Regulation R18 *Subject Code: 2B4AF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, February 2024

Numerical Methods

(Common to CE & ME)

Maximum Marks: 70 Date:28.02.2024 **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 questions from 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)			CO	Bloom Tx
1.		Define root of an equation	1	L1
2.		Show that $\nabla = 1 - E^{-1}$	1	L2
3.		Find any two initial positive roots of the equation $xe^x = 2$.	2	L2
4.		Write the relation between the operators E and δ.	2	L1
5.		Write the formula of Simpsons 3/8 rule.	3	L1
6.		Write Newton's backward formula for dy/dx at $x = x_n$.	3	L1
7.		Write the formula for Taylor's series method	4	L1
8.		Write Runge-kutta fourth order formula.	4	L1
9.		Define Elliptic partial Differential Equation	5	L1
10.		Write the Laplace equation and Poisson Equation for Elliptic Equations.	5	L1

Part-B

Answer All the following questions. (5X10M = 50 Marks)				
11.	A.	Find a positive root of x^3-x-1=0 by bisection method. [5]	1	L3
	B.	Evaluate $\sqrt{28}$ to four decimal places by Newton's Raphson Method. [5]		
		OR		
12.		Find a positive real root of the equation $e^x \sin x = 1$ up to 3 decimal places by Regula Falsi method. [10]	1	L3
13.	A.	Prove that $\mu = \frac{1}{2}(E^{\frac{1}{2}} + E^{-\frac{1}{2}})$ [5]	2	L3
	B.	Determine f(x) as a polynomial in 'x' for the following data, using Newton's divided difference formula. [5]		L3

x	-4	-1	0	2	5
y	1245	33	5	9	1325

		OR		
14.		Use Gauss's backward interpolation formula to find f(32) given that f(25) = 0.2707, f(30) = 0.3027, f(35) = 0.3386, f(40) = 0.3794 [10]	2	L3
15.		Find dy/dx at x = 1.1 for the following data. [10] X: 1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 Y: 7.989 | 8.403 | 8.781 | 9.129 | 9.451 | 9.75 | 10.031	3	L3
		OR		
16.		Evaluate $\int_0^{\pi} \frac{\sin x}{x} dx$ using n = 6, by Simpson's 1/3 rule. [10]	3	L4
17.		Apply 4th order Runge-Kutta method to find y(0.1) & y(0.2) given $y' = xy + y^2$, y(0)=1. [10]	4	L3
		OR		
18.		Given $\frac{dy}{dx} = y^2 + 3x, y(0) = 1$ Find y(0.1) taking h = 0.1 by using Taylor's series method. [10]	4	L3
19.		Solve $\frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2}$, with conditions u (0,t) = u(1,t)=0, u(x,0) = ½ x (1-x) and u(x,0) = 0 taking h = k = 0.1 for $0 \le t \le 0.4$. [10]	5	L4
		OR		
20.		Find the solution of the parabolic equation $u_{xx}=2u_t$ when u(0,t)=u(4,t)=0 and u(x,0)=x(4-x) taking h=1. Find the values upto t=5. [10]	5	L3