

Tribhuvan University
Institute of Science and Technology
2075
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Bachelor Level / First Year/ Second Semester/ Science
Computer Science and Information Technology (STA. 164)
(NEW COURSE)

Full Marks: 60
Pass Marks: 24
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.
All notations have the usual meanings.

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 is 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 manufactured by	A	5	16	13	7	5	4
	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

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

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

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

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

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

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

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

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?
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- (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. ✓

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

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

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