First Semester FYUGP Degree (Reg/Sup) Examination November 2025
KU1DSCPHY116 - INTRODUCTION TO COMPUTATIONAL PHYSICS

2024 Admission onwards

Time : 1.5 hours Maximum Marks : 50

Section A

Answer any 6 questions. Each carry 2 marks.

1. Describe the difference between analytical and numerical solutions in physics.
2. Explain how to define a function in Python with an example.
3. The velocity of light in vacuum is 299792458 m/s. a) Express it in scientific notation. b) Convert it into km/hr.
4. What are the base units in the International System of Units (SI)?
5. Define force and give examples of different force models.
6. State Newton's First law of Motion
7. Differentiate between average velocity and instantaneous velocity.
8. How can a sketch solve a physics problem involving motion? What elements should be included in such a sketch?

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Section B

Answer any 4 questions. Each carry 6 marks.

9. Write the expression for gravitational force exerted on object A by object B. Write a Python program to compute the gravitational force and display the result.
10. 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.
11. A person of mass m standing on a spring weight scale in an elevator of mass m which is moving with an acceleration a.If T is tension in the string supporting the elevator , Draw the free body diagrms for spring, elevator and the person. Write equation of motion foreach of them
12. A car is driving along a straight road. Sketch the position and velocity as a function of time for the car If (a). The car drives with a constant velocity (b). The car has constant acceleration

13. How does the acceleration of an object change as it falls through the air?

14. What are the limitations of using numerical methods for solving differential equations?

Section C

Answer any 1 questions. Each carry 14 marks.

15. Develop a modular Python program employing matplotlib to visualise the trigonometric functions sin(x) and cos(x) over the interval $0 \leq x \leq 5\pi$.

16. Explain the digital representation of numbers.

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