

THE OPEN UNIVERSITY OF SRI LANKA

B.Sc. Degree Programme

ADU5319 – DESIGN AND ANALYSIS OF EXPERIMENTS

OPEN ELECTIVES - LEVEL 05

CONTINUOUS ASSESSMENT TEST II 2021/2022



Duration: One Hour

Date: 06.02.2023

Time: 06.30 a.m- 07.30 a.m

Answer all questions

(1) A researcher wanted to compare 3 different rainfall measuring devices (A , B , C) to measure rainfall. He measured rainfall in a particular area in six rainy days using these 3 devices. The results of the measurements are given in the following table.

Device	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
A	1.38	8.69	0.12	0.82	0.24	4.94
B	1.42	10.37	0.39	1.46	0.55	6.15
C	1.49	10.59	0.41	1.45	0.65	6.36

(a) Identify the design structure used in this experiment. Justify your answer.

(b) Estimate the average rainfall for device A .

(c) Construct a 95% confidence interval for the difference between the average rainfall for device A and device B . ($S^2 = 0.152$).

(d) Using the result of part(c), test whether there is a difference between the average rainfall of device A and device B . Clearly state the findings.

(2) An investigator wanted to study the effect of four upcoming movies on the audience attraction. These movies are mystery (A), science fiction (B), comedy (C), and romantic (D). Movies are shown to audiences of 50 viewers at each showing, four times a day, and over a period of four days. It was thought that time of day and day of the week may influence the results of the study. The response is the number of people out of 50, who recommend the movie to a friend.

Time of Day	Day			
	Monday	Tuesday	Wednesday	Thursday
Morning	31(C)	23(D)	36(B)	40(A)
Afternoon	33(B)	36(A)	31(C)	22(D)
Evening	17(D)	37(C)	34(A)	41(B)
Night	35(A)	37(B)	18(D)	31(C)

Part of the analysis is given below. Complete the ANOVA table.

Source of Variation	Degrees of freedom	Sum of Squares	Mean Squares	F value
Movie
Day
Time	16.25
Error
Total	839.75

Test whether there is a significant effect of upcoming movies on the audience attraction at 5% level of significance and write down your conclusions.
