

BACHELOR'S DEGREE EXAMINATION, OCTOBER 2025
2025 ADMISSIONS REGULAR
SEMESTER I - MAJOR (PHYSICS)
PH1DSCA01B24 - FOUNDATIONS OF PHYSICS

Time : 1.5 Hours

Maximum Marks : 50

Part A

Answer all questions. Each question carries 1 mark.

(1x10=10)

1. Express 1 nanosecond in SI units of time. [CO1,Remember]
2. Name the two geometrical methods of vector addition. [CO1,Understand]
3. How do you find the magnitude of a vector A from its x & y components A_x and A_y ? [CO1,Understand]
4. Give two examples for projectile motion. [CO2,Remember]
5. Differentiate between average acceleration and instantaneous acceleration. [CO2,Remember]
6. What is the acceleration of a freely falling ball if there is no air resistance? [CO2,Remember]
7. The net force acting on a body is equal to the rate of change of its _____. [CO3,Remember]
8. What is the correct way to assign the value 10 to a variable named x? [CO4,Understand]
9. Write the output for the python program
for i in range(3):
 print(i) [CO4,Understand]
10. What will be the output of 5 % 2 in Python? [CO4,Understand]

Part B

Answer any 2 questions from the bunch of CO1. Each question carries 5 mark.

(5x2=10)

11. (a) Given $\vec{a} = 5\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{b} = 2\hat{i} - 8\hat{j} + 9\hat{k}$ (b) Compute the vector product $\vec{a} \times \vec{b}$
(c) Find the magnitude of the resulting vector. [CO1,Apply]
12. Give the definitions of a vector, a parallel vector, and an antiparallel vector. [CO1,Understand]
13. (a) A voltage is measured as 9.80 ± 0.02 . What is the range within which the true voltage is expected to lie?
(b) A measured quantity is reported as 2.718(17). Explain the meaning of this short hand notation. [CO1,Apply]

Part B

Answer any 2 questions from the bunch of CO2. Each question carries 5 mark.

(5x2=10)

14. A stone is dropped from rest from the top of a building and falls freely from rest. Find its position (measured from the release point, downward positive) and velocity after 1.0 s, 2.0 s, and 3.0 s. [CO2,Apply]
15. A man walks at 3 m/s on a train moving at 20 m/s. Calculate his velocity relative to the ground if he walks (a) in the direction of the train, (b) opposite to the train's motion. [CO2,Understand]

16. Two blocks connected by a light rope pass over a frictionless pulley. Find acceleration and tension. [CO2,Apply]

Part B

Answer any 2 questions from the bunch of CO4. Each question carries 5 mark. (5x2=10)

17. Write a Python program to calculate acceleration when a constant force acts on a mass. [CO4,Apply]

18. Write a Python program that accepts a number from the user and checks whether it is **even or odd**. [CO4,Apply]

19. Write a Python program to calculate the time taken by an object to fall from a given height h . Use the equation $h = u^2 / (2g)$. [CO4,Apply]

Part C

Answer any 1 question from the bunch of CO3. Each question carries 10 mark. (10x1=10)

20. (a) Explain the difference between mass and weight. How does the weight of a body vary with location on Earth and in space? (b) Two blocks, 5 kg and 3 kg, are connected by a light string over a frictionless pulley. The 5-kg block rests on a horizontal surface while the 3-kg block hangs vertically. Coefficient of friction between the 5-kg block and surface is 0.2.

(a) Draw free-body diagrams for both blocks.

(b) Find the acceleration of the system and tension in the string.

[CO3,Apply]

21. (a) Explain gravitational potential energy and elastic potential energy. Give examples and describe how energy is stored in each case. (b) A block of mass 1 kg is released from a height of 5 m above a spring (spring constant $k = 200 \text{ N/m}$). Find the maximum compression of the spring, neglecting friction. [CO3,Apply]