B. TECH.
(SEM-III) THEORY EXAMINATION 2019-20
STATISTICAL TECHNIQUES

Time: 3 Hours   *Total Marks: 100*

Notes: Assume any missing data.

SECTION A

1.   **Attempt *all* questions in brief.**   **10 x 2 = 20**

  a) What are methods of collection of secondary data?
  b) Find the mean of first ten even natural numbers.
  c) Define Type I Error.
  d) Write the name of different types of Diagrams.
  e) Define sample space if coin tossed two times.
  f) Describe level of significance.
  g) Write advantage of p-chart.
  h) Write types of correlations.
  i) Define skewness.
  j) Define Regression coefficient.

SECTION B

2.   **Attempt any *three* parts of the following:**   **10 x 3 = 30**

  a) From the following data, examine whether input of oil and output of electricity can be said to be correlated.

Input of oil	6.9	8.2	7.8	4.8	9.6	8.0	7.7
Output of electricity	1.9	3.5	6.5	1.3	5.5	3.5	2.2

  b) In a bolt factory, machines A, B and C manufacture respectively 25%,35% and 40% of total. Of their output 5,4 and 2 per cent are defective bolts. A bolt is drawn at random from the product and is found to be defective .What is the probability that it was manufactured by machine B?

  c) Find the first four moments of the Binomial distribution.

  d) Find the coefficient of correlation and regression lines to the following data:

x	5	7	8	10	11	13	16
y	33	30	28	20	18	16	9

  e) Three varieties A,B,C of a crop are tested in randomized block design with four replications. The plot yields in pounds are as follows:

A(6)	C(5)	A(8)	B(9)
C(8)	A(4)	B(6)	C(9)
B(7)	B(6)	C(10)	A(6)

  Analysis of experimental yield and state your conclusion.

SECTION C

3.   **Attempt any *two* parts of the following:**   **5 x 2 = 10**

  a) Evaluate the values of median for the following grouped cumulative data:

No.of days absent	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-50
No.of students	29	224	465	582	634	644	650	653	655

b) The gain of 60 similar resistances is measured and the results are as shown.

x	83-85	86-88	89-91	92-94	95-97
y	8	12	16	9	15

Draw a Histogram of this frequency distribution.

c) What do you understand by frequency polygon describe with example.

4.   Attempt any _two_ parts of the following: 5 x 2 = 10

a) Fit a Poisson distribution to the set of observations:

x	0	1	2	3	4
f	122	60	15	2	1

b) State and prove addition law of probability.

c) An urn contains nine balls, two of which are red, three blue and four black. Three balls are drawn from the urn at random. What is probability that
i) The three balls are of different colour?
ii) The three balls are of same colour?

5.   Attempt any _two_ parts of the following: 5 x 2 = 10

a) Find the rank correlation coefficient to the following data:

x	65	63	67	64	68	62	70	66	68	67	69	71
y	68	66	68	65	69	66	68	65	71	67	68	70

b) Calculate the Karl Pearson's coefficient of correlation for the following data:

Independent variable x	3	7	5	4	6	8	2	7
dependent variable y	7	12	8	8	10	13	5	10

c) The theory predicts the proportion of beans in four groups P_1, P_2, P_3, P_4 should be In the ratio 9:3:3:1.In an experiment with 1600 beans the number in the four groups were 882, 313, 287, and 118.Does the experimental results support the theory.

6.   Attempt any _two_ parts of the following: 5 x 2 = 10

a) Intelligence test of two groups of boys and girls give the following result. Examine if difference is significant.
Girls: Mean = 84, S.D. = 10, Number = 121
Boys: Mean = 81, S.D. = 12, Number = 81

b) The demand of a particular space part in a factory was found to vary from day to day. In a sample study, the following information was obtained.

Days	Mon	Tue	Wed	Thurs	Fri	Sat
No.of parts Demanded	1124	1125	1110	1120	1125	1116

Use Chi-square to test the hypothesis that number of parts demanded does not depend on the day of the week at 5 % level of significance.

c) A sample of six persons in an office revealed an average daily smoking of 10, 12, 8, 9, 16, 5 cigarettes. The average level of smoking in the whole office has to be estimated at 90% level of confidence.
   t = 2.015 for 5 degree of freedom.

7.   **Attempt any *two* parts of the following:**   **5 x 2 = 10**

a) If the heights of 300 students are normally distributed with mean 64.5 inches and standard deviation 3.3 inches, find the height below which 99% of the students lie.

b) Construct a p-chart for the following data:

No. of samples (each of 100 items)	1	2	3	4	5	6	7	8	9	10
No. of defectives	12	10	6	8	9	9	7	10	11	8

c) Distinguish between the np-chart and p-chart.
   The following is the data of 10 samples of size 100 each. Construct n $\bar{p}$ -chart and give your comments.

Sample no.	1	2	3	4	5	6	7	8	9	10
No.of Defectives	6	9	12	5	12	8	8	16	13	7