

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
MID TERM EXAMINATION - APR 2023**

Semester : Semester II - B.Tech MATH - 2022

Course Code : MAT2003

Course Name : Sem IV - MAT2003 - Numerical Methods for Engineers

Program : Mathematics for B.Tech

Date : 15-APR-2023

Time : 2:00PM - 3:30PM

Max Marks : 50

Weightage : 25%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. State the elements u_{12} and u_{13} from $\begin{bmatrix} 1 & 4 & -3 \\ -2 & 8 & 5 \\ 3 & 4 & 7 \end{bmatrix}$.

(CO1) [Knowledge]

2. State the second approximation of Gauss Siedel method for the system of equations,
 $a_{11}x + a_{12}y + a_{13}z = b_1, a_{21}x + a_{22}y + a_{23}z = b_2, a_{31}x + a_{32}y + a_{33}z = b_3.$

(CO1) [Knowledge]

3. Recognize the interval in which root of the equation _____ lies, from the following data $f(0)=-1, f(1)=-0.5, f(2)=-0.1, f(3)=0.5, f(4)=1.5$

(CO1) [Knowledge]

4. From the given data set find Δf_0

x	0	0.1	0.2	0.3
f(x)	5	12	27	41

(CO2) [Knowledge]

5. If $f(x_0) = y_0, f(x_1) = y_1$ and $f(x_2) = y_2$, then the Newton's divided difference second order polynomial for the above data is given by

$$P_2(x) = b_0 + b_1(x - x_0) + b_2(x - x_0)(x - x_1)$$

. Identify b_0 .

(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(4 X 7 = 28M)

6. Estimate the elements L and U matrices from the following system of equation
 $x + y + z = 1; 4x + 3y - z = 6; 3x + 5y + 3z = 4$

(CO1) [Comprehension]

7. Identify the real root of the equation $xe^x - 2 = 0$ correct to three decimal places. Carry out 3 decimal places

(CO1) [Comprehension]

8. For the following data, predict y at x=19.4 using appropriate formula.

X	19	20	21	22	23
Y	91	100.25	110	120.25	131

(CO2) [Comprehension]

9. Predict $y(10)$ using the appropriate interpolation formula from the table given below:

x:	5	6	9	11
y:	12	13	14	16

(CO2) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION

(1 X 12 = 12M)

10. From Gauss Seidel iteration method solve the system of equations
 $5x + 2y + z = 12, x + 4y - 2z = 15, x + 2y + 5z = 20$. Carry out four iterations.

(CO1) [Application]