

**UNIVERSITY OF FORT HARE**

AGC421

**SUPPLEMENTARY EXAMINATION  
January 2019**

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**Time: 3 HOURS**

**Subject: SPECIAL TOPICS IN CROP SCIENCE**

**Marks: 100**

**This paper consists of 3 pages including cover page**

**Internal Examiner**

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**Internal Examiner**

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## AGC421, JANUARY 2019

### Answer All Questions

1. a. Calculate the missing value for the following experiment laid as a randomized complete block design. (9)
- b. Name the type of trial from which data in Table 1 was obtained. (1)

Table 1: Evaluation of traditional farmer practice of maize production and improvements of density, nitrogen and variety in an on-farm trial at Middledrift in the 2007/08 summer season

Treatment	Block 1	Block 2
Traditional (T)	4.3	3.4
T + density	4.5	5.9
T + nitrogen	4.5	5.4
T + variety	5.7	-

2. A researcher evaluated four hybrids SC701, SC401, PAN6611, and PAN6616 for yield performance. The gross plot consisted of seven rows, each 5m long and spaced 0.9m apart. At harvest, two outside rows were discarded on either side of the nett plot rows. In the nett plot, only 3m of row length was harvested with 1m discarded at the end of each row. If the grain moisture content at harvest and cob yield was as set out in Table 2, calculate the grain yield achieved by each hybrid at standard moisture content for maize. (8)

Table 2: Cob yield and grain moisture content of four hybrids at harvest in a trial conducted at the Fort Hare Research Farm in the 2008/09 summer season

Hybrid	Moisture content of grain at harvest (%)	Nett plot cob yield (kg)	Shelling %
SC701	25	5.1	88
SC401	11	4.8	80
PAN6611	15	4.9	79
PAN6616	18	5.3	86

3. You intend to conduct an experiment to evaluate four maize hybrids, SC710, SC401, PAN6611 and PAN6616. The gross plot size is seven rows, each 5m long with between-row spacing of 0.9m. Answer the following questions if the trial is laid out as a randomized complete block design with 1m pathways between blocks and plots. Each treatment is replicated three times at the site.
  - a) How many factors and treatments are in this experiment? (2)
  - b) What is the gross plot size of each plot? (2)
  - c) What are the dimensions of the whole trial? (width, length, area) (3)
  - d) Draw a field plan of the trial and allocate treatments to plots specifying method used. (8)

4. Explain how key questions that are the focus of agricultural research are formulated. (10)
5. The design of an experiment has three essential components. Name these and write detailed notes on each component. (15)
6. What is the purpose of writing a plan for an experiment? What information should be included when writing the plan of an experiment? (10)
7. What are the types of trials that are conducted on-farm? Discuss the purpose and sequencing of the types of trials that you mention. (12)
8. The data in Table 3 was obtained by a researcher from an experiment.

Table 3: Fresh weight (t/ha) of six Irish potato varieties at Fort Hare Farm during the 2005 winter season

<b>Treatment</b>	<b>Block I</b>	<b>Block II</b>	<b>Block III</b>
Treatment 1	40	60	80
Treatment 2	30	55	120
Treatment 3	20	70	92
Treatment 4	20	42	60
Treatment 5	40	58	80
Treatment 6	50	68	92

- (a) What test would you perform for non-homogeneity of variation in the data above? (2)
  - (b) Using your named test, identify values that are unusual (or outliers) in the data obtained in this experiment. (4)
  - (c) What would be your recommendation to the researcher who generated this data? (4)
9. Write on the common causes of missing data in experiments and methods that you would use to correct a missing data situation. (10)

**END OF QUESTION PAPER**