Uva Wellassa University
Faculty of Animal Science and Export Agriculture
End Semester Examination-February/March, 2012
Year III-Semester I
Applied Statistics for Agriculture AAS 301-3-(Repeat)

Uva Wellassa University

Instructions:
Part B: Essay Questions
Total Two (02) pages
Answer **all** questions
Total Three (03) Questions
Time: One (1) hour and Thirty (30) minutes
Total Marks 50

1. A researcher wants to perform a one sample test for a given set of measurements. He believes that the true population mean is 215. To test his claim at 5% level of significance the following results were used. It is noticed that the data follow a normal distribution.

   Number of observations: 10

   Mean: 216.8

   Sample standard deviation: 6.48

   i. Write the null and alternative hypothesis and calculate the test value.
   ii. Test the researcher's claim at 5% level of significance.
   iii. Construct the 95% confidence interval for the true mean.

   [12 marks]

2. A multiple linear regression model was used to relate Y= viscosity of a chemical product, to X_1= temperature (F) and X_2= reaction time (hours). The data set consisted of 15 observations.
   i. The estimated regression coefficients were β_0=300.00, β_1=0.8, β_2=10.40. Calculate an estimate of mean viscosity when X_1=100F and X_2=2 hours.

27

27

2. Consider the given partial ANOVA table given below.

Table 01: ANOVA Table

Source of variation	Degrees of Freedom
Treatment	?
Row	?
Column	?
Error	30
Total	?

i. Find out the missing degrees of freedom for above ANOVA table.

ii. Write down the additive model specifying each term in ANOVA table.

iii. Write down the situations where ANOVA table is used in experimentation.

[12 marks]

3. A plant hormone experiment was conducted in a laboratory using tissue cultured plants to evaluate the growth of plants on 5 different levels of hormone concentrations. Each concentration was repeated 10 times.

i. Identify the most suitable experimental design for this experiment giving justifications.

ii. Prepare the lay-out of the experimental design you proposed above elaborating your randomization procedure.

iii. Construct the partial ANOVA giving sources of variations and degrees of freedom only.

iv. What are the advantages and disadvantages of the experimental design you proposed?

[20 marks]

ii. The sums of squares were SST=1230.50 and SSE=120.30.Prepare the ANOVA table and test for significance of regression using α=0.05.What conclusions can you draw?

iii. What proportion of total variability in viscosity is accounted for by the variables in this model?

[18 marks]

3. Three transplant seedling species (Macaranga, Symplocos and Euphoria) were tested on four different sites located on degraded grassland area in forest reserve and height (cm) of the seedlings were recorded after 3 months from plantation.

Site-1	Macaranga(32cm)	Euphoria(18cm)	Symplocos(26cm)
Site-2	Symplocos(20cm)	Euphoria(22cm)	Macaranga(45cm)
Site-3	Euphoria(16cm)	Macaranga(36cm)	Symplocos(28cm)
Site-4	Symplocos(10cm)	Euphoria(6cm)	Macaranga(16cm)

i. Write down the appropriate model for given data and interpret the terms.

ii. Perform Analysis of Variance (ANOVA) to test whether there is any significance different among 3 species at 5% level. State your conclusions clearly. (Hint: Sum of squares Treatment (SS_{TR}=583.17) and Sum of Squares Total (SS_T=1358.92)).

iii. Use Duncan's Multiple Range Test (DMRT) to check which species are different in terms of its height at 5% significance level.

[20 marks]