



**SLIATE**

**SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION**

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

**Higher National Diploma in Technology (Agriculture)  
Second Year, Second Semester Examination – 2015  
AG2211 - Field Experimentation and Design**

**Instructions for Candidates:**

Answer all questions in part I & two questions out of 3 in Part II.

All questions do not carry equal marks

Use given F and T tables

Calculators are allowed to use

No. of questions : 05  
No. of pages : 06  
Time : 1 ½ hrs

Index Number.....

**Part I**

**Q1. (Total marks 20)**

i. Write four (04) reasons for the importance of field experimentation **(04 marks)**

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ii. Write four methods of minimizing variance **(04 marks)**

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iii. Define the type II error in field experimentation (06 marks)

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iv. Give a definition for the random error in experiments (06 marks)

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**Q2. (Total marks 20)**

i. Write 02 (two) disadvantages of completely randomized designs (CRD) (04 marks)

- 1.....
- 2.....

ii. A researcher has done an experiment and obtained the following ANOVA table. Answer the questions using the given ANOVA table.

Source of variation	Degree of freedom	Sum of squares	Mean square	Computed <i>F</i>	Tabular <i>F</i> 5%
Treatment	4	762.69	190.67	57.38*	3.84
Error	8	26.58	3.32		
Total	12	789.27			

a. What is the type of design that the researcher applied. (02 marks)

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b. How many treatments did he apply for the research? (02 marks)

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c. Briefly interpret the results.

(06 marks)

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d. If the grand mean is given as 33.41. Find the coefficient of variation.

(06 marks)

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### Part II

Answer 02 questions only.

**Q1. (Total 30 marks)**

- i. Name one (01) multiple factor experiment. (03 marks)
- ii. What do you mean by explained variation. (06 marks)
- iii. What are the disadvantages of RCBD design in field experiments? (06 marks)
- iv. Carefully observe the following sources of variations of a field experiment.

Write the answers for the questions given below.

Sources of variation
Replication
Treatments
A
B
A x B
Error
Total

a. Identify and name the type of design.

b. Identify and name the main factors?

c. Name the interaction.

**(06 marks)**

v. A research was conducted using five varieties of tomato named A,B,C,D and E under field condition with soil fertility gradient and moisture gradient in opposite directions. Researcher used five replications per variety.

a. Select a suitable design for the research

b. Write the degrees of freedom for each source

c. Draw the correct design with the two gradients that the researcher is going to apply in the field.

**(09 marks)**

**Q2. . (Total 30 marks)**

i. What do you mean by accuracy and precision

**(10 marks)**

ii. The following data is given for an experiment conducted for four treatments in RCBD design with four replicates.

Treatments	Blocks				Treatment	
	R1	R2	R3	R4	Treatment total	Treatment mean
T1	47	52	62	51	212	53
T2	50	54	67	57	228	57
T3	57	53	69	57	236	59
T4	54	65	74	59	252	63
Block total	208	224	272	224	<b>Grand total=928</b>	
Block mean	52	56	68	56		Grand mean=58

Perform the ANOVA table and interpret your results. Total sum of square is given as 854.

**(20 marks)**

**Q3. . (Total 30 marks)**

i. State the steps in field experimentation **(04 marks)**

ii. What do you mean by coefficient of variation **(05 marks)**

iii. Briefly explain the types of field experiments. **(06 marks)**

iv. Following treatment means are given for an agricultural search. Using LSD mean separation procedure, find which treatments are significantly different from the control at 5% significant level. Use following information to find the LSD value.

**(15 marks)**

Number of replicates= 4

Error degrees of freedom=15

Standard error of mean difference is given (SD)= 3.34

T1=37, T2= 34, T3= 32, T4=28 (control)

**F Distribution 5% Points****Student's t Distribution**

Denominator

Numerator

(2-tailed probability)

df	1	2	3	4	5	6	7
1	161.45	199.5	215.71	224.58	230.16	233.99	236.77
2	18.51	19.00	19.16	19.25	19.30	19.33	19.36
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89
4	7.71	6.94	6.59	6.39	6.26	6.16	6.08
5	6.61	5.79	5.41	5.19	5.05	4.95	5.88
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29
10	4.96	4.10	3.71	3.48	3.32	3.22	3.13
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01
12	4.75	3.88	3.49	3.26	3.10	3.00	2.91
13	4.67	3.80	3.41	3.18	3.02	2.92	2.83
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44
24	4.26	3.40	3.00	2.78	2.62	2.51	2.42
25	4.24	3.38	2.99	2.76	2.60	2.49	2.40
26							
27							
28							
29							
30							

df	0.40	0.05	0.01
1	1.376	12.706	63.667
2	1.061	4.303	9.925
3	0.978	3.182	5.841
4	0.941	2.776	4.604
5	0.920	2.571	4.032
6	0.906	2.447	3.707
7	0.896	2.365	3.499
8	0.889	2.306	3.355
9	0.883	2.262	3.250
10	0.879	2.228	3.169
11	0.876	2.201	3.106
12	0.873	2.179	3.055
13	0.870	2.160	3.012
14	0.868	2.145	2.977
15	0.866	2.131	2.947
16	0.865	2.120	2.921
17	0.863	2.110	2.898
18	0.862	2.101	2.878
19	0.861	2.093	2.861
20	0.860	2.086	2.845
21	0.859	2.080	2.831
22	0.858	2.074	2.819
23	0.858	2.069	2.807
24	0.857	2.064	2.797
25	0.856	2.060	2.787
26	0.856	2.056	2.779
27	0.855	2.052	2.771
28	0.855	2.048	2.763
29	0.854	2.045	2.756
30	0.854	2.042	2.750