FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(Regular/ Improvement / Supplementary)

PHYSICS

GPHY5B06T: COMPUTATIONAL PHYSICS

Time: 2 Hours   **Maximum Marks: 60**

SECTION A: Answer the following questions. Each carries *two* marks.
(Ceiling 20 marks)

1. What is a function? Mention the types of function and their use.
2. Explain the Bisection method for solving algebraic equations.
3. Write down any two features of a projectile motion and derive the expression to calculate the time of flight.
4. Using polar () function write a program to plot a semi-circle of radius 6 cm.
5. List any two methods to create an array.
6. Write a program to plot a Archimedes spiral.
7. Give the features of python dictionaries.
8. What is a statement?
9. What are keywords? Give examples.
10. How is second order Runge-Kutta method related to Euler's method?
11. What do you mean by interpolation and extrapolation? Name any two methods for interpolation.
12. Describe the position-time graph and velocity-time graph of a body under free fall.

SECTION B: Answer the following questions. Each carries *five* marks.
(Ceiling 30 marks)

13. Write a python code to plot $y = x^2$, with the axes labelled.
14. Use trapezoidal rule to evaluate $\int_0^1 x^3 dx$, considering five sub-intervals.
15. Write a python code to numerically differentiate $sin(x^2)$ and plot it by vectorizing the function.
16. Discuss the Taylor's series expansion of sin(x) and cos(x).
17. Write a python code to numerically integrate e^x from x = 1 to 2.
18. Write a python program to simulate the motion of a body projected horizontally from a height on earth.
19. Write the algorithm and draw the flow chart to find sum of first 'n' natural numbers.

SECTION C: Answer any *one* question. The question carries *ten* marks.

20. (a) What is meant by module in python? List some built in modules in python?
    (b) Give an example for using if, elif , else statement.
21. Construct the forward difference table for the following data and evaluate *f (0.6):*

x:	0.1	0.3	0.5	0.7	0.9	1.1	1.3
f (x):	0.003	0.067	0.148	0.248	0.370	0.518	0.697

(1 x 10 = 10 Marks)