



R18 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

Subject code: 2B3BA

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 b_1
- 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

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

OR

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

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

OR

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