Model Question Paper

Subject Code: CS/IT/CM- 211 (R20)

R.V.R. & J.C. College of Engineering, Guntur – 522019

(Autonomous)

B.Tech. Semester-III [Second Year] Degree Examination

Probability and Statistics

Time: Three hours Max. Marks: 70

All questions carry equal marks

Answer Question No.1 compulsorily. (14 x 1 = 14M)
Answer ONE Question from each unit. (4 x 14 =56M)

1.	Answer All Questions			Blloom's Taxonomy Level
	(a)	Write the probability distribution of getting a head in tossing of 2 fair coins.	CO1	II
	(b)	For Poisson variate X find P(X=3) with its mean=4.8	CO1	I
	(c)	If is a normal variate with mean 30 and standard deviation 5 then find P(X>25)	CO1	I
	(d)	Write the mean and variance of Uniform distribution	CO1	III
	(e)	Define interval estimation	CO2	III
	(f)	Define null hypothesis	CO2	I
	(g)	Define type I error	CO2	I
	(h)	What do you mean by degrees of freedom	CO2	II
	(i)	Write test statistic for single proportion	CO3	I
	(j)	Define F-test.	CO3	I
	(k)	Define Run	CO3	III
	(l)	Write the test statistic for Sign-test.	CO4	I
	(m)	Define time series	CO4	I
	(n)	Define trend	CO4	I

UNIT – I

2.	(a)	The probability mass function of a random variable X is X: 0 1 2 3 4 5 6 P(X): k 5k 7k 9k 11k 13k 15k (i) Find k (ii) Evaluate $P(X < 4)$ and $P(X \geq 5)$.	7M	CO1	III
	(b)	An agricultural cooperative claims that 90% of the watermelons shipped out are ripe and ready to eat. Find the probabilities that among 18 watermelons shipped out (i) all 18 are ripe and ready to eat (ii) at least 16 are ripe and ready to eat (iii) at most 14 are ripe and ready to eat	7M	CO1	II

(OR)

3.	(a)	The time for a super glue to set can be treated as a random	7M	CO1	III

		variable having a normal distribution with mean 30 seconds. Find its standard deviation if the probability is 0.20 that it will take on a value greater than 39.2 seconds.			
	(b)	If a random variable has the gamma distribution with $\alpha = 2$ and $\beta = 2$, find the probability that the random variable will take on a value less than 4.	7M	CO1	III

UNIT – II

4.	(a)	A population consists of the four members 2, 3, 4, 5. Consider all possible samples of size two that can be drawn with replacement from this population. Find (i) The population mean. (ii) The population standard deviation. (iii) The mean of the sampling distribution of means. and (iv) The standard deviation of the sampling distribution of means.	7M	CO2	II
	(b)	A random sample of size 100 is taken from an infinite population with mean $\mu = 76$ and variance $\sigma^2 = 256$. What is the probability that the sample mean will lie between 75 and 78.	7M	CO2	II

(OR)

5.	(a)	The specifications for a certain kind of ribbon call for a mean breaking strength of 180 pounds. If five pieces of the ribbon(randomly selected from different rolls) have a mean breaking strength of 169.5 pounds with a standard deviation of 5.7 pounds, test the null hypothesis $\mu = 180$ pounds against the alternative hypothesis $\mu < 180$ pounds at the 0.01 level of significance. Assume normality.	7M	CO2	V
	(b)	An investigation of two kinds of photocopying equipment showed that 71 failures of the first kind of equipment took on the average of 83.2 minutes to repair with a standard deviation of 19.3 minutes, while 75 failures of the second kind of equipment took on the average of 90.8 minutes to repair with a standard deviation of 21.4 minutes. Test the null hypothesis of equality of two means at the level of significance $\alpha = 0.05$.	7M	CO2	II

UNIT – III

6.	(a)	Use the 0.01 level of significance to test the null hypothesis that $\sigma = 0.015$ inch for the diameters of certain bolts against the alternative hypothesis that $\sigma \neq 0.015$ inch, given that a random sample of size 15 yielded $S^2 = 0.00011$.	7M	CO3	II
	(b)	It is desired to determine whether there is less variability in the silver plating done by company 1 than in that done by company 2. If independent random samples of size 12 of the two companies work yield $S_1 = 0.035$ mil and $S_2 = 0.062$ mil, test the null hypothesis	7M	CO3	II

		$\sigma_1^2 = \sigma_2^2$ against the alternative hypothesis $\sigma_1^2 < \sigma_2^2$ at the 0.05 level of significance.			

(OR)

7.	(a)	An airline claims that only 6% of all lost luggage is never found. If, in a random sample, 17 of 200 pieces of lost luggage are not found, test the null hypothesis $p = 0.06$ against the alternative hypothesis $p > 0.06$ at the 0.05 level of significance.	7M	CO3	VI
	(b)	A study shows that 16 of 200 tractors produced on one assembly line required extensive adjustments before they could be shipped, while the same was true for 14 of 400 tractors on another assembly line. At the 0.01 level of significance, does this support the claim that the second production line does superior work?	7M	CO3	VI

UNIT – IV

8.	(a)	The breaking strength (in pounds) of a random sample of 10 ropes made by a manufacturer is given by 163 165 165 160 171 158 151 162 169 172 Use the sign test to test the manufacturer's claim that the average breaking strength of a rope is greater than 160 pounds at 5% level of significance.	7M	CO4	II
	(b)	A sequence of Heads (H) and Tails (T) in tossing of a coin 16 times is given below: HTTTHTHTHHTHTTHH (i) Count the number of runs. (ii) Test whether the Heads and Tails occur in random order.	7M	CO4	V

(OR)

9.	(a)	The following data represents the weight in Kgs of a personal luggage carried in an aircraft by the members of two baseball clubs Club A: 34, 39, 41, 28, 33 Club B: 36, 40, 35, 31, 39, 36 Use U-test to test the hypothesis that the two clubs carry same amount of the luggage at 0.05 level of significance	7M	CO4	V
	(b)	Fit a trend line to the following data and estimate the sales in the year 2022 Year: 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021 Sales (in Rs.): 62, 64, 66, 63.5, 67, 64.5, 69, 67	7M	CO4	I,II

Signature of the Paper setter