

Chapter 1 Gravitation

(2 and 3 marks)

Q. 1 . Write scientific reasons .

(2 marks)

1. If a stone and a feather both are dropped at the same time from the terrace of a building then the stone come down faster than the feather
2. Weight of an object is different on different planets.
3. Initial velocity being the same we can jump higher on the moon than on the Earth

Q. 2 . Differentiate between .

(2 marks)

1. Mass and weight
2. Gravitational constant and gravitational acceleration

Q. 3 . Write definition .

(2 marks)

1. What is centrifugal force?
2. Kepler's three laws
3. Write Newton's law of gravity and on its basis write the gravitational equation.
4. Find the SI gravitational constant ,on the basis of the resulting gravitational force between two objects .Write the CGS unit of gravitational constant. Write the definition of gravitational constant.

Q. 4 . Write short notes.**(2 marks)**

1. Explain the concept- Gravitational force of Earth

(or)

Write a short note on Earth's gravitational pull .

2. Explain the concept - Free fall

Q. 5 Questions based on table**(3 marks)**

I	II	III
1) Mass	m/s^2	zero at the center of Earth
2) weight	kg	measure of Inertia
3) gravitational acceleration	$N.m^2/kg^2$	same throughout the universe
4) gravitational constant	N	depends on height

Q. 6 Answer the questions .

1. The revolution period of a planet which is at R distance from a star is T . if that same planet is at 2R distance from the same star then will its revolution period be 8T? **(2 marks)**
2. Write the importance of Newton's law of gravity.
3. The value of g depends on which factors (ii) Also write how it is dependent on these factors. **(3 marks)**
4. Suppose the value of g suddenly becomes double then will it be doubly difficult to pull an object on the ground? why?

Q. 7. Solve the following examples

(2 marks)

1. Earth takes 3.156×10^7 S to complete one revolution around the Sun and the distance between Sun and Earth is 1.5×10^{11} m . On the basis of this find the speed of Earth's motion around the Sun.
2. Find the centripetal acceleration of Earth by considering that the orbit of revolution of Earth around the Sun is circular and considering that Earth's motion is uniform

[speed of Earth $= 3 \times 10^4$ m / s and distance between Earth and Sun $= 1.5 \times 10^{11}$ m]
3. The mass of Earth and moon is 6×10^{24} kg and 7×10^{22} kg respectively and the distance between them is 3.84×10^5 km .What will be the gravitational force between them ? Given $G = 6.7 \times 10^{-11} \text{ N.m}^2\text{kg}^{-2}$.
4. The mass of Earth is 6×10^{24} kg and its distance from the Sun is 1.5×10^{11} m .If the gravitational pull between these two bodies is 3.5×10^{22} N then what will be the mass of the Sun?
5. Find the value of acceleration due to gravity on surface of Earth
6. The radius of a planet A is half the radius of planet B . The mass of planet A is M_A . If the value of g on planet A is half the value of g on planet B then what will be the mass of planet B?
7. If the mass of Earth was double and the radius was half then what would be the value of g on Earth? (marks 3)

8. On some planet an object dropped from a height of 5 m comes down in 5 seconds then what will be the gravitational pull of that planet?
9. One stone thrown up at a speed 'u' reaches a height 'h' and then comes down. Prove that the time taken by the stone to go up and the time taken by it to come down is the same.
10. An object thrown up goes up to height 500m . What must be its initial velocity? How much time will that object take to go up and then come down?
11. One ball falls down from the table and reaches the ground in 1 second. If $g = 10\text{m/s}^2$ then what will be the height of the table and the velocity with which the ball comes down?
12. If a metal ball having mass 5kg falls on the ground from a height of 490 m then how much time will it take to reach the ground?
13. An object dropped from a height of 19.6 m will have how much velocity when it touches the ground?
14. The mass of an object and its weight on Earth is 5 kg and 49 N respectively. If the value of g on the moon is one sixth of the value of g on Earth then what will be the weight and mass of that object on the moon?

15. What will be the gravitational potential energy of an object having 10 kg mass on the surface of Earth? [$M [\text{Earth}] = 6 \times 10^{24} \text{ kg}$ $R (\text{Earth}) = 6.4 \times 10^6 \text{ m}$, $G = 6.67 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$]
16. If the object in example (16) is moving in a circular path at the height of 3600 km from Earth then what will be its gravitational potential energy?
17. An object having mass 20 kg is stationary on the Earth's surface. What will be its gravitational potential energy? How much kinetic energy will be required to free that object from the gravitational pull of Earth? (HOTS)
18. Find the escape velocity of the object on the moon.
19. The mass of a planet is four times that of Earth and its radius is double of Earth's radius. The escape velocity of an object on Earth is $11.2 \times 10^3 \text{ m/s}$ Find the escape velocity of this object on that planet.