H.T No

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(An Autonomous Institution)

Regulations: A17

Code No: 6HC18 **Date: 04-Aug-2023 (FN)**

B.Tech II-Year II- Semester External Examination, Aug - 2023 (Supplementary)

PROBABILITY AND STATISTICS (CIVIL, EEE, ME, CSE, IT and BT)

Time: 3 Hours **Max.Marks:75**

Note: *a) No additional answer sheets will be provided.*
b) All sub-parts of a question must be answered at one place only, otherwise it will not be valued.
c) Missing data can be assumed suitably.

Bloom's Cognitive Levels of Learning (BCLL)

Remember	L1	Apply	L3	Evaluate	L5
Understand	L2	Analyze	L4	Create	L6

Part - A Max.Marks:25

ANSWER ALL QUESTIONS

		BCLL	CO(s)	Marks
1	Define Random variable	L1	CO1	[2M]
2	Define Normal distribution.	L1	CO2	[2M]
3	State Central limit theorem.	L2	CO3	[2M]
4	Write Karl Pearson's formulae.	L1	CO4	[2M]
5	Write Type-I and Type-II Error.	L1	CO5	[2M]
6	Write the control line and three - sigma limits for the range chart.	L2	CO6	[3M]
7	State Conditional Probability theorem	L1	CO1	[3M]
8	Write the Positive and Negative correlation.	L1	CO3	[3M]
9	Define ANOVA one way	L1	CO5	[3M]
10	What is the purpose of control charts	L1	CO6	[3M]

Part – B Max.Marks:50

ANSWER ANY FIVE QUESTIONS. EACH QUESTION CARRIES 10 MARKS.

			BCLL	CO(s)	Marks
11.	a)	Determine (i) $P\left(\frac{B}{A}\right)$ (ii) $P\left(\frac{B}{A^c}\right)$ if A and B are events with $P(A)=\frac{1}{3}$, $P(B)=\frac{1}{4}$, $P(A\cup B)=\frac{1}{2}$	L3	CO1	[5M]
	b)	A businessman goes to hotels X, Y, and Z, 20%,50%, and 30% of the time respectively. It is known that 5%, 4%, and 8% of the rooms in X, Y, and Z hotels have faulty plumbing. What is the probability that the businessman's room having faculty plumbing is assigned to hotel Z?	L2	CO1	[5M]
12.	a)	Out of 800 families with 5 children each, how many would you expect to have (a) 3 boys (b) 5 girls (c) Either 2 or 3 boys (d) at least one boy? Assume equal Probability for boys and girls	L2	CO2	[5M]
	b)	If X is normally distributed with mean 2 and variance 0.1, then find $P(\lvert X-2\rvert \geq 0.01)$?	L3	CO2	[5M]
13.		A population consists of six numbers 5,10,14,13,18,24. Consider size two which can be drawn from this population. Find i. The mean of the population ii. The population S.D iii. The mean of the sampling distribution of mean	L3	CO3	[10M]

iv. The S.D of the sampling distribution of means.

14. a) Obtain the rank correlation coefficient for the following data L2 CO4 [5M]

x	68	64	75	50	64	80	75	40	55
y	62	58	68	45	81	60	48	50	68

b) Find the mean values of the variables X and Y and the correlation coefficient from the following regression equations 2y-x-50=0, 3y-2x-10=0 L2 CO4 [5M]

15. a) In two large populations, there is 30%, and 25% respectively of fair-haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations L3 CO5 [5M]

b) The numbers of automobile accidents per week in a certain community are as follows: 12,8,20,2,14,10,15,6,9,4. Are these frequencies in agreement with the belief that accident conditions were the same during this 10-week period? L3 CO5 [5M]

16. a) Explain in detail the mean and R charts. L2 CO6 [5M]

b) what is Latin Square Design? Give the assumptions and applications of an LSD in field experimentations. L2 CO6 [5M]

17. a) If a random variable has the probability density function f(x) as L3 CO1 [4M]

$$f(x) = \begin{cases} 2e^{-2x}, for & x > 0 \\ 0, & x \leq 0 \end{cases}$$

Find the probabilities that it will take on a value

(i) Between 1 and 3 (ii) greater than 0.5

b) If a random variable has a Poisson distribution such that P (1) =P (2). Find P(1<x<4). L2 CO2 [3M]

c) When a sample is taken from an infinite population, what happens to the standard error of the mean if the sample size is decreased from 800 and 200. L2 CO3 [3M]

18. a) Find the coefficient of correlation between X and Y for the following data L3 CO4 [4M]

x	10	12	18	24	23	27
y	13	18	12	25	30	10

b) Write the Properties of t- distribution. L2 CO5 [3M]

c) Write the control line and three - sigma limits for the fraction-defective chart. L2 CO6 [3M]

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