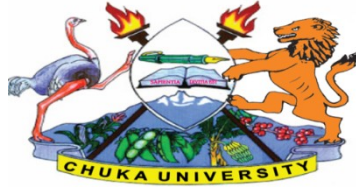


CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN
APPLIED STATISTICS

MATH 841: DESIGNS AND ANALYSIS OF EXPERIMENT

STREAMS:

TIME: 3 HOURS

DAY/DATE: TUESDAY 5/10/2021

2.30 P.M – 5.30 P.M

INSTRUCTIONS

Answer any three questions

QUESTION ONE

- (a) An experiment involving a paddy variety was conducted in a 3 x 3 balanced lattice design as shown below. Obtain the AVOVA table. Is treatment significant at 5%?

Block	Replication 1		
1	(7) 6.31	(5) 5.22	(3) 4.79
2	(6) 4.69	(8) 5.72	(1) 4.45
3	(2) 4.72	(4) 4.20	(9) 5.87
	Replication II		
4	(9) 5.14	(3) 4.75	(6) 3.30
5	(8) 5.55	(5) 5.30	(2) 4.20
6	(7) 4.67	(1) 4.19	(4) 3.08
	Replication III		
7	(1) 3.52	(9) 5.50	
8	(4) 3.58	(8) 5.03	(3)
9	(7) 4.83	(2) 4.51	(6) 4.3
	Replication IV		
10	(5) 5.34	(4) 3.59	(6) 4.5
11	(3) 4.30	(2) 4.83	(1) 4.14
12	(9) 5.33	(8) 5.31	(7) 5.50

QUESTION TWO (20 MARKS)

The following data were obtained from an experiment on sorghum varieties in PBIBD with a treatments arranged in a block of size 4 and 4 replications. Are the treatments significant at 5%?

Sorghum (kg/plot), treatment in parentheses

Block					Block total
1	(2) 60	(1) 6.4	(5) 77	(9) 54	255
2	(6) 7.2	(4) 6.7	(8) 72	(9) 60	271
3	(3) 6.7	(5) 7.2	(8) 60	(7) 57	256
4	(1)7.0	(6) 6.7	(7) 70	(8) 64	271
5	(7)5.2	(4) 64	(2) 82	(5) 87	285
6	(4)10.4	(1) 9.2	(9) 72	(7) 67	335
7	(2)8.2	(3) 82	(4) 72	(8) 70	306
8	(3)6.0	(6) 70	(2)70	(9) 67	267
9	(6) 7.4	(5) 82	(1) 80	(3) 77	313

[20 marks]

QUESTION THREE (20 MARKS)

Use the data in the table below to analyze the 2^3 factorial design with two replicates. Write the ANOVA. Which effects are significant at 1% level of significance? [20 marks]

Percent carbonation (A)	Operating pressure (B)			
	Line speed (25psi)		Line speed (30 psi)	
	200	250	200	250
10	-3	-1	-1	1
	-1	0	0	1
	$-4=1$	$-1=C$	$-1=6$	$2=bc$
12	0	2	2	6
	1	1	3	5
	$1=a$	$3=ac$	$5=ab$	$11=abc$

QUESTION FOUR (20 MARKS)

(a) The data below shows the factors levels used in a fertilizer experiment and the yield

X (phosphate kg/ha	0	15	30	45	60
Y (yield kg /ha	1000	2500	3000	1500	1000

Obtain the optimum level of phosphate the farmer should apply.

(b) Explain the term Balanced Incomplete Block Design (BIRD) as used in design of experiments.. [4 marks]