24U3141 (Pages: 2) Name : .....

Reg. No : .....

THIRD SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2025

(FYUGP)

CC24UPHY3MN200 - COMPUTATIONAL PHYSICS

(Physics - Minor Course)

(2024 Admission - Regular)

Time: 2.0 Hours Maximum: 70 Marks

Credit: 4

Part A (Short answer questions)

Answer ***all*** questions. Each question carries 3 marks.

1. Write down the algorithm to check if the number enetered by the user is an odd number or an even number. [Level:3] [CO1]
2. Write a short note on pickle module. [Level:2] [CO3]
3. How can you create an x-y graph using matplotlib module? [Level:2] [CO3]
4. Differentiate between resize and reshape functions in numpy module. [Level:2] [CO3]
5. Define accuracy in numerical computations. [Level:1] [CO4, CO5]
6. State the general form of a straight line equation used in linear least squares fitting. [Level:1] [CO4, CO5]
7. Describe how forward differences are constructed. [Level:2] [CO4, CO5]
8. Write a note on Monte Carlo Method. [Level:2] [CO4, CO6]
9. Explain why Numerov's method is more accurate than Euler method for second-order ODEs. [Level:2] [CO4, CO6]
10. Explain how the choice of step size affects the accuracy in Euler and RK2 methods. [Level:2] [CO4, CO6]

(Ceiling: 24 Marks)

Part B (Paragraph questions/Problem)

Answer ***all*** questions. Each question carries 6 marks.

11. Define algorithm. Explain in detail any five of its properties. [Level:2] [CO1]
12. Write a program to find the solution of a quadratic equation using ladder if structure. [Level:2] [CO2]

13. Explain in detail about the data type tuple. How do they differ from lists? [Level:2] [CO2]

14. Explain relational,logical and assignment operators. [Level:2] [CO2]

15. Apply Newton-Raphson method to find the root of $f(x) = x^2 - 5$ with initial guess $x_0 = 2$. [Level:3] [CO4, CO5]

16. Time (s): [0, 1, 2, 3, 4], Height (m): [100, 95, 80, 55, 20]. Describe interpolation for estimating height at 1.7 s. [Level:3] [CO4, CO5]

17. Write a simple python code to plot the configuration space trajectory from two lists. [Level:3] [CO4, CO6]

18. State how the Euler formula $y_{n+1} = y_n + hf(t_n, y_n)$ is implemented in Python for a radioactive decay problem. [Level:1] [CO4, CO6]

(Ceiling: 36 Marks)

Part C (Essay questions)

Answer any ***one*** question. The question carries 10 marks.

19. Explain the data type classification in python in detail. [Level:2] [CO2]

20. In a heating process, the temperature was measured at intervals of 5 minutes as 25, 40, 60, 75, and 90 degree celcius. Write a Python program to use Simpson's 1/3 rule to calculate the average temperature during the 20-minute interval. [Level:3] [CO4, CO5]

(1 × 10 = 10 Marks)

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