PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech., Winter 2017-18 Examination

Semester: 1   Date: 28/12/2017
Subject Code: 03218101   Time: 2:00pm to 4:30pm
Subject Name: Design And Analysis of Experiments   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 A) Compute the student t for the following value in a sample of eight.   **(05)**
2, 4, 6, 7, 7, 8, 8, 9
Taking the mean of universe to be zero.

B) Result of throwing die were recorded as follows: **(05)**

Number Turned up	1	2	3	4	5	6
Frequency	27	33	31	29	30	24

Is the die biased?

C) Calculate coefficient of correlation between x and y using following data.   **(05)**

x	2	4	5	6	8	11
Y	18	12	10	8	7	5

Q.2 **Answer the following questions**. (Attempt any three)   **(15)**
A) Ten young recruits were put through a strenuous physical training program by the army. Their weights (in kg) were recorded before and after with the following results:

Recruit	1	2	3	4	5	6	7	8	9	10
Weight before	127	195	162	170	143	205	168	175	197	136
Weight after	135	200	160	182	147	200	172	186	194	141

Using 5% level of significance, should we conclude that the program affects the average weight of young recruits (Answer using t-test).

B) Answer using F-test whether the following two samples have come from the same population:

Sample 1	20	25	28	24	19	26	21	22	23
Sample 2	19	18	21	22	24	17	20	18	

Use 5% of Significance.

C) Raju Restaurant near the railway station at Falna has been having average sales of 500 tea cups per day. Because of the development of bus stand nearby, it expects to increase its sales. During the first 12 days after the start of the bus stand, the daily sales were as under:
550, 570, 490, 615, 505, 580, 570, 460, 600, 580, 530, 526
On the basis of this sample information, can one conclude that Raju Restaurant's sales   have increased? Use 5 per cent level of significance.

D) The following table gives the number of units produced per day by two workers A and B for a number of days:

A	40	30	38	41	38	35		
B	39	38	41	33	32	49	49	34

Should these results be accepted as evidence that B is the more stable worker? Use F-test at 5% level.

Q.3 A) Set up an ANOVA Table for the following per acre production data for three varieties of wheat, each grown on 4 plots and state if the variety difference is significant. (BY DIRECT METHOD) **(07)**

Plot of land	Per acre production data		
	Variety of wheat		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	`7	4

Q.3 B) Analyze and interpret the following statistics concerning output of wheat per field obtained as a result of experiment conducted to test four varieties of wheat viz., A, B, C and D under a Latin square design. **(08)**

C	B	A	D
25	23	20	20
A	D	C	B
19	19	21	18
B	A	D	C
19	14	17	20
D	C	B	A
17	20	21	15

OR

Q.3 B) Present your conclusions after doing analysis of variance to the following results of the Latin-square design experiment conducted in respect of five fertilizers which were used on plots of different fertility. **(08)**

A	D	C	B
26	24	24	20
C	B	A	D
20	24	22	18
D	C	B	A
16	18	20	22
B	A	D	C
22	20	18	16

Q.4 A) Obtain two regression lines from the following data and hence find the correlation of coefficient. **(07)**

x	6	2	10	4	8
y	9	11	5	8	7

OR

Q.4 A) The participants in contest are ranked by two judges as follows: **(07)**

x	1	3	7	5	4	6	2	10	9	8
y	3	1	4	5	6	9	7	8	10	2

Q.4 B) The following are the no. of defective blocks produced by the 4 workers operating on three different machines. **(08)**

MACHINES	workers			
	A	B	C	D
M1	37	38	38	32
M2	31	40	43	31
M3	36	33	41	38

Consider m/c as treatment and worker as block. Apply ANOVA table at the level of 5% Significance.