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 2024

NUMERICAL METHODS AND TRANSFORMS

(Common to ECE & EEE)

Maximum Marks: 70 Date:02.12.2024 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)		CO	Bloom Tx
1	If $x^2 - x - 1 = 0$ by bisection method find the first approximation.	1	L1
2	Write the formula of Regula falsi method to solve an equation.	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	2	L1
4	State the relation between forward difference operator Δ and shift operator E.	2	L1
5	Write merits of Taylor series.	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.	3	L1
7	State shifting property of Fourier Transform.	4	L1
8	If F(p) is the Fourier transform of f(x), then what is the Fourier transform of xf(x).	4	L1
9	State change of scale property in Z-Transforms.	5	L1
10	State convolution theorem under Z-tranforms.	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
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 derive 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
	OR		

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

14	Evaluate $\int_0^1 \frac{1}{1+x} dx$ by Trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8rules. [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	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]	3	L2
17	Obtain half range Fourier Sine series for the function $f(x) = x(\pi - x)$;0<x<π Hence show that $\frac{\pi^3}{32} = \frac{1}{1^3} - \frac{1}{2^3} + \frac{1}{3^3} - \frac{1}{4^3} + \ldots\ldots\ldots\ldots$ [10M]	4	L2
	OR		
18	Find Fourier transform of $e^{-a\|x\|}$(a>0) and hence ST [10M] i) $\int_0^\infty \frac{\cos px}{a^2+p^2} dp = \frac{\pi}{2a} e^{-a\|x\|}$ ii) $F(x\, e^{-a\|x\|}) = \frac{i4ap}{(a^2+p^2)^2}$	4	L2
19	Find $z^{-1}[\frac{z}{(z-a)^3}]$ using convolution theorem and deduce that $z^{-1}[\frac{z}{(z-1)^3}] = \frac{(n+1)(n+2)}{2}$ [10M]	5	L2
	OR		
20	a) If z(u_n) =u(z) then prove that z($a^n u_n$) = u($\frac{z}{a}$) [5M] b) Find z(a^n sin nθ) [5M]	5	L2