MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF ENGINEERING APPLIED SCIENCES AND TECHNOLOGY

DEPARTMENT: APPLIED STATISTICS

MODULE: RESEARCH METHODS
CODE: ASTA 217

SESSIONAL EXAMINATIONS
APRIL 2024

DURATION: 3 HOURS

EXAMINER: MR. S. CHAMUNORWA

INSTRUCTIONS

1. Answer **All** questions in Section A
2. Answer **any three** questions in Section B
3. Start a new question on a fresh page
4. Total marks 100

Additional material(s): *Non-programmable electronic scientific calculator.*
Statistical tables

SECTION A: 40 MARKS.
Attempt/Answer all questions

A1 a) State four disadvantages of a face to face interview in a survey.

b) Explain the advantages of an open-ended questions over closed format questions in a questionnaire.

c) Give three reasons for asking a question in closed form rather than in open-ended form in order to obtain information.

[4,4,4]

A2 a) Make a comparison of the main characteristics, strengths and weaknesses of qualitative and quantitative research methods.

b) Discuss how they differ in terms of the relationship between the researcher and its subjects.

[4,4]

A3 a) What is research problem? Explain the classification of research.

b) Explain what is involved in data management.

c) Discuss the four classifications of surveys.

[4,2,8]

A4 Literature review is very important component of research; you, as a researcher, must review literature for your research. Hence, answer the following questions.

a) What are the purposes of literature review? Discuss.

b) What are the characteristics of good literature review?

[3,3]

SECTION B: [60 MARKS].
Attempt/Answer any 3 questions

B5 Professor Sithole is a researcher at a public University in Zimbabwe. He gathered a group of 16 participants and conducted a study. His key goal was to explore the lived experience of Female Genital Mutilation. Based on the given clue, answer the following questions

a) Which design is best suited for addressing his key goal, and why?

b) Which Sampling method of targets is best well-matched for addressing his key goal, and why?

c) Which data collection method is best appropriate for addressing his key goal, and why?

[**5,8,7**]

B6 In 1965, data on the connection between radioactive waste exposure and cancer mortality was published. The data was collected from 9 counties located near an Atomic Energy Commission facility in Hanford, Washington. The data give the index of exposure and the cancer mortality rate during 1959-1964 for the nine countries affected. Higher index of exposure values represent higher levels of contamination.

Output from fitting the simple linear regression for predicting Mortality from Exposure is shown in Table 1.

a) Write down the fitted regression line.

b) What is the expected mortality rate for a country with an exposure index of 3?

c) Is there a significant linear relationship between Mortality and Exposure? Provide a null hypothesis, alternative hypothesis, a test statistic, rejection criteria and conclusion.

d) What is the estimated variance of the observations?

e) Compute the Total Sums of Squares (SST) for this data.

f) Compute the coefficient of correlation, **r** and explain the nature and strength of the relationship between Mortality and Exposure.

[**3,2,5,3,3,4**]

Table 1: Regression model results

```
> lm.out=lm(Mortality~Exposure)



> summary(lm.out)

Call:
lm(formula = Mortality ~ Exposure)

Residuals:
    Min      1Q  Median      3Q     Max
-16.295 -12.755   4.011   9.398  18.594

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  114.716      8.046  14.258 1.98e-06 ***
Exposure       9.231      1.419   6.507 0.000332 ***
---
Signif. codes:  0 *** 0.001 ** 0.01 * 0.05 . 0.1   1

Residual standard error: 14.01 on 7 degrees of freedom
Multiple R-Squared: 0.8581,Adjusted R-squared: 0.8378
F-statistic: 42.34 on 1 and 7 DF,  p-value: 0.0003321




> anova(lm.out)
Analysis of Variance Table

Response: Mortality
          Df Sum Sq Mean Sq F value    Pr(>F)
Exposure   1 8309.6  8309.6  42.336 0.0003321 ***
Residuals  7 1373.9   196.3
---
Signif. codes:  0 *** 0.001 ** 0.01 * 0.05 . 0.1   1
```

B7 a) Discuss with aid of examples which situations are most appropriate to use

   i) Probability Sampling for your research?
   ii) Non-Probability Sampling?

   b) A researcher wants to find out the best seller food products brands of the year in China. In this case the target population is constituted by every market where the food products are sold. The population is not only spread over a wide geographical

region of the country but is also dispersed. There are 150 cities in China to be included in the study. Devise a sampling scheme which is a combination of stratified random sampling and cluster sampling.

[5,5,10]

B8 a) Explain four principles of ethics when carrying out a research.

b) Teenagers are to be asked to complete a questionnaire which includes a short section on their use of mobile phones. Topics of interest are:

i) Who pays for their calls,

ii) How often they use a mobile phone,

iii) How long their calls usually last,

iv) Their reasons for making calls,

v) The approximate proportion of their calls that are received as opposed to send,

vi) The percentage of occasions that they use the phone to send a text message (as opposed to making a call).

Draft one question on each of these six topics, with three questions in closed form and three in open-ended form, saying which questions are of which form.

[8,12]

END OF QUESTION PAPER