Reg. No ..... Name **23P4039**

M. Sc. DEGREE END SEMESTER EXAMINATION : MARCH 2023

SEMESTER 4 : MATHEMATICS

COURSE : **21P4MATTEL19 : NUMERICAL ANALYSIS**

(For Regular - 2021 Admission)

Duration : Three Hours Max. Weights: 30

PART A

Answer any 8 questions **Weight: 1**

1. Write Python codes to partially differentiate $f(x,y) = 2xy + xy^2$ with respect to y. (A)
2. What are the basic operators that can be used on symbols. (R)
3. Find l_{32} from the system of equation
$2x + 3y + z = 1$
$x + 2y + 3z = 0$
$3x + y + 2z = 0$ (A)
4. Give the algorithm for solution phase or forward substitution in Doolittle's method. (U)
5. What is the formula for computing number of iterations in bisection method? (R)
6. Define first divided difference. (R)
7. How to find limit of a function using Python. (R)
8. Find the extremum of $f(x) = 3x^2 - 2x - 2 = 0.$ (A)
9. Give an example to create an object of symbol class. (U)
10. Define error obtained in Lagrange interpolation. (R)

(1 x 8 = 8)

PART B

Answer any 6 questions **Weights: 2**

11. Explain briefly how to plot multiple expression using Python codes with example. (U)
12. Derive the composite form of Simpson 1/3 rule. (R)
13. Define probability density function and write a program to find the probability of grade of a student lying between 11 and 12. Briefly explain the same. (U)
14. Given the LU decomposition $A = LU$ determine A and $|A|$
$$L = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 5/3 & 1 \end{bmatrix} \quad U = \begin{bmatrix} 1 & 2 & 4 \\ 0 & 3 & 21 \\ 0 & 0 & 0 \end{bmatrix}$$ (A)
15. If $y_1 = 4, y_3 = 12, y_4 = 19, y_x = 7$. Find x. (A)
16. Explain subs() method. (U)

17. Find the root of the equation $f(x) = x^4 - 6.4x^3 + 6.45x^2 + 20.538x - 31.752$ using Newton Raphson method. (A)

18. Represent a continuous compound interest using Python codes. (U)

(2 x 6 = 12)

PART C

Answer any 2 questions **Weights: 5**

19. Use Gauss elimination method to solve
$2x + y + z = 10$
$3x + 2y + 3z = 18$
$x + 4y + 9z = 16$ (A)

20. Use bisection method to find the root $x^3 - 10x^2 + 5 = 0$ that lies in the interval (0,1) to three digit accuracy. (A)

21. Explain the concept of solving equations in detail. (U)

22. Distinguish between definite and Indefinite Integrals. Explain Integration of function and their codes in Python. (U)

(5 x 2 = 10)

OBE: Questions to Course Outcome Mapping

CO	Course Outcome Description	CL	Questions	Total Wt.

Cognitive Level (CL): Cr - CREATE; E - EVALUATE; An - ANALYZE; A - APPLY; U - UNDERSTAND; R - REMEMBER;