H.T No

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(An Autonomous Institution)

Regulations: A15

Code No: 5HC17 **Date: 06-Aug-2024 (FN)**

B.Tech II-Year II- Semester External Examination, Aug - 2024 (Supplementary)

PROBABILITY AND STATISTICS (Common to All Except ECE)

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)	A business man goes to hotels X, Y, Z, *20%, 50%* and *30%* of the time respectively. It is known that *5%*, *4%, 8%* of the rooms in X, Y, Z hotels have faulty plumbing. What is the probability that the business man's room having faulty plumbing is assigned to hotel *Z*	L4	CO1	[5M]
	b)	A random variable X has the following probability distribution	L5	CO1	[5M]

x	-3	-2	-1	0	1	2	3
f(x)	2k	0.2	k/2	0.1	k/2	0.3	k

Find (i) the value of 'k' (ii) mean

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)	A population consists of 5, 10, 14, 18, 13, and 24. List all possible samples of size 2 which can be drawn with replacement from the population. Find the mean and standard deviation of the population and of Sampling distribution of means ($\overline{X}$).	L3	CO3	[5M]

b) How large is a random sample, taken to assert with probability 0.95 that the sample mean will not differ from the true mean by more than 3.0 points? (Assuming that $\sigma = 20.0,$). L3 CO3 [5M]

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) Use 0.05 level of significance to test null hypothesis that $\sigma = 0.015$ inch for the diameter of certain bolts against the alternative hypothesis that $\sigma \neq 0.015$ inch, given that a random sample of size 15 yields s^2 = 0.00011. L2 CO5 [5M]

b) Perform a two-way ANOVA on the following data to examine whether all the plots are equally good and Treatments are equally affective L2 CO5 [5M]

Plots of land	Treatment			
	A	B	C	D
I	38	40	41	39
II	45	42	49	36
III	40	38	42	30

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) A can hit a target 3 times in 5 shots, B hits target 2 times in 5 shots, c hits target 3 times in 4 shots. Find the probability of the target being hit when all of them try simultaneously L5 CO1 [4M]

b) A hospital Switch board receives an average of 4 Emergency calls in a 10 minutes interval. Test what is the probability that
(i) There are almost 2 emergency calls
(ii) There are exactly 3 emergency calls in a 10 minutes interval. L2 CO2 [3M]

c) A Random sample of size 100 has a standard deviation of 5 what can you say about the maximum error with 95% confidence. L4 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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