Regulation R20 *Subject code: 3B3AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, July 2022

NUMERICAL METHODS

(Civil Engineering)

Maximum Marks: 70 Date:19.07.2022 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)**

1 Find the reciprocal of 18 by using Newton-Raaphson method. 2

2 Write a short notes on REgula- falsi method. 2

3 Find the relation between the operators E and D 2

4 Find the Lagrange's Interpolating polynomial fits the date 2

x	0	1	2
f(x)	2	1	12

5 Find dy/dx at x=1 form the table 2

x	1	2	3	4
y	1	8	27	64

6 Evaluate $\int_0^1 x^3 dx$ by using Simpson's 3/8 rule, with n = 5. 2

7 Define initial and boundary value problems. 2

8 Compute y(0.1) for dy/dx = xy + 1 and y(0) = 1 using Taylor series method. 2

9 State Standard Five point formul and Diagonal Five point formula to solve a Poisson equation of second order. 2

10 Classify the equation 2

$u_{xx} + 4u_{xy} + (4y^2 + x^2)u_{yy}$=Sin (x+y)

Part-B

Answer All the following questions. **(5X10M=50Marks)**

11 Derive a recurrence relation to find 5^{th} root of a number. Hence find 5^{th} root of 80 using Newton Raphson method. 10

OR

12 Find a +Ve real root of the equation xtanx +1 = 0 upto 2 decimals by Regula falsi method. 10

13 Use Newton forward interpolation formula to compute the pressure of the steam at temperature 142^0C from the following steam table 10

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

OR

14 A curve passes through the points (0,18), (1,10), (3, -18), (6,90). Find the slope of the curve at x = 2. 10

15 Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x = 1.5 and x = 4

x	1	2	3	4
y	3	5	6	7

OR

16 Evaluate $\int_0^{\pi} \frac{sinx}{x} dx$ using n = 6, by a) Trapezoidal rule b) Simpson's 1/3 rule 10

17 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

OR

18 Apply 4th order Runge-Kutta method to find y(0.1) given
$y' = xy$, y(0)=1. 10

19 Find the numerical solution of the heat conduction equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ $0 \le x \le 5, t > 0$ 10
with boundary conditions and initial condtions u(0,t) = u(4,t) = 0

$u(x, 0) = x(5 - x)$.

OR

20 Applying Leibmann's iterative method, approximate the solution of Laplace equation $\nabla^2 u = 0$ with h=1/3 in a square mesh with vertices A(0,0), B(0,1), C(1,1) and D(1,0) given that unknown function on the boundary is $u(x, y) = 9x^2y^2$ 10