

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATION

RESIT/SPECIAL EXAMINATION

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE

MATH 443: DESIGNS AND ANALYSIS OF EXPERIMENTS I

STREAMS:

TIME: 2 HOURS

DAY/DATE: MONDAY 01/11/2021

8.30 A.M – 10.30 A.M

INSTRUCTIONS**Instructions Answer all the questions**

1. a) State and explain briefly three basic principles of experimental designs [6 marks]

- b) The table below shows the lifetime in hours of samples of 3 different types of television tubes manufactured by a company. Analyse the data at 5% level of significance to determine whether there is a difference between 3 types of television tubes. [10 marks]

	Replications				
Sample 1	407	411	409		
Sample 2	404	406	408	405	402
Sample 3	410	408	406	408	

2. a) Explain briefly the components of the Completely Randomized model. [4 marks]

- b) The table below shows measurement of Pulmonary Arteria Pressure for three different treatments. [SC-sodium chloride, SS-sodium sulphate]

2mg SC	12.3	11.7	12.2	12.1	12.0
1mgSC+1mg SS	12.8	13.2	11.9	12.9	13.1
2mg SS	13.3	12.7	13.2	12.8	12.0

Using 5% level of significance is there any difference in the three treatments? [9 marks]

3. The following table gives fields of Maize per plot in experiment. The four treatments denoted by P, Q, R & S.

Q32	R45	S54	P40
S38	P55	Q51	R37
R58	S39	P46	Q56
.P34	Q60	R44	S33

- (i) Prepare an ANOVA table for the Latin square data. [10 marks]
- (ii) Test whether effects of treatment differ at 5% level of significance. [5 marks]
- (iii) Define the following terms as used in factorial experiments.
 - a) Factor,
 - b) Levels
 - c) Treatment. [6 marks]

4. The table below shows the effect of N:P:K fertiliser and seed rate (S1,S2,S3) on yield of paddy in a split-plot design experiment. The treatment combinations used were:

$$f_1 = 75: 15: 20, f_2 = 75: 30: 20, f_3 = 75: 45: 20, f_4 = 75: 15: 40, f_5 = 75: 15: 60.$$

Analyse the split plot data. [20 marks]

Replication I			Replication II			Replication III		
S2	S1	S3	S1	S3	S2	S2	S3	S1
f_1 13.8	f_2 11.1	f_3 11.8	f_5 12.3	f_4 13.7	f_3 11.3	f_5 13.4	f_3 14.3	f_4 10.4
f_4 13.2	f_5 9.7	f_1 14.0	f_2 10.9	f_1 14.1	f_5 14.1	f_2 14.2	f_1 13.8	f_5 11.8
f_2 11.5	f_3 10.8	f_4 13.6	f_4 10.6	f_3 13.3	f_2 13.2	f_3 13.7	f_4 11.9	f_2 9.8
f_5 14.4	f_1 11.8	f_2 14.3	f_1 10.1	f_5 14.2	f_4 14.2	f_1 14.3	f_5 14.1	f_3 7.8
f_3 12.9	f_4 10.2	f_5 13.1	f_3 11.3	f_2 13.7	f_1 13.8	f_4 13.0	f_2 13.5	f_1 11.7