

## EXAMINATIONS OF THE ROYAL STATISTICAL SOCIETY

### ORDINARY CERTIFICATE IN STATISTICS, 2016

#### MODULE 1 : Collection and compilation of data

**Time allowed: Three hours**

*Candidates may attempt **all** the questions.*

*The number of marks allotted to each question or part-question is shown in brackets.*

*The total for the whole paper is 100.*

*A pass may be obtained by scoring at least 50 marks.*

*Graph paper and Official tables are provided.*

*Candidates may use calculators in accordance with the regulations published in the Society's "Guide to Examinations" (document Ex1).*

This examination paper consists of 4 printed pages.

This front cover is page 1.

Question 1 starts on page 2.

There are 8 questions altogether in the paper.

1. (i) Define *simple random sampling*. Explain how a simple random sample is obtained. Explain also how a *systematic sample* is obtained, and discuss briefly whether a systematic sample may be expected to behave as though it were a simple random sample. (9)

- (ii) An insurance company wishes to obtain customers' views on their satisfaction with the service they have received. The company decides to survey callers who telephone its call-centre, to obtain their views.

Explain how you would use systematic sampling to select a sample of 100 callers over a six-day period from Monday to Saturday if you know that the approximate number of calls is 400 each day. Give two reasons why your method may be preferable to simple random sampling. (9)

2. Discuss two advantages and two disadvantages of each of the following methods of collecting data.

(i) Face-to-face interviews.

(ii) Postal questionnaires.

(iii) Internet surveys. (12)

3. Discuss four benefits and four drawbacks of the use of secondary data instead of primary data collection, using examples to illustrate your points. (8)

4. Observation is often used for collecting data relating to a target population which is not a human population. An example would be when a researcher wishes to collect information on the amount of time that wild red deer spend grazing, sleeping and resting. Explain why the use of observation as a data collection approach would be useful and appropriate in this context. Discuss three main problems associated with the use of observation as a method for collecting data in this context. (8)

5. (i) A university is aware that full-time students are increasingly engaging in paid work to support them during their studies and university staff are concerned that this may have a negative influence on their academic performance. Design a short paper-based questionnaire survey (including 5 questions only, all closed) to obtain information from students on their sex, age, the number of hours of paid work they do, and the time they spend on university studies outside of their timetabled classes. (12)
- (ii) Design a short covering letter or information sheet to be given to students before they are asked to take part in the questionnaire survey. (4)
- (iii) Discuss two advantages of cluster sampling in order to reach a representative sample of students across the university. (4)
- (iv) The researchers consider whether they might recruit lecturers and tutors to administer the questionnaire during class time. Discuss two ethical issues which should be considered before using this method for obtaining information from students, and suggest how these issues may be overcome. (4)
6. Briefly describe what is meant by an *experimental study* and what is meant by an *observational study*, giving an example of each. (6)
7. Questionnaire surveys are commonly used to collect data.
- (i) Define how you would calculate the response rate in a survey. (2)
- (ii) Describe what is meant by *non-response bias* and why this poses a problem when analysing survey data. (4)
- (iii) Explain the reasons for carrying out a pilot questionnaire survey. (6)

8. The following questions should be answered in the context of a large survey with which you are familiar.
- (i) Describe the survey in terms of the aim, target population, sampling procedure, data collection procedure and methods of analysing and presenting the data. (9)
  - (ii) Discuss three potential sources of error in your chosen survey. (3)