



R20 Regulation

Subject code: 3B3CA

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**  
(Autonomous, Accredited by NAAC with 'A' Grade)

**B.Tech III Semester Supplementary Examinations, July 2022**

**PROBABILITY & STATISTICS AND COMPLEX VARIABLE**  
(MECHANICAL ENGINEERING)

**Maximum Marks: 70**

Date: 19.07.2022

Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

**Part-A**

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 Define binomial distribution
- 2 If the mean and variance of the binomial variate are 12 and 4 then write binomial distribution
- 3 If  $f(x) = k e^{-x/5}, x > 0$  is a probability density function then find k?
- 4 Write the probability density function of Normal distribution.
- 5 Define point estimation and interval estimation?
- 6 Define critical region.
- 7 Find chi-square value for 1 degree of freedom at 5% level of significance.
- 8 Find  $F_{0.05}$  with  $V_1 = 7$  and  $V_2 = 15$
- 9 Write the statement of Cauchy's theorem
- 10 Define Analytic function

**Part-B**

Answer All the following questions

(5X10M=50 Marks)

- 11 Let 'X' denote the sum of the two numbers that appear when a pair of fair dice is tossed  
Determine the (i) Distribution function (ii) Mean and (iii) Variance [10]

OR

- 12 Out of 800 families with 5 children each how many would you expect to have (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys (iv) at least one boy? Assume equal probabilities for boys and girls. [10]

- 13 The cumulative distribution function for a continuous random variable 'x' is [10]

$$F(x) = \begin{cases} 1 - e^{-2x} & , x \geq 0 \\ 0 & , x < 0 \end{cases}$$

Evaluate (i) density function (ii) Mean (iii) Variance

OR

- 14 Derive variance and mean of the Normal distribution. [10]

- 15 A population consists of five numbers ,3,6,9,15and 27. Consider all possible samples of size three Which can be drawn with out replacement from this population. Find i) The population mean. ii) The standard deviation of the population.iii) The mean of the sampling distribution of means. iv) standard deviation of the sampling distribution of means. [10]

OR

- 16 a) A sample of size 100 was taken whose variance is 16 and mean 4. Construct 99% confidence interval for the mean. And also find maximum error of mean at 95% confidence? [5]  
 b) A sample of 60 students have a mean weight of 50 kgs. Can this be regarded as a sample from a population with mean weight 25 kgs and standard deviation 12kgs. [5]
- 17 The means of two random samples of sizes 9 and 7 are 196.42 and 198.82 respectively. The sum of the squares of the deviations from the mean are 26.94 and 18.73 respectively ,can the sample be considered to have been from the same normal population. [10]

OR

- 18 Use F- test to the following data to test the significance of variances [10]

X	67	24	57	55	63	54	56	68	33	43
Y	70	38	58	58	56	67	68	75	42	38

- 19 Prove that  $u = x^2 - y^2 - 2xy - 2x + 3y$  is harmonic. Find  $f(z)$ . [10]

OR

- 20 Evaluate the integrals around  $c:|z|=3$  ,  $\int_c \frac{e^{zz}}{(z-1)(z-2)} dz$ . [10]