

Institute of Actuaries of India

November 2010 EXAMINATION

Subject ST4 — Pensions & other Employee Benefits

Indicative Solution

A1	<ul style="list-style-type: none"> ○ The accounts provide an independent check of the valuation data ○ One would check for consistency against the sponsor contributions and member contributions. ○ The ratio of contributions should be consistent with the rates payable e.g. if company rate is 15% and the member rate is 3% then the ratio of contributions should be 5:1 ○ Using the member contributions one could check the reasonableness of the pensionable salary information provided ○ Membership numbers arrived at in the audit should tie up with the data provided ○ Total pensions paid in the year should be reasonably similar to the pension payroll data with the main exception of pension increases ○ The cash out flows such as transfers out, commutations paid should be consistent with the leavers and new retirees in the period ○ One can derive an approximate asset return from the accounts and that should be similar to the fund manager return declared ○ The investment income in the accounts should be consistent with the asset information 	
		[5]
A2	<p>i) Encourage infrastructure investment :</p> <ul style="list-style-type: none"> ● By discouraging pension schemes to investment overseas – either don't allow overseas investment or put a ceiling or make investment return (income and capital gains) from overseas investment taxable at reduced/full rate ● Set rules for investment where a minimum investment, say 15% is made in infrastructure projects as well as in government bonds, say 40 to 50% ● Make investment income/gains from other investments (other than infrastructure and government bonds) taxable at reduced/full rate ● Ensure that there is enough scope for investment in infrastructure investments and government bonds to support demand <p>ii) Higher paid:</p> <ul style="list-style-type: none"> ● Exclude the higher paid from scheme membership ● Limit the pension based on earnings up to a cap ● Tax benefit may be allowed on contributions at a lower/basic rate of tax ● Taxing investment return on funds in respect of higher paid ● Have a lifetime maximum pensionable accumulation amount for individuals that benefit from tax incentives <p>iii) Old age :</p> <ul style="list-style-type: none"> ● Don't allow lump sum benefits from the scheme or let them be allowed after tax ● Require index- linked benefits so that value does not erode in older age ● Compulsory family pension ● Require a portion of the pension to be held back to cover any old age nursing requirements after a particular age, say, after 75 or 80 years <p>iv) Physically /Mentally disabled dependents :</p> <ul style="list-style-type: none"> ● Allow higher contribution (tax efficient) from people with physically /mentally disabled dependants ● Special tax privileges may also be allowed to such people ● Government may also pay contributions (matching or otherwise) for the disabled dependant ● Allow breaks in contributions without penalty if time is taken out to care for dependants that can be made up later with full tax benefits over and above the benefits in that particular year 	
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A3	<p>a)</p> <ul style="list-style-type: none"> ▪ The ability to pay the pensioners is dependent on the cashflow in the company. This means the security risk for the pensioners is dependant on the company's financial status. ▪ The future liability for meeting these pensioners is unknown for the following reasons: <ul style="list-style-type: none"> ○ Longevity risk of the pensioner. Pensioners may live longer than expected ○ Spouse's may live longer than expected thereby the pensions being paid for even longer ○ In calculations of the liabilities that may be held as provisions in the financial statements, there would be an assumption of the age of the spouse. There is a risk spouses are younger than assumed thereby increasing the chance of longevity compared to that assumed ○ Increases in pensions due to inflation may be different than expected due to inflation being higher than expected. This not only means cashflows cannot be planned as well but also the liabilities increasing more than assumed ○ There is a risk that pensions are not stopped once death occurs if the company is not informed suitably ○ There is an administration risk that pensions are paid incorrectly for example in the case of tax rate changes, additionally administering new pensioners and ensuring they are suitably brought onto the pension payroll <p>b)</p> <ul style="list-style-type: none"> ▪ Review the assumptions used in the calculation of the actuarial liabilities by conducting an analysis of the actual mortality experience, the spouse's age ▪ This will mean more accurate assumptions and less variability but it may not be practical or realistic to conduct a mortality study (especially if it is not a large scheme or there is not sufficient past data). ▪ Longevity risk and cashflow risk can be mitigated by securing annuities at the time of retirement ▪ However, annuities may be costly as insurers will add a expense and profit margin to their annuity rates ▪ Depending on the market environment, inflation linked annuities may not be available or there may be very expensive. The company could look to hedge the inflation risk itself in the market but again this may be expensive. ▪ It will mean the company requires large cash lump sums to pay the premiums which it may not have ▪ The company could consider starting a fund for future retirees. This will, over the long term, help to meet cashflows from the fund and contributions can be spread out over the service period of the employee ▪ This may have tax advantages for the company by contributions being a tax deductible expense as well as the funds interest/ income being tax free as well 	
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	<ul style="list-style-type: none"> ▪ However, this does not explicitly reduce the existing pensioner liability risk ▪ Implement a tight process with HR informing the finance team in advance (at least quarterly) of the anticipated retirements to ensure that payroll is informed as well as the company is able to plan its cashflows ▪ Ensure that pensioner existence checks are conducted regularly by writing to them and asking for a certified signature to confirm their status and that of their spouse 	
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A4	<p>a) Scope of Benefit Design</p> <ul style="list-style-type: none"> ▪ Will the new design apply to new entrants only or both existing and new employees ▪ What schemes will be termed as “retirement” and therefore to be considered – possibly leave out leave encashment ▪ Which benefit will be targeted, only at retirement or also on leaving service / early retirement and/or death ▪ It will be important for the DC design to be sustainable in the long term and reflect the demographics of the employee profile ▪ The contribution rates decided should not change year on year ▪ Need to decide if the contribution rates will be uniform across all employees, by cadre or service or age (or a combination) <p>b) Determining contribution rate for new entrants</p> <ul style="list-style-type: none"> ▪ An entry age method is most appropriate to determine the long term rate at each entry age for each scheme ▪ Other methods may be appropriate e.g. PUM if the population is expected to be stable in terms of age and service ▪ This needs to be modelled at different sample entry ages and salary points for each scheme that is determined as part of the “retirement” benefits ▪ The starting point for the DC scheme contribution rate would be the 30% less the EAM rate for each of the schemes ▪ Multiple scenarios should be conducted to stress test the rates in order to come up with a robust rate. Scenarios should include changes in type of new entrants as well as changes in assumptions. ▪ Assumptions will be required for: <ul style="list-style-type: none"> ○ Investment return – set at best estimate or at a little prudent level so as to ensure protected against inadequacy of contribution rate to give a suitable accumulation of corpus ○ Salary Increase rate - This will especially be important where modelling the gratuity scheme because of the pace and extent to which people reach the maximum benefit amount in the future ○ Medical inflation rate – will apply like salary increases pre retirement and pension increases post retirement. A critical assumption that will have a material effect on the post retirement medical cost 	

	<ul style="list-style-type: none"> ○ Average medical cost – using past claims data (say three years) conduct an analysis to determine a unit per employee cost to use. Alternatively if the benefit is insured, one could use the past average annual unit premium rates as a proxy. ○ Mortality – most significant for the post retirement benefit once in retirement. Need to decide allowance for future improvements in mortality <p>Consideration also to be given for the targeted benefit while calculating the contribution.</p> <p>c) Other points regarding implementation</p> <ul style="list-style-type: none"> ▪ The company should agree the timeframe when the design is reviewed (for example in three or five years) ▪ The company will need to model projected population demographics and numbers in order to estimate future cash outlay for the scheme. The actual cost will vary depending on the actual make up of the population and their future salaries ▪ Being a DC scheme the death in service benefit will need to be provided separately through another arrangement (e.g. insurance) ▪ Communicating the rational for the contribution rate to employees will be difficult, giving illustrations of possible accumulations and total possible retirement benefits including all the schemes would be required ▪ Need to decide what investments will be made and whether employees will be given any investment choice ▪ Decide how the scheme will be administered. Internally or externally through a service provider 	
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A5	<p>a) The areas the accounting standards should address</p> <ul style="list-style-type: none"> ▪ Shareholders and potential investors make decision based on the information disclosed to them in the company's financial statements. ▪ When considering the employee benefit costs and liabilities they require information between companies to be consistent. ▪ Consistency has to be achieved as far as possible in a number of areas: <ul style="list-style-type: none"> ○ requiring the same actuarial method to be used by all companies and schemes. ○ the approach to setting assumptions should be the same ○ disclosure requirements should be the same ▪ The framework should not result in company's declaring over or under stated profit and liabilities ▪ The framework should adhere to the principal accounting concepts of accruals and going concern ▪ The disclosure requirements should give adequate information for readers to understand the risks of the liabilities, key sensitivities to the results and high level reasons for the change in the financial position of the schemes (and therefore 	

	<p>impact on the company's financial statements)</p> <ul style="list-style-type: none"> ▪ In setting assumptions, the following aspects need to be considered <ul style="list-style-type: none"> ○ Which party will be responsible for the final assumptions ○ Need to be in keeping with fair value (market value) accounting ○ The assumptions should be “best estimate” as far as possible to reflect realism ○ How will significant deviations in experience from the assumptions be accounted for and disclosed ▪ Which type of schemes will be included under the standard and how will their requirements for actuarial involvement and disclosures differ. (e.g. defined contribution schemes vs defined benefit as well as other staff costs such as wages and holidays) ▪ Give guidance as to how often actuarial valuations are to be conducted and specify whether/when approximate calculation (e.g. roll forwards) can be used for reporting purposes ▪ Will all companies need to adhere to the standard in exactly the same way or will there will some flexibility on disclosures for small companies (which need to be defined). <p>b) Actuarial methods could be used and state which you feel most appropriate and why</p> <ul style="list-style-type: none"> ▪ EAM <ul style="list-style-type: none"> ○ results in a high level of liability and therefore may be too prudent. The incremental cost each year would be the same by the nature of the funding method and so does not reflect the pace at which the actual cost for a typical defined benefit scheme emerges through the service of an employee. ○ It does project salary to the point of exit reflecting the accrual concept and ongoing concept ▪ AAM –similar point to the EAM with regards to emerging cost ▪ PUM <ul style="list-style-type: none"> ○ uses projected salaries to exit reflecting ongoing concept ○ the basic cost of benefit emerges one year at a time and reasonable uniform throughout the service rendered by an employee, in keeping with the accrual concept ○ it means the liability measured is also more realistic ▪ CUM <ul style="list-style-type: none"> ○ Does not project salary and the cost emerges exponentially with service so not appropriate 	
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A6	<p>a)</p> <ul style="list-style-type: none"> • Need to split members in homogeneous sub-groups based on age, service or according to other factors that are expected to be closely correlated to salary growth. • Consider only actives throughout inter-valuation period as new entrants and exits distort picture. • The analysis could be performed by the production of table along the following lines: <ul style="list-style-type: none"> ○ In column (1), age (as per the definition) at this valuation date ○ In column (2), salaries at previous valuation for members now age x (represents members aged (x-3) last time) ○ In column (3), salaries at this valuation for members age x ○ In column (4), (3)/(2) is the increase in salary in the three years period for (x-3) to x. • Any stable pattern of differences between the figures in this column at different ages may then indicate the existence of a correlation between salary growth and age • It may be further investigated, whether this age related salary growth is consistent with the assumptions or other possible tables for such growth, the following extra columns could be added to the analysis table: <ul style="list-style-type: none"> ○ In column (5), s_x/s_{x-3} (s is an assumed salary inflation including general inflation rises as well as promotional/age-related rises) ○ In column (6), (4)/(5) as the Actual/Expected • Any differences will be explained by both general salary increases and promotional/age-related increases • Need now to consider how to split between promotional rises and general salary inflation. • One can speak to the employer to find out what their general increases have been • This can be done by the following approach <ul style="list-style-type: none"> ○ promotional scales used as given by employer or by considering the average profile of salaries at last and this valuation ○ consider progress of national average earnings • May note that this analysis cannot be expected to be perfect. Some subjectivity involved. <p>b)</p> <ul style="list-style-type: none"> • Results of the analysis should not be used blindly • Consideration should be given to whether the period under investigation was typical and experience is likely to be representative of future experience. • Trends, if any, due to economic cycles etc. should be detected and allowed for. • Care should be taken to ensure that sub-groups analysed are sufficiently homogeneous. • Credibility of data should be tested to ensure that results of the analysis are statistically credible. In particular, the group is under consideration is a medium sized and expected to have enough credibility to use as the basis for future experience projection. • If need, appropriate adjustments may be made to the assumptions to create a margin for prudence • Compare the results with what may be expected against market information and benchmarks (e.g. assumptions used by similar companies) 	
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A7	<p>a)</p> <p>A - Lump sum in advance when individual commences employment. B - Regular contributions throughout the period that the individual is employed. C - Lump sum at the time the individual retires. D - Pay-as-you-go as and when benefit payments are due.</p> <p>b)</p> <ul style="list-style-type: none"> • Surplus/deficit does not arise under D. • Generally, surplus might be dealt with by reducing future contributions, but there is no scope for this under A, and only limited scope under B and C surplus may arise after retirement. • An alternative is to take a refund of surplus. 	

	<ul style="list-style-type: none"> • Generally deficits are dealt with by the employer paying additional contributions. • Another option is to adjust benefits, but that defeats the objective. • There may be legislative constraints and/or tax implications. <p>c)</p> <ul style="list-style-type: none"> • Capital requirements can be considered in terms of economic capital or regulatory capital. • Regulatory capital will depend on what legislation applies (if any) and on what accounting rules apply. • Will need to assess the possible volatility of accounting expense and balance sheet so the company can plan and forecast appropriately • In economic terms, the company is taking on an obligation which reduces its available capital; the obligation is the value of the benefits and expenses that will arise. There are a variety of ways to value this but it is important to allow for the uncertainty: the risk that the actual obligation exceeds the expected cost. • The company could aim to secure this with an insurance contract at retirement - consider the expected premium - or even look at the cost of securing the benefit now. • Even if it is not intended to secure the benefit with insurance, the cost of doing so is a good measure of the cost of the capital required to provide it. • The company needs to ascertain whether the obligation accrues immediately or over the course of the member's career. The latter is preferable so that the capital cost can be met from profits over the period, which is the period that the company benefits from the individual's contribution. • Also consider the benefits payable if the individual dies or leaves before age 60. • There may be currency risk consider if that could be hedged. • The measurement will need to be conducted on a regular basis (e.g. annually) • It will be important to assess the cashflow requirements for the company depending on whether it will secure an insurance contract at the time of benefit entitlement or the company will pay the pension itself on an ongoing basis 	
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A8	<p>a) Sponsor covenant is the combination of the "ability" and "willingness" of the sponsoring employer to pay (or the ability of the Trustee to require the sponsor to pay) sufficient contributions to ensure the plan's benefits are paid as and when they become due.</p> <p>b)</p> <ul style="list-style-type: none"> ▪ Sponsor can be viewed as having ongoing and/or discontinuance obligations. ▪ Ongoing obligation may be determined by legislation or the requirements of the Trust Deed. Where the Trustees have full power to set the contribution level ▪ On discontinuance there may be an obligation to make good any deficit before the plan can be wound up ▪ Both the ongoing and discontinuance results of the valuation should be considered ▪ Trustee should assess the strength of the employer using credit assessment techniques <ul style="list-style-type: none"> ○ Consider the general business outlook and the specific outlook for the employer's industry ○ This is simpler and cheap to assess ○ Look at some common established financial metrics using public available information and compare these with peer group companies and also previous years ○ Gives better insight and is simpler and cheap to perform but is based 	

	<p>on historical information unless up to date information is available</p> <ul style="list-style-type: none"> ○ If the company is publically traded or has issued bonds then consider the implied market default risk. When looking at bonds, compare the company's risk premium over the risk free rate (government bond) to proxy for default risk. ○ For quoted companies, one can look at the equity price and also try to model the relationship with the company's share price and debt. Model's like the Merton model can be used to assess the cost of default. ○ It should be noted the actual risk of default is different for a pension scheme than the market implied default risk mainly because the pension deficit is not borrowed money and also there are differences in priority orders for debt compared to the pension scheme. ○ The model approach has limitations if the company does not have traded stock or debt. ○ The Trustee could use the services of a credit rating agency to research. This is a comprehensive measure but can be misleading for smaller companies. ○ If the Trustee feels the pension plan deficit is significant in relation to the size of the company and they are not being given comfort by the information provided then an independent review could be commissioned. This is expensive but will be a robust and deep study of public and non-public available information. <p>c)</p> <ul style="list-style-type: none"> ▪ Trustees would need to monitor the situation very closely and agree to regular updates to information from the company (monthly) ▪ Meet with the CFO and CEO on a regular basis to understand the company's position each month ▪ Agree a funding plan focussed on the discontinuance position, if the company's situation improves then ongoing funding could be restored later (e.g. fund for leaving service benefits but on a buy out basis) ▪ Change the investment policy to reduce volatility such as move to bonds or even consider moving assets to a deposit administration type contract with an insurance company ▪ Buy a credit default swaps for the amount of deficit ▪ Establish an agreement with the company for security on company assets if the company is unable to pay the contributions ▪ Conduct an asset liability study to obtain advice from the actuary to quantify the Value at Risk. ▪ Look for guarantees from a Parent / subsidiary company (if one exists) for payment of contributions 	
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A9	<p>(a)</p> <p><i>Pay as you go</i></p> <ul style="list-style-type: none"> • Unfunded approach to benefit provision where benefit outgo is funded by ongoing contribution inflows • The contribution is likely to vary each year and depends on the levels of working population • The ratio of benefit outgo vs contribution inflow will generally rise as the system matures or the population ages • An increase in contribution rate over the year creates administrative difficulty in communicating and implementing a change in the contribution rates. • Can be smoothed out by building up a contingency reserve to maintain cash flows • A control period could be adopted — using an equalised annual contribution rate covering the expected income over a fixed number of years • PAYG can result in inequality between generations of working population, especially in maturing countries when contributions need to be increased from contributing employees to meet higher outgo. <p>General average premium</p> <ul style="list-style-type: none"> • The level contribution rate is payable throughout the lifetime of the scheme • A relatively high initial rate is set compared to the pay as you go method • The contribution is calculated as the present value of all future benefit expenditure / present value of total salaries of the contributing population in all future years • The contribution rate is stable if the assumptions are borne out in practice • Possibility of building up substantial reserves and hence the stability of the contribution <p><i>Terminal Funding</i></p> <ul style="list-style-type: none"> • The contribution income in any period is the amount required to finance the capital value of the benefits awarded in that period i.e. benefits are pre-funded at the time they are awarded • The contribution is calculated as the present value of benefits awarded in a particular year / present value of total salaries of the contributing population in that year • Widely used for pension benefits paid from occupational injuries funds <p><i>Scaled Premium</i></p> <ul style="list-style-type: none"> • The contribution rate is between the extremes of pay as you go and general average premium • It is similar to using an equalised pay as you go rate but the fund cannot fall to zero • This method enables the building up of a fund, but without requiring the scheme to be fully funded • It may be complicated to operate • As it requires a non-decreasing fund, it would result into invest the assets which are not required to be sold in near future <p>b) The key assumptions used are</p> <ul style="list-style-type: none"> • Mortality improvements • Future fertility • Future migration • Price inflation • Earnings inflation • Rate of pension increases • Contribution limit increases • Economic activity rates • Invalidity rates • Age of retirement • Employment rates 	
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	<p>c)</p> <ul style="list-style-type: none"> • Retirement ages increased for all • Average pension is likely to increase • Accrual of the benefits will depend on the benefit design • However the cost of providing the benefits may not increase, since the pension is likely to be paid over a shorter time. • This effect will be more significant for females, since the average working life span has increased by 7 years for females compared to 5 years for males. • Equal Pension Age <ul style="list-style-type: none"> • Studies have shown that in general females live longer than males. • So if both males and females retire at the same age, then the cost of providing pensions should be higher for females, assuming both get the same amount of pension. • Effect of increasing the retirement ages on the economy: <ul style="list-style-type: none"> • It will be longer before jobs become available, as people will be working longer. • Whether employers will be happy to keep the older employees working for a longer time • Whether employees themselves will be keen to work for a longer period • When will the proposal be implemented and how will it affect people on the verge of retirement • What is the reason for the proposed changes? If it is the increasing cost of pension provision, the government can promote private provision and target the available funds for the needy. • The scheme set-up can be changed to defined contribution and benefits can be linked to the amount of contributions. • What are the political ramifications of implementing this change • The change could be done over a period of time and a transitional period. 	
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	Total Marks	[100]
