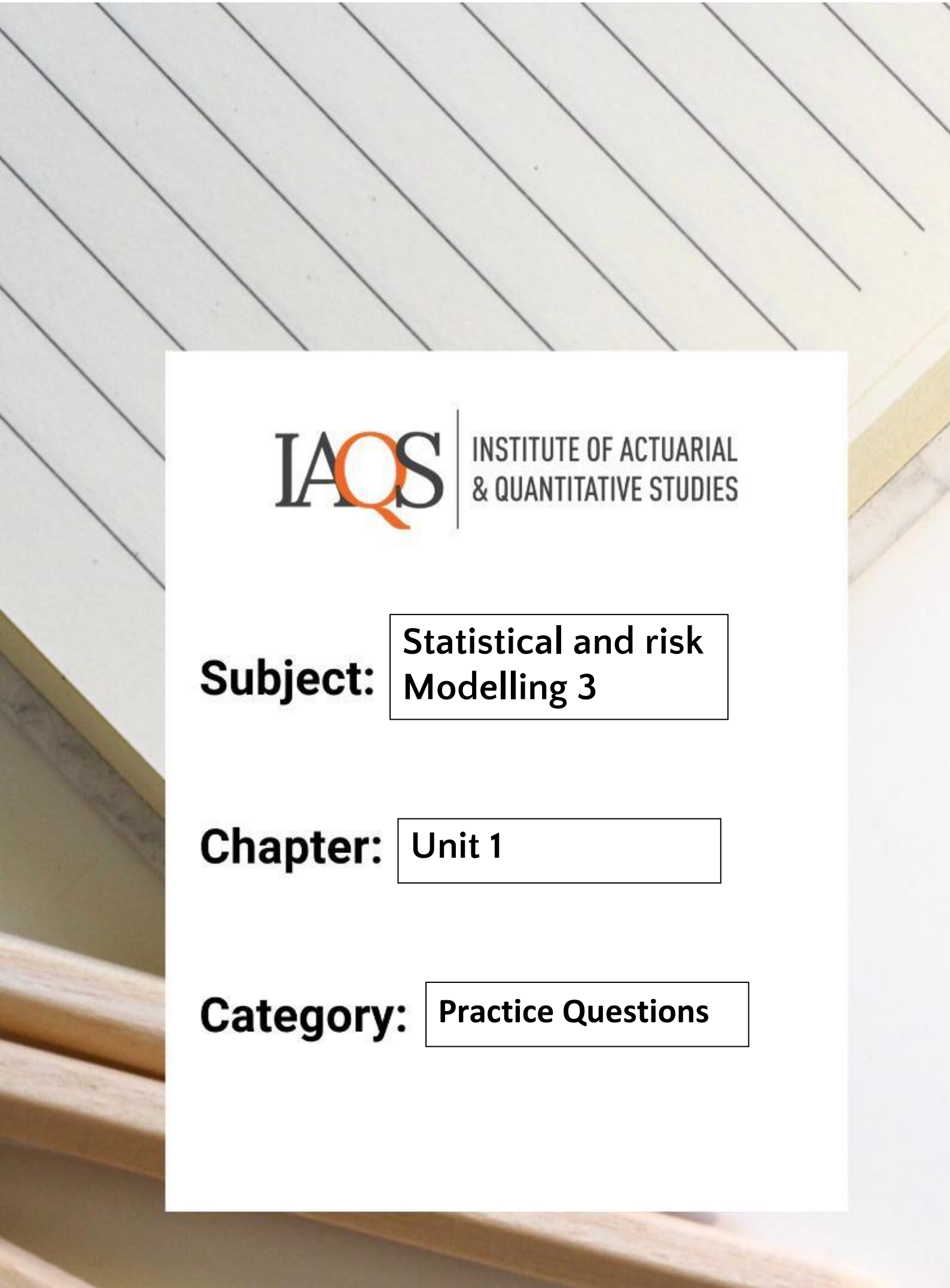

INSTITUTE OF ACTUARIAL & QUANTITATIVE STUDIES

Subject: Statistical and risk Modelling 3

Chapter: Unit 1

Category: Practice Questions

1. CT4 April 2015 Q1

For a simple random walk:

(i) Define the process. [2]

(ii) Write down the nature of the state space and time space in which it operates. [1]

(iii) Describe an example of a practical application of the process. [1]

[Total 4]

2. CT4 April 2017 Q2

(i) Define an increment of a process. [1]

The rate of mortality in a certain population at ages over exact age 30 years, $h(30 + \mu)$, is described by the process:

$h(30 + \mu) = B(1 + \gamma)^{\mu}$, $\mu \geq 0$

where B and γ are constants.

(ii) Show that the increments of the process $\log[h(30 + \mu)]$ are stationary. [3]

[Total 4]

3. CT4 April 2017 Q4

(i) Describe how a classification based on the nature of the state and time spaces of stochastic processes leads to a four-way categorisation. [2]

(ii) List FOUR stochastic processes, one for each of the four categories in your answer to part (i). [2]

[Total 4]

4. CT4 September 2017 Q2

For each of the following processes:

- General Random Walk
- Markov Jump Process
- Compound Poisson Process
- Markov Chain

(a) State whether the state space is discrete, continuous or can be either.

(b) State whether the time set is discrete, continuous, or can be either.

5. CT4 April 2018 Q4

(i) Describe what is meant by the following terms:

(a) discrete state space

(b) stochastic model

(c) continuous time model

(d) stochastic process of mixed type [4]

(ii) Describe the factors which should be considered when deciding whether to consider time in a discrete or continuous way for a model. [3]

[Total 7]

6. CT4 April 2013 Q3

For both of the following sets of four stochastic processes, place each process in a separate cell of the following table, so that each cell correctly describes the state space and the time space of the process placed in it. Within each set, all four processes should be placed in the table.

		Time Space	
		Discrete	*Continuous*
State Space	*Discrete*		
	Continuous		

(a) General Random Walk, Compound Poisson Process, Counting Process, Poisson Process

(b) Simple Random Walk, Compound Poisson Process, Counting Process, White Noise [5]