



Jain College, Jayanagar
I PUC MOCK PAPER JAN 2020
Subject: Physics (33)

Duration: 3.15 hrs

Max.Marks: 70

Instructions:

- a. All parts are compulsory.
- b. Answers without relevant diagram / figure wherever necessary will not carry any marks.
- c. Direct answers to the numerical problems without detailed solutions will not carry any marks.

PART - A

I. Answer all of the following questions: 10 × 1 = 10

1. What is meant by light year?
2. For what two angles of projection, the range of projectile is same?
3. What type of work is done by frictional force?
4. What is the magnitude of torque acting in a body rotating with a constant angular momentum?
5. Which physical quantity is conserved in the case of law of areas?
6. What are elastomers?
7. How does viscosity of a liquid vary with temperature?
8. Define latent heat of vaporization.
9. State the law of equipartition of energy.
10. How does speed of a transverse wave on a stretched string vary with its tension?

PART - B

II. Answer any five of the following questions: 2 × 5 = 10

11. Name the (i) strongest (ii) weakest fundamental force in nature.
12. Write the dimensional formula for Stress and Strain.
13. A vector of 10 units acts at a point making an angle 30° with the horizontal. What are the horizontal and vertical components of the vector?
14. Mention any two advantages of friction.
15. What are the conditions for a satellite to be geostationary?
16. Convert 85°C to Kelvin and Fahrenheit.
17. State and explain First law of thermodynamics.
18. What are the two basic characteristics of a simple harmonic motion?

PART - C

III. Answer any five of the following questions: 5 × 3 = 15

19. a) Define relative velocity of an object w.r.t another.
b) Draw position – time graphs of two objects moving along a straight line when their relative velocity is (i) zero and (ii) non – zero
20. Derive the expression for the time of flight of the projectile.
21. Prove the law of conservation of linear momentum.

22. Prove the work-energy theorem for a variable force.
23. Draw typical stress – strain graph for a metal.
24. Derive an expression for liquid pressure at a point inside a liquid.
25. Determine the specific heat capacity of a Di-atomic gas molecule treated as a rigid rotator.
26. Give the differences between progressive and stationary waves.

PART – D

IV. Answer any two of the following questions: 5 × 2 = 10

27. Derive the expression for the centripetal acceleration.
28. Prove the conservation of mechanical energy in case of a freely falling body.
29. State and explain perpendicular axis theorem and parallel axis theorem.

V. Answer any two of the following questions: 5 × 2 = 10

30. Derive the expression for acceleration due to gravity at a point below the surface of the earth.
31. On what factors does thermal conductivity of a metal depend? Define co-efficient of thermal conductivity and write its SI unit.
32. Derive an expression for total energy of a simple harmonic oscillator.

PART – E

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

33. A body is thrown vertically up from the top of a building with a velocity of 10 ms^{-1} . It reaches the ground in 5 s. Find the height of the building and the velocity with which the body reaches the ground.
34. A shell of mass 0.020kg is fired by a gun of mass 100kg. If the muzzle speed of the shell is 80 ms^{-1} , what is the recoil speed of the gun?
35. A solid cylinder of mass 20 kg rotates about its axis with angular speed 100 rad s^{-1} . The radius of the cylinder is 0.25m. What is the kinetic energy associated with the rotation of the cylinder? What is the magnitude of angular momentum of the cylinder about its axis?
36. A perfect Carnot engine utilizes an ideal gas. The source temperature is 500 K and sink temperature is 375K. If the engine takes 600 Kcal per cycle from the source, Compute: (a) the efficiency of the engine. (b) Work done per cycle. (c) Heat rejected to the sink per cycle.
37. Two trains are approaching each other with the speeds of 72 km/hr. The frequency of whistle of one train as heard by the passenger in the other is 700 Hz. Find
 - i. The real frequency of the whistle.
 - ii. The frequency of the whistle heard by the passenger when the trains have crossed each other.

Give: The speed of the sound in air is 340 ms^{-1} .