# Sample Paper – 2014
# Class – XI
# Subject – Physics

TIME: 3 Hrs. MM: 70

Instructions:

(I) All questions are compulsory.
(II) Q. No. 1 to 8 are very short answer type questions, carrying one marks each.
(III) Q. No. 9 to 16 are short answer type questions, carrying two marks each.
(IV) Q. No. 17 to 25 are short answer type questions, carrying three marks each.
(V) Q. No. 27 to 29 are long answer type questions, carrying five marks each.
(VI) Q. No. 26 is a value based question carry four marks.

1. Find the number of times the heart of a human being beats in 10 years. Assume that the heart beats once in 0.8 sec.
2. A rope is weightless and unstretchable. It passes over a highly placed pulley. Two monkeys of same weight climbs the rope from two opposite end. One monkey climbs at high speed. Which of the two will reach the top first?
3. The momentum of a body is increased by 50%. What is the percentage change in its K.E.?
4. A child sits stationary at one end of a long trolly moving uniformly with a speed V on a smooth horizontal floor. If the child gets up and run about on the trolly in any manner, what is the speed of C.M. of the (trolly + child) system?
5. Should a thermometer bulb have large heat capacity or small heat capacity?Explain.
6. State Dalton's law of partial pressure.
7. List any two factors affecting the speed of sound in a gaseous medium.
8. When we start filling an empty bucket with water, the pitch of sound produced goes on changing. Why?
9. Deduce the dimension formula for R, using ideal gas equation PV= nRT.
10. ''The direction in which an object moves is given by the direction of velocity of the object and not by the direction of acceleration.'' Explain with an example?
11. A car moving with a speed of 50 Km/h can be stopped by brakes after at least 6 m. What will be the minimum stopping distance, if the same car is moving at a speed of 100 km/h?
12. Determine the moment of inertia of a thin ring about a tangent to the circle in the plane of the ring.
13. Derive the formula for rise of liquid in a capillary tube (Ascent formula)
14. Discuss the variation in g with height and depth.
15. On reducing the volume of a gas at constant temperature, the pressure of the gas increases. Explain it on the basis of kinetic theory.

OR

When an automobile travels for a long distance, the air pressure in the tyres increases slightely. Why?

16. Write any four fundamental postulates of the kinetic theory of an ideal gas.
17. What is meant by instantaneous velocity? How does this concept enable us to introduce the idea of acceleration? Why don't we expect the position –time graph of a uniformly accelerated motion to be a straight line?
18. A balloon is moving upwards with a speed of 5 m/s. When it is at a height of 98 m, a packet is dropped from it. What is the velocity of the packet, when it strikes the ground?

19. State theorem on parallel axis and perpendicular axis. The moment of inertia of a circular disc about a diameter is ¼ $MR^2$, where M is mass and R is radius of the disc. Using this relation, find the moment of inertia about an axis passing through its centre and perpendicular to its plane.
20. Explain what is meant by the coefficient of linear, superficial and cubical expansion of a solid. Give their units and find the relationship between them

OR

State Stefan's law. Show , how Newton's law of cooling follows from it for small temperature difference between a body and its surroundings.

21. Read each statement below carefully and state , with reasons, if it is true or false:
    (a) The modulus of elasticity of a rubber is greater than that of steel.
    (b) The stretching of a coil spring is determined by its shear modulus.
    (c) When a material is under tensile stress, the restoring forces are caused by interatomic attraction; while under compressional stress, the restoring force are due to interatomic repulsion.
22. Derive Newton's formula for the velocity of sound in air. What correction did Laplace apply to it?
23. What are standing waves? Explain the formation of standing waves by applying superposition principal to the wave functions of incident and reflected waves in case of a string fixed at both ends. Discuss graphically the various modes of vibration.
24. State and prove the principal of conservation of linear momentum. Apply this law to explain, why?
    (i) A gun recoils, when fired;
    (ii) A rocket goes up when fired and
    (iii) The boat moves away, when a man jump from it to the shore.

OR

A ball moving with a momentum of 15 kg m/s strikes against the wall at an angle of $30^0$ and is reflected back with the same momentum at the same angle. Calculate the impulse.

25. Define angle of banking. Draw a neat labeled diagram showing different forces and their component acting on a vehicle moving on a banked road.
26. Jagat and Ram are working in the same company .Jagat has noticed that ram is suffering from cancer. Ram is not aware of this, when Jagat asks him to go for checkup, ram refused. He gets convinced now, when herealized it is very important to get checkup done once a year.
    (i) What according to you are values shown by Jagat in helping Ram.
    (ii) A hospital uses an ultrasound scanner to locate tumour in a tissue. What is the wavelength of sound in the tissue in which speed is 1.7 Km/s and frequency 4.2 MHZ.

27. Discuss the elastic collision of two bodies in one dimension. Calculate the velocities of the bodies after the collision. Discuss what happen when both the bodies are of equal mass.
    A bullet of mass 100g moving with a velocity 240 m/s hits a target. After passing through the target 10 cm thick, it continued to move with a velocity of 160 m/s. Find the average resistance offered by the target.

OR

A 75 Kg box is dropped from the top of a tower. The height of the tower is 35m. Calculate
    (i) The initial potential energy of the box
    (ii) Its potential energy 15m above the ground,

(iii) The maximum value of its kinetic energy and

(iv) Its kinetic energy 20m below the top of the tower.

28. State Bernoulli's theorem. Prove that the total energy possessed by a flowing ideal liquid is conserved. What will be the equation and statement, if the tube is horizontal?

OR

Explain using Bernoulli's equation , why there is a lifting force produced by the flow of air past the wings of an aeroplane.

Air density 1.3 kg $m^{-3}$ blows horizontally with a speed of 108 km/h. A house has a plane roof of area 40 $cm^2$. Find the magnitude of aerodynamics lift on the roof.

29.State the postulates of kinetic theory of gases. Prove that the pressure exerted by a gas is

$$P = 1/3\ \rho C^2$$

Where $\rho$ is density and c is root mean square velocity.

OR

What is a simple pendulum? Show that motion executed by the bob of the simple pendulum is S.H.M. Derive an expression for its time period. What is meant by second pendulum.

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