R18 Regulation *Subject code: 2B3BA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, July 2024

NUMERICAL METHODS AND TRANSFORMS

(Common to EEE & ECE)

Maximum Marks: 70 Date:18.07.2024 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	State Trapezoidal and Simpson's 1/3 rules.	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	Find the value of a_0 in the Fourier series expansion of $f(x)= x^2$ in the interval $(0,2\pi)$.	4	L1
8	If f(x) = cosx in $(-\pi,\pi)$ then find the Fourier coefficient bn .	4	L1
9	State change of scale property in Z-Transforms.	5	L1
10	Find Z(k), where k is a constant.	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)			
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 interpolation formula to find f(3.3) from the following data [10M]	2	L2
	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]	2	L2

X	1	2	3	4	5
y=f(x)	15.30	15.10	15.0	14.50	14.00

15	Solve $y' = x^2 - y$, y(0) = 1,using Taylor's series method and compute y(0.1),y(0.2). (correct to 4 decimal places) [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 [5M+5M] i) $\int_0^\infty \frac{\cos px}{a^2+p^2} dp = \frac{\pi}{2a} e^{-a\|x\|}$ ii) $F\left(x\, e^{-a\|x\|}\right) = \frac{i4ap}{(a^2+p^2)^2}$	4	L2
19	Solve $y_{n+2} - 3y_{n+1} + 2y_n = 4^n$ with $y_0=0, y_1=1$ using z-transforms. [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