



JAIN COLLEGE V V Puram

1st PUC MOCK Paper – Feb. 2023

Course:	1 st year PUC
Subject:	Physics
Max. Marks:	70
Duration:	3:15 hour

General Instructions:

- (i) All parts are compulsory.
- (ii) Part – A questions have to be answered in the first two pages of the answer – booklet. For Part – A questions, first written – answer will be considered for awarding marks.
- (iii) Answers without relevant diagram/figure/circuit wherever necessary will not carry any marks.
- (iv) Direct answers to Numerical problems without detailed solutions will not carry any marks.

PART – A

I. Pick the correct option among the four given options for ALL of the following questions

15 x 1 = 15

1. The method used to measure length indirectly
 - (a) decay of elementary particles
 - (b) parallax method
 - (c) gravitational method
 - (d) mass spectrograph
2. In the position – time graph for a particle at rest, the graph is
 - (a) parallel to time axis
 - (b) perpendicular to time axis
 - (c) exponential
 - (d) inclined
3. The unit vector along the x and z axis are respectively
 - (a) \hat{i} and \hat{j}
 - (b) \hat{i} and \hat{k}
 - (c) \hat{k} and \hat{j}
 - (d) none of these
4. If external force on a body is zero, then its
 - (a) displacement is zero
 - (b) velocity is zero
 - (c) acceleration is zero
 - (d) none of these
5. The force does not do work if angle between force and displacement is
 - (a) 0°
 - (b) 180°
 - (c) 90°
 - (d) 30°
6. The example for body having variable axis of rotation
 - (a) ceiling fan
 - (b) gaint wheel
 - (c) potter's wheel
 - (d) spinning top
7. Kepler's law of areas is the law of conversation of
 - (a) linear momentum
 - (b) energy
 - (c) angular momentum
 - (d) mass
8. The dimension of stress is
 - (a) MLT
 - (b) $ML^{-1}T^{-2}$
 - (c) MLT^{-2}
 - (d) M^2LT^2
9. The angle of contact is greater than 90° in
 - (a) water & glass interface
 - (b) mercury & glass interface
 - (c) milk & glass interface
 - (d) castor oil & glass interface
10. The melting point is the temperature at which the
 - (a) solid & liquid coexist
 - (b) solid & gas coexist
 - (c) gas & liquid coexist
 - (d) solid, liquid & gas coexist

11. The following gas is not a green house gas
 - (a) nitrus oxide
 - (b) ozone
 - (c) carbon monoxide
 - (d) methane
12. The thermodynamic variable, internal energy is defined by using
 - (a) zeroth law of thermodynamics
 - (b) first law of thermodynamics
 - (c) second law of thermodynamics
 - (d) Newton's law
13. The average kinetic energy of a gas molecule is directly proportional to:
 - (a) volume of the gas
 - (b) pressure of the gas
 - (c) absolute temperature of the gas
 - (d) mass of the gas
14. Among the following, which is the characteristics of simple harmonic motion?
 - (a) it is periodic in nature.
 - (b) the time period and frequency are dependent of its amplitude.
 - (c) acceleration is directed away from the mean position.
 - (d) it is non – oscillatory motion.
15. In a standing wave the points at which amplitude is the largest is known as
 - (a) nodes
 - (b) crest
 - (c) rarefaction
 - (d) antinodes

II. Fill in the blanks by choosing appropriate answer given in the brackets for ALL the following questions **5 x 1 = 5**

(isothermal, force, critical velocity, temperature, gravitational pull)

16. A particle is said to be in translational equilibrium when net external _____ on it is zero
17. The minimum speed with which a body must be projected vertically upward so that it escapes the _____ of the planet is escape speed
18. For the streamline flow velocity of fluid must be less than _____
19. The velocity of the molecule increases with increase of _____
20. According to Newton, the propagation of sound in air is _____ process

PART – B

III. Answer any FIVE of the following questions **5 x 2 = 10**

21. Name the forces that exist and dominant between i) Two proton within nucleus
ii) Two proton separated by distance 1 m.
22. Write any difference between speed and velocity.
23. State and explain triangle law of vector addition.
24. Show that power is equal to dot product of force and velocity.
25. Write the expression for distance of centre of mass of two particles system and explain the terms.
26. State the Kepler's law of orbits and law of periods.
27. What is heat pump? Give its schematic representation.
28. Mention the expression for mean free path. Explain the terms
29. List the two differences between transverse wave and longitudinal wave

PART – C

IV. Answer any FIVE of the following questions

5 x 3 = 15

30. Check the consistency of the equation $K = \frac{1}{2}mv^2$ using dimensional analysis (symbols have usual meanings).
31. Derive the relation between linear velocity and angular velocity.
32. Mention any three advantages of friction.
33. A rain drop of mass 2 g falling from a height 1 km. If it hits the ground with a speed of 60 ms^{-1} calculate the work done by the gravitational force.
34. Show that torque is equal to the rate of change of angular momentum of a particle.
35. Draw stress – strain curve. Indicate yield point and fracture point.
36. State and explain Bernoulli's theorem. From which principle theorem follows?
37. Show that volume coefficient of thermal expansion $\alpha_v = \frac{1}{T}$ for ideal gas at constant pressure.
38. Write the displacement relation (equation) of a progressive wave travelling in the negative direction of x – axis with initial phase ϕ . Explain the terms

PART – D

V. Answer any THREE of the following questions

3 x 5 = 15

39. What is velocity – time graph? Derive $s = ut + \frac{1}{2}at^2$ using velocity – time graph.
40. State and prove law of conservation of linear momentum.
41. Prove work-energy theorem for a constant force.
42. (i) What is acceleration due to gravity? **1**
(ii) Why gravitational constant is called universal gravitational constant? **1**
(iii) Derive the relation between acceleration due to gravity and universal gravitational constant. **3**
43. Explain the working of Carnot's cycle.
44. (i) What is free oscillation? **1**
(ii) Write the expression for the period of oscillation of a mass attached to a horizontal spring and explain the terms. **2**
(iii) Where are velocity of particle executing SHM maximum and what is its value? **2**

VI Answer any TWO of the following questions

2 x 5 = 10

45. A cricket ball is thrown at a speed of 80 ms^{-1} in a direction 60° above the horizontal. Calculate: a) the maximum height reached by the ball.
b) the distance from the thrower to the point where the ball returns to the same level
c) the time taken by the ball to return to the same level.
46. A homogeneous metal bar of uniform cross section 80 cm long and 5 kg in mass supported on two knife edges placed 10 cm from each end. Find the reactions at the knife edges.
47. A copper block of mass 3 kg is at temperature of 30°C is heated in a furnace to a temperature of 500°C . Calculate the amount of heat gained by the copper block. Now the copper block is placed on a large ice block, determine the maximum amount of ice that can melt. Given specific heat of copper is $390 \text{ J kg}^{-1} \text{K}^{-1}$, heat of fusion of water is $3.35 \times 10^5 \text{ J kg}^{-1}$.
48. A train is moving at speed of 72 kmph towards a station, is sounding a whistle of frequency 600 Hz. What are the apparent frequencies of the whistle as heard by a man on the platform when the train (a) approaches him (b) recedes from him? (speed of sound in air = 340 ms^{-1}).

