H.T No

(An Autonomous Institution)

Regulations: A15

Code No: 5HC17 **Date: 28-July-2022 (FN)**

B.Tech II-Year II- Semester External Examination, July/August - 2022 (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.

ANSWER ANY 5 OUT OF 8 QUESTIONS. EACH QUESTION CARRIES 15 MARKS.

Bloom's Cognitive Levels of Learning (BCLL)

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

			BCLL	CO(s)	Marks
1.	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	[8M]
	b)	A random variable X has the following probability distribution	L5	CO1	[7M]

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

2.	a)	*20%* of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random (i) none is defective (ii) one is defective (iii) at most 2 defective	L5	CO2	[8M]
	b)	In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, Find (i) how many students' score between 12 and 16 (ii) how many score above 17 (iii) how many score below 7?	L4	CO2	[7M]
3.	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 ($\bar{X}$).	L3	CO3	[8M]
	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	[7M]
4.	a)	Find the correlation coefficient between x and y form the following data	L5	CO4	[8M]

x	55	56	58	59	60	60	62
y	35	38	38	39	44	43	45

	b)	Using method of least squares fit a curve of the form $y = ae^{bx}$ to the given data	L4	CO4	[7M]

x	1	2	3	4	5
y	2.6	3.3	4.2	5.4	6.9

5. 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 [8M]

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 [7M]

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

6. a) Explain the terms: control limits, tolerance limits and specification limits L2 CO6 [8M]

b) Distinguish between defects and defectives. Explain the construction an operation of a *p*- chart. L3 CO6 [7M]

7. 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 [5M]

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 [5M]

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 [5M]

8. a) **Using method of least squares fit a straight line to the following data** L4 CO4 [5M]

x	0	1	2	3	4
y	2.1	3.5	5.4	7.3	8.2

b) Write a note on the test of hypothesis concerning single mean. L1 CO5 [5M]

c) Explain the construction and interpretation of mean chart and range chart. L2 CO6 [5M]

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