Q. Code: 439325

B.E./B.TECH. Degree Examination, December 2020

Fifth Semester

OM18001-STATISTICAL METHODS FOR ENGINEERS

(Regulation 2018)

Time: Three hours Maximum : 80 Marks

Use of statistical tables are permitted

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. Which measure of location will be suitable to compare intelligence of students

   (a)Mean (b) Mode (c) Median (d) Harmonic mean

2. A sample of 26 bulbs gives a mean life of 990 hours with a standard deviation of 20 hours. The manufacturer claims that the mean life of 6 bulbs is 1000 hours. The test statistic value is _____.

   (a) 3.5 (b) 1.5 (c) 2.5 (d) 4.5

3. The sum of squares between samples of the following completely randomized design is _____.

   A: 5 7 3 1

   B: 4 4 7 -

   C: 3 5 1 -

   (a) 5 (b) 6 (c) 8 (d) 15

4. The distribution of measured data can be studied by using ----------.

   (a) $\bar{X}$ chart (b) R chart (c) both $\bar{X}$ and R chart (d) none of the above

5. The first four moments of a distribution about x=4 are 1,4,10 and 45. Find the mean and variance.

6. Write down the value chi-square for a (2x2) contingency table with cell frequencies a, b, c and d.

7. What motivated the adoption of design of experiments and analysis of variance techniques in scientific problems?

8. Find the lower and upper control limits for p-chart and np-chart, when n=100 and $\bar{p}$ = 0.085.

PART B - (4 X16 = 64 marks)

09. (a) (i) The runs taken by two cricket players A and B in 10 innings are as follows: of these two players, who is better scorer and who is more consistent? **(8)**

A	30	44	66	62	60	34	80	46	20	38
B	34	46	70	38	55	48	60	34	45	30

(ii) The first four moments of a distribution about the value 5 are 2, 20, 40 and 50. Compute skewness and kurtosis of the distribution based on these values **(8)**

(OR)

(b) (i) The following data relate to the frequency distribution of Intelligence Quotients of 900 school children. Find the lower and upper quartiles **(8)**

I.Q	55 - 64	65 - 74	75 - 84	85 - 94	95 - 104	105 - 114	115 - 124	125 - 134	135 - 144
No. of Children	3	21	78	182	302	207	81	21	5

(ii) In a distribution of 25 measurements, it was found that the mean and standard deviation are 36 cm and12 cm. After these results were calculated ,it was noticed that 2 measurements were wrongly recorded as 60cm and 36 cm,instead of 40 and30 cm. Find the corrected values of the mean and standard deviation. **(8)**

10. (a) (i) The mean life-time of a sample of 5 bulbs is found as 1550 hours with a S.D .of 120 hours. The company manufacturing the bulbs claims that the average life of their bulbs is 1600 bulbs .Is the claim acceptable at 5% LOS? **(8)**

(ii) The nicotine contents in two random samples of tobacco are given below. **(8)**

Sample I	21	24	25	26	27	-
Sample II	22	27	28	30	31	36

Can you say that the two samples came from the same normal population?

(OR)

(b) (i) The mean height and the S.D height of 8 randomly chosen soldiers are 166.9 cm and 8.29cm respectively. The corresponding values of 6 randomly chosen sailors are 170.3cm and 8.50cm respectively. Based on this data , can we conclude the soldiers are ,in general shorter than sailors? **(8)**

(ii) Theory predicts that the proportion of beans in 4 groups A,B,C,D should be 9:3:3:1.In an experiment among 1600 beans, the numbers in the four groups were 882,313,287 and118.Does the experiment supports the theory. **(8)**

11. (a) Three varieties A, B, C of a crop are tested in a randomized block design with four replications, the layout being as given below. The yield are given kilograms. Analyze for significance **(16)**

C 48	A 51	B 52	A 49
A 47	B 49	C 52	C 51
B 49	C 53	A 49	B 50

(OR)

(b) Analyze the following results of a Latin square experiments. **(16)**

A (12)	D(20)	C(16)	B(10)
D(18)	A(14)	B(11)	C(14)
B(12)	C(15)	D(19)	A(13)
C(16)	B(11)	A(15)	D(20)

The letters A, B, C, D denote the treatments and the figures in brackets denote the observations.

12. (a) The following data give the average life in hours and range in hours of 12 samples each of 5 lamps. Construct the control charts for mean and range and comment on the state of control. **(16)**

Mean	120	127	152	157	160	134	137	123	140	144	120	127
Range	30	44	60	34	38	35	45	62	39	50	35	41

(OR)

(b) (i) Construct a c-chart for the number of defects from the following data which represent the number of imperfections in 20 pieces of cloth of equal length in a certain production of a mill. Is the process under control? **(8)**

No .of imperfections: 3,3,4,10,10,3,3,3,6,5,6,10,4,7,4,7,4,8,4 and 7.

(ii) Draw the appropriate control chart for the following data and comment on the state of control. **(8)**

Day	1	2	3	4	5	6	7	8	9	10
No.of inspected	150	184	181	196	180	174	210	210	195	210
No.of defectives	25	10	3	14	6	15	43	28	39	25