



UNIT 5

GRAVITATION

SHORT QUESTIONS

- Q.1 Define gravitation.** (LHR 2011, 2015, 2016, GRW 2015)
Ans: In the universe, there exists a force between the bodies due to which everybody of the universe attracts every other body. This force is known as force of gravitation.
- Q.2 State law of gravitation** (LHR 2013, 2014, GRW 2015)
Ans: Every object in the universe attracts every other object with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers.
- Q.3 What is the relation between Law of Gravitation and Newton's Third law of motion?**
Ans: It is to be noted that mass m_1 attracts m_2 towards it with a force F while mass m_2 attracts m_1 with a force of the same magnitude F but in opposite direction. If the force acting on m_1 is considered as action then the force acting on m_2 will be reaction. The action and reaction due to force of gravitation are equal in magnitude but opposite in direction. This is in consistence with Newton's third law of motion which states, to every action there is always an equal but opposite reaction.
- Q.4 What is Gravitational Field Strength?** (LHR 2013, 2015)
 In the gravitational field of the Earth, the gravitational force per unit mass is called gravitational field strength of the Earth. At any place its value is equal to the value of g at that point. Near the surface of the Earth, the gravitational field strength is 10 N kg^{-1} .
- Q.5 Define orbital velocity** (GRW 2012)
 It is the velocity of the satellite with which it moves around the earth at specific height.
- Q.6 What do you know about Global Positioning System (GPS)?** (GRW 2014)
Ans: Global Positioning System (GPS) is a satellite navigation system. It helps us to find the exact position of an object anywhere on the land, on the sea or in the air. GPS consists of 24 Earth satellites. These satellites revolve around the Earth twice a day with a speed of 3.87 km s^{-1} .
- Q.7 What will happen if Earth suddenly stops revolving around the Sun?**
Ans: If Earth suddenly stops revolving around the Sun then due to attraction of sun and earth, it will fall down on the sun.
- Q.8 What do you know about geostationary satellites?** (LHR 2014)
Ans: Geostationary satellites are the satellites whose velocity relative to earth is zero. These satellites remain stationary with respect to the earth at the height of 42,300 km from the surface of the earth. These are used for global TV transmissions and other telecommunication purposes.

Q.9 What is effect of the followings on the gravitational acceleration?

(i) Mass of freely falling body

(ii) Distance of freely falling body from the centre of earth

Ans: Effect of mass

There is no effect of mass of the body on gravitational acceleration because according to the relation $g = GM/R^2$. This relation shows that gravitational acceleration is independent of the mass of freely falling body.

Effect of distance from the center of earth

Gravitational acceleration is inversely proportional to the square of distance of freely falling body from the centre of earth. If the distance of the body is increased from the centre of the earth gravitational acceleration will be less and vice versa.

Q.10 Is there any difference between the value of 'g' at the equator and at the poles?

Ans: As the shape of the earth is not perfect sphere but elliptical. The distance at the equator to the center of earth is more, so gravitational acceleration 'g' at equator will be less. However, as the distance at the poles to the center of the earth is less, so gravitation acceleration 'g' will be more.

Q.11 Moon revolves around the earth, from where it gets necessary centripetal force?

Ans: The gravitational force between the earth and the moon provides the necessary centripetal force to moon for revolving around the earth.

Q.12 If we go on top of the mountain, will our weight increase or decrease?

Ans: If the distance from the centre of the Earth increases from the average radius of the Earth, the value of 'g' will decrease. This is the reason due to which the value of 'g' is less on the top of mountains. So our weight will be decreased.

Q.13 Why do not we observe force of attraction between any two objects around us? (GRW 2014)

Ans: Since the gravitational force between different objects around us is very small, so we do not feel it. However, if the mass of one or both the objects is very large, then we can observe the effect of gravitational force easily.

Q.14 What is the gravitational force acting on the body placed at the surface of Earth?

Ans: Since the mass of the Earth is very large, it attracts nearby objects with a significant force. The weight of an object on the Earth is a result of the gravitational attraction between the two.

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