



DELHI PUBLIC SCHOOL SURAT

PHYSICS

Roll No:

Class: XI

Marks: 70

Time Allowed: 3Hrs

Instructions:

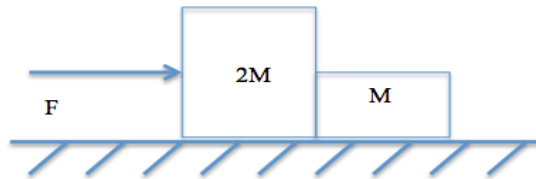
1. Answer all questions.
2. Q.No.1 to 5 are very short answer questions and carry 1 mark each.
3. Q.No. 6 to 10 are short answer questions and carry 2 marks each.
4. Q.No. 11 to 22 are also short answer questions and carry 3 marks each.
5. Q.No. 23 may be value based carrying 4 marks each.
6. Q.No. 24 to 26 are also long answer questions and carry 5 marks each.
7. No overall choice is given.
8. Use of Calculators is not allowed. However if required use of Log tables is permitted.

1. What are fundamental units? [1]
2. Draw position time graph for a stationary body. [1]
3. What is rotational analogue of mass of a body? [1]
4. Explain how can we increase temperature of a gas without supplying heat to it? [1]
5. What is the distance between a node and an adjoining antinode in a stationary wave? [1]
6. Check the dimensional consistency of the following equation $\frac{1}{2}mv^2 = mgh$
where m is the mass of the body, v is its velocity, g is acceleration due to gravity and h is the height. [2]
7. Why a cricketer does lower his hand soon after/while catching a cricket ball? [2]
8. State parallel axes theorem. [2]
9. State Kepler's second law. [2]
10. Estimate the fraction of molecular volume to the actual volume occupied by oxygen gas at STP. Take the diameter of oxygen molecule to be 3 Å [2]
11. A bullet P is fired from a gun when the angle of elevation of the gun is 30°. Another bullet Q is fired from the gun when the angle of elevation is 60°. The vertical height attained in the second case is x times the vertical height attained in the first case. What is the value of x [3]

12. On a two-lane road, car A is travelling with a speed of 36km/h. Two cars B and C approach car A from opposite directions with speeds of 54 km/h each. At a certain instant, when both car B and C are at a distance of 1 km from A, B decides to overtake car A before C does. What minimum acceleration of B is required to avert an accident? [3]

13. Prove Galileo’s law of odd numbers [3]

14. Two blocks are in contact on a frictionless table. One has mass M and another mass $2M$. A force F is applied on $2M$ as shown. Now the force F is applied on M from right. Find the ratio of force of contact between the blocks in the two cases [3]

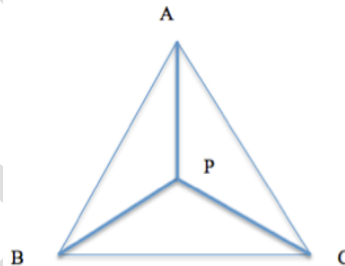


15. The kinetic energy of a body is increased by 21%. What is the percentage increase in the linear momentum of the body? [3]

16. Derive equation for loss of kinetic energy in case of a completely inelastic collision in one dimension. [3]

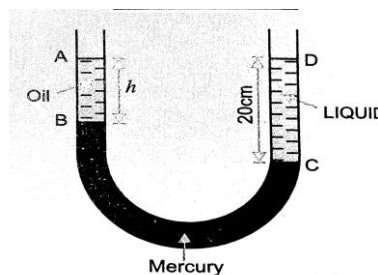
17. A ring, a disc and a sphere, all of the same radius and mass roll down an inclined plane from the same height h . Which of the three reaches the bottom (i) earliest (ii) latest? [3]

18. Three equal masses of M kg each are fixed at the vertices of an equilateral triangle ABC . What is the force acting on mass $2M$ placed at the centroid P of the triangle? Take $AP = BP = CP = 1$ m. [3]



19. A cubical icebox of thermocole has each side 30cm long and a thickness of 5 cm. 4 kg of ice is put in the box. If outside temperature is 45°C and the coefficient of thermal conductivity is $0.01 \text{ J/S/m}^{\circ}\text{C}$, calculate the mass of ice left after 6 hours. Latent heat of fusion of ice = $335 \times 10^3 \text{ J/kg}$. [3]

20. Determine height h of oil in the U tube as shown in figure. Density of oil = 0.9 g/cc ; Density of liquid is 1.6 g/cc and density of mercury = 13.6 g/cc [3]



21. What is an ideal gas? State its two main characteristics. [3]
22. A particle executes SHM according to the equation $x = A \cos \omega t$.
Draw graphs to represent the displacement, velocity and acceleration of the particle. [3]
23. Having found his mother suffering from fever Venkat took her to the doctor for treatment. While checking the status, the doctor used a thermometer to know the temperature of the body. He kept the thermometer in the mouth of the patient and noted the reading as 102°F . Doctor used the necessary medicines. After coming home, Venkat asked his mother, who is a science teacher, why mercury is used in a thermometer when there are so many liquids. Then his mother explained the reason.
(a) Comment upon the values of the mother
(b) A newly designed thermometer has its lower fixed point and upper fixed point at 5° and 95° respectively. Compute the temperature on this scale corresponding to 50°C . [4]
24. (a) Is the centrifugal force an action of the centripetal force? Give reason for your answer. [5]
(b) What is the effect of reversing the sense of revolution on the centripetal force?
(c) What provides the centripetal force to a car taking a turn on a level road?
(d) What is 'angle of banking'?
(e) What is the advantage of banking? [5]
25. (a) What is capillarity?
(b) Define angle of contact.
(c) Mention three factors on which angle of contact depends. [5]
26. (a) Explain Doppler Effect in sound. [5]
(b) Deduce an expression for apparent frequency of sound when the observer is in motion towards a stationary source.

*****END OF THE EXAMINATION*****