JHARKHAND Rai University
RANCHI

PRACTICE SET
End Semester Examination, December, 2025

Program: Diploma (Mining/CSE)
Semester: I
Subject: Basic Physics 1
Subject Code: 8DBSC103 / 3DBSC103

UNIT I

Section A (5 Marks)

1. Derive the Dimensional Formula for the following-
   (i) Impulse (ii) Energy (iii) Force (iv) Velocity (v) Acceleration
2. Define the term "dimension of a physical quantity." Give an example.
3. Compare fundamental and derived quantities with two examples each.
4. Check whether the following equation is dimensionally correct or not.
   $S=ut+1/2\ at^2$
5. What are the seven Fundamental units?
6. What are the limitations of dimensional analysis?

Section- B (10 Marks)

7. What is Dimensional analysis? .Explain the applications of dimensional analysis.
8. It is known that the time of revolution T of a satellite around the earth depends on the universal gravitational constant G, the mass of the earth M, and the radius of the circular orbit R. Obtain an expression for T using dimensional analysis.

Section- C (20 Marks)

9. Explain in detail the need for measurement and the evolution of different systems of units. Compare CGS, FPS, and MKS systems with the SI system.
10. Using the method of Dimensions Analysis, derive an expression for the centripetal force F acting on a particle of mass 'm' moving with velocity 'v' in a circle of radius 'r'.

UNIT II

Section-A (5 Marks)

11. Differentiate between speed and velocity with suitable examples
12. Define Linear momentum. Explain Law of conservation of Linear momentum.

13. How will you find Acceleration of an object from Velocity Time Graph**?**
14. Define average speed and instantaneous velocity**.**

Section- B (10 Marks)

15. The position of an object from an arbitrary origin is given by $x=6t^3 + 4t^2 +8$ in metre unit. Find the acceleration of the object as a function of time t. calculate its value at (i) t=1s (ii) t=5s
16. A bird flies due north with velocity 20 m/s for 15 s it rests for 5 s and then flies due south with velocity 24 m/s for 10 s. Find the average speed and magnitude of average velocity. For the whole trip.

17. Explain the **position-time graph** and **velocity-time graph** for:
    (a) uniform motion, and
    (b) uniformly accelerated motion

18. State and explain Newton's laws of motion with suitable examples.

Section- C (20 Marks)

19. Define (i) Acceleration (ii) Uniform accelerated motion. Derive the equations of motion for a uniformly accelerated motion of an object.
20. What do you mean by Relative Velocity? Bus moves east with a speed of 200 Km/h and car moves west with a speed of 150 Km/h. Calculate the relative Velocity of car with respect to bus.

UNIT III

Section- A (5 Marks)

21. Differentiate between conservative and non-conservative force**?**
22. Define Kinetic Energy. Derive expression for Kinetic Energy.
23. Define Energy with S.I. units & Dimension.
24. Define Collision. Explain Elastic & Inelastic Collisions.

Section- B (10 Marks)

25. Define Work. Explain Zero, Negative & Positive work with suitable examples.
26. A body of mass 10 kg is moving on a horizontal smooth surface at a velocity of 25m/s. A Constant force of 50 N is applied on the body for 10s in the direction of the velocity. Find (a) the work done by the force (b) the increase in KE of the body and (c) the power of the agent that exerts the force**.**

Section- C (20 Marks)

27. State and Prove Work –Energy Theorem.
28. 80 kg boy climbs with a constant speed a vertical rope of length 8m in 15 s. What is the average power output during the climb**?**

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UNIT IV

Section-A (5Marks)

29. A particle is executing SHM, the amplitude of motion is 0.03m and its frequency is 100 Hz. Calculate the maximum acceleration of the particle.
30. Discuss Free & Damped Oscillations with Examples.
31. What is Periodic Motion? Define Time Period & Frequency of Periodic Motion.
32. What are Necessary Conditions for Simple Harmonic Motion?
33. Define Velocity, Acceleration, Time period and Restoring force of Simple Harmonic motion.
34. State & prove Law of Conservation of Angular Momentum.
35. On an average a human heart is found to beat 75 times in a minute. Calculate its frequency and time period**.**
36. Two particle of masses 5 Kg and 10 Kg are placed at a distance 2 m apart. Find the position of Center of mass**.**
37. Find an expression for Centre of Mass & Centre of gravity of a system of two –Particles.

Section- B (10 Marks)

38. Two particles of masses 2 kg and 4 kg are lying in XY plane at point (-2, 4) and (5, 6). Calculate the Centre of mass of two particle system**.**
39. Discuss Potential and Kinetic Energies of a particle executing Simple Harmonic Motion.

Section- C (20 Marks)

40. Define Simple Harmonic Motion and evaluate an expression for the Equation of SHM.

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Disclaimer: - This is a Practice set. The Question in End term examination will differ from the Practice set. This Practice set is meant for practice only.