



R18 Regulation

Subject code:2B3BA

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**

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

**B.Tech III Semester Supplementary Examinations, December 2025**

**NUMERICAL METHODS AND TRANSFORMS**

(Common to EEE & ECE)

Maximum Marks: 70

Date:15.12.2025

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)		Marks	CO	BTL
1	If $x^2 - x - 1 = 0$ by bisection method find the first approximation.	2M	1	L1
2	Write the formula of Regula falsi method to solve an equation.	2M	1	L1
3	Find all the first order forward differences from the following values. $f(0)=1, f(1)=1.5, f(2)=2.2, f(3)=3.1$	2M	2	L1
4	Write the formula of Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rules.	2M	2	L1
5	Write merits of Taylor series.	2M	3	L1
6	If $dy/dx = -y$ , $y(0) = 1$ , $h=0.01$ then find the value of $y(0.01)$ by Euler's method.	2M	3	L1
7	Find the value of $a_0$ in the Fourier series expansion of $f(x)=x^2$ in the interval $(0,2\pi)$ .	2M	4	L1
8	Write the Fourier Series for the function $f(x)$ in the interval $C \leq x \leq C + 2\pi$ .	2M	4	L1
9	Expand $Z(u_{n+1})$ .	2M	5	L1
10	Find $Z(k)$ , where $k$ is a constant.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL										
11	Find a real root of the equation $x^3 - 4x - 9 = 0$ which lies between 2 and 3 by Bisection method.	10M	1	L2										
OR														
12	Using Newton – Raphson method derives a formula to find the cube root of a number. Hence find the cube root of 21.	10M	1	L2										
13	Use Lagrange's formula to find the value of $y$ at $x=6$ for the following data	10M	2	L2										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">x</td> <td style="width: 15%;">3</td> <td style="width: 15%;">7</td> <td style="width: 15%;">9</td> <td style="width: 15%;">10</td> </tr> <tr> <td>Y=f(x)</td> <td>168</td> <td>120</td> <td>72</td> <td>63</td> </tr> </table>		x	3	7	9	10	Y=f(x)	168	120	72	63			
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	OR			
14	Evaluate $\int_0^1 \frac{1}{1+x} dx$ by Trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 rules.	10M	2	L2
15	Find $y(0.1), z(0.1), y(0.2)$ and $z(0.2)$ from the system of equations, $y' = x+z$ , $z' = x-y^2$ given $y(0)=2, z(0)=1$ using Runge-Kutta method of Fourth order.	10M	3	L2
	OR			
16	Using Milne's predictor and corrector formula, find $y(4.4)$ , given, $5xy' + y'' - 2 = 0$ ; $y(4)=1, y(4.1)=1.0049, y(4.2)=1.0097, y(4.3)=1.0143$	10M	3	L2
17	Obtain half range Fourier Sine series for the function $f(x) = x(\pi - x)$ ; $0 < x < \pi$ Hence show that $\frac{\pi^3}{32} - \frac{1}{1^3} + \frac{1}{2^3} - \frac{1}{3^3} + \frac{1}{4^3} - \dots$	10M	4	L2
	OR			
18	Find Fourier sine and cosine transform of $2e^{-5x} + 5e^{-2x}$ .	10M	4	L2
19	Find $z^{-1}\left[\frac{5z}{(2-z)(3z-1)}\right]$ .	10M	5	L2
	OR			
20	Solve $y_{n+2} - 5y_{n+1} + 6y_n = 1$ , with $y_0=0, y_1=1$ using z-transforms.	10M	5	L2