R22 Regulation *Subject code: 4B2AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Regular/Supplementary Examinations, June 2024

NUMERICAL METHODS AND APPLICATIONS

(CIVIL ENGINEERING)

Maximum Marks: 60 Date:24.06.2024 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 10 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 (10X1M=10 Marks)			CO	BT Level
1.	a	Write the reciprocal of the number N using Newton-Raphson method?	1	L1
	b	Define root of an equation.	1	L1
	c	If $f(x) = x^2+2x+1$ and h=3 then find $\Delta f(x)$.	2	L1
	d	Show that $\Delta = E - 1$	2	L1
	e	State the formula to find $\frac{dy}{dx}$ at $x=x_0$ for the function y=f(x) which is tabulated for the values $x_i = x_0 + ih$	3	L1
	f	State Simpson's 1/3 formula	3	L1
	g	Describe Taylor's series method	4	L1
	h	If $\frac{dy}{dx} = x+y$, h =0.2, y(0)=0 by Eulers method find y(0.4)	4	L1
	i	Classify the equation $x^2 u_{xx} + (1-y^2) u_{yy} = 0$, $-\infty<x<\infty, -1<y<1$	5	L1
	j	Write the Laplace equation.	5	L1

Part-B

Answer All the following questions. (5X10M=50 Marks)				
2	Find the roots of the equation $x\log_{10}(x)=1.2$ by using False position method. [10M]		1	L3
	OR			
3	Find a +Ve real root of the equation $x\tan x + 1 = 0$ upto 2 decimals by Regula falsi method. [10M]		1	L3
4	Use Newton forward interpolation formula to compute the pressure of the steam at temperature 142^0C from the following steam table. [10M]		2	L3
	OR			

temp	140	150	160	170	180
Pressure	3.685	4.854	6.302	8.076	10.225

5	Find the interpolating polynomial which corresponds to the following data. [10M]	2	L3

x	-1	0	2	5
Y	9	5	3	15

6	A slider in a machine moves along a fixed straight rod the distance xcm along the rod is given below for various values of the time t seconds. Find the velocity of the slider and acceleration when i=0.3 seconds t = 0 0.1 0.2 0.3 0.4 0.5 0.6 x = 30.13 31.62 32.87 33.64 33.95 33.81 33.24 [10M]	3	L3
	OR		
7	Evaluate $\int_0^{\pi/2} e^{sinx}$ dx using (i)Trapezoidal rule (ii) Simpsons 1/3 rule (iii)Simpsons 3/8th rule [10M]	3	L3
8	Using Taylor series method find y at x=0.1, 0.2 for the initial value problem $y^1 = x^2+y$, given that y(0)=10 [10M]	4	L3
	OR		
9	Given $\frac{dy}{dx}$ = x+ siny, y (0)=1 find y(0.2) and y(0.4) in two steps using Modified Eulers method . [10M]	4	L3
10	Using Crank-Nicholson formula , Solve u_{xx}-16u_t =0 , given u(x,0) =0, u(0,t) = 0, u(1,t) = 200t. Compute u for one step in t division. [10M]	5	L3
	OR		
11	Find the values of u(x,t) satisfying the parabolic equation $u_t = 4\ u_{xx}$ and the boundary conditions u(0,t)= 0=u(8,t) and u(x,0)= 4x- $\frac{x^2}{2}$ at the points x=i , i=0,1,….8 and t= $\frac{1}{8}j$, j=0,1,2 …5 [10M]	5	L3