R18 Regulation *Subject code:* 2B3BA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Regular/Supplementary Examinations, February 2021

NUMERICAL METHODS AND TRANSFORMS
(Common to EEE& ECE)

Maximum Marks: 70 Date:17.02.2021 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 which carries 10M.
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 the first approximation x_0 for $x^2 - x - 4 = 0$ is 2 then find x_1 by Newton Raphson method.

2 Find the initial root of the equation x^3-x-4 =0 by Regula falsi method.

3 State Trapezoidal and Simpson's 1/3 rules.

4 State the relation between forward difference operator Δ and shift operator E.

5 If $\frac{dy}{dx} = y - x$, y(0) = 2, h=0.1 find k_2 by RK fourth order method.

6 Write the two advantages of R-K method over Taylor's series

7 If f(x) =x in $(0,2\pi)$ then find the Fourier coefficient b1

8 If f(x) is to be expanded as a Fourier series in the interval $0 \leq x \leq 2$, write formulae for a_0, a_n, b_n.

9 Find $Z(n^2)$.

10 Find Z(Sin nx).

Part-B

Answer All the following questions. **(10MX 5=50Marks)**

11 Find a positive root of the equation f(x) = x^3-2x-5=0 by regula – falsi method. (10M)

OR

12 Using Newton – Raphson method derive a formula to find the reciprocal of a number.Find the reciprocal of 22 using Newton-Raphson method. (10M)

13 Use Lagrange's formula to find the value of y at x=6 for the following data (10M)

x	3	7	9	10
Y=f(x)	168	120	72	63

OR

14 Evaluate $\int_0^4 e^x \, dx$ by using Trapezoidal, Simpson's $\frac{1}{3}$ rules. Also compare your result with the exact value of the integral. (10M)

15 Solve $y' = x\, y^{1/3}$, y(1) = 1, using Taylor's series method and compute y(1.1), y(1.2). (correct to 3 decimal places) (10M)

OR

16 Given that $\frac{dy}{dx} = x^2+y^2$, y(0) = 1, determine y(0.1) and y(0.2) using Modified Euler's method. (10M)

17 Find the Fourier series expansion of the function f(x) given by

$$f(x) = \begin{cases} k, & for\ 0 < x < \pi \\ -k, & for\ \pi < x < 2\pi \end{cases}$$ (10M)

OR

18 Find the Fourier Transform of $f(x) = \begin{cases} 1, & for\ |x| < a \\ 0, & for\ |x| > a \end{cases}$ (10M)

19 Find $z^{-1}[\frac{5z}{(2-z)(3z-1)}]$. (10M)

OR

20 Solve $y_{n+2} - 5y_{n+1} + 6y_n = 1$, with $y_0 = 0, y_1 = 1$ using z-transforms. (10M)