

Class - XI

Chapter - Work, Power & Energy

Date - 13.07.20

Topic – Vertical circular motion

Choose the correct option for the following questions.

- 1. A block of mass m moving with speed v compresses a spring by x amount before its speed is halved. What is the value of the spring constant of the spring?
 - a. $\frac{3mv^2}{4x^2}$
b. $\frac{mv^2}{4x^2}$
 - mv^2
 - c. $\frac{mv}{2x^2}$
 - d. $\frac{2mv^2}{x^2}$
- 2. A stone of mass 1kg is tied to the end of a string of 1m length. It is whirled in a vertical circle. If the velocity of the stone at the top be 4m/s, what is the tension in the string there?
 - a. 6N
 - b. 16N
 - c. 5N
 - d. 10N
- 3. In a vertical circle, at which point the tension in the string may be zero?
 - a. Highest point
 - b. Lowest point
 - c. At any point
 - d. None of these
- 4. A stone attached to one end of a string is whirled in a vertical circle. The tension in the string is maximum when
 - a. The string is horizontal
 - b. The string is vertical with stone at highest point
 - c. The string is vertical with stone at lowest point
 - d. None of these
- 5. A weightless thread can withstand tension upto 30 N. a stone of mass 5kg is tied to it and is revolved in a circular path of radius 2m in a vertical plane. If $g = 10m/s^2$, then the maximum angular velocity of the stone can be
 - a. 5rad/s
 - b. $\sqrt{30} rad/s$
 - c. $\sqrt{60} rad/s$
 - d. 10rad/s
- 6. A particle is moving in a vertical circle. The tension of the string at angles 30° and 60° w.r.t lowest position are T_1 and T_2 respectively. Then
 - a. $T_1 = T_2$
 - b. $T_1 > T_2$
 - c. $T_1 < T_2$
 - d. Can not be predicted



 $1 \times 15 = 15$

- 7. A body crosses the top most point of vertical circular path with critical speed. What will be the its centripetal acceleration when the string is horizontal?
 - a. g
 - b. 2g
 - c. 3g
 - d. 6g
- 8. A 10kg satellite completes one revolution around the earth at a height 100km in 108 min. the work done by the gravitational force of earth will be
 - a. $108 \times 100 \times 10J$
 - b. $\frac{108 \times 10}{100} J$

 - c. 0/
 - d. $\frac{100 \times 10}{108} J$
- 9. A spring of force constant 800N/m has an extension of 5cm. The work done in extending it from 5cm to 15cm is a. 16J
 - b. 8J
 - c. 32J
 - d. 24J
- 10. If a spring extends by x on loading then energy stored by spring is
 - a.

 - b.
 - $\frac{T^2}{2x}$ $\frac{T^2}{2K}$ $\frac{2K}{T^2}$ c.

 - d. $\frac{2T^2}{K}$

11. A body of mass 2kg falls from a height of 20m. what is the loss of potential energy

- a. 400J
- b. 300J
- c. 200J
- d. 100J
- 12. In stretching a spring by 2cm, energy stored is given by U. Then stretching by 10cm, energy stored will be
 - a. U
 - b. 5U
 - c. U/25
 - d. 25U
- 13. 4J of work is required to stretch a spring through 10cm beyond its unstretched length. The extra work needed to stretch it through additional 10cm will be
 - a. 4J
 - b. 8J
 - c. 12J
 - d. 16J
- 14. A body of mass 6kg is displaced under a force which causes displacement in it as $s = \frac{t^2}{4}$ metres, where t is in sec. The work done by the force in 2sec is –
 - a. 12J
 - b. 9J
 - c. 6J
 - d. 3J

- 15. A block released at the top comes to rest just reaching the end of an inclined plane of inclination θ . The coefficient of kinetic friction in this case will be
 - a. Cannot be predicted
 - b. $\sin \theta$
 - c. $g\cos\theta$
 - d. $\tan \theta$

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