



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2010/2011

**SECOND SEMESTER EXAMINATION FOR THE DEGREE OF MASTER OF
SCIENCE (LAND AND WATER MANAGEMENT)**

KCU 500: BIOMETRY

DATE: Tuesday 5th April 2011

TIME: 12.00p.m -5.00p.m

INSTRUCTIONS

Time: 3 hours

- Answer question **one** and any other **three** questions.
- Use two decimal places in your calculations.

1.

- a) Differentiate the following terminologies:
- i. Voluntary sample and Convenience sample
 - ii. Statistical hypothesis and Statistical test
 - iii. Cluster sampling and Stratified sampling
 - iv. Discrete variable and continuous variable
 - v. Randomization and Replication

(10marks)

- b) A researcher calculated a mean of 12 and an mean square error of 36 in the analysis of variance. Use this information to answer the following questions: **(6 marks)**
- i. Calculate the standard deviation
 - ii. Calculate the standard error of the mean
 - iii. Calculate the coefficient of variation.

- c) Give four characteristics that describe the shape of a distribution **(4 marks)**

d)

- i. Differentiate between coefficient of correlation (r) and coefficient of determination (R^2).
(2marks)

- ii. Use the data below to estimate a simple regression equation of weight on heart girth of cows using the following sample: **(8marks)**

Cow	1	2	3	4	5	6
Weight (Y)	641	633	651	666	688	680
Hearth girth (x)	214	215	216	217	219	221

2. An experiment was conducted to compare the starch content of tomato plants grown in sandy soils supplemented by one of different nutrients A, B and C. The data are given below:

	Starch content					
A	22	20	21	18	16	14
B	12	14	15	10	9	-
C	7	9	7	6	-	-

- a. Write an appropriate model for this experiment (2marks)
b. Calculate ANOVA for the data. (8marks)
3. An experiment was conducted to evaluate the effect of six seeding rates (kg/ha) on grain yield of rice.

	Seeding rate (kg/ha)					
Block	25	50	75	100	125	150
1	5.1	5.3	5.3	5.2	4.8	5.3
2	5.4	6.0	5.7	4.8	4.8	4.5
3	5.3	4.7	5.5	5.0	4.4	4.9
4	4.7	4.3	4.7	4.4	4.7	4.1

- a. Give the linear model for this experiment. (2mks)
b. Calculate ANOVA for the data. (6mks)
c. State whether the treatment and block effects were significant at $\alpha = 0.05$. (2mk)
4. The extraction rate of a certain polymer is known to depend on the reaction temperature and the amount of catalyst used. An experiment was conducted at four levels of temperature and five levels of the catalyst and the extraction rate was recorded as shown in the following table.

	Amount of catalyst				
Temp.	0.5%	0.6%	0.7%	0.8%	0.9%
50°C	38	45	57	59	57
	41	47	59	61	58
60°C	44	56	70	73	61
	43	57	69	72	58
70°C	44	56	70	73	61
	47	60	67	61	59
80°C	49	62	70	62	53
	47	65	55	69	58

- a. Show ANOVA for the data. (7mks)
 - b. Are there significant temperature, catalyst and interaction effects at $\alpha = 0.05$? (3mks)
5. An experiment was conducted in a split-plot design to study the effect of fertilizer (F) and seed rates on the yield of paddy rice. The main plot treatments were the seed rates 75, 100 and 125 kg/ha denoted by S_1 , S_2 and S_3 respectively. The sub-plot treatments were the fertilizer F_1 , F_2 and F_3 . The results are given in the table below:

Seed rate	Fertilizer	Blocks		
		I	II	III
S_1	F_1	9.75	10.14	10.01
	F_2	10.66	11.28	10.46
	F_3	11.83	12.31	11.70
S_2	F_1	12.98	13.12	13.29
	F_2	13.82	13.65	13.36
	F_3	14.12	14.20	13.48
S_3	F_1	13.16	13.26	13.32
	F_2	13.89	13.84	13.74
	F_3	14.31	14.18	14.40

Calculate ANOVA for the data. (10mks)