Reg No:..... K24FY1485(C)
Name :.....

First Semester FYUGP Physics Examination November 2024 (2024 Admission onwards) KU1DSCPHY116 (INTRODUCTION TO COMPUTATIONAL PHYSICS)

(EXAM DATE : 06-12-2024)

Time : 90 min Maximum Marks : 50

Part A (Answer any 6 questions. Each carries 2 marks)

1. Discuss the role of parameters in Python functions. 2

2. Write the SI unit and symbol of Temperature. 2

3. Write the SI unit and symbol of Luminous intensity.. 2

4. What is numerical representation, and why is it important in computational physics? 2

5. What are numerical errors? 2

6. How does the position vs. time plot illustrate the motion of a freely falling ball? 2

7. Define integral of acceleration. 2

8. How does gravitational force affect objects on Earth? 2

Part B (Answer any 4 questions. Each carries 6 marks)

9. a) Write a script that calculates the mass of a sphere given its radius r and mass density ρ according to the formula $m = \frac{4}{3}\pi r^3$ b) Use the script to find the mass of a sphere of steel of radius r=1mm, r=1m, and r=10m 6

10. The speedometer in your car reports the speed to be 60 kilometres per hour .How can you convert this to metre per second. 6

11. Describe briefly about uncertainty and significant digits . 6

12. Explain the influence of air resistance on velocity-time and position-time graphs of a falling object 6

13. How does air resistance affect the motion of a falling object compared to freefall? 6

14. A mass of 2 kg is connected to a spring with a spring constant of 100 N/m. Use Python to calculate the force on the mass when it is displaced by 0.05 m. Discuss how the spring force obeys Hooke's Law. 6

Part C (Answer any 1 question(s). Each carries 14 marks)

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15. (a) Write a Python function that calculates the velocity of an object under constant acceleration using the equation v=u+at. Demonstrate its use by calculating the velocity after 5 seconds, given an initial velocity of 2 m/s and an acceleration of 3 m/s^2. 7

(b) Create a Python script that uses a loop to calculate the position of a free-falling object at regular time intervals. Assume initial conditions and print the results for every second up to 10 seconds. 7

16. Use Python to simulate the motion of an object under the influence of a constant external force. Analyze how Newton's First and Second Laws explain the resulting acceleration and motion. 14

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