*R20 Regulation* *Subject code: 3B3BA*

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

## B.Tech III Semester Regular/Supplementary Examinations, March/April 2023

### PROBABILITY, NUMERICAL METHODS AND COMPLEX ANALYSIS

*(Electrical and Electronics Engineering)*

***Maximum Marks: 70*** Date:27.03.2023 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 If a random variable has a Poisson distribution such that P(X=1) = 2P(X=3) find mean of the distribution

2 The mean and variance of the binomial distribution are 4 and 4/3 respectively. Find P(X≥1).

3 Write Point estimation – Interval estimation

4 Define Type-I and Type-II errors.

5 Define Algebraic equations and Transcendental equations.

6 Find the first approximation to the root lying between 0 and 1 of $x^3+x^2-1=0$ by iteration method.

7 Write Newton's backward difference formulae.

8 Evaluate $\int_0^1 x^3\,dx$ using the Trapezoidal rule

9 State Cauchy- Riemann equations in polar form.

10 Define Analytic function.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 A Discrete Random Variable X has the following Probability Distribution

| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| P(x) | 0 | K | 2K | 2K | 3K | $K^2$ | $2K^2$ | $7K^2+K$ |

10M

i) Determine K
ii) Evaluate P(X<6),P(X≥6),P(0<X<5) and P(0≤X≤4)
iii) Determine Mean and Variance

OR

12 A) Find the mean and standard deviation of Normal distribution in which 7% of items are under 35 and 89% of items are under 63. 6M

B) Out of 800 families with 5 children each, how many would you expect to have (a) 3 boys and (b) 5 girls? Assume equal probabilities for boys and girls. 4M

13 If the population is 3,6,9,15,27

(i) List all possible samples of size 3 that can be taken without replacement from the finite population. 10M

(ii) Calculate the mean of each of the sampling distributions of means.

(iii) Find the standard deviation of sampling distributions of means.

OR

14 A) An ambulance service claims that it takes on average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and a variance of 16 minutes. Test the claim at 0.05 level significance. 5M

B) A researcher wants to know the intelligence of students in a school. He selected two groups of students. In the first group there are 150 students with having mean IQ of 75 with an SD of 15 in the second group there are 250 students with having mean IQ of 70 with an S.D of 20. Test this claim at 0.05 level of significance. 5M

15 A) Find a real root of the equation $x \log_{10} x = 1.2$ by using by False position Method. 5M

B) Find a real root of the equation by using by Bisection Method $x^3-5x+3=0$ 5M

OR

16 A) Find a positive root of the equation by iteration method $3x = cosx + 1$ 5M

B) Evaluate $\sqrt{28}$ to four decimal places by Newton's iterative method. 5M

17 Given the values:

| X | 0 | 2 | 3 | 6 |
|---|---|---|---|---|
| f(x) | -4 | 2 | 14 | 158 |

Using Lagrange's formula for interpolation find the value of f (4) 10M

OR

18 Evaluate $\int_0^2 e^{-x^2} dx$ using (i) Trapezoidal rule (ii) Simpson's $\frac{1}{3}^{rd}$ rule taking h=0.25. 10M

19 Prove that the function f(z) defined by $f(z) = \frac{x^3(i+1)-y^3(1-i)}{x^2+y^2}$ $(z \neq 0)$, $f(0) = 0$ is continuous and the Cauchy-Riemann equations are satisfied at origin. 10M

OR

20 A) Evaluate $\oint_c \frac{z^3-sin3z}{(z-\frac{\pi}{2})^3} dz$ where c is the circle |z|=2 using Cauchy integral formula 5M

B) Find the conjugate harmonic function of the harmonic function $u = x^2 - y^2$. 5M