INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

21st November 2023

Subject SP1 – Health and Care

Time allowed: 3 Hours 15 Minutes (10.15 – 13.30 Hours)

Total Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. ***Please read the instructions inside the cover page of answer booklet and instructions to examinees sent along with hall ticket carefully and follow without exception.***
2. ***The answers are not expected to be any country or jurisdiction specific. However, if Examples/illustrations are required for any answer, the country or jurisdiction from which they are drawn should be mentioned.***
3. ***Attempt all questions beginning your answer to each question on a separate sheet.***
4. ***Mark allocations are shown in brackets.***
5. ***Please check if you have received complete Question Paper and no page is missing. If so, kindly get new set of Question Paper from the Invigilator.***

AT THE END OF THE EXAMINATION
Please return your answer book and this question paper to the supervisor separately. You are not allowed to carry the question paper in any form with you.

Q. 1) A health insurer has launched an innovative health insurance product for the first time in the country. Under this product, the insurer will collect information from policyholders and conduct a health assessment based on various lifestyle factors. The policy will provide certain health insurance benefits. In addition, policyholders will be provided with advice on improving their lifestyle, with specific health goals. On achieving these goals, the policyholder will earn rewards, such as travel or entertainment vouchers, and will also be entitled to premium discounts on healthcare products in future periods from this insurer on renewal of their policy as defined in the policy terms and conditions.

i) List the features of an individual's lifestyle and health status that may form a part of the health assessment. (2)

ii) Discuss the benefits to the insurer, of offering this product and discuss why it might be attractive to potential policyholders. (5)

[7]

Q. 2) A large health insurer has launched a comprehensive health indemnity product with high sum insured options, four years ago.

The company has observed a significant difference in the claims' severity between two hospitals on its network – Hospital X and Y from the same location- over the last 2 years.

Claims team has shared its analysis that over the past two years, average claims severity of Hospital X is ₹ 1,15,000 & Hospital Y is ₹ 75,000 and concluded that "Hospital X is significantly more expensive than Hospital Y and should be removed from the network of covered hospitals for this product".

Describe the analysis you will perform to find reasons for difference in cost and suggest alternative ways to manage cost. **[13]**

Q. 3) You are working for an insurance company with a large health portfolio. Currently the company accepts lives with chronic conditions with an appropriate loading basis risk assessment by the medical underwriting team.

You are in the process of developing a new indemnity health insurance product and to increase market penetration, the sales director has suggested accepting lives with lifestyle conditions such as diabetes, hypertension etc. with four year waiting period at a standard rate (without any loading) in this product basis simplified underwriting and Pre-policy health checkup is waived off. In this product, policyholders can renew the policy annually with the same sum insured without further underwriting for lifetime.

i) Discuss the implications to the insurer and policyholder of introducing such an option. (8)

ii) Explain how you will derive the premium for this product. (7)

[15]

Q. 4) A private bank has approached your company about the possibility of offering a group critical illness scheme for its home loan customers.

The benefit would be the payment (direct to the bank) of all remaining loan instalments from the date on which loan customer has satisfied one of a standard list of conditions subject to a maximum of 18 monthly instalments. Premium will be paid by bank and would be part of the processing fees of home loan. The policy for any customer would end when the first qualifying critical illness event occurred, or when the customer fully pays the home loan whichever is earlier. The maximum term of loan is 30 years.

i) Describe with reasons, the underwriting procedures you would recommend. (5)

ii) Discuss whether it would be appropriate to charge premium at same rate to all customers. (2)

[7]

Q. 5) A standalone health insurance company offers a product which pays a lump sum of ₹1,00,000, on total permanent disability of the policyholder occurring during the three-year policy term. Total permanent disability is deemed to occur once the policyholder has been sick and unable to carry out any occupation for a continuous period of twelve months. The policy terminates after three years, on the payment of the disability sum insured, or on death, whichever occurs first. Policyholders who are sick after completion of three years but have less than twelve months of continuous sickness up to that point, will not receive any benefit.

i) Calculate the single premium payable for a life aged 30 at entry, using the following assumptions:

Parameters	**Assumptions**
Morbidity	S(ID)
Mortality and expenses	ignore
Interest	5% p.a.

(4)

The company now proposes to offer the policy with an option to extend the term for a further three years beyond the normal expiry date, without requiring further evidence of health at the time of extension. Those taking up the option would be required to pay the company's standard single premium for the additional cover as at the extension date.

ii) Calculate the additional amount of single premium that would have to be charged to the policyholder in part (i) to cover the cost of this option, given the following additional assumptions:

- all policyholders who are sick after the first three years, and would ultimately qualify for claim payment, are assumed to take up the option (and thereby receive the claim benefit in their fourth year of total cover).
- 30% of all other policies still in force at the end of the third year are assumed to take up the option. Their claim inception rates are assumed to be 150% of the rates in the above S(ID) tables thereafter.
- the inception rates shown in the above S(ID) tables are assumed to apply also to lives who were originally healthy at age 33, as well as to those who were originally healthy at age 30.

(8)

[12]

Q. 6) In a country X, Health Insurer A, offers both long-term and short-term policies.

i) Describe the different types of reserves that are held separately to cover liabilities under

a) Long term non-linked Critical Illness (CI) policies with an option to convert the lumpsum benefit into guaranteed annuity for 10 years. (4)

b) Short-term policies with an option of guaranteed renewal without any underwriting. (4)

The policy reserves in respect of long-term health insurance policy in country X is calculated using prudent assumptions.

The solvency capital is calculated as sum of:

- A fixed proportion of reserve arrived through gross premium valuation method and a fixed proportion of benefit sum assured, and the reserve arrived through gross premium valuation method.
- No specific risk margin except prudent margins in the economic and non-economic assumptions.
- The assets are valued at amortized cost or historical cost.
- Discount rate used for calculation of reserves is based on portfolio yield adjusted with prudent margins.
- No separate capital charge on assets held to cover liabilities.

The country X is now proposing to modify the solvency capital calculation for long-term health insurance policies as follows:

- The policy reserve is calculated using gross premium valuation method based on best estimate assumptions discounted using risk free rate of interest.
- A risk margin over and above the policy reserve, which is equal to a fixed proportion of solvency capital.
- Reserves are sum of best estimate liability and risk margin.
- The best estimate liability is probability weighted average of future net cash flows discounted at risk free rate of interest.
- The assets are valued at market value or fair value.
- The solvency capital is arrived through change in Net Asset value between best estimate balance sheet and stressed balance sheet.
- Pre-specified stress applied on
  - risk free rate of interest for debt securities,
  - market price of equity and
  - fair value of property.
- The stress is applied on best estimate assumptions i.e., morbidity, mortality, expenses, and persistency.
- For each stress, the net change in assets minus liabilities compared to pre-stress assets minus liabilities is considered as solvency capital for that specific risk.
- No diversification benefit is allowed.
- No requirement of Incurred But Not Reported (IBNR) Reserves.
- Explicit reserves for options using stochastic modelling.
- The required solvency capital of insurer is sum of capital required under all risks specified.

ii) Discuss the merits and demerits of the proposed approach mentioned above. (10)

iii) Discuss the impact of new approach proposed by country X on the reserves and solvency capital calculations under the long-term CI portfolio of Health Insurer A. (12)

[30]

Q. 7) A health insurance company is offering long-term Income Protection, long-term Critical Illness and Private Medical Insurance products over the past 10 years. In the recent past the insurer has experienced significant growth in new business. The free reserves of the insurer are quite limited. A reinsurer has approached to offer financial assistance in meeting New Business Strain against future profits arising from the insurer's long-term Critical Illness portfolio. The insurer is examining the proposal to avail reinsurer's support for financial assistance. There is no regulatory restriction on entering into such arrangement with reinsurer in that jurisdiction.

i) Discuss the ways in which a reinsurer can support the insurer in providing financial assistance. (4)

ii) Discuss the factors and any other aspects that the reinsurer may consider in offering the financial assistance. (12)

[16]

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