094

THE OPEN UNIVERSITY OF SRI LANKA

B.Sc. /B.Ed. Degree Programme, Continuing Education Programme

APPLIED MATHEMATICS-LEVEL 05

ADU5318 – Bio Statistics

Open Book Test (OBT) 2017/2018

Date: - 21.07.2018 **Time: 10.30am – 11.30am**

Instructions

- This examination is of **One hour** duration.
- There are two parts to the question paper. Part *A* consists of 10 multiple choice questions. Each correct answer is given 5 marks. Part *B* consists of a structured essay question. Fifty (50) marks are allocated for this question distributed as indicated.
- Answer **All** questions. At the end of the examination, handover Part *A* with correct answers underlined along with the answers to Part *B*.

Part *A*

Underline the most suitable answer from the choices given.

1. In a study on estimating the mean dried weight of a medicinal plant, the plants sampled were not dried enough at the time of measuring. Identify the correct statement.
   a) The resulting error is a sampling error.
   b) The resulting error adds a bias to the estimate.
   c) This is an example of an error due to confounding.
   d) The statements (a), (b) and (c) are all true.

2. Identify the correct statement.
   a) An appropriate sampling procedure will reduce non-sampling error.
   b) An appropriate sampling procedure is likely to produce a representative sample.
   c) An appropriate sampling procedure will produce a sample with small random variation.
   d) The statements (a), (b) and (c) are all true.

3. The management of a school is interested in estimating the number of students with dental problems among the 2000 students in the school using a sample of size 400. Identify the correct statement.
    a) The population in this study is homogeneous.
    b) This study cannot have non-sampling errors.
    c) The population in this study is finite.
    d) The statements (a), (b) and (c) are all true.

4. Which of the following statements is true for simple random sampling?
    a) Simple random is suitable for sampling from inhomogeneous populations.
    b) Simple random sampling can be applied to sample from infinite populations.
    c) Simple random sampling can produce non-representative samples.
    d) The statements (a), (b) and (c) are all true.

5. Which of the following statements is true for systematic sampling?
    a) It is suitable for sampling from a population arranged in an order.
    b) It is a random sampling method.
    c) It is suitable for sampling from an inhomogeneous population.
    d) The statements (a), (b) and (c) are all true.

6. In a study on dengue prevalence in an area, a researcher collected a sample of 200 families in the area and recorded the number of family members diagnosed with dengue in the sampled families. Identify the correct statement.
    a) The researcher has conducted an observational study.
    b) The researcher has conducted a confirmatory study.
    c) In this study, sampling unit is a resident.
    d) The statements (a), (b) and (c) are all true.

7. Identify the correct statement.
    a) Randomized complete block designs are probability sampling methods used for data collection in observational studies.
    b) Randomized complete block designs are non-probability sampling methods used for data collection in observational studies.
    c) Randomized complete block designs are suitable for data collection in studies in which experimental units are homogeneous.
    d) The statements (a), (b) and (c) are all false.

8. In a study to compare the effectiveness of two drugs (*A* and *B*) on reducing the blood cholesterol levels in rats, the rats that had received drug *A* were much younger to the rats that had received drug *B*. Identify the incorrect statement.
   a) The study has a bias.
   b) The study has confounding errors.
   c) A rat represents an experimental unit.
   d) None of the statements (a), (b) and (c) is true.

9. Which of the following statements is true?
   a) When the sample size is increased sampling error will reduce.
   b) When the sample size is increased, non-sampling error will reduce.
   c) When the sample size is increased, the bias in the estimate will reduce.
   d) The statements (a), (b) and (c) are all true.

10. Identify the incorrect statement.
   a) The estimates derived from populations with large random variation will have large sampling errors.
   b) Small samples selected from populations with large random variation are likely to be non-representative.
   c) The estimates derived from populations with large random variation will be less precise.
   d) None of the statements (a), (b) and (c) is true.

Part *B*

1. A researcher is interested in comparing the effects of two diets (Diet1, Diet2) on the weight gain of rats. For this study, he has 200 rats available of which 100 are less than 1 year old and the rest are over 2 years. He plans to keep the rats on one of the diets for four months and measure the weight gain. The rats are to be kept in cages during the experimentation period. Each cage can only handle 5 rats and rats in the same cage have to be fed with the same diet.

   Suppose the researcher seeks your advice to design this study.

   i) Clearly describe how you advice the researcher. If you use the random number table, clearly explain how you read the values.

   (20 marks)

   ii) Explain the following terms in relation to this study:

   a) Replicate

   (10 marks)

   b) Random variation

   (10 marks)

   c) Interaction

   (10 marks)