W1-2-68-1-6

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2016/2017**

THIRD YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE INLAND RESOURCE PLANNING AND MANAGEMENT

**AHS 2307: EXPERIMENTAL DESIGN AND ANALYSIS**

**DATE: JUNE, 2017** **TIME: 2 HOURS**

SECTION A -ANSWER ALL QUESTIONS

1. Below is the yield of money maker tomato variety grown under hydroponics and under field condition:
   Hydroponics: 32 37 29 39 25 35 27 34 30 31 26 31 30
   Field: 22 27 29 29 23 26 27 24 20 21 26

   Calculate t, and determine whether the differences in yield are significant (at 5% and 1% levels) (5 marks)

2. Explain in detail stratified random sampling (5 marks)

3. Show the randomization and layout for a split-plot design with 5 levels of fertilizer and 6 groundnut varieties arranged according to a RCBD with 4 replications. The levels of fertilizer are of secondary importance. (5 marks)

4. A researcher has developed red bells for chasing birds. He installs them in a sorghum plot and for comparison purposes has another plot with green bells. From the red bells plot he collects 286 damaged plants out of 450, and from the green bells plot he collects 164 damaged plants out of 450.
   Is the difference between the two plots significant (at 5% level)? (5 marks)

5. Is interaction useful in interpretation of experimental results? Explain, using illustrations. (5 marks)

6. Describe four types of competition effects in field experiments. (5 marks)

7. Discuss:
   i) planned and unplanned comparisons. (2 marks)
   ii) three uses of the $\chi^2$ test. (3 marks)

8. Explain how the incorrect stage of thinning can cause a mechanical error to occur. (5 marks)

**SECTION B -ANSWER ANY TWO QUESTIONS IN THIS SECTION**

9. An adaptability trial with 4 arrowroot hybrids and a local non hybrid control ..

| Row | Yield in kg/plot | | | | Row total |
|---|---|---|---|---|---|
| | Column 1 | Column 2 | Column 3 | Column 4 | |
| 1 | 69(A) | 45D) | 37(C) | 64(B) | 215 |
| 2 | 63(B) | 71(A) | 45(D) | 34(C) | 213 |
| 3 | 49(D) | 38(C) | 66(B) | 67(A) | 220 |
| 4 | 39(C) | 61(B) | 68(A) | 45(D) | 213 |
| Column total | 220 | 215 | 216 | 210 | 861 |
| Grand total | | | | | |

C.F = 46,332.6

Complete the ANOVA table for this data at 5% significane level: (15 marks)

10. Farmers in Limuru were classified according to level of education and their inclination to use fungicides in their farms:

| Fungicide Inclination | Education | | | |
|---|---|---|---|---|
| | Low | Moderate | High | Total |
| Low | 39 | 31 | 77 | |
| Moderate | 37 | 32 | 81 | |
| High | 33 | 34 | 65 | |
| Total | | | | |

Is the inclination to use fungicides independent of their level of education? Use the 5% level of significance. (15 marks)

11. Pollutant (kg/tonne) from 6 quarry sites in Uasin Gishu county (4 replications):

| Treatment | Block I (kg/ha) | Block II (kg/ha) | Block III (kg/ha) | Block IV (kg/ha) | Treatment total | Treatment mean |
|---|---|---|---|---|---|---|
| 1 | 530 | 581 | 573 | 485 | 2169 | |
| 2 | 553 | 555 | 499 | 418 | 2025 | |
| 3 | 551 | 531 | 535 | 495 | 2112 | |
| 4 | 959 | 758 | 875 | 911 | 3503 | |
| 5 | 418 | 485 | 453 | 489 | 1845 | |
| 6 | 342 | 315 | 399 | 408 | 1464 | |
| Totals | 3353 | 3225 | 3334 | 3,206 | G.T= 13,188 | |

The experiment was laid out in RCBD.

*(i)* Use DMRT to show the mean differences (at 5% level). C.F = 7,170,080.17

*(ii)* Use LSD to show the mean differences (at 5% level). (15 marks)