R20 Regulation *Subject code: 3B3AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, July 2024

NUMERICAL METHODS

(Civil Engineering)

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	Write about Bisection method.	1	L1
2	Find any two initial positive roots of the equation $xe^x = 2$	1	L1
3	Find the relation between the operators E and D	2	L1
4	Find the Lagrange's Interpolating polynomial fits the date x: 0, 1, 2 f(x): 2, 1, 12	2	L1
5	Evaluate $\int_0^1 x^3 dx$ by Trapezoidal Rule taking n=4	3	L1
6	Write the formula of Simpson's $\frac{1}{3}$rule	3	L1
7	Write the formula for Taylor's series method and find an approximate value of y at x = 0.1 for $y^1 = e^x$, y(0) = 0.	4	L1
8	Use Runge-kutta method of second order to find y(0.1) for the IVP dy/dx = -y, y(0) = 1.	4	L1
9	What is the classification of equation $f_{xx}+2f_{xy}+f_{yy}=0$	5	L1
10	Classify the equation $(1+x^2)u_{xx} + (5+2x^2)u_{xy} + (4+x^2)u_{yy}=0$	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)			
11	Find a real root for x e^x = cosx , using Regula Falsi method. [10]	1	L2
	OR		
12	Evaluate $\sqrt{28}$ to four decimal places by Newton's Raphson Method. [10]	1	L2
13	Use Newton forward interpolation formula to compute the pressure of the steam at temperature 142^{0}C from the following steam table. [10] temp: 140, 150, 160, 170, 180 Pressure: 3.685, 4.854, 6.302, 8.076, 10.225	2	L2
	OR		

<table>
<tr><td>14</td><td>A curve passes through the points (0.18), (1,10), (3, -18), (6,90). Find the slope of the curve at x = 2. [10]</td><td>2</td><td>L2</td></tr>
<tr><td>15</td><td>Find the first and second derivitaves of the function tabulated below at the point x=1.5. [10]
<table>
<tr><td>X</td><td>1.5</td><td>2.0</td><td>2.5</td><td>3.0</td><td>3.5</td><td>4.0</td></tr>
<tr><td>Y</td><td>3.375</td><td>7.0</td><td>13.625</td><td>24.0</td><td>38.875</td><td>59.0</td></tr>
</table></td><td>3</td><td>L2</td></tr>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>16</td><td>Use Trepezoidal rule with n=4 to estimate $\int_0^1 \frac{1}{1+x^2}dx$ [10]</td><td>3</td><td>L2</td></tr>
<tr><td>17</td><td>Given $y^1 = x + \sin y$, $y(0) = 1$ compute y(0.2) with h = 0.2 using Euler's modified method. [10]</td><td>4</td><td>L2</td></tr>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>18</td><td>Given $\frac{dy}{dx} = \frac{1}{x^2+y}, y(4) = 4$ compute y(4.2) using R-K method of 4th order h = 0.2 [10]</td><td>4</td><td>L2</td></tr>
<tr><td>19</td><td>Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$, subject to the initial condition u(x,0) = sinπx, $0 \le x \le 1$ and the boundary conditions $u(0,t) = 0, u(1,t) = 0$. Carry out computations for the two levels taking h=1/3,k=1/36 [10]</td><td>5</td><td>L2</td></tr>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>20</td><td>Find the solution of Poisson equation $\frac{\partial^2 u}{\partial t^2} + \frac{\partial^2 u}{\partial x^2} = 8x^2y^2$, for the square mesh of the figure given below with u(x,y)=0 on the boundary and mesh length =1 [10]</td><td>5</td><td>L2</td></tr>
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