

INSTITUTE OF ACTUARIES OF INDIA
EXAMINATIONS

28th May 2024

SP9 - Enterprise Risk Management

Time allowed: 3 Hours 15 Minutes (09.30 – 12.45 Hours)

Total Marks: 100

- Q. 1)** Your teenager cousin, Udyamee, is setting up a Friendly Neighbourhood Lemonade Stall during her forthcoming summer vacation. Lemonade (or neembu pani) is a refreshing drink made of lemons, sugar and water. Udyamee has raised some seed money from her parents. She has now reached out to you for some consulting advice regarding the risks that her enterprise might face and how she should go about dealing with them.
- i)** Identify the various types of risks that this enterprise might face during its lifecycle under the following categories:
 - Market risks
 - Credit and counterparty risks
 - Operational risks
 - Other risks

(10)
 - ii)** How should Udyamee go about choosing an appropriate time horizon and discount rate for evaluating her venture's risks? Discuss the factors that she should consider. (4)
 - iii)** State the typical challenges / issues in risk quantification. For each challenge, provide a specific example related to one of the risks identified in part (i). (4)
 - iv)** Given the small scale of Udyamee's enterprise and given that a stochastic risk modelling approach is deemed inappropriate, elaborate on the various deterministic risk modelling approaches that could be suitable. Use one of the risks identified in part (i) to demonstrate how each approach can be used. (5)
 - v)** Outline potential responses to an identified risk. For each response, provide an example from part (i) demonstrating how Udyamee could implement the response to manage a specific risk. (4)
- [27]**
- Q. 2)** You As a qualified ERM actuary, you are in talks with a large conglomerate having entities in the retail banking, life insurance and general insurance sector to set up and lead their Enterprise Risk Management (ERM) function.
- i)** List the typical triggers why a large conglomerate with entities in diverse sectors might consider setting up an ERM function? (2)
 - ii)** What are the benefits that an ERM paradigm might offer over traditional risk management? (3)
 - iii)** It seems that there are inconsistencies in the usage of risk terminology and documentation across the various group entities. Discuss the importance of having consistent risk terminology and documentation across various entities of a conglomerate. (5)
 - iv)** Recommend a reporting structure for the group Chief Risk Officer (CRO). Justify your recommendation based on organizational effectiveness and good corporate governance. (3)
 - v)** VaR is a commonly used probabilistic risk measure in use at some of the group entities. However, you are concerned that it is not a coherent risk measure. By listing the axioms of a coherent risk measure, provide a practical example in the context of this group demonstrating how VaR fails to meet one of the axioms. (5)

- vi)** The banking entity often uses structural models to assess the credit risk for its biggest exposures.
- Describe the Merton and the KMV models used for assessing credit risk.
 - What are the relative advantages and disadvantages of each model? (6)
- vii)** The regulator of this jurisdiction has recently permitted the use of derivatives for the purposes of market risk management. Discuss the use of derivatives for managing market risk, concluding with a justified recommendation in this case. (4)
- viii)**
- a) Describe the two key types of derivative instruments that can be used to transfer credit risk.
 - b) Additionally, briefly explain two other methods, other than derivatives, that can transfer credit risk. (7)
- ix)** How should the demographic and other insurance risks emanating from the insurance entities of the group be managed? (4)
- x)** The group is considering whether to use a generic capital model or an internal capital model. Describe the characteristics, the advantages, and the disadvantages of a generic capital model vis-à-vis an internal capital model for a large conglomerate with diverse businesses. (5)
- xi)**
- a) Why might an entity consider undertaking a capital allocation exercise?
 - b) Describe at least four potential allocation methods, highlighting their key advantages / limitations. (10)
- xii)** What are some key lessons learnt from the 2008-09 Global Financial Crisis that might be relevant for the risk management function of a large conglomerate? (3)
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- Q. 3)**
- i) Detail the evolution of a life insurance company through the stages of Lam's 5-stage ERM maturity model. Specifically identify the key strategic initiatives a life insurer might implement at each stage to enhance its risk management capabilities. (7)
 - ii) Discuss the role of emerging technologies (such as predictive analytics and blockchain) in accelerating a life insurer's progression from stage 4 to Stage 5. Evaluate how these technologies could transform risk assessment, policy pricing, and customer engagement processes. (3)
[10]
- Q. 4)**
- i) For each of the Gumbel, Frank and Clayton copulas, state whether they exhibit upper and/or lower tail dependency.
 - ii) Following this, suggest a practical modelling use case for each copula where the specified tail dependency is appropriate. (6)
