



# MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF ECONOMICS AND STATISTICS

BACHELOR OF ECONOMICS

EES 303: SAMPLE SURVEY

DATE: 22/1/2021

TIME: 8.30-10.30 AM

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## INSTRUCTIONS:

- (i) Answer question one (Compulsory) and any other two questions
- (ii) Do not write on the question paper
- (iii) Show your working clearly

## QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Distinguish clearly between sampling and non-sampling errors, and explain the main sources of non-sampling errors (12 marks)
- b) Given two populations of size 95 and 240, use the provided table of random numbers to draw a simple random sample of size 5 and 10 respectively from the populations. Explain the steps followed in each case. (10 marks)
- c) Distinguish between the following terms as used in sampling survey;
  - i. Target population and Accessible population
  - ii. Judgemental sampling and Quota sampling
  - iii. Questionnaire and an Interview
  - iv. Systematic bias and sampling error (8 marks)

## QUESTION TWO

- a) Under what circumstances would a stratified random sampling considered appropriate? Using an illustration, explain how you can select such a sample. (6 marks)
- b) A sample survey is to be carried out to study the extent of educated unemployed in Machakos sub-county. Describe the important stages of the work. (10 marks)
- c) What is the importance of sampling in solving business problems? (4 marks)

### QUESTION THREE

- a) i An advertising firm wanted to estimate the population mean of households in the country that view show X. The country is divided into three strata, town A, town B and the rural area. The strata contains  $N_1=155$ ,  $N_2=62$ , and  $N_3=93$  households respectively. The advertising firm finds that it costs more to obtain information from a rural household than to obtain a response in town A and B. The increase is due to cost of travelling from one rural household to another. The cost per observation in each town is estimated to be \$9 and the cost per observation in the rural area is \$16. The stratum standard deviations from prior survey are  $S_1=5$ ,  $S_2=15$  and  $S_3=10$ . Find the overall sample size  $n$  and the stratum sample sizes that allow the firm to estimate at minimum cost, the average television viewing time with a bound on the error of estimation equal to 2 hours. (7 marks)
- ii The advertising firm decides to use telephone interview rather than personal interview because all households in the country have telephone and this method reduces costs. The cost of obtaining an observation is then the same in all three strata as in (i) above. The stratum standard deviations are again approximated by  $S_1=5$ ,  $S_2=15$  and  $S_3=10$ . Find the appropriate sample size  $n$  and stratum samples taking a bound of 2 (7 marks)
- b) Under what circumstances would you consider cluster sampling (6 marks)

### QUESTION FOUR

- a) Identify and clearly explain any five non-probability sampling techniques (10 marks)
- b) State and explain the various methods of Data collection a researcher can use in a survey (10 marks)

### QUESTION FIVE

- a) i) A government park charges admission according to car load rather than by person and a park official wants to estimate the number of persons per car for a particular summer holiday. The officer knows from past experience that there should be 400 cars entering the park and wants to sample 80 cars. To obtain an estimate of the variance, he uses repeated systematic sampling with 10 samples of 8 cars each. Using the data given below, estimate the average number of persons per car and place a bound on the error of estimation. (7marks)

Data on number of people per car\*

Random starting point	Second element	Third element	Fourth element	Fifth element	Sixth element	Seventh element	Eighth element	$\bar{y}_i$
2(3)	52(4)	102(5)	152(3)	202(6)	252(1)	302(4)	352(4)	3.75
5(5)	55(3)	105(4)	155(2)	205(4)	255(2)	305(3)	355(4)	3.38
7(2)	57(4)	107(6)	157(2)	207(3)	257(2)	307(1)	357(3)	2.88
13(6)	63(4)	113(6)	163(7)	213(2)	263(3)	313(2)	363(7)	4.62
26(4)	76(5)	126(7)	176(4)	226(2)	276(6)	326(2)	376(6)	4.50
31(7)	81(6)	131(4)	181(4)	231(3)	281(6)	331(7)	381(5)	5.25
35(3)	85(3)	135(2)	185(3)	235(6)	285(5)	335(6)	385(8)	4.50
40(2)	90(6)	140(2)	190(5)	240(5)	290(4)	340(4)	390(5)	4.12
45(2)	95(6)	145(3)	195(6)	245(4)	295(4)	345(5)	395(4)	4.25
46(6)	96(5)	146(4)	196(6)	246(3)	296(3)	346(5)	396(3)	4.38

\*The responses  $y_i$  are in parentheses.

- ii) The management of a large utility company is interested in the average amount of time delinquent bills are overdue. A systematic sample will be drawn from an alphabetical list of  $N=2500$  overdue customer accounts. The standard deviation from a similar study conducted the previous year was  $S=10$ . Determine the sample size required to estimate the average amount of time utility bills are overdue with a bound on the error of estimation of 2 days. (3 marks)
- b) Explain the important steps that a researcher must pay attention to when deciding on the best sampling procedure (10 marks)