Regulation R18 *Subject code: 2B4AF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, July 2022
NUMERICAL METHODS

(Common to CE & ME)

Maximum Marks: 70 Date:02.08.2022 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 initial roots of equation x^3-x-4=0 by Newton Raphson method.

2 Using Newton – Raphson method derive a formula to find the reciprocal of a number N.

3 Write the Newton's forward interpolation formula.

4 Write the Lagrange's unequal intervals formula.

5 Evaluate $\int_0^4 e^4 dx$ by Trapezoidal Rule.

6 Evaluate $\int_0^1 \frac{1}{1+x} dx$ by Simpson's Rule by taking n=4

7 Given $\frac{dy}{dx} = -xy^2, y(0) = 2. Compute\ y(0.2)$ using Eulers Method.

8 Write any two demerits of Taylor Series Method

9 Find whether the following equation is Elliptic or hyperbolic $(x+1)u_{xx} - 2(x+2)u_{xy} + (x+3)u_{yy} = 0.$

10 Write the explicit scheme for the solution of wave equation.

Part-B

Answer All the following questions. (10M X 5=50Marks)

11 By using Bisection method, find an approximate root of the equation $\sin x = \frac{1}{x}$ that lies between x=1 and x=1.5 (measured in radians). 10

OR

12 Using Regula –Falsi method, find the real root of $xe^x = 2$ in four approximations. 10

13 Find the parabola passing through the points (0,1),(1,3),(3,55) using Lagrange's Interpolation Formula 10

OR

14 Find the polynomial to the following data by Newton's Divided Difference Formula,hence find f(5) 10

X	0	2	3	6
y	648	704	729	792

15 The population of a town is shown in the following table,estimate the rate of growth of the population in the year 1981 10

Year	1951	1961	1971	1981	1991
Population	19.96	39.65	58.81	77.21	94.61

OR

16 Evaluate $\int_0^4 e^x\,dx$ using Trapezoidal Rule and Simpson's Rule. Also compare your result with the exact value of the integral. 10

17 Using Taylors series method solve $y' = xy + y^2, y(0) = 1\ at\ x = 0.1,0.2.$ 10

OR

18 Apply 4th order Runge-Kutta method to find y(0.1) & y(0.2) given $y' = x - y$, y(0)=1. 10

19 Solve the Poisson equation $u_{xx}+u_{yy}= -81xy$, $0<x<1,0<y<1$ given that $u(0,y)=0,u(x,0)=0$, $u(1,y)=100$, $u(x,1)=100$ and $h=1/3$ 10

OR

20 Solve the Laplace equation $u_{xx}+u_{yy}=0$ given that 10

0	11.1	17	19.7	18.6
0	u1	u2	u3	21.9
0	u4	u5	u6	21
0	u7	u8	u9	17
0				9
	8.7	12.1	12.5	