MODEL PAPER

Grade : XI **Subject: PHYSICS** **Marks: 70**

Time : 3hrs

***General Instructions*:**

a) All the questions are compulsory.
b) There are37 questions in total.
c) This question paper contains four sections: Section-A, Section-B, Section-C and Section-D
d) Section-A contains 20 questions of one mark each.
e) Section-B contains 7 questions of two marks each.
f) Section-C contains 7 questions of three marks each.
g) Section –D contains 3 questions of five marks each.

SECTION – A

1. The Raman effect deals with
   a) Diffraction of light with medium particles
   b) refraction of light with medium particles
   c) Scattering of light with medium particles
   d) reflection of light by medium particles
2. Among the given following units which one is not unit of length?
   a) Angstrom
   b) Fermi
   c) Barn
   d) Parsec
3. Moment of inertial depends upon_____ of the body
   a) mass
   b) shape
   c) temperature
   d) all the above
4. If $\left|\vec{A}\times\vec{B}\right| = \vec{A}\cdot\vec{B}$, then the angle between $\vec{A}$ *and* $\vec{B}$ is_____
   a) 0^o
   b) 30^o
   c) 45^o
   d) 90^o
5. Which of the following statement is not true regarding Newton's third law of motion?
   a) To every action there is always an equal and opposite reaction
   b) Action and reaction act on the same body
   c) There is no cause-effect relationshiop between action and reaction
   d) Action and reaction forces are simultaneous
6. For 'n' particles in space, the suitable, the suitable expression for the *x*-coordinate of the centre of mass of the system is
   a) $\frac{\sum m_i x_i}{m_i}$
   b) $\frac{\sum m_i x_i}{M}$
   c) $\frac{\sum m_i y_i}{M}$
   d) $\frac{\sum m_i z_i}{M}$

7. Earth is flattened at the poles and bulges at the equators. This is due to the fact that_____

   a) the revolves around the sun in an elliptical orbit

   b) the angular velocity of spinning about its axis is more at the equator

   c) the centrifugal force is more at the equator than an poles

   d) None of the above

8. The co-efficient of viscosity for hot air is _____

   a) Greater than the co-efficient of viscosity for cold air

   b) Smaller than the co-efficient of viscosity for cold air

   c) Same as the co-efficient of viscosity for cold air

   d) Increases (or) decreases depending on external pressure

9. The amount of heat that a body can absorb by radiation_____

   a) depends on colour of body only

   b) depends on the temperature of the body only

   c) depends on colour and the temperature of the body only

   d) depends on the density of the body

10. The average energy associated with each translational degree of freedom is _____

    a) $K_B T$ b) $2K_B T$

    c) $\frac{1}{2}K_B T$ d) $\frac{3}{2}K_B T$

11. Dimensional formula of power is _____

12. Two masses of 1g and 4g are moving with equal kinetic energy. The ratio of the magnitudes of their momentum is _____

13. Escape velocity on the surface of earth is _____ km/s

    Or

    1 atmosphere = _____ N/m^2

14. The efficiency of Carnot engine working between boiling point and freezing point of water is _____

15. A simple harmonic motion is represented by $x = 12\sin(10t + 0.6)$ metre. Its amplitude is _____ metre.

16. What is the relation between horizontal range and angle of projection?

17. Define Young's modulus of elasticity for a perfectly rigid body.

18. What happens when a pendulum clock was taken to the top of a mountain.

    Or

    A force of 5N acts on a body for 2 milli sec. If the mass of the body is 5g, calculate the change in velocity.

19. Define zeroth law of thermodynamics.

20. Draw the graph between displacement and time which represents the uniform velocity.

SECTION - B

21. State and explain Kepler's laws of planetary motion.

22. Two stones are falling at a place from heights in the ratio 2.3 what is the ratio of their velocities on reaching the ground.

23. In 20 seconds, the speed of motor changes from 1200 rpm to 1800 rpm. In this period of time, the number of revolutions completed by it is?

Or

Derive the expression for Kinetic energy of a body vibrating in SHM.

24. Calculate the fractional change in volume of a glass slab, when subjected to a hydraulic pressure of 10 atmosphere (Bulk modulus) of elasticity of glass is $37 \times 10^9 N/m^2$)

Or

Give the differences between isothermal process and adiabatic process.

25. State and prove perpendicular axis theorem.

26. What is specific heat? Give its units.

27. a) Define mean free path

b) Write the factors affecting the mean free path.

SECTION - C

28. Explain graphically the variation of displacement, velocity & acceleration with time for a particle in SHM..

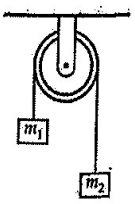
29. **a.** Show that $S = ut + \frac{1}{2} at^2$.

b. Draw the graphs for i) Uniform velocity ii) Rest

30. Explain about the cross product, write the properties of cross product and give any one examples of a physical quantity that can be expressed as cross product of two physical quantities. Give one more example of a physical quantity that can be expressed as a dot product of two physical quantities.

31. Describe the behaviour of a wire under gradually increasing load with the necessary graph.

32. Two masses $m_1 = 5kg \ and \ m_2 = 4.8kg$ tied to a string are hanging over a light frictionless pulley. What is the acceleration of the masses, when left free to move? Given: g=9.8 ms^{-2}.



33. a) State and prove the work-Energy theorem.

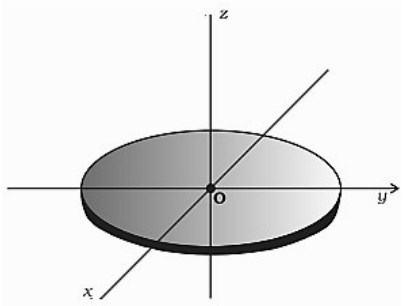
b) Give the units and dimensions for the co-efficient of restitution.

34. Show that the orbital velocity of a satellite is independent of the mass of the satellite.

Or

State the theorem of perpendicular axes. Give the expression with respect to the diagram

What is the moment of inertia of a disc about one of its diameters and along the Z-axis? (M-Mass of the disc and R-Radius of the disc)



SECTION - D

35. a) State the parallelogram law of vectors. Derive an expression for the magnitude of the resultant vector.

a) The vector A has a magnitude 5 unit, B has a magnitude of 6 unit and the cross product A and B has a magnitude of 15 unit. Find the angle between A and B.

Or

a) Define rolling friction and give the laws of rolling friction.

b) Mention the methods used to decrease friction.

c) A vehicle of mass 120kg is moving with a velocity of 90kmph. What force should be applied on the vehicle to stop it in 5 sec?

36. a) State and prove Bernoulli's principle.

b) What is Torricelli's law? Derive an expression for the speed of efflux with an experiment.

Or

a) Define Head on collision and derive the expressions for the final velocities of bodies after the one dimensional elastic collision between two bodies.

b) A simple pendulum in a stationary lift has time period T. What would be the effect on the T when the lift i) Moves up with uniform velocity ii) Moves down with uniform acceleration.

37. a) What is Doppler's effect? Derive the expression for an apparent frequency when the source is moving towards a stationary observer.

b) A 10m long steel wire has mass 5g. If the wire is under the tension of 80N, then calculate the speed of transverse waves.

Or

a) Derive the expression for work done in the isothermal process.

b) Derive the relation between the two specific heat capacities of gas on the basis of the first law of thermo dynamics.

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