



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE

UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF EDUCATION

ARTS, SPECIAL EDUCATION AND EDUCATION SCIENCE

3RD YEAR 2ND 2018/2019 ACADEMIC YEAR

REGULAR (MAIN)

COURSE CODE: SAS 308

COURSE TITLE: ANALYSIS OF EXPERIMENTAL DESIGN I

EXAM VENUE:

STREAM: (B.sc ACTUARIAL SCIENCE)

DATE: 29/4/19

EXAM SESSION: 3.00 – 5.00PM

TIME: 2.00 HOURS

Instructions:

- 1. Answer question 1 (Compulsory) and ANY other 2 questions**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE (30 MARKS)

a) Explain THREE principles that governs design and analysis of experiment. (6 Marks)

b) Show that the sum of squares due to treatment is $S_t^2 = \sum_{i=1}^k \frac{T_i^2}{n_i} - \frac{G^2}{N}$ when

$$S_t^2 = \sum_{i=1}^k n_i (\bar{y}_{i.} - \bar{y}_{..})^2 \quad (5 \text{ Marks})$$

c) Outline assumptions of Balance Incomplete Block Design. (4 Marks)

d) Test whether the following types of insurance policies have a significance difference at 0.05 level of significance in contribution to insurance company's profits. (15 Marks)

A	B	C	D
25	19	22	23
24	21	23	24
28	25	26	26

QUESTION TWO (20 MARKS)

10 employees did an interview for promotion to next grade and their performance was graded by 5 different interviewers. The following table gives the scores of the employees as given by 5 interviewers. Determine whether there is any significant different between the interviewers or between the employees at 0.05 level of significance.

	1	2	3	4	5	6	7	8	9	10
1	89	70	80	89	65	85	75	70	85	82
2	86	65	80	85	70	88	70	51	84	81
3	85	60	48	87	48	75	71	93	80	83
4	88	65	70	85	67	82	73	94	86	80
5	87	65	62	89	60	80	76	92	90	89

QUESTION THREE (20 MARKS)

The table below shows performance of 6 employees in 4 replicate except for one value missing. Estimate the missing value and analyze the data for homogeneity of the treatments and blocks at 0.05 level of significance.

	1	2	3	4
1	18.5	17.7	15.4	16.5
2	15.7		16.6	18.6
3	16.2	12.9	15.5	12.7
4	14.1	14.4	20.3	15.7
5	13.0	16.9	18.4	16.5
6	13.6	12.5	21.5	18.0

QUESTION FOUR (20 MARKS)

- a) Carry out the analysis of variance for the result of the following 4 by 4 Latin square design at 0.05 level of significance. (10 Marks)

a_1	a_2	a_3	a_4
10	8	5	4
a_2	a_4	a_1	a_2
11	13	16	12
a_3	a_1	a_4	a_2
10	14	9	10
a_4	a_3	a_2	a_1
8	6	11	13

- b) Set up an analysis of variance for the following results of Latin square design at $\alpha = 0.05$ level of significance. (10 Marks)

A	C	B	D
10	15	5	4
C	B	D	A
12	10	4	3
B	D	A	C
20	10	5	10
D	A	C	B
10	4	25	12

QUESTION FIVE (20 MARKS)

- a) Explain steps involved in conducting an experiment. (8 Marks)
- b) The following results are from a 2^3 factorial experimental run in a randomized complete block design.

Treatment	Block	
	1	2
(1)	42.6	42.9
a	40.5	43.4
b	41.6	48.5
ab	41	41.5
c	38.1	41.7
ac	39.5	39.4
bc	43.3	44.9
abc	42.5	44.1

Calculate both the simple and main effects for both A and B (12 Marks)