



JAIN COLLEGE

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

Date:

SUBJECT: PHYSICS

**I PUC
MOCK**

Timings Allowed: 3 Hrs 15 Minutes

Total Marks: 70

General Instructions:

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

PART-A

I Answer the following:

10 X 1=10

- Name the strongest force in nature.
- Give a unit less, dimensionless physical quantity.
- At what point in its trajectory does a projectile have minimum speed?
- Which law of motion is involved in rocket propulsion?
- Friction is a non-conservative force. Why?
- What is the unit of angular momentum?
- Mention one application of Pascal's law.
- How are kinetic energy and temperature of a gas molecule related?
- What are beats?
- Define damped oscillation.

PART-B

II Answer any five of the following:

5x2=10

- Mention the expression for time of flight of a projectile and explain the terms.
- Why does a gun recoil when bullet is fired?
- Give the position- time graph for uniform motion. What does the slope of a position-time graph indicate?
- Arrive at the relation between g and G .
- Define specific heat capacity? Give its S.I unit.
- State Kelvin-Planck and Clausius statements for II law of thermodynamics.
- Give two assumptions of Kinetic Theory.
- What are the factors on which energy of harmonic oscillator depends?

PART-C

III Answer any five of the following:

3x5=15

- The frequency of vibration (ν) of a string may depend upon length (l) of the string, tension (T) in the string and mass per unit length (m) of the string. Using the method of dimensions. Derive the expression of its frequency..
- Arrive at $F=ma$ with usual notations.
- State and prove Work-Energy theorem for a constant force.
- Obtain the expression for K.E. of rolling friction.
- Draw a stress-strain graph for an elastic body and explain the significance of the graph.
- a) What is critical velocity?
b) Give the importance of Reynold's number.
- Draw the block diagram of a refrigerator. Mention the expression for co-efficient of performance and explain the terms.

26. How much heat is required to melt 10 kg of ice?
Given Latent heat of fusion for ice = 336 Jg^{-1}

PART-D

IV Answer any two of the following:

2x5=10

27. With relevant graph arrive at the expression $x = v_0 t + \frac{1}{2} a t^2$.
28. Derive the expression for maximum speed of a vehicle which can be achieved while taking a turn on a banked road.
29. State and explain Kepler's Laws of Planetary motion

V Answer any two of the following:

2x5=10

30. Deduce the relation between α, β, γ .
31. With relevant graph, explain the various operations of a Carnot's heat engine working between two temperatures. Hence derive its efficiency.
32. What is Doppler effect? Derive the expression for the apparent frequency the source and the observer are moving in the same direction.

VI Answer any three of the following:

3x5=15

33. A football player kicks a ball at an angle of 45° to the horizontal with an initial velocity of 20 ms^{-1} . Assuming that the ball travels in a vertical plane, calculate
- Maximum height reached.
 - Time of flight
 - Horizontal Range
34. Calculate the angular momentum of a circular disc having moment of inertia 3.5 kgm^2 and which rotates at 20rpm.
35. A motor can pump up water to fill a tank of volume 600 m^3 in 30 minutes which is placed at a height of 30m. If efficiency of the motor is 40%, calculate the power of the motor.
36. A steel rail of length 7m and area of cross section 40 cm^2 is prevented from expanding while the temperature rises by 20°C . Calculate the amount of tension developed in the rod responsible for the thermal stress
Given: $\alpha_{\text{steel}} = 1.5 \times 10^{-5} \text{ K}^{-1}$; $Y_{\text{steel}} = 2 \times 10^{11} \text{ Nm}^{-1}$.
37. A body executes SHM of time period 10s. If its mass is 0.1kg, its velocity 1s after it passes through its mean position is 5 ms^{-1} , find its
- Kinetic Energy
 - Potential Energy
 - Total Energy
