JAIN COLLEGE V V Puram **1st PUC MOCK PAPER – Jan. 2025**	**Course:** 1st year PUC **Subject:** Physics **Max. Marks:** 70 **Duration:** 3 hours

General Instructions:

(i) All parts A to D are compulsory.
(ii) 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 relevant formula and 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 number of significant figures in 30600 is
   A) 2 B) 3 C) 5 D) 4
2. An object moving along a straight line covers equal distances in equal intervals of time. This motion is called
   A) non-uniform motion B) uniform motion
   C) variable motion D) not defined
3. The expression for centripetal acceleration in terms of velocity v and radius r of radius of circular motion is
   A) $a = \frac{v^2}{r}$ B) $a = \frac{v}{r^2}$ C) $a = \frac{2v^2}{r}$ D) $a = v^2 r$
4. Propulsion of rocket is based on
   A) Newton's first law. B) Newton's second law.
   C) Newton's third law D) Galileo's law
5. What do we call a body in which the distances between all particles remain constant, even when subjected to external force?
   A) Elastic body B) Plastic body C) Rigid body D) Fluid body
6. The analogue of mass in rotational motion is
   A) angular mass B) moment of inertia C) momentum D) centre of mass
7. The escape velocity of a body on the surface of the earth is
   A) 11.2 kms^{-1} B) 112 kms^{-1} C) 1.12 kms^{-1} D) 11.2 ms^{-1}
8. The maximum load a wire can withstand without breaking, when its length is reduced to half of its original length, will
   A) be doubled B) be halved C) be quadrupled D) remain same
9. The resistance to the relative motion between layers of a liquid is called
   A) friction B) viscosity C) surface tension D) cohesion
10. Water has maximum density at
    A) 0^0 C B) 32^0 C C) 4^0 C D) 9^0 C
11. The internal energy of an ideal gas depends on
    A) temperature B) pressure C) density D) specific volume

12. Efficiency of Carnot engine is 100 % if (with standard symbols)
A) $T_2 = 273$ K B) $T_2 = 0$ K C) $T_1 = 273$ K D) $T_1 = 0$ K

13. A monoatomic gas molecule has
A) three degrees of freedom B) four degrees of freedom
C) five degrees of freedom D) six degrees of freedom

14. The circular motion of a particle with a constant speed is
A) periodic and oscillatory B) neither periodic nor oscillatory
C) periodic but not oscillatory D) oscillatory but not periodic

15. Propagation constant of a wave is also called as
A) wave number B) wavelength
C) frequency D) angular wave number

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

(equal, energy, compressibility, unequal, 1metre, sublimation)

16. The line that joins any planet to the sun sweeps _____areas in equal interval of time.
17. The reciprocal of bulk modulus is called_____.
18. The process of change of state directly from solid to vapour is known as _____.
19. The length of second's pendulum is _____.
20. In case of progressive waves_____is transferred from one point to another.

PART – B

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

21. Write any two limitations of dimensional analysis.
22. Explain triangle law of vector addition.
23. Two forces of 4N and 3N act at a point making an angle of 60^0 with one another. Find the magnitude of resultant of the two forces.
24. Define impulse of a force with an example.
25. What is elastic collision? Give examples.
26. What is a satellite? Name the natural satellite of earth.
27. State and explain Hooke's law.
28. Mention any two applications of beats.

PART – C

IV. Answer any FIVE of the following questions: 5 x 3 = 15

29. Obtain the expression for time of flight of a projectile motion.
30. Mention any three methods of reducing friction.
31. Show that $P = \vec{F} \cdot \vec{v}$, where the symbols have their usual meanings.
32. The angular speed of a motor wheel is increased from 1200 rpm to 3120 rpm in 16 seconds. What is its angular acceleration, assuming the acceleration to be uniform?
33. Draw typical stress - strain graph. Represent yield point and fracture point.
34. Arrive at an expression for gauge pressure inside a static fluid.
35. Mention the modes of transfer of heat.
36. State any three postulates of kinetic theory of ideal gases.

PART – D

V. Answer any THREE of the following questions: **3 x 5 = 15**

37. What is velocity - time graph? Derive $x = v_0 t + \frac{1}{2} a t^2$ using v - t graph.

38. Show that the total mechanical energy of a freely falling body under gravity is conserved.

39. a) What are the factors on which the moment of inertia of a body depends? **2**

b) Prove that the torque $\tau = I\alpha$, where the symbols have their usual meanings. **3**

40. a) What is isothermal process? **1**

b) Derive an expression for work done by a gas in an isothermal process. **4**

41. Show that the overtones in a closed pipe are odd harmonics of the fundamental.

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

42. A driver of a car moving at $25\ ms^{-1}$ sees a child on the road $70\ m$ ahead and stops the car $20\ m$ earlier to 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. The size of a planet is same as that of the earth. Its mass is 4 times that of earth. Find the potential energy of a mass of $2\ kg$ at a height of $2\ m$ on the planet. $\left(g = 10\ ms^{-2}\right)$

44. A liquid takes 10 minutes to cool from $70^0 C$ to $50^0 C$. How much time will it take to cool from $60^0 C$ to $40^0 C$? The temperature of the surrounding is $20^0 C$.

45. A spring balance has a scale that reads from 0 to $50\ kg$. The length of the scale is $20\ cm$. A body suspended from this spring, when displaced and released oscillates with a period of $0.6\ s$. What is the weight of the body?

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