

**B.Sc. (Hons.) Bioinformatic-3<sup>rd</sup> Semester**  
**BIN-3004: Statistical Methods**

Time allowed: 3 Hours

Max. Marks: 60

**NOTE:** Attempt five questions in all including Q. No.-I which is compulsory and select two questions from each Unit.

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- I. (a) Write a brief note on the properties of sample correlation coefficient.
- (b) Given the following pairs of values of X and Y:
- |    |   |   |   |   |    |    |
|----|---|---|---|---|----|----|
| X: | 2 | 3 | 5 | 6 | 8  | 9  |
| Y: | 6 | 5 | 7 | 8 | 12 | 11 |
- (i) Make a scatter diagram
- (ii) Is there any correlation between X & Y?
- (iii) By inspection, draw an estimating line
- (c) An educator claims that the average IQ of government college students is no more than 110. To test this claim, a random sample of 150 students was taken and their IQ was tested. Their average IQ score came out to be 111.6 with a standard deviation of 7.2. at level of significance of 0.01, test if the claim of educator is justified.
- (d) With a variance of normal population  $\sigma^2 = 580$  and the sum of the squares of the deviations of 15 samples values from their mean is 150. Compute the  $\chi^2$  - value. (4×3)

**UNIT-I**

- II. (a) Consider a population consisting of three values 1,2 and 3. Draw all possible samples of size two with replacement from the population. Construct sampling distribution of means. Also find the mean and standard error of this distribution.

- (b) Find Spearman's rank coefficient of correlation from the following data:-

X:	50	66	34	21	15	79	42
Y:	31	64	53	41	17	73	29

(6+6)

- III. (a) From the following data obtain the regression equation of X on Y:

X:	6	2	10	4	8
Y:	9	11	5	8	7

Also find value of X when Y is 10.

- (b) The financial manager of a large department store chain selected a random sample of 200 of its credit card customers and found that 136 had incurred an interest charge during the previous year because of an unpaid balance:
- (i) Compute a 90% confidence interval for the true proportion of credit card customers who incurred an interest charge during the previous year.
- (ii) If the desired width of the 90% interval is .05, what sample size is necessary to ensure this? (6+6)

- IV. (a) Calculate the coefficient of correlation between X and Y from the following data: -

X:	78	89	99	60	59	79	68	61
Y:	125	137	156	112	107	136	123	108

(2)

- (b) The following data based on 450 students, are given for marks in statistics and biology at a certain examination.

Mean marks in Statistics	40
Mean marks in Biology	48
S.D. of marks in Statistics	12
Variance of marks in Biology	256
Sum of product of deviation of marks from their respective means	42075
Give the equations of the two lines of regression.	(6+6)

### UNIT-II

- V. (a) Two different samples from two districts gave the following results:

$$A \quad \bar{X}_1 = 648 \quad S_1^2 = 120 \quad n_1 = 100$$

$$B \quad \bar{X}_2 = 495 \quad S_2^2 = 140 \quad n_2 = 90$$

Test at 0.05 level of significance that  $\mu_1 - \mu_2 > 150$ .

- (b) A random sample of a boys had heights in inches:

45, 47, 50, 52, 48, 47, 49, 53, & 51.

In view of the data, discuss the argument that mean height in the population is 47.5. (Given the table value of t for 8 d.t. at 5% level=2.306).

(6+6)

- VI. (a) A sample analysis of examination results of 500 students was made. It was found that 220 students had failed, 170 secured a third class, 90 secured second class and 20 got a first class. Are these figures commensurate with the general examination result which is in the ratio of 4:3:2:1 for the various categories respectively? (Given  $\chi_{0.05}^2$  at  $3df = 7.81$ )

- (b) In an experiment of immunization, the following results were obtained:

	Died	Survived
Immunized	2	10
Non-Immunized	4	8

Use  $\chi^2$  test to test the efficiency of immunization programme at 5% level of significance.

(6+6)

- VII. The three samples below have been obtained from normal populations with equal variances. Test the hypothesis that the sample means are equal:

8	7	12
10	5	9
7	10	13
14	9	12
11	9	14

The table value of F at 5% level of significance for  $v_1 = 2$  and  $v_2 = 12$  at 3.88.

(12)