



JAIN COLLEGE, J C Road Bangalore
Mock Paper February - 2015
I PUC – Physics (33)

Time: 3 Hours 15 Minutes

Max. Marks:100

I. Answer the following:

1 X 10 = 10

1. State the number of significant figures in 2.64×10^{24} Kg.
2. What does position-time graph signify?
3. What is the angle of projection for a projectile thrown parallel to horizontal?
4. Define power.
5. Write the relation between linear and angular momentum.
6. State Newton's law of gravitation.
7. Write the dimensional formula for couple.
8. Which substance has highest specific heat?
9. How does the mean free path of a gas depend on its temperature?
10. What is meant by beats?

II. Answer any FIVE:

2 X 5 = 10

11. Mention the fundamental forces in nature.
12. Discuss the method of reducing friction.
13. What is centre of mass? Give the expression for centre of mass of n-particle system.
14. Define modulus of elasticity and write its SI unit?
15. Define coefficient of viscosity and write its SI unit.
16. Give the difference between conduction and convection.
17. Give the two statements of second law of thermodynamics.
18. What are longitudinal and transverse waves? Give one example of each.

III. Answer any FIVE:

3 X 5 = 15

19. Derive the formula of time period of simple pendulum which depends on length of the pendulum and acceleration due to gravity, using dimensional analysis.
20. Derive the expression for the magnitude of resultant of two vectors directed from a common origin.
21. State and prove the law of conservation of linear momentum.
22. Derive an expression for the velocities of the two bodies after collision in an elastic collision.
23. Draw stress - strain curve and represent Hooke's law, elastic limit, yield point and breaking point.
24. State Pascal's Law; explain the working of hydraulic lift with a neat diagram.
25. Derive the relation between co-efficient of linear expansion and co-efficient of volume expansion.
26. Arrive at an expression of time period of oscillation due to a spring.

IV. Answer any TWO:

5 X 2 = 10

27. Derive the three equations of motion graphically using v-t graph for uniformly accelerated motion.
28. Define torque and angular momentum. Derive the relation between them.
29. Derive the expression for gravitational potential.

V. Answer any TWO:

5 X 2 = 10

30. What is the principle of working of a heat pump? Explain the working with the help of diagram and find the co-efficient of performance.
31. Derive the expression of pressure exerted by an ideal gas.
32. Arrive at an expression of energy in simple harmonic motion.

VI. Answer any THREE:

5 X 3 = 15

33. The ceiling of a long hall is 25 m high. What is the maximum horizontal distance that a ball thrown with a speed of 40 ms^{-1} can go without hitting the ceiling of the hall?
34. A car travels on a flat circular track of radius 200 m at 30 ms^{-1} and has a centripetal acceleration of 4.5 ms^{-2} a) if the mass of the car is 1000 kg what frictional force is required to provide the acceleration?
B) If the co-efficient of static friction is 0.8, what is the maximum speed at which the car can circle the track?
35. A body of mass 3 kg makes an elastic collision with another body at rest and continues to move in the original direction with a speed equal to one-third of its original speed. Find the mass of the second body.
36. One end of a brass rod 2 m long and 1 cm radius is maintained at 250°C . When a steady state is reached, the rate of heat flow across any cross-section is 0.5 cal s^{-1} . What is the temperature of the other end? $K = 0.35 \text{ cal s}^{-1} \text{ cm}^{-1} ^\circ\text{C}^{-1}$.
37. A SONAR system fixed to a submarine operates at a frequency 40 Hz. An enemy submarine moves towards the sonar with a speed of 360 km/h. What is the frequency of sound reflected by the submarine? Take speed of sound in water to be 1450 m/s.