(Knowledge for Development)

KIBABII UNIVERSITY

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UNIVERSITY EXAMINATIONS

2022/2023 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER

MAIN EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE

COURSE CODE: STA 312

COURSE TITLE: EXPERIMENTAL DESIGN I

DATE: 22/12/2022 **TIME:** 2:00 PM – 4:00 PM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

This Paper Consists of 4 Printed Pages. Please Turn Over.

QUESTION ONE (30 MARKS)

a) Differentiate between the terms Latin square and Orthogonal Latin square designs as used in design and analysis of experiments. (2mks)

b) State and briefly explain the basic principles of experimentation (6mks)

c) b) Highlight the causes of inherent variation in any observation (2mks)

d) Discuss the importance of ANOVA (2mks)

e) State the assumptions of statistical experimental design models (4mks)

f) By use of a simple illustration show the layout of a one-way classification experimental design. (4mks)

g) The data given below shows the number of patients who developed immunity of an infectious disease at the end of the first after being subjected to two different vaccines. Using the variance ratio determine if the following vaccines have the same effect on immunity development of patients (use $\propto$ =0.05). (10mks)

Vaccine A:	42	81	90	97	96	
Vaccine B:	137	85	167	154	137	100

QUESTION TWO (20 MARKS)

An Agricultural station conducted an experiment to determine whether there was any difference in the yields of 5 varieties of maize. The design adopted was 5 random blocks of 5 plots each. The yields per hectare obtained in the experiment were;

	Varieties					
Blocks	V1	V2	V3	V4	V5	total
1	30	23	34	35	20	132
2	39	22	28	25	28	142
3	56	43	43	31	49	222
4	38	45	36	35	32	186
5	44	51	23	58	40	216
Total	207	184	164	174	169	898

(a) Analyze the design and comment on your findings (take α 0.05) (15mks)

(b) Obtain the efficiency of the design relative to CRD (5mks)

QUESTION THREE (20 MARKS)

An experiment based on an economical poultry feeding study was conducted in a poultry farm in Kenya to investigate the effect of feeding cockerels with locally available foodstuff on their growth. The feeds tried were

a. Usual feed (control)
b. Rice beans
c. Kodon
d. Sawan
e. Meat meal.

The cockerel under study were allocated to the feeds at random and the increase in body weight of individual birds recorded

Control t_1	28.0	24.8	28.7	34.8	34.8	30.5	25.1					
Rice Bean t_2	24.7	30.7	30.5	26.7	28.7	28.7	22.7	34.7	22.5			
Kodon t_3	30.5	24.8	30.7	31.7	28.5	28.7	28.7	33.5	24.0	26.7		
Sowon t_4	30.7	24.7	24.8	20.7	30.8	30.5	22.5	22.8	21.7	28.7	38.7	30.7
Meat meal t_5	28.7	30.8	22.7	23.8	18.7	24.7	26.7	25.0	31.0	27.8	25.0	

At 5% level of significance test whether the feeds differ

QUESTION FOUR (20 MARKS)

Five varieties of wheat labeled A, B, C, D, E are tried in a Latin square design. The varieties are shown in each plot and the yields obtained in kgs are given below.

	1	2	3	4	5
1	B 90	E 80	C 134	A 112	D 93
2	E 85	D 84	B 70	C 141	D 82
3	C 111	B 90	D 87	B 84	E 69
4	A 81	C 125	E 84	D 76	B 72
5	D 83	B 60	A 94	E 85	C 88

At 5% test whether or not the five varieties differ

QUESTION FIVE (20 MKS)

(a) With an illustration of ANOVA table differentiate between a completely randomized design (CRD) and a Randomized block design (RBD). (6mks)

(b) Test the hypothesis that the following four sets of data are homogeneous at $\propto = 0.05$

Set 1	3	8	7	10
Set2	6	8	9	7
Set3	11	10	12	9
Set4	12	8	9	10

(14mks)