(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 9593 Roll No. | | | | | | | | | | |

B. Tech.

(SEMESTER-IV) THEORY EXAMINATION, 2011-12

STATISTICAL TECHNIQUES

Time : 3 Hours] *[Total Marks : 100*

Note : Attempt **all** questions. Provide the statistical tables which are required to students.

SECTION – A

1. Attempt **all** parts of this question : **10 × 2 = 20**
   (a) Write representation of data by diagrams and their interpretations.
   (b) Define mean and median.
   (c) Define the various measures of dispersion.
   (d) In a moderately asymmetrical distribution, the mode and mean are 32.1 and 35.4 respectively. Find the value of median.
   (e) The first four central moments of a distribution are 0, 2.5, 0.7 and 18.75. Comment on the kurtosis of the distribution.
   (f) If two regression coefficients are 0.9 and 0.8, what would be the value of the coefficient of correlation ?
   (g) What is the probability that a leap year, selected at random, will contain 53 Sundays ?
   (h) The probability of a man hitting a target is $\frac{1}{3}$. How many times he must fire so that the probability of his hitting the target at least once is more than 95 % ?
   (i) Describe the main steps to be taken in the tests involving F – distribution.
   (j) State the fundamental principles of analysis of variance.

SECTION – B

2. Attempt any **three** parts of this question : **3 × 10 = 30**
   (a) The equations of two lines of regression are 3x + 12y = 19 and 9x + 3y = 46. Find
      (i) Mean of x and y
      (ii) Regression coefficient b_{xy} and b_{yx}
      (iii) Coefficient of correlation between x and y

(b) The following data show the number of seeds germinating out of 10 on damp filter for 80 set seeds. Fit a binomial distribution to this data :

x :	0	1	2	3	4	5	6	7	8	9	10
y :	6	20	28	12	8	6	0	0	0	0	0

(c) Four coins were tossed 160 times and the following results were obtained :

No. of heads :	0	1	2	3	4
Observed frequencies :	17	52	54	31	6

Under the assumption that coins are balanced, find the expected frequencies of getting 0,1,2,3 or 4 heads and test the goodness of fit. The value of χ^2 for 4 degrees of freedom at 5% level of significance is 9.49.

(d) Use the sign test to see if there is a difference between the number of days until collection of an account receivable before and after a new collection policy. Use the 0.05 significance level.

Before :	30	28	34	35	40	42	33	38	34	45	28	27	25	41	36
After :	32	29	33	32	37	43	40	41	37	44	27	33	30	38	36

(e) Analyse the following results of a Latin square experiments :

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.

SECTION – C

Attempt any **two** parts from each question of this Section : **5 × 10 = 50**

3. (a) The first four moments of a distribution about the value 4 of the variable are –1.5, 17, –30 and 108. Find the first four moments about the mean.

(b) Find the mean, standard deviation for the following data :

Years :	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
No. of persons :	12	16	18	25	20	9

(c) Calculate Bowley's coefficient of skewness from the following data :

Variable :	5	15	25	35	45
Frequency :	10	20	40	20	10

4. (a) A bag contains 10 white and 6 black balls. 4 balls are successively drawn out and not replaced. What is the probability that they are alternately of different colour ?

(b) Prove that Poisson distribution is a limiting case of the binomial distribution.

(c) In a distribution exactly normal, 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution ?

5. (a) Calculate the coefficient of correlation of the data given below :

x :	3	5	7	12	20	22	24
y :	30	25	24	16	11	9	5

Also interpret the result.

(b) Prove that the product of two regression coefficients is equal to the square of the coefficient of correlation.

(c) Use the method of least square, fit the curve of the form $y = ax^2 + \frac{b}{x}$ to the following data.

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

6. (a) In a sample of 8 observations, the sum of squared deviations of items from the mean was 94.5. In another sample of 10 observations the value was found to be 101.7. Test whether the difference is significant at 5% level.

(b) Describe briefly the procedure of testing hypothesis.

(c) Write short notes on :

(i) Types of error

(ii) Level of significance

7. (a) Describe in details the principles of experimental designs.

(b) Write short note on nonparametric statistics advantages and disadvantages.

(c) Write the significance of Latin Square and assumption in the analysis of Latin Square.