

End Semester Examinations - 2015-16 Even Semester - May 2016

14MA2009 Statistical Data Analysis and Reliability Engineering

Set B

Time : 3 hrs
Total Marks: 100

1. a. Find Correlation coefficient between X and Y. (10 marks)

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

- b. Find the two Regression Lines from the following data. (10 marks)

X	25	28	35	32	31	36	29	38	34	32
Y	43	46	49	41	36	32	31	30	33	39

OR

2. a. Fit a straight line to the following data (10 marks)

X	5	10	15	20	15
Y	15	19	23	26	30

- b. Fit a parabola to the following data (10 marks)

X	1	2	3	4	5	6	7	8	9
Y	2	6	7	8	10	11	11	10	9

3. a. Before an increase in excise duty on coffee, 800 people out of a sample of 1000 were consumers of coffee. After the increase in duty, 800 people were consumers of coffee in a sample of 1200 persons. Test whether there is significant decrease in consumption of coffee after increase in excise duty. (10 marks)

- b. The average marks of a sample of 100 students was 51 with standard deviation of 6 marks. Could this have been a random sample from a population with average marks 50. (10 marks)

OR

4. a. A group of five patients treated with medicine A, have the following weights 42,39,48,60,41 kg. A second group of 7 patients from the same hospital treated with medicine B, have the following weights, 38,42,56,64,68,69,62 kg. Do you agree with the claim that, on the average medicine B increase weight significantly. (10 marks)

- b. An ice cream producer unit wishes to test whether the preference pattern of consumers for its products is dependent on income level or not. From the following data can you conclude that preference pattern is independent of income level. (10 marks)

Income	Product A	Product B	Product C
Low	170	30	80
Medium	50	25	60
High	20	10	55

5. Five breeds of cattle B₁, B₂, B₃, B₄, B₅ were fed on four different rations R₁, R₂, R₃, R₄. Analyse the variance and discuss the difference between (i) breeds (ii) rations

	B ₁	B ₂	B ₃	B ₄	B ₅
R ₁	1.9	2.2	2.6	1.8	2.1

R ₂	2.5	1.9	2.3	2.6	2.2
R ₃	1.7	1.9	2.2	2.0	2.1
R ₄	2.1	1.8	2.5	2.3	2.4

OR

6. Analyse the variance from the following latin square design and give your conclusion.

A16	B17	C20
B16	C21	A15
C15	A12	B13

7. The following data give the measurements of 10 samples each of size 5 drawn from a production process. Construct the control chart of mean and range and comment on state of control of the process.

Sample number	Measurements				
1	9	15	14	9	13
2	10	11	13	6	10
3	10	13	8	12	7
4	8	13	11	10	13
5	7	9	10	4	5
6	12	15	7	16	10
7	9	9	9	13	5
8	15	15	10	13	17
9	10	13	14	7	11
10	16	14	12	14	14

OR

8. The data given below are the number of defectives in 10 samples of 400 items each. Construct a p-chart and an np-chart and comment on state of control of the process.

Sample number	1	2	3	4	5	6	7	8	9	10
Number of defectives	15	12	4	26	15	9	19	9	14	17

9. a. The density function of time to failure in years of a product manufactured by a company is $f(t) = \frac{32}{(t+2)^3}$; $t > 0$ in years.

(10 marks)

i. Derive the reliability function.

ii. Compute failure rate.

iii. Find MTTF.

- b. Calculate the reliability of the system whose block diagram is given below. (10 marks)



