

**NATIONAL UNIVERSITY OF LESOTHO**

**FACULTY OF AGRICULTURE**

**B.Sc. AGRICULTURE**

**CPS 316: RESEARCH METHODOLOGY**

**DECEMBER 2017**

**MARKS: 100**

**TIME: 3HRS**

---

**INSTRUCTIONS: ANSWER ALL THE QUESTIONS**

---

**QUESTION 1 [30 marks]**

- a) What are the steps followed in conducting agricultural experiment (10 marks)
- b) State the objectives of conducting research (10 marks)
- c) State research ethics (10 marks)

**QUESTION 2 [20 marks]**

Distinguish the following terms;

- a) Descriptive and analytical research (2 marks)
- b) Null and alternative hypothesis (2 marks)
- c) Control and replication (2 marks)
- d) Applied, basic and adaptive research (3 marks)
- e) Quota sampling, expert (Delphi) and snow-balling (3 marks)
- f) Inductive and deductive reasoning (2 marks)
- g) Complete Randomized Design, Randomized Complete Block design and Latin square design (3 marks)
- h) Single factor and multi-factorial experiment (2 marks)
- i) Control, randomization and treatment (3 marks)

**QUESTION 3 [25 marks]**

Briefly explain the following;

- a) different types of random sampling (10)
- b) motivation for conducting research (5)
- c) statement of the problem (5)
- d) hypothesis (5)

**QUESTION 4 [25 marks] Choose either section A or section B not both.**

**Section A**

Construct and populate analysis of variance for randomized complete block design with data provided below;

Treatment	Bean yield (ton/ha)			
	Rep 1	Rep 2	Rep 3	Rep 4
Likoekoe	5.4	5.8	5.7	5.6
Borotho	7.2	7.5	7.3	7.5
Natal	1.0	1.3	1.2	1.1
Wart 332	3.8	3.9	4.0	3.7
Phi 564	5.3	5.4	5.3	5.2

## Section B

Construct and populate analysis of variance for Latin Square Design with data provided below;

	Maize yield (ton/ha)			
	Col. 1	Col. 2	Col. 3	Col.4
Row 1	8.4 (A)	8.8 (C )	8.7 (C)	8.6 (B)
Row 2	5.2 (B)	5.5 (B)	2.7 (A)	2.5 (D)
Row 3	2.0 (C)	2.3(A)	2.2 (D)	2.1 ( C)
Row 4	3.8 (D)	3.9 (D)	3.0 (B)	3.7(A)

### Cultivar Legend:

A=Phi 567

B=PAN 987

C=SNK 445

D=CGI 2167