PRN No.	

Total No. of Printed Pages: 2

PAPER CODE	U314-211 (ESE)

(AY:2024-25) December 2024 (ENDSEM) EXAM

TY (SEMESTER - I)

COURSE NAME: NUMERICAL METHODS **Branch: MECHANICAL** **COURSE CODE: MEUA31201**

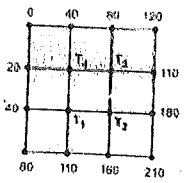
(PATTERN 2020)

Time: [1Hr 30 Min] **[Max. Marks: 40]**

(*) Instructions to candidates:

1) **Figures to the right indicate full marks. Use of scientific calculator is allowed**
2) **Use suitable data wherever required**
3) **All questions are compulsory. Solve any two sub question each from Questions 1 and 2**
4) **Solve any one sub question (2 marks) from Questions 3 ,4 ,5 and 6 and sub question of 4 marks is compulsory from questions 3,4,5,and 6**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Roundoff the number 6.65250 to 3 significant digits and Identify absolute, relative and percentage relative error.	[4]	CO01	3
	b) Identify the root of the equation $x^3 + x - 1 = 0$ using Newton Raphson method. Take Initial Guess value $x_1 = 0$ and use up to 3 iteration	[4]	CO01	3
	c) Solve real root of the equation $e^x = 5x$ using method of successive approximation. Assume initial guess $x = 0.15$, and solve up to 3 iterations	[4]	CO01	3
Q2	a) Apply the Gauss elimination method to solve the equations as follows: U+3V+3W =16 U+4V+3W=18 U+3V+4W=19	[4]	CO02	3
	b) Apply the Gauss Seidel iterative method to solve the equations as follows upto 2 iteration: 9 x + 4y + z = -17 x-2y-6z = 14 x+ 6y = 4	[4]	CO02	3
	c) Apply the Thomas algorithm method to solve the equations as follows: 0.8 x-0.4y = -18 -0.4x+0.8y- 0.4z=21 0.8 y-0.4z = 25	[4]	CO02	3

Q3	a)What are the applications of least square criteria OR b)What are the use of curve fitting c) Using the following points, fit a polynomial using Lagrange's method. (2.10,5.14) (2.50,6.78) (3.10,10.29), (3.50,13.58) Identify the value of y at x = 2.7	[2] [2] [4]	CO03 CO03 CO03	1 1 3
Q4	a)List the different methods of numerical integration OR b)Explain the significance of integration with one suitable example. c) Solve $\int_0^1 x.e^x.dx$ using Gauss Quadrature two-point formula	[2] [2] [4]	CO04 CO04 CO04	1 1 3
Q.5	a) What are the different methods to solve ordinary differential equation? OR b) What is mean by ordinary differential equation? c) Using the Runge-Kutta method of second order, solve the equation $\frac{dy}{dx} = x + yz$ and $\frac{dz}{dx} = x^2 - y^2$, Take x =0 ,y =1 , z =0.5 and h=0.2. Identify y and z at x = 0.2	[2] [2] [4]	CO05 CO05 CO05	1 1 3
Q.6	a) List the different Partial differential equations commonly used. OR b) List the 2 methods used to solve Partial differential equation. c) Solve the Laplace equation (2D heat flow) with respect to the grid as shown in figure1.Indentify the temperatures T_1,T_2,T_3 and T_4.  	[2] [2] [4]	CO06 CO06 CO06	1 1 3

Note: [BT level- 1: Remember 2: Understand 3: Apply 4: Analyze 5: Evaluate 6: Create]