JGi JAIN COLLEGE V V Puram

I PUC Mock Paper – January. 2026

Course:	I PUC
Subject:	Physics
Max. Marks:	70
Duration:	3 Hours

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 dimensional formula for the force is
   (A) $[M^0L^1T^{-2}]$
   (B) $[M^1L^1T^{-2}]$
   (C) $[M^1L^0T^{-1}]$
   (D) $[M^1L^0T^{-3}]$

2. For a freely falling body near the earth's surface, the acceleration is
   (A) increasing
   (B) constant
   (C) zero
   (D) decreasing

3. A vector is multiplied with a negative integer. The direction of the resultant vector is
   (A) same as that of the initial vector
   (B) opposite to that of the initial vector
   (C) perpendicular to the initial vector
   (D) along any arbitrary direction

4. Which of the following is a self adjusting force ?
   (A) sliding friction
   (B) static friction
   (C) rolling friction
   (D) fluid friction

5. A motion of a potter's wheel is an example for
   (A) a pure translational motion
   (B) a pure rotational motion
   (C) combination of translational and rotational motion
   (D) neither translational nor rotational motion

6. SI unit of torque is
   (A) $rads^{-1}$
   (B) Nm^{-1}
   (C) Js^{-1}
   (D) Nm

7. When earth is closer to the sun, earth
   (A) moves faster
   (B) moves with same speed
   (C) moves slower
   (D) moves with constant acceleration

8. Which of the following is more elastic ?
   (A) rubber
   (B) glass
   (C) wood
   (D) iron

9. Free liquid and bubbles are spherical in shape due to
   (A) viscosity
   (B) gravity
   (C) air resistance
   (D) surface tension

10. The column I is the list of modes of heat transfer and column II , the list of transport media. Identify the correct match.

Column I	Column II
1) conduction	a) fluid
2) convection	b) no medium
3) radiation	c) solid

   (A) (1) – (a), (2) – (b), (3) – (c)
   (B) (1) – (b), (2) – (a), (3) – (c)
   (C) (1) – (c), (2) – (a), (3) – (b)
   (D) (1) – (b), (2) – (c), (3) – (a)

11. The state of thermodynamic system is represented by
   (A) pressure only
   (B) volume only
   (C) number of moles
   (D) pressure,volume and temperature

12. The efficiency η of Carnot's engine is given by (with standard symbols)

(A) $\eta = 1 + \dfrac{T_2}{T_1}$ (B) $\eta = 1 - \dfrac{T_2}{T_1}$

(C) $\eta = 1 - \dfrac{T_1}{T_2}$ (D) $\eta = 1 + \dfrac{T_1}{T_2}$

13. The work done in which of the following processes is zero
    (A) Isothermal process   (B) Adiabatic process   (C) Isochoric process   (D) Isobaric process
14. The repeated to and fro motion of a particle about a fixed point is called
    (A) frequency   (B) wavelength   (C) phase   (D) oscillation
15. Air column present in an open pipe is vibrating in fundamental mode. It contains
    (A) a node and an antinode   (B) a node and two antinodes
    (C) two nodes and an antinode   (D) two nodes and two antinodes

II. Fill in the blanks by choosing the appropriate answer given in the brackets for ALL the following questions: **5 x 1 = 5**
(mechanical, frequency, linear, instantaneous speed, compressibility, instantaneous velocity)

16. The speedometer of a vehicle indicates_____.
17. The reciprocal of bulk modulus is called _____.
18. The expansion in length due to heating is called _____ expansion.
19. The SI unit of _____ is hertz.
20. _____ waves require a material medium for propagation.

PART – B
III. Answer any FIVE of the following questions: **5 x 2 = 10**
21. Write any two uses of dimensional analysis.
22. Explain triangle law of vector addition.
23. An aircraft executes a horizontal loop of radius 1m with a steady speed of 500ms⁻¹. What is its centripetal acceleration ?
24. State Newton's first law of motion. Give an example.
25. Differentiate between conservative and non-conservative forces.
26. What is escape velocity? What is the value of escape velocity of an object on the surface of earth ?
27. Define stress. Mention its SI unit.
28. What are nodes and antinodes in a stationary wave?

PART – C
IV. Answer any FIVE of the following questions: **5 x 3 = 15**
29. If $\vec{A} = 3\hat{i} + 2\hat{j}$ and $\vec{B} = \hat{i} - 2\hat{j} + 3\hat{k}$, find the magnitude of $\vec{A} + \vec{B}$.
30. Mention any three advantages of friction.
31. State and prove work-energy theorem for a constant force.
32. Define moment of inertia of a rigid body. Mention two factors on which moment of inertia of a body depends.
33. Draw typical stress-strain graph for copper. Represent yield point and fracture point.
34. Derive the expression for guage pressure inside a static fluid.
35. Define mean free path of a gas molecule. Write the expression for mean free path and explain the terms.
36. Define SHM. Draw the displacement-energy curve of a particle executing SHM.

PART – D
V. Answer any THREE of the following questions: **3 x 5 = 15**
37. What is a projectile? Show that the trajectory of a projectile is a parabola.
38. State and prove the law of conservation of linear momentum.
39. Derive an expression for acceleration due to gravity at a certain height from the surface of the earth.
40. State and prove Newton's law of cooling.
41. What is a closed pipe? Discuss the modes of vibration in a closed pipe.

VI. **Answer any <u>TWO</u> of the following questions:**   **2 x 5 = 10**

42. A driver of a car moving at 20 ms^{-1} finds a child on the road 50 m ahead and stops the car 10 m before the child. If the mass of the car with the driver is 1000 kg, calculate the force exerted by the brakes on the car and the time taken to stop the car.

43. A pump on the ground floor of a building can pump up water to fill a tank of volume 30 m^3 in 15 minutes. If the tank is 40 m above the ground and the efficiency of the pump is 30 %, how much electric power is consumed by the pump ? . [g = 10 ms^{-2}]

44. Calculate the efficiency of a Carnot engine working between 100^0 C and 400^0 C. If it absorbs 200 joule per cycle from the source , calculate the heat rejected to the sink in one cycle.

45. A wave travelling along a string is described by y (x, t) = 0.005sin (80.0x – 3.0t) where 'y' is in metre and 't' in seconds. Calculate (a) amplitude (b) wavelength (c) time period and (d) velocity of the wave.

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