B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Fourth Semester

Civil Engineering

19UMA423 - NUMERICAL METHODS

Common to Chemical Engineering

(Regulation 2019)

Duration: Three hours   Maximum: 100 Marks

PART A   10*2 =20 Marks

Answer any ten of the following questions

1.	Iteration method converges if $|g^1(x)|$	CO1- U
2.	What do you mean by diagonally dominant?	CO1- R
3.	Gauss Seidel iteration converges if the coefficient matrix is	CO6- U
4.	In Cubic Spline, determine the value of M_0 and M_n	CO2- R
5.	Newton's divided difference formula used only for	CO2- U
6.	State Lagranges interpolation formula for three set of values (X_0,Y_0) , (X_1,Y_1) and (X_2,Y_2) are given	CO2- R
7.	Truncation error in Trapezoidal rule ?	CO3- R
8.	State Simpson's $\frac{1}{3}$ rule to evaluate $\int_a^b f(x)dx$	CO3- U
9	Write down Romberg's formula for I_1 and I_2 as well as I_2 and I_3	CO3- R
10	Using Euler's method find y(0.1) given $\frac{dy}{dx} =1+ y^2$, y(0) =0	CO6- AP
11	Using Taylor's series method find $y(1.1)$ given $y' = x + y$ with $y(1) = 0$	CO6- AP
12	Which method is better ? Taylor's series or RK method. Why?	CO6- U
13	Bender-Schmidt recurrence equation is valid if $\lambda=$	CO5- U
14	Classify $u_{xx} - 2u_{xy} + u_{yy} = 0$	CO5- AP
15	PDE of second order, if B^2-4AC> 0 then	CO5- U

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PART B   3*10 =30 Marks

Answer any three of the following questions
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1 Solve for a positive root of $3x - \cos x - 1 = 0$ by Newton's Raphson method .   CO1 -App   (16)

2 Using Newton's divided difference formula find f(8) for the data   CO2- App   (16)

X	4	5	7	10	11	13
Y	48	100	294	900	1210	2028

3 Evaluate $\int_0^6 \dfrac{dx}{1 + x^2}$ with 6 equal intervals by (i) Trapezoidal rule   (16)

(ii) Simpson's $\dfrac{1}{3}$ rule.   CO3- App

4 Using R-K method of fourth order, solve $\dfrac{dy}{dx} = \dfrac{y^2 - y^2}{y^2 + x^2}$ with $y(0) = 1$ at   CO4- App   (16)

$x = 0.2$

5 Solve $\dfrac{\partial^2 u}{\partial x^2} = 2 \dfrac{\partial u}{\partial t}$, u(0,t) = 0 , u(4,t) = 0 , u(x,0) = x(4 - x) . Take h = 1   CO5- App   (16)

and find the values of u up to t = 5 using Bender-Schmidt's difference equation

6 Solve 27x + 6y – z = 85, 6x + 15y +2z = 72, x + y + 54z =110 by Gauss   CO1 -App   (16)
Seidel method

7 Using Newton's forward interpolation formula find f(3) for the following   CO2- App   (16)
data

X	2	4	6	8
Y	1	2	1	10

8 Using three point Gaussian quadrature formula to find the value of   CO3- App   (16)

$\int_1^5 \dfrac{dx}{x}$