



# JAIN COLLEGE

463/465, 18th Main Road, SS Royal, 80 Feet Road, Rajarajeshwari Nagar,  
Bangalore - 560 098

**Date:**

**SUBJECT: PHYSICS**

**I PUC  
Mock paper**

**Timings Allowed: 3 Hrs 15 Minutes.**

**Total Marks: 70**

*General 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 the following questions.**

**10 × 1 = 10**

1. Define Astronomical unit.
2. State triangle law of vector addition.
3. What kind of energy is stored in the spring of a watch?
4. Is moment of inertia scalar or vector quantity?
5. What is the limitation of Hooke's law?
6. Stirred liquid comes to rest after some time. Why?
7. Write the equation of continuity for the flow of incompressible fluids.
8. Which material has highest specific heat?
9. Name the thermodynamical variable defined by Zeroth law of thermodynamics.
10. What is the effect on the pressure of a gas if it is compressed at constant temperature?

## PART - B

**II. Answer the FIVE of the following questions.**

**5 × 2 = 10**

11. Mention the fundamental forces in nature.
12. What are the limitations of dimensional analysis?
13. Differentiate between distance and displacement.
14. Define unit vector and null vector.
15. State two advantages of friction in daily life.
16. Define radius of gyration. What is its physical significance?
17. State Bernoulli's theorem. Mention one application of it.
18. Write the expression for velocity of a particle executing S.H.M. When is its velocity maximum?

## PART - C

**III. Answer any FIVE of the following questions.**

**5 × 3 = 15**

19. What is centripetal acceleration? Write the expression for the centripetal acceleration and explain the terms.
20. Derive  $F = ma$  with usual notations.
21. Differentiate between elastic and inelastic collision. Give example of each.
22. State and explain the parallel axis theorem.
23. State Kepler's laws of planetary motion.
24. Draw a typical stress – strain curve for a metal. Mention yield point and fracture point.

25. State and explain Wien's displacement law.  
26. Show that the average kinetic energy of a gas molecule is directly proportional to the temperature of the gas.

**PART - D**

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

27. What is v – t graph? Show that area under v- t graph is equal to distance.  
28. What is the need of banking a circular road .Find the expression for maximum speed of a vehicle which can be achieved while taking a turn on a banked circular road.  
29. Define torque. Show that  $\tau = \frac{dL}{dt}$ .

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

30. What is an isothermal process? Arrive at the expression for work done in an isothermal process.  
31. Derive the expression for the kinetic energy and potential energy in simple harmonic motion.  
32. What are beats? Give the theory of beats.

**PART - E**

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

33. A cricket ball is thrown at a speed of  $28\text{ms}^{-1}$  in a direction  $30^\circ$  above the horizontal. Calculate (a) the maximum height , (b) the time taken by the ball to return to the same level, and (c) the horizontal distance from the thrower to the point where the ball returns to the same level.
34. A particle moves along the x- axis from  $x = 0$  to  $x = 5$  m under the influence of a force given by  $F = 7 - 2x + 3x^2$ . Calculate the work done in doing so.
35. An artificial satellite of mass 100 Kg is in circular orbit of 500 Km above the earth's surface. Take radius of earth as  $6.5 \times 10^6$  m. (i) Find the acceleration due to gravity at any point along the satellite path. (ii) What is the centripetal acceleration of the satellite? Take  $g = 9.8 \text{ms}^{-2}$
36. One end of a 0.25m long metal bar is in steam and the other is in contact with ice. If 12 g of ice melts per minute, what is the thermal conductivity of the metal?  
Given cross-section of the bar =  $5 \times 10^{-4} \text{m}^2$  and latent heat of ice is  $80 \text{cal g}^{-1}$ .
37. A railway engine and a car are moving on parallel tracks in opposite directions with speed of  $144 \text{Kmh}^{-1}$  and  $72 \text{Kmh}^{-1}$ , respectively. The engine is continuously sounding a whistle of frequency 500 Hz. The velocity of sound is  $340 \text{ms}^{-1}$ . Calculate the frequency of sound heard in the car when  
(i) The car and the engine are approaching each other.  
(ii) The two are moving away from each other.

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