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(An Autonomous Institution)

Regulations: A17

Code No: 6HC18 **Date: 11-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	State properties of Axiomatic probability.	L1	CO1	[2M]
2	Suppose that X follows Binomial distribution with mean10 and variance 0.25. Find P(X<3).	L5	CO2	[2M]
3	State any five properties of Normal Distribution.	L1	CO3	[2M]
4	Describe types of correlation.	L2	CO4	[2M]
5	Distinguish Type-I and Type-II errors.	L3	CO5	[2M]
6	State central limit theorem.	L1	CO6	[3M]
7	Find the correlation coefficient for the given data.	L5	CO1	[3M]

x	-3	-2	-1	1	2	3
y	9	4	1	1	4	9

8	Derive the Mean of Poisson distribution.	L4	CO3	[3M]
9	Write formula for χ^2test goodness of fit and t-test.	L1	CO5	[3M]
10	What are the important terminologies involved in defining experimental designs.	L2	CO2	[3M]

Part – B Max.Marks:50

ANSWER ANY FIVE QUESTIONS. EACH QUESTION CARRIES 10 MARKS.

			BCLL	CO(s)	Marks
11.	a)	Suppose 5 men out of 100 and 25 women out of 10,000 are color blind. A color blind person is chosen at random. What is the probability of the person being a male? Assume male and female to be in equal numbers.	L2	CO1	[5M]
	b)	Find Mean and Variance for $f(x) = y_0 x(2-x) \quad 0 \le x \le 2$ and y_0 is constant.	L2	CO1	[5M]
12.	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	[5M]
	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	[5M]

13. A population consists of five numbers 2, 3, 6, 8, 11. Consider all possible samples of size 2 which can be drawn with replacement from this population. Find
(i) Mean of the population
(ii) S.D of the population
(iii) Mean of the sampling distribution of means
(iv) S.D of the sampling distribution of means

L3 CO3 [10M]

14. a) Find the correlation coefficient between x and y form the following data

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

L5 CO4 [5M]

b) Using method of least squares fit a curve of the form $y = ae^{bx}$ to the given data

L4 CO4 [5M]

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

15. a) A fertilizer mixing is set to get 12kg of nitrate for quintal bag of fertilizer. Ten 100kg bags are examined. The percentages of nitrate per bag are as follows.
11,14,13,12,13,12,13,14,11,12.
Is there any reason to believe that the machine is defective?
(Value of t for 9 degrees of freedom at 5% level of significance = 2.62)

L3 CO5 [5M]

b) A certain drug was administrated to 500 people out of 800 included in a sample to test its efficiency against typhoid. The results are given below.

L5 CO5 [5M]

	Typhoid	No typhoid	Total
Drug	200	300	500
No Drug	280	20	300
Total	480	320	800

On the basis of the data can we say that the drug is effective in preventing typhoid?

16. a) Explain the terms: control limits, tolerance limits and specification limits L2 CO6 [5M]
b) Distinguish between defects and defectives. Explain the construction an operation of a *p*- chart. L3 CO6 [5M]

17. a) 'A' can hit the target once in five shots. B can hit two targets in three shots. C can hit one target in four shots. What is the probability that 2 shots hit the target? L3 CO1 [4M]
b) If 0.8% of the fuses delivered to an arsenal are defective, use the Poisson approximation to determine the probability that
(i) 4 fuses will be defective in a random sample of 400
(ii) at least 4 fuses will be defective in a random sample of 400. L3 CO2 [3M]
c) State central limit theorem. L2 CO3 [3M]

18. a) **Using method of least squares fit a straight line to the following data**

L4 CO4 [4M]

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 [3M]
c) Explain the construction and interpretation of mean chart and range chart. L2 CO6 [3M]

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