Questions Paper 2016-17

Session Ending Examination

CBSE Class XI Physics

General Instructions:

- All questions are compulsory.
- There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks. You have to attempt only one of the choices in such questions.
- Questions number 1 to 5 are very short answer type questions, carrying one mark each.
- Questions number 6 to 10 are short answer type questions, carrying two marks each.
- Questions number 11 to 22 are also short answer type questions, carrying three marks each.
- Question number 23 is value-based question, carrying four marks.
- Questions number 24 to 26 are long answer type questions, carrying five marks each.
- Use of calculators is not permitted. However, you may use log tables, if necessary: y G = 6.67×10^{-11} Nm^2/kg^2, Mass of earth M = 6×10^{24} kg, Radius 4 of earth R = 6.4×10^6 m, Acceleration due to gravity of earth g = 9.8 m/s^2

1. Write four fundamental forces in the ascending order of their strength. (1)

2. State Work Energy theorem. (1)

3. What are the factors on which center of mass of a body depends? (1)

4. Define absolute zero temperature. (1)

5. What is the time period of second's pendulum? (1)

6. If E, M, J and G respectively denote energy, mass, angular momentum and gravitational constant, calculate the dimensions of EJ^2/M^5G^2. (2)

7. The potential energy function for a particle executing linear simple harmonic motion is

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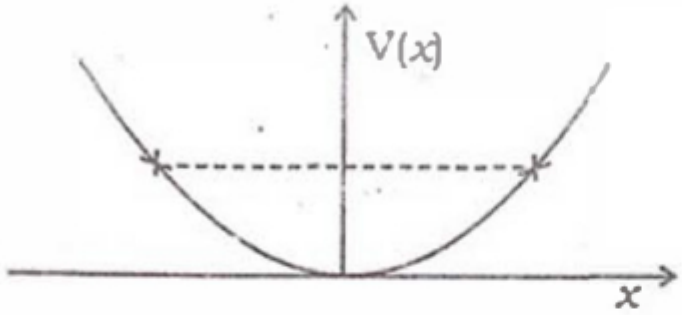
given by V(x) = $\frac{1}{2}kx^2$, where k is the force constant of the oscillator. For k = 0.5 Nm^{-1}, the graph of V(x) versus x is shown in given fig. Show that a particle of total energy 1 J moving under this potential must turn back when it reaches = ±2 m. (2)



OR

The bob of a pendulum is released from a horizontal position. If the length of the pendulum is 1.5 m, what is the speed with which the bob arrives at the lowermost point, given that it dissipated 5% of its initial energy against air resistance?

8. Derive an expression for orbital velocity of a satellite. Establish a relation for orbital velocity of a satellite orbiting very close to the surface of earth. (2)

9. A pan filled with hot food cools from 94°C to 86°C in 2 minutes when the room temperature is at 20°C. How long will it take to cool from 71°C to 69°C? (2)

10. A Carnot engine whose heat sink is at 27° has an efficiency of 40%. By how many degrees should the temperature of source be changed to increase the efficiency by 10% of the original efficiency? (2)

11. A ball is thrown vertically upwards with a velocity of 20 m/ s from the top of a multistorey building. The height of the point from where the ball is thrown is 25.0 m from the ground. (3)
(a) How high will the ball rise?
(b) How long will it be before the ball hits the ground?

12. Define centripetal acceleration and find out an expression for centripetal acceleration. (3)

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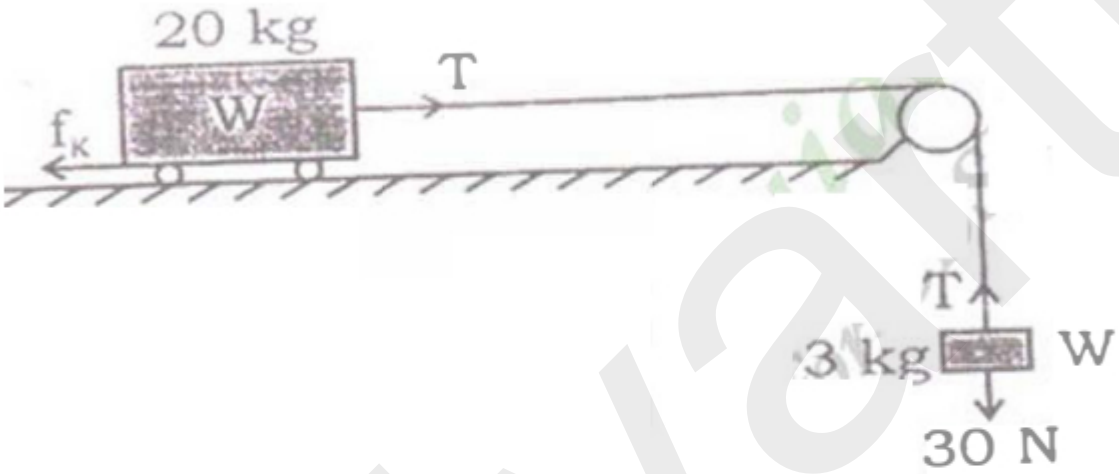
OR

Obtain equations of motion for constant acceleration using method of calculus.

13. What is the acceleration of the block and trolley system shown in given figure, if the coefficient of kinetic friction between the trolley and the surface is 0.04? What is the tension in the string?

(Take g = 10 ms^{-2}) Neglect the mass of the string. (3)



14. What is meant by banking of road? Obtain an expression for the maximum speed with which a vehicle can safely negotiate a curved road banked at an angle θ. The coefficient of friction between the vehicle and road is p. (3)

15. A monkey of mass 40 kg climbs on a rope which can stand a maximum tension of 600 N. Find tension in each case and in which of the following cases will the rope break. The monkey : (3)

(a) Climbs up with an acceleration of 6 m/s^2

(b) Climbs down with an acceleration of 4 m/s^2

(c) Climbs up with a uniform speed of 5 m / s

(d) Falls down the rope nearly under gravity

(Take g = 10 ms^{-2}) Ignore the mass of the rope.

16. Define completely inelastic collision. Show that during completely inelastic collision always there is loss of kinetic energy. (3)

17." Define acceleration due to gravity and discuss the variation of acceleration due to

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