

04D-31 (Evening)
15/11/23

Exam.Code:0041
Sub. Code: 1004

2123
B.Sc. (Hons.) Bio-Informatics
Third Semester
BIN-3004: Statistical Methods

Time allowed: 3 Hours

Max. Marks: 60

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

X-X-X

Q1.

Attempt the following:

a	b
c	d

write down the corresponding chi

- a) For 2x2 contingency table square value?
- b) Distinguish between α - error and β - error.
- c) Write down the ANOVA for one-way classification.
- d) For the following cases, specify which probability distribution to use in a hypothesis test

i) $H_0: \mu = 27, H_1: \mu \neq 27, \bar{X} = 20.1, \sigma = 5, n = 12$

ii) $H_0: \mu = 98.6, H_1: \mu > 98.6, \bar{X} = .65, s = 12, n = 42$

- e) What are the limits of the value of 'r'? What do positive, negative, and zero values of 'r' indicate?
- f) The regression coefficient of the regression equation of X on Y is 2.4 and the same for the regression equation of Y on X is 0.8. Are the regression coefficients consistent? (2, 2, 2, 2, 3, 1)

UNIT - I

Q2. (a) What is scatter diagram and how is it useful in the study of correlation?

(b) Define Rank correlation. Write down Spearman's formula for Rank correlation coefficient R. What are the limits of R? Interpret the case when R assumes the minimum values.

(c) From the data given below, find the number of items n.

$$r = 0.5, \sum xy = 120, \sigma_y = 8, \sum x^2 = 90$$

where x and y are deviations from arithmetic mean.

(3, 5, 4)

Q3. (a) What do you mean by regression? Why are there two regression lines in a bivariate series? Can there be one regression line? Write short note on different types of regression. Also prove that regression coefficients are independent of origin.

(b) The lines of regression of a bi-variate distribution are as follows:

$$5X - 145 = -10Y;$$

$$14Y - 208 = -8X$$

It is given that variance of X = 4. You are required to find out the mean values of X and Y and the standard deviation of Y. also, find out the coefficient of correlation between X and Y. (6, 6)

P.T.O.

(2)

Q4. (a) Find the minimum sample size n for P with confidence coefficient $(1 - \alpha)$ and permissible error E in estimate.

(b) What do you mean by confidence interval? How will you determine the confidence interval for the normal population mean? (6, 6)

UNIT – II

Q5. (a) What is meant by hypothesis testing? In this context, explain the concepts of the acceptance region and rejection region (use the appropriate diagram). Differentiate between a two-tailed test and a one-tailed test.

(b) Explain 'Analysis of Variance' (ANOVA) technique. Enumerate the basic assumptions of analysis of variance. Justify that F-test and 't' test are complimentary to each other. Also, indicate the assumptions of two-way analysis of variance technique. (6, 6)

Q6. (a) Explain χ^2 is a frequency analysis technique. Indicate the formula and characteristics of χ^2 . Explain χ^2 is both a parametric and non-parametric test.

(b) The following table gives the number of screws declared fit and also unfit by three inspectors X, Y, and Z. Test the hypothesis that the proportion of screws declared unfit by the three inspectors are same:

Inspector	Number of Screws			Total
	X	Y	Z	
Fit Screws	50	47	56	153
Unfit Screws	5	14	8	27
Total	55	61	64	180

(6, 6)

(Table value of $\chi^2_{1d.f.} = 3.84, \chi^2_{2d.f.} = 5.99$)

Q7. A company's trainees are randomly assigned to groups which are taught a certain industrial inspection precision by three different methods. At the end of the instructing period they are tested for inspection performance quality. The following are their scores:

Method A : 80, 83, 79, 85, 90, 68
 Method B : 82, 84, 60, 72, 86, 67, 91
 Method C : 93, 65, 77, 78, 88

Use H test to determine at the 0.05 level of significance whether the three methods are equally effective. (12)

X-X-X