

# **Institute of Actuaries of India**

## **Subject SA4 –Pensions & Other Employee Benefits**

### **September 2018 Examination**

# **INDICATIVE SOLUTION**

#### **Introduction**

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable.

**Solution 1:**

i)

- Current costs being incurred are in respect of services rendered to the public / employees or retirees
- The auditor comment is originating from the accounting standards such as INDAS19 / AS15(revised) – Accounting for employee benefits
- The accounting to recognise a liability when an employee has rendered service and, in exchange, the company is providing an employee benefit to be paid in the future
- The company also is to recognise the expense when the economic benefit gained from the employee service is exchanged for employee benefits
- The health benefits are provided to employees in two ways. In service and post-retirement.
- The “in service” benefits are deemed to be short term as the ability for an employee to accrue that benefit and utilise it starts and ends during the financial year only. This is classified as a “short term” benefit and is accounted for on actuals basis. This is already included in the current ongoing expenses of running the medical facilities.
- The “post-retirement” provided health benefits are classified as “long term” employee benefits as employee is rendering service now but the post retirement benefit will only be actually utilised more than 12 months after the financial year. It is this benefit that the auditor is referring to for an actuarial valuation.
- This post retirement benefit liability/expenses is not currently part of the ongoing running expenses of the medical facilities.
- These standards lay out the following:
  - Types of employee benefits in scope under the standards
  - Classification of short term employee benefits and long term employee benefits
  - Measurement and recognition
  - Approach of calculation /methods
  - Guidance on setting assumptions for calculations
  - Guidance on special events and circumstances
  - Disclosure requirements

[6]

ii)

**1. Demographic data**

- Separately for current employees and current retirees

**2. Employees data**

- Some unique identifier (e.g. Employee number)
- Date of birth
- Date of Hire
- Gender
- Retirement date (or age)
- Location/Cost centre code (if results needed by location/cost centre)
- Staff category (if benefit different for different categories)

**3. Data of all potentially eligible retirees**

- Some unique identifier (e.g. previous Employee number or that of original retiree in case of spouse)

- Date of birth
- Gender
- Retiree status (retiree or spouse or dependent)
- Spouse's date of birth
- Dates of birth of other dependants

4. **Plan information**

- Employee handbook to give us information for:
  - Eligibility (e.g. only post retirement or on ill-health /disability too?)
  - any vesting criteria (e.g. minimum years of service)
  - any restrictions like room type

[3]

iii)

1. The accounting standards specify the discount rate reference to be used (e.g. Para 83 of INDAS19)
2. The discount rate represents the time value of money on project cash flows and timing of future payments. Furthermore, it is stated that the discount rate should not reflect the entity-specific credit risk borne by the entity's creditors.
3. The standards specify that the rate used to measure the obligations should refer the market yields at the end of the reporting period on government bonds.
4. However, subsidiaries, associates, joint ventures and branches domiciled outside India shall discount post-employment benefit obligations arising on account of post-employment benefit plans using the rate determined by reference to market yields at the end of the reporting period on high quality corporate bonds if available in that country. Else, government bonds of that country shall be used.
5. The reference to government bonds is probably made so that discount rate represents a risk free rate at which the obligation may be extinguished/settled. It also ensures that the rate is objectively set and comparability between companies is more consistent.
6. The currency and term of the government bonds or corporate bonds shall be consistent with the currency and estimated term of the post-employment benefit obligations.
7. The discount rate reflects the estimated timing of benefit payments. In practice, an entity often achieves this by applying a single weighted average discount rate that reflects the estimated timing and amount of benefit payments and the currency in which the benefits are to be paid.
8. Where government bonds of suitable enough maturity do not exist then one can estimate the discount rate for longer maturities by extrapolating current market rates along the yield curve.
9. There is also a case for using separate discount rates for employees and current retirees/beneficiaries as their length of payments can be very different. However, this should be discussed with the auditor on the materiality of doing this.

[4]

<b>iv)</b>	<b>Demographic assumptions</b>
	<ul style="list-style-type: none"> <li>- Frequency of usage/availment <ul style="list-style-type: none"> <li>o Not all eligible retirees will utilise the facilities. One needs a percentage of availment that is applied to the entire population of eligible retirees. This is sometimes called the utilisation/claim frequency</li> <li>o Multiple visits/event will need to be tracked to each individual and all counted towards the availment rate. E.g. One person using the facility twice and is the only eligible person then the percentage is 200% for that person.</li> <li>o This should be done separately for in-patient and out-patient treatment</li> <li>o This should also be done separately for spouse's / beneficiaries and dependants</li> <li>o This should be done by location to check for material variations to incorporate into the overall assumption</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>- Mortality both pre and post retirement <ul style="list-style-type: none"> <li>o Industry standard tables can be used</li> <li>o However, ideally there would be a mortality study conducted of past trends. Especially for retirees who have been availing the facilities over the years.</li> <li>o It may not be too significant a study to do for pre-retirement mortality</li> <li>o This will only be credible if there is large number of retirees, say few thousands</li> <li>o Even a slightly simplified study would work to assess whether there is a significant difference in the mortality of the company's retirees with that of the standard industry life tables.</li> <li>o This information can be used to approximately adjust the base table</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>- Mortality improvements <ul style="list-style-type: none"> <li>o A mortality study can also tell us the trend over cohorts of the rate of improvement</li> <li>o This is important as we will be projecting for future years</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>- Attrition rates <ul style="list-style-type: none"> <li>o Ideally there would be an attrition study conducted of past trends within the company. Maybe over the last 3 to 4 years.</li> <li>o This should be for voluntary attrition only.</li> <li>o It should be for employees that were there at the start of an investigation period.</li> <li>o It should not be distorted by attrition from new hires during the investigation period.</li> <li>o This should be done for a few rolling investigation periods and a suitable trend analysis plotted.</li> <li>o One needs to put the analysis into context of any special events that may distort the past trends such as mergers/sell offs.</li> <li>o One can also look at attrition statistics from similar medical facilities.</li> <li>o One would want to consider the analysis separately for different category of staff (e.g. nurses / doctors / housekeeping and support staff) and location</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>- Disability rates <ul style="list-style-type: none"> <li>o Industry standard tables can be used</li> <li>o However, ideally there would be an experience study conducted of past trends. Especially for retirees who have been availing the facilities over the years.</li> <li>o This would also apply for pre-retirement if the benefits are continued for / ill-health retirement</li> <li>o This will only be credible if there is a significant number of instances</li> <li>o Even a slightly simplified study would work to assess whether there is any material trend at all.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>- Proportion married at retirement <ul style="list-style-type: none"> <li>o Consider actual past data from those at retirement age in past years</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>- Age difference of employee-spouse (if spouses ages not available) <ul style="list-style-type: none"> <li>o Consider actual past data from those at retirement age in past years</li> </ul> </li> </ul>
<b>Financial Assumptions (except discount rate)</b>	
	<ul style="list-style-type: none"> <li>- Amount of spend per retiree <ul style="list-style-type: none"> <li>o As the benefit is free unlimited healthcare one needs to assume the future cost of the benefit amount. This is sometimes called the utilisation/claim severity.</li> <li>o The expenditure incurred for each beneficiary will need to be analysed from past data.</li> <li>o This should also be done separately for spouse's / beneficiaries and dependants</li> <li>o This should be done separately for in-patient and out-patient treatment</li> <li>o This should be done for the period from which the retiree retired for each subsequent year</li> <li>o Exceptional one large expenses may need to be identified (e.g. cancer) and a separate assumption for that done (if material).</li> <li>o One would develop a model from each year's data on the average spend per beneficiary.</li> <li>o This should be done by location to check for material variations to incorporate into the overall assumption</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>- Medical cost inflation <ul style="list-style-type: none"> <li>o One will need to assume how future medical costs will evolve in future</li> <li>o This could be done separately for staff costs versus medical treatment costs</li> <li>o This can be done separately for types of key high value treatments</li> <li>o One will look at trends from past expenses and supplier costs</li> </ul> </li> </ul>

[7]

v)

### 1. Demographic assumptions

- Frequency of usage/availment
  - o If not separated by in-patient and out-patient then use total usage for each individual
  - o One may not do by location
  - o If one cannot track by retiree/spouse etc., then simply count the total number of "beneficiary" utilisation rates
  - o If there is no utilisation data differentiated for current employees and post retirement then use the total combined utilisation as proxy
  - o If no tracking is done on individual's utilisation at all then one may need to ignore this assumption as a separate assumption and have it combined as part of a macro proxy which also includes the amount of spend on treatment
- Mortality both pre and post retirement
  - o Industry standard tables can be used
  - o One can use general population statistics as well
  - o One can try to obtain tables from insurance companies
- Mortality improvements
  - o Consider general population improvements, per government or other recognised health organisations
  - o Look at any regional differences such as urban vs rural locations

- Use global statistics for improvements and data available for similar countries to India
- Attrition rates
  - Consider internal HR attrition calculations – although they will be distorted by in year attrition from new hires.
  - Include all attrition if involuntary and voluntary not separated out. Must still ensure attrition not distorted by any mergers/acquisition events however.
  - This should still be done for a few rolling investigation periods and a suitable trend analysis plotted.
  - One can also look at attrition statistics from similar medical facilities.
  - Consider overall employee population if data on category or location wise not available
  - If nothing specific to medical industry available then use more general industry data
- Disability rates
  - Industry standard tables can be used
  - One can use general population statistics as well
  - One can try to obtain tables from insurance companies.
  - This assumption may be ignored also
- Proportion married at retirement
  - General population statistics
- Age difference of employee-spouse (if spouses ages not available)
  - General population statistics
- 2. **Financial Assumptions (except discount rate)**
  - Amount of spend per retiree
    - One would develop an average per person spend from past years' total spend to get the average spend per beneficiary.
    - If not separated by in-patient and out-patient then use total costs for each individual
    - One may not do by location
    - If one cannot track by retiree/spouse etc. ,then simply count the total costs of providing "beneficiary" benefits
    - If there is no cost data differentiated for current employees and post retirement, then use the total combined costs as proxy
    - On a macro level one could simply divide out the total costs spent on employees/retirees by the number eligible. This will automatically tackle the frequency and cost per beneficiary element as a proxy.
    - If not tracking of any kind is available then one may need to just divide the entire total cost of the medical facilities by the number of patient incl. the general public.
    - One may use insurance premium rates for health insurance as a proxy
  - Medical cost inflation
    - One would look at medical industry data
    - If not available separately for treatments etc.. then just separate out staff costs and use trends in all non-staff medical costs as a proxy
    - Use insurance company claims information inflation as proxy
    - Use global health data from reputed organisations like World Health Organisation for proxy data

- vi)
- The post-retirement medical benefit is a defined benefit plan. It means the promise of the benefit is being made by the company to the employee during their service, for which the ultimate actual cost is not known.
  - The actual cost will depend on many factors which cannot be certain today.
  - Amount of benefit – Future cost of treatment / running the medical facilities will evolve in the future. The risk is that increases in those costs are more than expected or assumed.
  - Length of utilisation – Given the treatment offered is lifetime; there is a risk that the facilities are open to people for far longer than expected. This risk is the longevity risk and as mortality rates improve this will bring a risk of increasing the actual costs.
  - Eligibility – Given current employees have to retire from the company, there is an uncertainty on how many employees make it to that retirement point and then avail the benefits. Similarly, how many of them will have spouses dependants who will also utilise the benefits is not known.
  - Over treatment – given the retirees and their families will be known to hospital staff there is a risk that for ex-staff more special treatment and vigilance is applied by medical staff on treatments. This may increase the costs.
  - To measure accurately a lot of data capture is required to monitor the costs and also conduct the actuarial valuations. This brings risk of added administration costs.
  - There are risks of changes in diseases and types of treatment developed that retiree patients would expect, which is a further risk of higher costs.
  - There are reputational risks if the company decided to treat ex-staff differently
  - Some of the treatments may not be provided by the Healthcare Company itself and may need to be referred elsewhere. It may involve extra costs
  - Some of the retirees may settle at a place where the Company may not be providing facilities. Such retirees might choose to take treatment locally which may involve more costs

[5]

vii)	
	<p>Eligibility modifications</p> <ul style="list-style-type: none"> <li>- Tighten the definition of any early retirement or ill-health retirement eligibility to the benefit</li> </ul> <p>Pros</p> <ul style="list-style-type: none"> <li>- Will limit the eligibility</li> <li>- Will still cater for genuine cases</li> </ul> <p>Cons</p> <ul style="list-style-type: none"> <li>- Risk of genuine cases not being catered for</li> <li>- May have limited impact as such cases may not be many</li> </ul>
	<p>Pros</p> <ul style="list-style-type: none"> <li>- Introduce service vesting criteria at retirement for the benefit (e.g. 15 years or 20 years)</li> <li>- Rewards long service</li> <li>- Will reduce number of eligible retirees significantly and therefore costs</li> </ul> <p>Cons</p> <ul style="list-style-type: none"> <li>- Will be a tough change for management as staff already enjoys this as their in service benefits and expects such benefits to be available in their retirement. So it may be a disincentive for those not going to make the service threshold from joining at older ages – something that would be needed in certain specialists in the medical field.</li> <li>- One may need to grandfather the introduction of the criteria and make it for only new employees and/or employees currently younger than x (say 40 years old) or something.</li> <li>- Other hospitals might be providing such benefit irrespective of service or say, after putting in 5 or 10 years' service. It will make the Company unattractive while recruiting staff</li> </ul>
	<p>Pros</p> <ul style="list-style-type: none"> <li>- Restrict to spouses only and exclude other dependants</li> <li>- Restrict dependent spouses cover only whilst the original employee alive</li> <li>- Limits costs</li> <li>- Dependants removal should not have too much impact as in case of retirees, the chances of dependants up to age 25 are far less – same way will have small impact on costs</li> </ul> <p>Cons</p> <ul style="list-style-type: none"> <li>- Eliminating spouse's cover after death of employee will be a reputational risk and difficult situation to manage</li> </ul>
	<p>Benefits covered</p> <p>Pros</p> <ul style="list-style-type: none"> <li>- Only allow for in-patient care and not out patient</li> <li>- Reduces costs</li> <li>- Focuses on hospitalisation care when really needed</li> </ul>



	<p>Cons</p> <ul style="list-style-type: none"> <li>- Would not be the main portion of the expenses so possibly limited impact</li> <li>- Would need to cater for post hospitalisation care which then negates impact of removing out-patient care to a large extent</li> <li>- Any change may generally be made prospectively</li> </ul>
	<p>Pros</p> <ul style="list-style-type: none"> <li>- Specify the type of treatments that can be availed</li> <li>- Reduces costs</li> <li>- Focuses on hospitalisation care where really needed and on key treatments</li> </ul> <p>Cons</p> <ul style="list-style-type: none"> <li>- Volatility in respect of specialised treatments would show up more and so costs more difficult to predict</li> <li>- Will be a tough change for management as staff depending on the nature of treatments excluded</li> <li>- Will make the Company unattractive while recruiting staff if other Companies are offering all types of treatments to their retired employees</li> </ul>
	<p>Pros</p> <ul style="list-style-type: none"> <li>- Introduce limits on overall treatment to be covered</li> <li>- Introduce limits on certain treatments</li> <li>- Will have impact on costs</li> <li>- Introducing a behavioural boundary for ex-staff</li> <li>- Will ensure introduction of tighter monitoring and expense tracking system</li> </ul> <p>Cons</p> <ul style="list-style-type: none"> <li>- Difficult to introduce for existing retirees. May be introduced prospectively</li> <li>- What to do in genuine cases of exceeding the limits? Need to introduce a plan for that like discretionary spend or some type of insurance</li> <li>- Limits will need to be decided carefully so as to control costs but still be relevant for providing enough treatment</li> <li>- Limits may need to be revised over time</li> </ul>
	<p>Pros</p> <ul style="list-style-type: none"> <li>- Introduce cost sharing with retirees at retirement one off payment</li> <li>- Introduce cost sharing for each visit/treatment for a fixed amount or percentage</li> <li>- Will have impact on costs</li> <li>- Introducing a behavioural boundary for ex-staff</li> <li>- Increases an appreciation of the benefit</li> </ul> <p>Cons</p> <ul style="list-style-type: none"> <li>- Difficult to be introduced for retirees</li> <li>- Will need to possibly grandfather for existing retirees</li> <li>- Percentage method may be difficult for retirees to meet the cost at the time of a serious illness as amounts may be very large.</li> </ul>

viii)	
	<p>Accounting costs</p> <ul style="list-style-type: none"> <li>- As the company still has its constructive obligation, and the plan is not changing, the overall post-retirement plan is still classified as a defined benefit plan</li> <li>- This would be like “funding” the benefit to the extent described</li> <li>- The accounting standards would permit the Company to estimate the actuarial value of the group insurance policy up to the age of 80 and treat it as an asset</li> <li>- This may not necessarily reduce the expense but will reduce the net liability</li> </ul>
	<p>Risks</p> <ul style="list-style-type: none"> <li>- The underlying risks do not change and so there is limited overall impact on costs in the long term. Especially the benefit has not changed in the eyes of the beneficiary</li> <li>- It should however help in bringing stability to the costs as the insurance policy will cover much of the costs up to age 80</li> <li>- Generally a group health insurance policy is available on yearly renewable basis and the costs from one year to another may increase if the experience is bad</li> <li>- General out patient costs will largely not be covered under the policy or if covered will be available at very high cost</li> <li>- There is an additional risk that the cost of premiums are higher than the underlying medical expense costs. This needs to be considered when deciding on this option and a balance of the level of cover and costs assessed.</li> <li>- There is a risk in the actuarial value placed on the insurance premiums e.g. premium increases but the value of the asset does not move in line with the underlying cost of the benefit.</li> </ul>
	<p>Beneficiaries</p> <ul style="list-style-type: none"> <li>- There should not be any impact for beneficiaries</li> </ul>
	<p>Administration</p> <ul style="list-style-type: none"> <li>- There will be added administration to ensure the group policy is up to date; has suitable people covered and details are updated timely when retirees pass away etc.</li> <li>- People may still approach for assistance at the time of claim, particularly when the claim is not entertained by the insurer.</li> </ul>

[5]

ix)	
	<p>Accounting Measurement</p> <ul style="list-style-type: none"> <li>- This would amount to a different nature of benefit.</li> <li>- As the existing benefit is without a limit, the change will amount to reduction of the benefit.</li> <li>- The benefit will still remain a post-retirement medical benefit plan and classified as a defined benefit plan</li> <li>- The premiums actually paid for the retiree population are accounted for as an expense.</li> <li>- At the time of the change there would be a curtailment credit that is recognised to reduce the built up provisions</li> </ul>
	<p>Risks</p> <ul style="list-style-type: none"> <li>- Compared to the current benefit the risks reduce dramatically.</li> <li>- Longevity risk is reduced as there is a limit up to age 80 for the cover only.</li> <li>- Unknown volatility and one off costs risk is eliminated due to insurance premiums are expected to be more stable. Especially with a limit of 300,000 sum insured in place.</li> <li>- There is still the risk of increasing premium rates higher than expected.</li> <li>- There is potential for a conflict of interest when the company is providing the health treatment and also claiming from the insurer for its ex-staff.</li> </ul>
	<p>Administration</p> <ul style="list-style-type: none"> <li>- There may be little more administration as retirees will claim as per an insurance policy. The company will need to liaise with the TPA/insurer.</li> </ul>
	<p>Beneficiaries</p> <ul style="list-style-type: none"> <li>- Current beneficiaries will likely oppose any such move as the perception of an unlimited benefit now going to an insurance benefit up to a limit will come with many negative perceptions.</li> <li>- A significant change management exercise would be needed. Or the benefit will likely need to be grandfathered for current retirees and changed for only future retirees or even future employees.</li> <li>- The company may want to take some additional corporate buffer coverage for genuine specialised one off cases.</li> </ul>

[5]

[50 Marks]

**Solution 2:**

i)

1) Objective: The Government proposes to provide a combination of benefits that would aim to provide regular income, sickness benefits & a lump sum at death. These benefits meet the essential needs of the senior citizens and provides them a safety net

2) Benefit to all citizens or to any targeted group?

Needs to decide whether to provide benefits for all citizens who satisfy age criteria or target the benefits who satisfy some other criteria too, say income criteria.

Benefit to all senior citizens will be considered fair, easy to administer but increases the cost.

Income criteria will target resources towards needy persons. While this will lead to reduction in cost but will be perceived as unfair by other people especially when it is financed by taxes.

Setting the income criteria is also likely to increase the administrative complexities and cost due to verification process

### 3) Level of Benefits and their cost:

Needs to decide on the level & nature of benefits to be provided.

Benefits to meet the minimum needs of the targeted group. May not want to provide large level of benefits due to cost constraints.

Terminal benefits to meet the reasonable cost of funeral/burial expenses. Pension to be sufficient to meet the regular income needs of senior citizens Benefits at Terminal illness to cover medical cost.

An allowance for inflation will help to provide benefits in real terms but will have significant impact on the cost

### 4) Integration with other benefits:

Needs to decide whether to consider benefits received from other sources, say provided by employers

Considering benefits received from other sources will reduce the size of benefits and the cost but makes the administration complex

### 5) Profile of targeted group and how it is likely to move over the period

Population of the country is relatively young as senior citizens are 12%. But their size is likely to increase. The changes in the proportion is likely to alter the cost significantly over the period

### 6) Funding of scheme:

Whether to fund the scheme during the active life time of the people (ie between the ages 18-60) or on PAYG –Pay as You go basis or a combination of the two

Funding provides stability.

Adopting PAYG may not pose much problem initially due to surplus budget but consider whether the budget surplus is temporary in nature or is permanent.

Also the size of surplus viz-a-viz the size of the cost of the proposed Social Security Program (SSP)

### 7) Financing of scheme:

Can be financed by taxes levied on general population. This may be resented by affluent people (tax payers) especially if benefits are to be paid only to needy targeted group.

Alternatively all persons between age group 18-60 pay.

However, difficult to implement as some may be too poor to pay

8) Investment of funds: will be an issue in case of funded SSP. Security of the funds invested will also be an issue if funds invested in private sector.

9) Use professional service providers:

Better to engage experts, such as actuaries, financial and investment experts, statisticians, IT experts, administrators etc.

10) Operational aspects:

System to collect population data; collection of contributions; payments of benefits to the eligible members etc.

Introduce reporting process for deaths, terminal illness cases etc

[10]

ii) The process involves-

Projecting benefit cash flows payable under normal survival, survival with terminal illness and death of the beneficiaries.

Benefits projected given in Scheme Rules.

It will need number of beneficiaries at each age under the various categories, viz normal pensioners surviving at each age, pensioners surviving with terminal illness, pensioners dying each year in future.

Data of all persons needed and not only who are aged above 60 & above.

If data of all members not available, model points may be used in projection.

If model points used, they should sufficiently represent the population of the Country

Full data/model points should be in terms of age, gender, occupation, income level, tax payer/non-tax payer, region etc.

Data available with government, or census data can be used – but we need to allow for possible errors and inaccuracies

For projecting the assumptions on various parameters needed such as morbidity, mortality, fertility rate

Possible improvement in longevity, advancement in medical field to prolong the illness, reduction in fertility rates etc. to be allowed

Projection is to be done over a sufficiently long future period to get a reliable trend

Such projection of members multiplied by the benefits at each model point will give benefit cash flows.

The cost can be expressed as a % of GDP of the Country

Such projections over a medium period, say next 5 or 10 years may give a trend on annual cost

If it is to be funded during active life time of the people, then discounted value of benefits at age 60 be arrived at together with the value of contribution of 1% of the taxable income from starting age till age 60 to arrive at the contribution needed to fund the benefit of such person.

Such estimates of contributions may be arrived at for each entry age

Important to illustrate the variability of cost due to changes in the age /demographic profile, changes in the trends in mortality, morbidity - for instance

- Demographic shift can be stress tested
- Changes in benefits and its impact on budget or taxes, schedule of contributions.

[6]

iii) Section C and D of the APS 20 issued by Institute of Actuaries of India are relevant

Section C covers the Principles of Actuarial Practice and actuary should comply with the following principles while producing his report:

- Methodology used for long term financial projections is based on actuarial principles complying with any general or specific professional guidance
- Mention that assumptions used, though reasonably determined, are estimates and not predictions and actual experience may differ which will be analysed in subsequent reports
- Mention the origin of the assumptions used and whether the assumptions have been derived by him or they have been set by another entity. In case assumptions have been set by another entity, actuary should state their reasonableness with SSP
- Make it clear in the report that assumptions used by him have been determined without any inappropriate political or external influences
- While preparing the report the actuary should ensure that no element of condescension is reflected in the report and the report is as clear as possible looking to the audiences concerned

Section D sets the information to be included in the Report while presenting the results as under:

The Executive summary should cover the purpose of the report, brief summary of the SSP, key assumptions used, results of the financial projection and the conclusions.

The Introduction part of the report would cover to whom the report is addressed, the name of the Government Social Security Program (SSP) valued and the projection period

The Introduction part will also cover the purpose of the report including a mention in the report that projections are dependent upon the underlying data, methodology and assumptions

The report should describe full details of SSP valued i.e. benefits, eligibility conditions, financing provisions etc. including the provisions of the SSP which are materially relevant

Must comment on quality of data used in projections – may cover demographic trends, number of contributors and beneficiaries and the balance between the two and also how this balance may shift over the period.

Must mention the efforts taken to ensure the sufficiency & accuracy of the data. If there are insufficiencies in some part of data, the report should mention the limitation of the results.

The report should specify the approach in developing the basis. If an element of prudence is included, the degree of prudence should be specified.

Must cover the methodology used in the projection of the population profile and the benefits.

Results of demographic & financial projections to be placed in two separate sections

Financial projections may cover the PAYG rate, contribution rate, investment earnings if funded, benefits, contributions, expenses, asset data used, if any

Demographic projections may include the projected population by age groups, gender, dependency ratios, and contribution earnings by age groups, sex and averages etc.

The results should include a summary of income, expenditure, assets and the benefit outgo by calendar and /or fiscal year- results if shown in nominal value, the effect of inflation should be illustrated in an appropriate manner.

The results should cover the sensitivity analyses of the projections to provide an indication of the variability to the changes in key assumptions

If there are any previous reports/studies, the actuary should try to reconcile his results with those earlier reports. He should also explain the significant differences/changes in results, if any

Any material changes in benefits, demographic structure, during the projection period and its impact on financial results can be mentioned in the report.

Must bring to the notice of government the reliability of estimated cost and that the ultimate cost will emerge over a period of time depending on the actual demographic experience

In the end the actuary should sign the report along with his name, position held and Date

[9]

**iv) PAYG VS funded approach – points to be included in the report**

In Pay As You Go (PAYG) approach benefits payable in each given period of time (say, one year) are financed in that period (year) and the scheme does not have funds for future payments except a margin money to provide smoothness of running the scheme.

Financing of these payments may come either from contributions or through the annual budgetary provisions or a combination of the two.

Current financial position may be comfortable (surplus budget in last 5 years). However, much will depend on extent of surplus

Analysis of nature of surplus and whether such surpluses are of continuing nature

If nature of surpluses is of continuing nature and the size of such surpluses is adequate, then Government can start the proposed SSP on PAYG basis

By this Government will be able to earn goodwill of the citizens as a whole (and senior citizens in particular).

PAYG is easy to operate and administer as it focuses on payment of benefits only without the complexities involved in collection of contributions

Also no need to bother for investment of funds

In PAYG approach the Government needs to project benefit outflows over a short period of time, say 5 years to estimate the budgetary provisions required in near future

However a significant shift in demographic profile of the population may cause strain

Further in case of democratic set up, it is customary for the political parties to announce additional benefits in their election manifestoes to get public support which generally tends to disturb the SSP planned to be run on PAYG basis and sometimes it endangers the economy of country

There is also a risk of “surplus” in the budget vanishing.

Any additional taxes to support the benefits may be resented by tax payers and may make the government unpopular

Any reduction in benefits in future, if required due to budget constraints will be considered as unfair and therefore politically un-popular.

The Government can start the Scheme on PAYG basis for the existing senior citizens using the current surplus budget but start a "Pre funded approach" eventually for the potential future beneficiaries who are aged less than 60.

The level of contributions can be kept at a sufficient lower level so that the value of benefits from age 60 looks attractive as compared to the contributions.

The schedule of contributions is to be kept simple to make the scheme simple to administer and easy to understand.

Different schedules can be made for different age bands to make the contributions fair for all age groups. Eg for those who start the contributions in the age group 18-25, K100 per month payable till age 60 whereas for the age group between ages 40-50, the monthly contribution can be kept at k200 payable till age 60 etc. The schedule of contributions can remain stable over a period of time to provide credence to the funding group.

Alternatively the contribution can be kept uniform irrespective of age to make the administration simple In this proposed approach every citizen below age 60 needs to contribute at a desired level. However, some may not like to contribute, particularly whose income level is very low and hence unaffordable.

Hence if the Government wants to pay benefits to all above age 60, the contributions need to be collected from those who can afford them, say income-tax payers

It may mean enhancement of taxes initially

The prefunding approach will keep the cost to the Government at a relatively low level and the overall cost of the scheme will also come down due to the investment return on funds accumulated.

Citizens will consider the prefunded approach as fair as it keeps the cross subsidy to the minimum.

But the prefunded approach requires an effective system to administer & monitor as huge funds need to be managed. It will involve substantial expenses also

A financial regulator may be authorised to regulate & monitor the entire Scheme both at the funding stage and at the payment.

The Regulator should be authorised to give guidelines on overall management of the scheme (eg areas like investment, pension payments, use of professional services, and set code of conduct for service providers).

The government should use services of professionals such as finance & investment experts, actuaries, statisticians to ensure that the scheme is operated on sound financial principles.

[7]

**v) Testing the adequacy of benefits through actuarial model while certifying exemptions**

Employer may provide post retirement/pension/ Health care benefits to employees either on Defined Benefit basis (DB) or DC basis.

In either case, benefits offered by employers, are unlikely to match benefits of the SSP exactly



- If employer's scheme offers all the three benefits on DB basis, the actuarial model may compare them with SSP benefits.
- If employer's scheme offers distinctly different benefits from the SSP benefits, the model may compare the value of employer scheme benefits with the value of SSP benefits.
- If the benefit offered by employer is on DC basis, the model may check the adequacy of contributions and their accumulations to buy (at least) the benefit offered by SSP.

In 2<sup>nd</sup> and 3<sup>rd</sup> case, we need not only to test each and individual case but also exemption may be subject to the following:

- Consent of each individual member is taken with explicit understanding that they are aware that the employer's scheme provides benefits different from the SSP and that the employer's scheme benefits may prove to be less than those of SSP
- The employer gives an undertaking that they will provide an option to the employees to opt for benefits equal to SSP at their retirement

Further in all three cases the exemption will be subject to employer agreeing to at least match their scheme benefits with the SSP in future whenever there is an enhancement of the SSP benefits.

An actuarial model developed for the certifying purpose should cover the following areas.

**Data:** Individual employee data should be used. Model points should **not** be used in the certifying process;

**Parameters:** All parameters financial, demographic impacting the benefits and contributions should be included in the model. These include investment return, inflation, salary growth etc. which are set at a prudent level

The model should assume that all the employees will survive up to age 60 to receive the benefits and hence the mortality, morbidity and withdrawal decrement should not be considered.

**Basis:** the values assigned to each parameter will have to be set with reference to past experience. The Government, Professional body (Institute) may provide guidelines on the basis to be used. More reliance is to be given to recent trends.

Stress testing may be used in certification process.

**Cash flows:** Benefits, investment returns & contributions are to be projected sufficiently over a long period to capture all scenarios.

In case of DC schemes the model should assess the likelihood of the scheme benefits falling below the SSP benefits. The exemption may be given only if it is unlikely for the employer's scheme's value of benefits to be lower than the value of benefits under the SSP.

**Other factors to be considered:**

- Security of funds – eg funding levels, funds kept internally or externally?
- Quality of Assets: are these funds are sufficiently diversified?

- Administration: Are they kept outside employer's control? –Are they managed by Trustees,
- Governance: Whether management of retirement funds is regulated & monitored by some Regulatory Authority
- Transparency in reporting the management of the funds (eg public disclosures, disclosure to employees)
- Certification should take place on regular basis ( eg once in two years)

[8]

vi)

**a) Potential reasons for the experience to be worse than the initial estimates:**

More number of people below age 60 at introduction of SSP reach age 60 –This may be due to increasing longevity and more number of people (than initial estimates) become beneficiaries receiving benefits.

Initial estimates may have gone wrong resulting in the actual experience to be different than estimated in the analysis

For example, if initial estimates of people above 60 were low, then benefit outgo will be higher than expected with no contribution

Similarly, if estimated population between age 55-60 was less than actual, then benefit outgo will be larger than expected with insufficient contribution

Deficiency in the administrative system resulting in higher benefit outgo than estimated

If the investment returns are lower than estimated earlier, the actual experience may be worse than expected

[2]

**b) Impact of increasing the superannuation age from 60 to 62**

Citizens who are already in receipt of benefits will not be affected by the proposal. However, for those who are below 60 at that time, their benefits will be deferred by two years.

Assumptions:

- People are exactly aged 60 at the start of each year
- People diagnosed with terminal illness (50% of those who die during the year) are spread over uniformly during the year. They are therefore assumed to have been diagnosed at the middle of the year
- The diagnosed with terminal illness survive for six months. Hence those diagnosed with terminal illness are assumed to die at the end of the year
- Remaining 50% of the deaths are assumed to have spread over the year and hence die at the middle of the year

With the information given here and the assumptions made above, following will be the year wise details of people eligible to get different benefits from age 60/62 onwards:

Year	Age	People reaching at start of year	No. of deaths during the year	No. of people diagnosed with TI before death	No. of people surviving at end of year
1	60	360,000	3,600	1,800	356,400
2	60	363,600	3,636	1,818	359,964
	61	356,400	3,849	1,925	352,551
3	60	367,236	3,672	1,836	363,564
	61	359,964	3,888	1,944	356,076
	62	352,551	4,112	2,056	348,439

If the Government had not enhanced the vesting age from 60 to 62 years, following benefits would have become payable in first year:

- The surviving persons (356,400) would have got pension for 12 months
- Terminally ill people (1,800) would have got pension at normal rate for 6 months and at double rate for another 6 months
- Remaining 50% of deaths (1,800) would have got pension at normal rate for 6 months
- Death benefit had become payable for all deaths (3,600) during the year

Hence,  $[(356,400 \times 12) + 1,800 \times (6 + 6 \times 2) + 1,800 \times 6 + 3,600 \times 24] \times 500$

$$= [356,400 \times 12 + (1,800 \times 24 + 3,600 \times 24)] \times 500$$

$$= [356,400 \times 12 + 3,600 \times 1.5 \times 24] \times 500$$

$$= [356,400 + 3,600 \times 3] \times 12 \times 500 = \text{K}2.2 \text{ billion}$$

Similarly in 2<sup>nd</sup> and 3<sup>rd</sup> year, the payments to be made would have been:

In 2<sup>nd</sup> year:  $[359,964 + 3,636 \times 3] \times 12 \times 500 + [352,551 + 3,849 \times 3] \times 12 \times 500 \times 1.03$

$$= [(359,964 + 3,636 \times 3) + (352,551 + 3,849 \times 3) \times 1.03] \times 12 \times 500$$

$$= \text{K}4.48 \text{ billion}$$

In 3<sup>rd</sup> year:  $[(363,564 + 3,672 \times 3) + (356,076 + 3,888 \times 3)] \times 1.03 + (348,439 + 4,112 \times 3) \times 1.06] \times 12 \times 500$

$$= \text{K}6.81 \text{ billion}$$

However, after implementation of the increase in vesting age from 60 to 62, the payment in 1<sup>st</sup> year due to people reaching age 60 in that year will be nil. Similarly in 2<sup>nd</sup> year also it will be nil. However in 3<sup>rd</sup> year it will be

$$= [348,439+4,112 \times 3] \times 12 \times 500 = \text{K}2.16 \text{ billion}$$

Hence saving in first 3 years due to increase in vesting age from 60 to 62 will be as under:

(Amount in billion K)

Year	Benefit payment without increase of vesting age	Benefit payment after increase of vesting age	Saving
1	2.2	-	2.2
2	4.48	-	4.48
3	6.81	2.16	4.65

There may be some more saving by way of increase in contributions also if contributions continue till age 62

[8]

[50 Marks]

\*\*\*\*\*