JAIN COLLEGE, J C Road Bangalore
Mock Paper January - 2017
I PUC– Physics (33)

Time: 3 Hours 15 Minutes **Max. Marks :70**

I. Answer the following. **10 × 1 = 10**

1. Write the dimensional formula for pressure.
2. Define unit vector.
3. Define work.
4. What is the position vector of Centre of mass of two particles of equal mass?
5. Mention the SI unit of G.
6. What is the elastic limit?
7. State the laws on which hydraulic breaks and hydraulic lifts are based.
8. What do you mean by perfectly black body?
9. State first law of thermodynamics.
10. How many degrees of freedom does a monoatomic gas molecule have?

II. Answer any FIVE of the following questions. **5 × 2 = 10**

11. Mention any two concepts unified by Einstein.
12. Check the correctness of the formula $F=mv^2/r$, where the symbols have their usual meanings.
13. Draw the velocity-time graph: (i) when the object moves with uniform velocity.
    (ii) When the motion of the object is uniformly accelerated.
14. Define impulse of a force with an example.
15. What is escape velocity? Give its expression.
16. State Zeroth law of thermodynamics. How does it lead to the concept of temperature?
17. Define periodic motion with an example.
18. State principle of superposition of waves.

III. Answer any FIVE of the following questions. **5 × 3 = 15**

19. State Newton's second law of motion. Hence deduce the relation F=ma, where the symbols have their usual meanings.
20. Prove that change in kinetic energy of a particle is equal to the work done by a variable force.
21. Establish a relation between torque and moment of inertia.
22. Define modulus of elasticity. Give its unit and explain its all form?
23. Define critical velocity and on what factors does it depends.
24. Explain the different modes of transmission of heat.
25. State and explain the law of equipartition of energy.
26. Give any three differences between progressive waves and the standing waves.

IV. Answer any TWO of the following questions **2 × 5 = 10**

27. What is centripetal acceleration? Find its magnitude in case of a uniform circular motion of an object.
28. What is meant by banking of roads? Derive an expression for the maximum velocity acquired by a vehicle on a banked road.
29. Establish a relation between angular momentum and moment of inertia of a rigid body.

V. Answer any TWO of the following questions. **2 × 5 = 10**

30. Discuss the variation of 'g' with the height and depth.
31. What is Carnot's engine? Explain the different parts of the engine.
32. What is a simple pendulum? Find an expression for the time period of a simple pendulum.

VI. Answer any THREE of the following questions. 3 × 5 = 15

33. From the top of a tower 100m in height a ball is dropped and at the same time another ball is projected vertically upwards from the ground with a velocity of 25m/s. Find when and where the two balls will meet.($g=9.8\ ms^{-2}$).
34. How far away from the earth acceleration due to gravity becomes 36% of its value at the earth's surface. Assume that the earth's surface is a sphere of radius $R=6.4\times10^{6}m$.
35. From what height should a body of mass 40kg fall in order to have some kinetic energy as a body of mass 1.96 kg travelling at $12ms^{-1}$.
36. Steam at 373 K is passed through a tube having length 4m and radius 10 cm. The thermal conductivity of material is 390 $Wm^{-1}K^{-1}$ and thickness of tube is 5 mm. Calculate the heat lost per second if surrounding temperature is $0^{O}C$.
37. A train blow a whistle of frequency 400Hz in air.
    (1) What is the frequency of the whistle of platform observer when (a) train approaches with the speed of $10ms^{-1}$ (b) recedes with a speed of $10ms^{-1}$.
    (2) What is the speed of sound in each case if velocity of sound is $340ms^{-1}$?

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