to cover funeral expenses [1/2]
- The employer will have better access to more information on beneficiaries [1/2]
- it may be difficult for the State to determine potential beneficiaries e.g. if the member is not married [1/2]
- The employer may be able to incorporate the benefit (and the claim process) within existing life assurance arrangements [1/2]
- The employer may provide a better tailored life assurance amount, for example relating to the employees current salary

[Max 4]

[Total Max 10]

Part (i)	Very well answered.
Part (ii)	Generally well answered.

Q5 (i) A self-sufficiency basis

- Adopts very prudent assumptions [1/2]
- Assumes a derisked investment strategy [1/2]
- That the scheme will continue to meet its liabilities (including expenses) on an ongoing basis [1/2]
- On the assumption that the employer will not provide any further financial support [1/2]

[Max 2]

(ii)

- To reduce the costs associated with divesting and transferring the assets to an external provider [1/2]
- To avoid investing in insurance contracts which generate profits for the provider [1/2]
- There may be a lack of insurers willing to take on the liabilities [1/2]
- To retain freedom to invest in some higher yielding assets, such as corporate bonds [1/2]
- Which may generate surplus assets in the future [1/2]
- Which may allow the trustees to award discretionary benefits such as pension increases [1/2]

- There may still be a deficit on insurance company buyout basis [½]
 - Which the sponsoring company cannot afford to pay [½]
 - The sponsoring company may be willing and able to stand behind the scheme [½]
 - Should a deficit emerge in the future [½]
 - The trustees may be looking for a more cost efficient means of managing longevity risk [½]
 - Such as the use of a swap contract [½]
 - As the scheme is fully funded on self-sufficiency the benefit security risk is likely to be within the trustees' risk tolerance [½]
 - As self-sufficiency is likely to cost less than buy out the risk of members' benefits being reduced due to insufficient funding is lower if the self-sufficiency approach is retained [½]
- [Max 4]

(iii)

- The scheme will continue to run some investment risk [½]
- As it will be impossible to find assets that exactly match the cash outflows from the scheme [½]
- And longevity risk [½]
- Although this can be mitigated to a large extent through the use of a swap contract [½]
- There is a risk that the expenses involved in running the scheme are higher than expected in particular as the scheme shrinks in size [½]
- Therefore it is possible that deficits will emerge in the future [½]
- So that the scheme will become reliant on the sponsor once again [½]
- And the ability and willingness of the sponsor to meet these unexpected payments at some unknown future point of time will be in doubt [½]
- Therefore the members continue to run the risk that benefits may not be paid in full [½]
- This risk is likely to impact the younger members to a greater extent since it is the later payments that are most at risk [½]

- The application of any future surplus may not be equitable across the membership [1/2]
- For example, some members may have died before the surplus has been generated [1/2]
- This risk is likely to impact the older members to a greater extent since they are more likely to die sooner [1/2]
- It is likely that it will become uneconomic to run the scheme in this way at some point in the future [1/2]
- So that the trustees will probably need to approach the insurance market eventually [1/2]
- And the terms then on offer are unknown and may have deteriorated (e.g. as a result of potential excess demand from schemes) [1/2]

[Max 4]

[Total Max 10]

Part (i) Generally well answered.

Part (ii) Most candidates made a reasonable attempt.

Part (iii) Most candidates made many valid points but generally did not mention enough specific risks or their mitigation to score highly.

Q6 (i)

- The data will cover a historic period and will not reflect any subsequent changes in life expectancy [1/2]
- There will be random fluctuations in experience for even the largest schemes [1/2]
- Particularly at older ages where there are likely to be fewer members [1/2]
- And at younger ages where there are likely to be fewer deaths [1/2]
- The data may reflect unusual experience such as the effects of particularly bad weather or medical epidemics [1/2]
- Particularly as only one year's worth of experience has been used [1/2]
- There may be calculation error or errors in the data provided by the scheme [1/2]
- The approach omits any deaths that are "incurred but not reported" [1/2]

- The approach may be unsuitable for some groups of members e.g. senior executives who might be expected to display higher life expectancies [1/2]
 - And it would be usual to determine different tables for males and females [1/2]
 - Current experience may be helpful to assess the base table but will not provide any information on likely improvements in the longer term [1/2]
 - Use of a base table with no allowance for future improvements will materially understate actual life expectancies [1/2]
 - And the value placed on pension liabilities [1/2]
 - The results may not be relevant to different cohorts with the mix of members changing over time [1/2]
 - It is important to use assumptions appropriate to the purpose and type of valuation [1/2]
 - For example a funding valuation may require a prudent mortality assumption [1/2]
 - Consider consistency with the previous valuation and other valuations (e.g. solvency) [1/2]
- [Max 4]

(ii)

- Using a longer period than one year to increase the amount of data and reduce volatility [1/2]
- Consideration should be given to whether there are homogeneous groups within the population with different mortality profiles [1/2]
- And the study undertaken for each of these groups (assuming that there is sufficient reliable information) [1/2]
- Particularly males/females, white collar/blue collar and potentially by other worker types (e.g. those in hazardous occupations) [1/2]
- If the scheme is big enough, the review could split the results in to annual periods to check whether there is any evidence of trends over time [1/2]
- The results should be smoothed to eliminate random fluctuations [1/2]
- The results should be compared to standard tables for similar companies/industries to ensure that they are broadly consistent [1/2]

- The results should be brought up to date (e.g. by extrapolating past trends) [½]
- The results should be tested against the expected tables based on a postcode review [½]
- In theory, medical information could be obtained for a sample of members to check whether there are any particular biases [½]
- The review should consider the extent to which IBNR deaths have been a feature in the past and an appropriate adjustment to the crude rates should be made [½]
- The results should incorporate an allowance for future improvements to mortality [½]
- Based on studies by insurance companies, the actuarial profession or other similar institutions [½]

[Max 6]

[Total Max 10]

Part (i) Generally well answered.

Part (ii) Generally well answered. Some candidates went into detail about modelling techniques although the question was about modifying the given proposal.

END OF EXAMINERS' REPORT