CHUKA  **UNIVERSITY**

SUPPLEMENTARY/ SPECIAL EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE ECONOMICS AND STATISTICS, BACHELOR OF EDUCATION SCIENCE

MATH 441: SAMPLING METHODS II

STREAMS: BSC (ECN STAT) BED (SCI) **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 03/02/2021 **2.30 PM – 4.30 PM**

INSTRUCTIONS:

- Answer ALL other questions
- Sketch maps and diagrams may be used whenever they help to illustrate your answer
- Do not write on the question paper
- This is a **closed book exam**, No reference materials are allowed in the examination room
- There will be **No** use of mobile phones or any other unauthorized materials
- Write your answers legibly and use your time wisely

QUESTION ONE: (30 MARKS)

a) Define the following statistical terms: Sampling frame, sampling units, unbiasedness. (6marks)

b) Explain what is meant by cluster sampling illustrating your answer with an example. (5marks)

c) A survey was conducted to estimate the number of pepper standards and production of pepper in a certain county. For this, 3 clusters out of 95 were selected by simple random sampling without replacement. The information on the number of pepper standards recorded is given below.

Cluster Number	Cluster size	Number of pepper standards
1	25	41, 16, 19, 15, 144, 454, 212, 27, 28, 76, 199
2	31	29, 39, 70, 38, 37, 161, 38, 219, 46, 128, 30, 20
3	10	115, 59, 120, 67

i) Estimate the mean number of pepper standard per cluster .
ii) Estimate the mean number of pepper standards per listing together with its standard error (You are given = 22, = 4025.659, = 1004.917) (11mrks)

d) How is multistage sampling procedure carried out? (4marks)

e) Differentiate between ratio estimation and regression estimation. (4marks)

QUESTION TWO: (20 MARKS)

a) Discuss the relationship between jackknife and bootstrap resampling techniques. (6marks)

b) Use the data below to compute the estimate of and its 95% confidence interval using the jack knife resampling technique.
34.2, 33.1, 30.6, 32.9, 33.7,
34.8, 35.8, 30.1, 29.8, 32.4 (14mrks)

QUESTION THREE: (20 MARKS)

A Cider forest has got 280 trees of the same species and of similar ages. A preliminary estimate is required of the total weight of timber that trees will yield. A forestry expert claims to be able to make fairly accurate assessments of the yield from any tree merely by visual inspection and makes such assessments for all 280 trees. He assesses the total yield as 439.5 tonnes. Subsequently, 25 trees picked at random are felled and their timber yields □□ and their corresponding assessed yields, □□, provide the following summary results.

= 41.4, = 73.47, = 39.8,
= 69.08, = 70.64 . Using the ratio estimator, estimate the:

i) Total yield,
ii) Var () and
iii) The confidence interval of
