



# UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

## FIRST SEMESTER EXAMINATIONS, NOV/DEC 2018

**COURSE NO:** MA 473 [Unihubgh.com](http://Unihubgh.com)  
**COURSE NAME:** SAMPLE SURVEY THEORY  
**CLASS:** MA 4

**TIME:** 3 HOURS

Name: \_\_\_\_\_ Index Number: \_\_\_\_\_

*Answer any THREE (3) questions in the answer booklet provided*

### Question 1

a.

- i. State 5 examples of probability sampling techniques
- ii. State 5 examples of non-probability sampling techniques
- iii. State 3 advantages and 2 disadvantages of probability sampling techniques
- iv. State 3 advantages and 2 disadvantages of non-probability sampling techniques

b.

The Management of University of Mines and Technology, Tarkwa want to conduct a survey to determine the average age of first year students that are admitted to the school. Suppose you have been chosen to do the survey, describe how you will use simple random sampling technique to select a sample of 15 students out of a total population of 500 students. Again, suppose the data below are the ages of the sampled students, determine the **confidence interval** of the population parameter using a confidence level of 95%.

16,17,18,18,19,20,20,25,21,16,19,22,21,20,17

c.

- i. State the two main sources of error in sampling survey.
- ii. Give five examples of Non-sampling errors.

### Question 2

a.

- i. State 3 advantages and 2 disadvantages of cluster sampling.
- ii. State 5 causes of non-response in sampling survey.
- iii. State 5 qualities of a good questionnaire.

b. Describe how coverage error will be reduced.

c. The management of UMaT conducts a survey on the average age of her students in each year. Suppose that the school has 2000 students grouped in 40 separate classes and each class has a total of 50 students. 15 classes are randomly selected for the survey using the one-stage cluster sampling and the average age of the students in each of the 15 classes is presented below:

16,17,18,18,19,20,20,25,21,16,19,22,21,20,17

Determine the confidence interval of the population parameter using a confidence level of 95%.

### Question 3

- a. A warehouse manager is interested in the possible improvements to labour efficiency if air conditioning is installed in the warehouse. The following data set shows the time taken to unload a fully-laden truck at various temperature levels.

Unloading Time	64	53	58	59	49	54	38	48	68	63	58	47
Temperature ( $^{\circ}C$ )	52	68	64	88	80	75	59	63	85	74	71	66

- i. Fit a linear regression model with time as the dependent variable and the temperature as the explanatory variable.
  - ii. Estimate the error.
  - iii. What is the predicted unloading time when the temperature is  $72^{\circ}C$  ?
  - iv. Describe the relationship between the unloading time and temperature.
- b. State 3 advantages and 2 disadvantages of systematic sampling
- c. State 3 advantages and 2 disadvantages of stratified sampling.

### Question 4

- a. Define the following:
- i. population parameter
  - ii. Sample statistic
  - iii. Sampling techniques
  - iv. Probability sampling techniques
- b. At the end of every school year, the state administers a reading test to a sample of JHS students. The school system has 20,000 JHS students, half boys and half girls. This year, a proportionate stratified sample was used to select 20 students for testing. Because the population is half boys and half girls, one stratum consists of 10 boys; the rest girls. The test scores from each sampled student are shown blow:

**Boys:** 50,55,60,62,62,65,67,67,70,70

**Girls:** 70,70,72,72,75,75,78,78,80,80

Find the confidence interval of the population parameter assuming a 95% confidence level.

- c. You want to conduct a survey on first year students' satisfaction with the facilities of UMaT. The instrument you want to use for this survey is the written questionnaire. What are some of the steps you will consider to ensure you have a good questionnaire for the survey?

**Examiners:** K. Agyarko / P. Boye