Reg. No ..... Name **26U681**

B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2026

SEMESTER 6 : PHYSICS

COURSE : **19U6CRPHY13 : COMPUTATIONAL PHYSICS (EL)**

(For Regular 2023 Admission and Supplementary 2022/2021/2020/2019 Admissions)

Time : Three Hours Max. Marks: 75

PART A

Answer any 10 (2 marks each)

1. Give a graphical analysis of implementing Trapezoidal rule and also mark the error involved in this calculation.
2. Using Picard method, find solution for the differential equation y'= x+y^2, y(0)=1.
3. Briefly outline, solution by elimination, in the case of a system of linear equations.
4. Discuss the graphical analysis of solving 1st order Ordinary Differential equation using Euler Method.
5. Give any two possible solution conditions of a system of linear equations.
6. Show that EΔ and ΔE are equivalent.
7. What is a shift Operator? Give its 2 properties.
8. What is Crout LU decomposition?
9. List any 2 major advantages of using RK method over Taylor Series method.
10. When does one prefer to go with Lagrange's interpolation over Newton's forward interpolation?
11. Show that E and 1+Δ are equivalent.
12. What is a stopping criterion?

(2 x 10 = 20)

PART B

Answer any 7 (5 marks each)

13. Obtain the best polynomial fit for the given set of data points: (0,5), (1,9), (2,13), (3,5), (4,-27), (5,-95) & (6,-211).
14. Solve the system using Gauss-Jordan method, $2x + 4y - 6z = -8$
$x + 3y + z = 10$
$2x - 4y - 2z = -12$
15. Using false position method, solve, $x - e^{-x} = 0$.
16. Using Euler method evaluate the solution of the initial value problem at x=0.1 and 0.2 ; dy/dx = -2xy^2, y(0)=1.
17. Solve the following equation using Newton-Raphson method, $x^3 - 4x^2 + x + 6 = 0 (x_0 = 5)$.
18. From the following data sets obtain the second derivates for x=1.2

x :	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y :	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

19. Using Picard method, find the value of y at x=0.1, given that y'= (y-x)/(y+x) , y(0)=1
20. Find the cubic polynomial which takes the following values (x,y) as: (0,1) (1,2), (2,1) and (3,10). Hence evaluate f(4).

21. Using Taylor series method, upto 3rd order, find solution for the differential equation $y' = x^2 - y$, $y(0)=1$.

22. Construct Newton's forward interpolation polynomial for the following (x,y) data: (4 ,1), (6,3), (8,8) and (10,16). Hence evaluate y for x =5.

(5 x 7 = 35)

PART C

Answer any 2 (10 marks each)

23. Derive the general formula for 1st derivates at the tabulated data sets using forward interpolation method and hence arrive at formula for the tabulated sets.

24. Discuss the linearization fitting techniques to be used to solve the following non-linear laws: $y = ae^{bx}$; $xy^a = b$ and $y = ab^x$

25. Explain bisection, false position, Newton-Raphson and secant method can be used to find roots of equations and make a comparison of the associated convergences.

26. Discuss the method of fitting a straight line using the concept of Least Squares.

(10 x 2 = 20)