Tribhuwan University
Institute of Science and Technology
2075

Bachelor Level / third-semester / Science — Full marks: 60
Computer Science and Information Technology(STA210) — Pass marks: 24
(Statistics II) — Time: 3 hours
Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Group A

Attempt any Two questions:(2 x 10 = 20)

1. What is Multiple Linear Regression (MLR)? From following information of variables X_1, X_2, and Y.

$\Sigma X_1 = 272$, $\Sigma X_2 = 441$, $\Sigma Y = 147$, $\Sigma X_1^2 = 7428$, $\Sigma X_2^2 = 19461$, $\Sigma Y^2 = 2173$, $\Sigma X1Y = 4013$, $\Sigma X_1X_2 = 12005$, $\Sigma X_2Y = 6485$, n=10. Fit a regression equation Y on X_1 and X_2. Interpret the regression coefficients.

2. What do you mean by Latin Square Design? Write down its merit and demerit. Set up the analysis of variance for the following result of design.

A (10)	B (15)	C (20)
B (25)	C (10)	A (15)
C (25)	A (20)	B (15)

3. What do you mean by hypothesis? Describe null and alternative hypothesis. A company claims that its light bulbs are superior to those of the competitor on the basis of study which showed that a sample of 40 of its bulbs had an average life time 628 hours of continuous use with a standard deviation of 27 hours. While sample of 30 bulbs made by the competitor had an average life time 619 hours of continuous use with a standard deviation of 25 hours. Test at 5% level of significance, whether this claim is justified.

Group B

Attempt any Eight questions:(8 x 5 = 40)

4. Suppose we are given following information with n=7, multiple regression model is

$\blacksquare = 8.15 + 0.6X_1 + 0.54X_2$

Here , Total sum of square = 1493,

Sum of square due to error = 91

Find i) R^2 and interpret it. ii) Test the overall significance of model.

5. The following data related to the number of children classified according to the type of feeding and nature of teeth.

Type of feed	Nature of teeth	
	Normal	Defective
Breast	18	12
Bottle	2	13

Do the information provide sufficient evidence to conclude that type of feeding and nature of teeth are dependent? Use chi square test at 5% level of significance.

6. Determine the minimum sample size required so that the sample estimate lies within 10% of the true value 95% level of confidence when coefficient of variation is 60%.

7. A manufacturer of computer paper has a production process that operates continuously throughout an entire production shift. The paper is expected to have an average length of 11 inches and standard deviation is known to be 0.01 inch. Suppose random sample of 100 sheets is selected and the average paper length is found to be 10.68 inches. Set up 95% and 90% confidence interval estimate of the population average paper length.

8. A chemist use three catalyst for distilling alcohol and lay out were tabulated below

Catalyst	Alcohol(in cc)				
C_1	380	430	410		
C_2	290	350	270	250	270
C_3	400	380	450		

Are there any significant differences between catalyst? Test at 5% level of significance. Use Kruskal Walli's H test.

9. Consider the partially completed ANOVA table table below. Complete the ANOVA table and answer the following.

Source of variation	Sum of square	Degree of freedom	Mean sum of square	F value
column	72	?	?	2
Rows	?	?	36	?
Treatments	180	3	?	?
Error	?	6	12	
Total	?	?		

i) What design was employed?

ii) How many treatments were compared?

10. Define main component of queuing system.

11. Jobs are sent to mainframe computer at a rate of 4 jobs per minute. Arrivals are modeled by a binomial process.

i) Choose a frame size that makes the probability of a new received during each frame equal to 0.1.

ii) Using the chosen frame compute the probability of more than 4 jobs received during one minute.

iii) Compute mean and variance of inter arrival time?

12. Write short notes of the following :

i) Need of non parametric statistical methods.

ii) Efficiency of Randomized Block Design relative to Completely Randomized Design.