CBSE

CLASS 11 | PHYSICS

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CHAPTER-7 | Gravitation

QUIZ
PART-04

1. The tangential velocity required to establish a satellite in Earth's orbit is called:
   A. Escape velocity   B. Orbital velocity
   C. Binding energy
   D. Terminal velocity   (B)
   Explanation : A satellite remains in orbit only if it has the correct tangential velocity that balances gravitational pull with centripetal force. This is termed orbital velocity.

2. For a satellite near Earth's surface, the orbital velocity is approximately:
   A. 5 km/s   B. 7.92 km/s
   C. 11.2 km/s   D. 9.8 km/s   (B)
   Explanation : Using $V_0 = \sqrt{gR_e}$, with $g = 9.8$ m/s^2 and $R_e = 6.4 \times 10^6$ m, we get 7.92 km/s.

3. The relation between escape velocity Ve and orbital velocity V0 is:
   A. $V_e = V_0$ B. $V_e = 2 V_0$
   C. $V_e = \sqrt{2} V_0$
   D. $V_e = V_0/\sqrt{2}$ (C)
   Explanation : Escape velocity is derived from total energy becoming zero, giving the relation $V_e = \sqrt{2} V_0$.

4. The time taken by a satellite to revolve once around Earth is called:
   A. Binding energy
   B. Period of revolution
   C. Orbital velocity
   D. Escape period   (B)
   Explanation : The period of revolution is the orbital time for one complete revolution of the satellite.

5. The period of a low Earth orbit satellite is approximately:
   A. 5075 seconds   B. 22 hours
   C. 40 minutes   D. 120 minutes   (A)
   Explanation : From the formula $T = 2\pi \sqrt{r^3/GM}$, the result for low orbit satellites is about 5075 seconds (~84.6 minutes).

6. The total energy of a satellite in orbit is:
   A. Positive and equal to kinetic energy
   B. Zero
   C. Negative and equal to half the potential energy
   D. Equal to gravitational potential energy   (C)
   Explanation : $E = KE + PE = -GMm/(2r)$. The negative sign shows the satellite is bound to Earth.

7. Which of the following represents a natural satellite?
   A. INSAT   B. Apple
   C. Rohini   D. Moon   (D)
   Explanation : Moon is Earth's only natural satellite; others listed are artificial.

8. A satellite requires additional energy to escape Earth's gravity. This energy is known as:
   A. Orbital velocity   B. Binding energy
   C. Potential energy
   D. Centripetal energy   (B)
   Explanation : Binding energy is the minimum extra energy needed so that total energy becomes zero, allowing the satellite to escape.

9. A satellite that appears stationary to an observer on Earth has:
   A. A time period of 85 minutes
   B. A time period of 24 hours
   C. A polar orbit
   D. An eccentric orbit   (B)
   Explanation : A geo-stationary satellite has the same period as Earth's rotation (24h), hence appears stationary.

10. Which type of satellite passes over the Earth's poles during each revolution?
    A. Geo-stationary satellite B. Polar satellite
    C. Natural satellite
    D. Equatorial satellite   (B)
    Explanation : Polar satellites pass over both poles and cover the entire Earth in successive orbits, useful for mapping and surveillance.