CSc.164-2075 ✡

Tribhuvan University
**Institute of Science and Technology**
2075
✡

Bachelor Level / First Year/ Second Semester/ Science
**Computer Science and Information Technology (STA. 164)**
(Statistics I)
**(NEW COURSE)**

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

*Candidates are required to give their answers in their own words as for as practicable.*
The figures in the margin indicate full marks.
**All notations have the usual meanings.**

*34 - avg.*

**Long answer questions:**

**Group A**

Attempt any Two questions:                                                (2x10=20)

1. Distinguish between absolute and relative measure of dispersion. Two computer manufacturers A and B compete for profitable and prestigious contract. In their rivalry, each claim that their computer a consistent. For this it was decided to start execution of the same program simultaneously on 50 computers of each company and recorded the time as given below.

| Time (in seconds) | | 0-2 | 2-4 | 4-6 | 6-8 | 8-10 | 10-12 |
|---|---|---|---|---|---|---|---|
| Number of computers | A | 5 | 16 | 13 | 7 | 5 | 4 |
| manufactured by | B | 2 | 7 | 12 | 19 | 9 | 1 |

Which company's computer is more consistent?

2. In a certain type of metal test specimen, the effect of normal stress on a specimen is known to be functionally related to shear resistance. The following table gives the data on the two variables.

| Normal stress | 26 | 25 | 28 | 23 | 27 | 23 | 24 | 28 | 26 |
|---|---|---|---|---|---|---|---|---|---|
| Shear resistance | 22 | 27 | 24 | 27 | 23 | 25 | 26 | 22 | 21 |

⑥

(i) Identify which one is response variable, and fit a simple regression line, assuming that the relationship between them is linear.

(ii) Interpret the regression coefficient with reference to your problem.

(iii) Obtain coefficient of determination, and interpret this.

(iv) Based on the fitted model in (a), predict the shear resistance for a normal stress of 30 kilogram per square centimeter.

3. (a) What do you understand by binomial distribution? What are its main features?   $1 - e^{-\lambda} x^x$

4. (b) What do you mean by marginal probability distribution? Write down its properties

$$\frac{P_{75} - P_{25}}{2(P_{90} - P_{10})}$$

⑤

**Short answer questions:**

**Group B**

**Attempt any Eight questions:**                                            (8x5=40)

4. Measurement of computer chip's thickness (in nanometers) is recorded below.

| Thickness of chips (in nanometers) | 34-39 | 39-44 | 44-49 | 49-54 | 54-59 | Total |
|---|---|---|---|---|---|---|
| Number of computers | 3 | 11 | 16 | 25 | 5 | 60 |

   Find the mode of thickness of computer chips and interpret the result.

5. Calculate $Q_3$, $D_6$, and $P_{80}$ from the following data and interpret the results.

| Respiratory rate | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
|---|---|---|---|---|---|---|---|---|---|
| No. of person | 8 | 12 | 36 | 25 | 28 | 18 | 9 | 12 | 6 |

   ④

6. Define a random variable. For the following bi-variants probability distribution of X and Y , find
   [i] marginal probability mass function of X and Y , [ii] P(x ≤ 1, Y= 2), [iii] P(X ≤ 1)

| X \ Y | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1/32 | 2/32 | 2/32 | 3/32 |
| 1 | 1/16 | 1/16 | 1/8 | 1/8 | 1/8 | 1/8 |
| 2 | 1/32 | 1/32 | 1/64 | 1/64 | 1/64 | 1/64 |

   ④

7. If two random variables have the joint probability density function

$$f(x,y) = \begin{cases} Ke^{-(x+y)}, & 0 < x < \infty, 0 < y < \infty \\ 0 & othewise. \end{cases}$$   ③

   Find (i) constant k (ii) Conditional probability density function of X given Y (iii) Var(3X +2Y).

8. A certain machine makes electrical resistors having a mean resistance of 40 ohms and standard
   deviations of 2 ohms. Assuming that the resistance follows a normal distribution.
   (i)   What percentage of resistors will have a resistance exceeding 43 ohms?
   (ii)  What percentage of resistors will have a resistance between 30 ohms to 45 ohms?

9. As part of study of the psychobiological correlates of success in athletes, the following
   measurements are obtained from members of Nepal national football team.

| Anger | 6 | 7 | 5 | 21 | 13 | 5 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|
| Vigor | 30 | 23 | 29 | 22 | 19 | 19 | 28 | 19 |

   Calculate Spearman's rank correlation coefficient.

10. Compute percentile coefficient of kurtosis from the following data and interpret the result. ⑤

| Hourly wages (Rs) | 23-27 | 28-32 | 33-37 | 38-42 | 43-47 | 48-52 |
|---|---|---|---|---|---|---|
| Number of workers | 22 | 16 | 9 | 4 | 3 | 1 |

11. Write the properties of Poisson distribution. Fit a Poisson distribution and find the expected
   frequencies.

| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| Y | 71 | 112 | 117 | 57 | 27 | 11 | 3 | 1 |

   $z = e^{\frac{x}{z}} \frac{1}{2n} e^{-\frac{1}{2}}$

12. Define primary data and secondary data and explain the difference between them. ②

13. What do you mean by sampling? Explain non probability sampling with merits and demerits.
   ③