JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF AGRICULTURAL SCIENCES AND FOOD SECURITY
UNIVERSITY EXAMINATION FOR DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL EXTENSION

1st YEAR 2nd SEMESTER 2018/2019 ACADEMIC YEAR

MAIN REGULAR

COURSE CODE: AEE 5121

COURSE TITLE: QUANTITATIVE METHODS

EXAM VENUE: **STREAM: (MSc. In Agricultural extension)**

DATE: 4/09/19   **EXAM SESSION: 9.00 – 12.00NOON**

TIME: 3.00 HOURS

<u>**Instructions:**</u>
(i) Answer any three questions.
(ii) Candidates are advised not to write on the question paper.
(iii) Candidates must hand in their answer booklets to the invigilator while in the examination room.
(iv) Where necessary, computations and data analysis to be done with R statistical software.

QUESTION ONE (20 MARKS)

    a. Distinguish between product correlation coefficient and Spearman's coefficient of Rank correlation. **(2 marks)**

    b. During the lambing season 8 ewes and the lambs they bore were weighted at the time of birth with the following results

Weight of ewe[x] in kg	44	41	43	40	41	37	38	35
Weight of lamb [y] in kg	3.5	2.8	3.2	2.7	2.9	2.5	2.8	2.6

Assuming that $\sum xy = 923.2, \sum x^2 = 12785, \sum y^2 = 66.88$

    i)   Plot a scatter diagram and interpret accordingly. **(4 marks)**

    ii)   Calculate the product moment correlation coefficient between X and Y. (6 marks)

    iii)   At 5% level of significance, test whether the data could have come from a population with correlation coefficient $\rho = 0$. State the hypothesis, provide the test statistic and the critical values **(8 marks)**

QUESTION TWO (20 MARKS)

a. A hundred and twenty chicks were subjected to a certain feed and the increase in their weight measured after one week. The increase in weight was recorded as follows:

Additional weight in grams	10-14	15-19	20-24	25-29	30-34	35-44	45-59	60-89	90-119
No of chicks	2	5	17	33	27	25	7	3	1

    i.   Obtain the estimates of the median and quartiles of this distribution. (5 marks)

    ii.   Computer coefficient of skewness and interpret the result. (5 marks)

b. During the lambing season 8 ewes and the lambs they bore were weighted at the time of birth with the following results

Weight of ewe[x] in kg	44	41	43	40	41	37	38	35
Weight of lamb [y] in kg	3.5	2.8	3.2	2.7	2.9	2.5	2.8	2.6

Assuming that $\sum xy = 923.2, \sum x^2 = 12785, \sum y^2 = 66.88$

    i. Obtain regression slope and intercept. **(2 marks)**

    ii.   Write an equation of the regression line **(2 marks)**
    iii. Interpret the estimated parameters **(2 marks)**
    iv. Test the hypothesis on the slope parameter **(2 marks)**
    v. Obtain the coefficient of determination for the model and interpret the
       result **(2 marks)**

QUESTION THREE (20 MARKS)

a) An investigator carried out an experiment where V treatments $i = 1,2,3, \dots, V$ were administered to B blocks $j = 1,2,3, \dots, b$, such that each block received each of the V treatments. The order in which the treatments were administered to blocks did not really matter.
    i.   Identify the design he possibly used. **(2 marks)**
    ii. Explain the two main criterions that are used to control variation in this design.
       (4 marks)

b) The results of investigations as carried out in part (a) above were recorded as follows.

		Blocks			
		1	**2**	**3**	
	1	21	24	34	
Treatments	**2**	25	33	30	
	3	31	34	38	
	4	17	39	32	

Test the hypotheses

    i. $H_{01}: t_1 = t_2 = t_3 = t_4 = 0$ **(8 marks)**
    ii. $H_{02}: b_1 = b_2 = b_3 = 0$ at 0.05 level of significance **(8 marks)**

QUESTION FOUR (20 MARKS)

a. Explain the following terms as used in sample surveys:
    i.   Sampling unit **(2 Marks)**
    ii. Sampling frame **(2 Marks)**
    iii. Purposive sample **(2 Marks)**
    iv. Simple Random Sampling without Replacement. **(2 Marks)**
    v. Cluster sampling **(2 Marks)**
b. Assume that X is normally distributed with a mean of 5 and a standard deviation 4. Determine
    i. $P(X < 11)$ **(2 Marks)**
    ii. $P(X > 0)$ **(2 Marks)**
    iii. $P(3 < X < 7)$ **(2 Marks)**

iv. $P(-2 < X < 9)$ **(2 Marks)**

v. $P(2 < X < 8)$ **(2 Marks)**

QUESTION FIVE (20 MARKS)

a. Discuss any three core functions of literature review in research. (3 marks)

b. The ages (in months) at which 50 children were first enrolled in a preschool are listed below.

38, 40, 30, 35, 39, 40, 48, 36, 31, 36, 47, 35, 34, 43, 41, 36, 41, 43, 48, 40
32, 34, 41, 30 ,46 ,35, 40 ,30 ,46, 37, 55, 39, 33, 32, 32, 45, 42, 41, 36, 50
42, 50, 37, 39, 33, 45, 38, 46, 36, 31

    a. Construct a stem and leaf display for the data. Start the lower boundary of the first class at 30 and use a class width of 5 months. **(5 marks)**

    b. Construct a grouped frequency distribution for the data **(5 marks)**

    c. Obtain frequency polygon and an ogive curve to the data **(10 marks)**