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Chapter no.6 MCQs

Gravitation

1. Gravitational force between two bodies acts:
   (a) Along the line joining their centres.
   (b) Perpendicular to the line joining their centers.
   (c) Along the tangent to each body.
2. Approximate mass of the earth is:
   (a) $M_e = 5.98 \times 10^6$ kg.
   (b) $M_e = 5.98 \times 10^{24}$ slug.
   (c) $M_e = 5.98 \times 10^{24}$ g.
   (d) $M_e = 5.98 \times 10^{24}$ kg.
3. Average radius of the earth I about:
   (a) $R_e = 6.38 \times ^6$ miles.
   (b) $R_e = 6.38 \times 10^6$ ft.
   (c) $R_e = 6.38 \times 10^6$ m
   (d) $R_e = 6.38 \times 10^6$ km.
4. Average value of "g" on the surface of the earth at sea level is:
   (a) G = 9.8 ft/s^2 or 32 m/s^2.
   (b) G = 9.8 m/s^2 or 32 ft/s^2
   (c) G = 980 m/s^2 or 32 ft/s^2.
   (d) G = 980 ft/s^2 or 32 m/s^2
5. For various purposes average and not the exact value of density of the earth is used, because:
   (a) Earth is not a perfect sphere.
   (b) Composition of the earth is not the same every where.
   (c) Value of "g" is different at different locations.
   (d) A and b.
   (e) B and c
6. Value of "g" decreases with altitude, because:
   a) Gravitational force between the earth and other bodies being inversely proportional to square of distance decreases with altitude.
   b) At high altitude atmospheric pressure is less.
   c) At high altitude density of the air is less.
   d) At high altitude attraction of the moon becomes noticeable.
7. Fore existing between material bodies is called:
   (a) Electrostatic force.
   (b) Magnetic force.
   (c) Gravitational force.
   (d) Nuclear force.
8. Gravitational force between two bodies is directly proportional to product of their masses and inversely proportional to square of distance between the centers, it means that if distance between the centers of the bodies is halved, the gravitational force between the bodies:
   (a) Reduces to half its initial value.
   (b) Reduces to one fourth its initial value.
   (c) Becomes twice its initial value.
   (d) Becomes four times its initial value.
9. Two bodies held close to each other if allowed to fall simultaneously, they fall to the ground independently, without moving towards each other, although according to Newton's law of gravitation there exists a force of attraction between them, because:
   (a) Force between them does not obey law of gravitation.
   (b) Due to comparatively a very large mass earth exerts stronger force on each of them.
   (c) Gravitational force between the bodies is very weak and is not enough to move them towards each other.
   (d) A and b
   (e) B and c
10. "G" represents:
    (a) Gravity.
    (b) Acceleration due to gravity.
    (c) Universal gravitational constant
    (d) None of these
11. Lieu of "G" is:
    (a) G = 6.67 x 10^{-11} dybe-m^2 /kg^2
    (b) G = 6.67 x 10^{-11} N-m^2 /kg^2
    (c) G = 6.67 x 10^{-11} lbs-ft^2/slug^2
    (d) G = 6.67 x 10^{11} N-m^2/kg^2

12. In our solar system nine planets are known to revolve around the sum, the centripetal force required to move them around the sun is provided by:
    (a) Magnetic force of the sun.
    (b) Gravitational force of the sun on these planets.
    (c) Combined gravitational force of these planets on the sun.
    (d) None of these.
13. Apparent weight of a body depends upon……. Of the frame of reference with respect to which it is measured.
    (a) Inertia.
    (b) Acceleration.
    (c) Velocity.
    (d) Speed.
14. State of weightlessness can be achieved by…….
    (a) Uniform motion of the frame of reference.
    (b) Accelerated motion of frame of reference.
    (c) Free fall motion of frame of reference.
    (d) Keeping the frame of reference at rest.
15. Value of g one radius above the surface of the earth will be……it's value on the surface:
    a) ½
    b) ¼
    c) 1/8 th
    d) 1/16 th
16. Weight of a body at the centre of the earth is:
    a) Maximum.
    b) Double it's weight on the surface
    c) Zero.
    d) Negative.
17. The apparent weight of a body orbiting the earth:
    a) Increases.
    b) Zero.
    c) M g.
    d) Negative.
18. ……determined the value of "G ".
    a) Newton.
    b) Einstein.
    c) Galileo.
    d) Cavendish.
19. Value of g at the center of the earth is:
    a) 9.8 m/s^2.
    b) 19.6 m/s^2.
    c) Zero.
    d) - 9.8 m/s^2.
20. Value of "g" decreases with depth inside the earth, because:
    (a) Atmospheric pressure is higher.
    (b) Surrounding walls pull the body side ways.
    (c) Rotation of the earth decreases the value of "g".
    (d) Mass of the earth effective in pulling the body downwards deceases, that decreases the pulling force.
21. If "M" is mass and "R" is the radius of a planet, then the value "g" on the surface of the planet is given by:
    (a) $G = G M/R^2$
    (b) $G = G M^2/R$
    (c) $G = G M/R$
    (d) $G = G M/R^3$
22. Moon revolves around the earth in a nearly circular orbit, the centripetal force required for this purpose by:
    (a) Magnetic force of the earth because earth behaves as a huge magnet.
    (b) Gravitational force of the earth on the moon.
    (c) Gravitational force of the moon on the earth.
    (d) Gravitational force of the sun.
23. Approximate centripetal acceleration of the moon is:
    (a) 2.73×10^{-3} cm/s^2
    (b) 2.73×10^{-3} m/s^2
    (c) 2.73×10^{-3} ft/s^2
    (d) 2.73×10^{-3} km/s^2
24. Time taken by a revolving body to complete one revolution is called its period of revolution. The period of revolution of the moon in orbit around the earth is:
    (a) 27.3 hours.
    (b) 27.3 days.
    (c) 365.3 days.
25. Mass of the sun is about:
    (a) 2×10^{24} kg.
    (b) 2×10^{30} kg.
    (c) 2×10^{30} pounds.
    (d) 2×10^{30} g
26. Period of revolution of the earth revolving around the sun is:
    (a) 365.3 days.
    (b) 27.3 days.
    (c) One lunar year.
    (d) One day.
27. Acceleration due to gravity "g" on Jupiter is more than "g" on the earth by 318 times and less by $(11)^2 = 121$ times, because:
    (a) Jupiter is far from the sun.
    (b) Jupiter is about 318 times heavier than the earth.
    (c) Jupiter is 11 times larger than the earth.
    (d) A and b
    (e) B and c.

28. Artificial gravity is produced in a spacecraft to: (3-a iii, pre-med.2002)
    a) Increase the weight of the astronaut.
    b) Decrease the weight of the astronaut.
    c) Overcome the state of weightlessness.
    d) Overcome the force of fiction.
29. If radius of the earth ere to shrink and its mass were to remain the same, the acceleration due to gravity on the surface of the earth will: (3-a I, Pre-med. 2003)
    a) Decrease.
    b) Remain the same.
    c) Increase.
    d) None of these.
30. If a man goes to a height equal to radius of the earth from its surface, his weight relative to the earth would become: (4-a I, pre-med.2003)
    a) Half.
    b) Same.
    c) Twice.
    d) One-fourth.
31. The ocean tides are caused by gravitational force exerted on earth by: 3a iii, 2005)
    a) Moon only.
    b) Sun only.
    c) Both sun and the moon.
    d) Jupiter only.
32. Two forces which are equal in magnitude but opposite in direction not acting on the same line, constitute a:
    a) Couple.
    b) Circle.
    c) Power.
    d) Force.
33. The apparent weight of a body in a satellite orbiting around the earth is:
    a) Zero.
    b) Increasing.
    c) Decreasing.
    d) None
34. The centre of mass of a system of particles: (2a iii 08)
    a) Always coincides with the centre of gravity.
    b) Never coincides with the centre of gravity.
    c) Coincides with the centre of gravity in a uniform gravitational field.
    d) Coincides with the centre of gravity in a non uniform gravitational field.
35. When frame of reference of an observer (such as elevator) moves upward with a certain acceleration weight of bodies measured in it appears to:
    a) Increase.
    b) Decrease.
    c) Remains constant.
36. When frame of reference of an observer (such as elevator) moves downward with a certain acceleration weight of bodies measured in it appears to:
    a) Increase.
    b) Decrease.
    c) Remains constant.
37. If an elevator falls freely under the action of gravity, apparent weight of bodies in it will be:
    a) More than mg.
    b) Less than mg.
    c) Equal to mg.
    d) Zero.
38. A scientist standing in an elevator falling freely under the action of gravity, drops a heavy metallic ball, the scientist will observe that the ball:
    a) Remains stationary.
    b) Falls with acceleration g.
    c) Moves up with a constant velocity.
    d) None of the above.
39. If an elevator moves upward with constant velocity, apparent weight of bodies in it will be:
    a) More than mg.
    b) Less than mg.
    c) Equal to mg.
    d) Zero.
40. If an elevator moves downward with constant velocity, apparent weight of bodies in it will be:
    a) More than mg.
    b) Less than mg.
    c) Equal to mg.
    d) Zero.
41. Above the surface of the earth as we go o a distance equal to double the earth's radius, the value of "g" reduces to: 3-a ii, pre-ded,2002)
    a) One-ninth.
    b) One-third.
    c) One-fourth.
    d) One-half.

42. If we go from the surface of earth to a distance eual to the radius of the earth, the value of "g" will be: (3a iii 08
    a) ½.
    b) ¼.
    c) 2 g.
    d) 4 g.
43. A man goes up to a height from earth's surface equal to radius of the earth. His weight relative to the earth's surface would: 6-iii, 2009)
    a) Become half.
    b) Becomes double.
    c) Remain the same.
    d) Becomes one fourth.
44. If we go up from the surface of the earth to a distance equal to the radius of the earth, the value of 'g' will become: (1-x,2010)
    a) One fourth.
    b) One eighth.
    c) One ninth.
    d) Double.
45. If one moves up from the surface of the earth to a distance equal to the radius of the earth the value of acceleration due to gravity 'g' will be: (1-xiii, 2011)
    a) ½ g.
    b) ¼ g.
    c) 2 g.
    d) 4 g.

ANSWERS

1. Gravitational force.
2. Becomes four times its initial value.
3. B and c.
4. Universal gravitational constant.
5. $G = 6.67 \times 10^{-11}$ N-m^2/kg^2
6. Along the line joining their centers.
7. $M_e = 5.98 \times 10^{24}$ kg.
8. $R_e = 6.38 \times 10^6$ m
9. $G = 9.8$ m/s^2.
10. A and b.
11. Gravitational force between the earth and other bodies being inversely proportional to the distance decreases with altitude.
12. Mass of the earth effective in pulling the body downward decreases that decreases the pulling force.
13. $G = G\,M/R^2$.
14. Gravitational force of the earth on the moon.
15. 2.73×10^{-3} m/s^2.
16. 27.3 days.
17. 2×10^{30} kg.
18. 365.3 days.
19. B and c.
20. Gravitational fore of the sun on these planets.
21. Acceleration.
22. Free fall motion of frame of reference.
23. ¼ th.
24. Zero.
25. Zero.
26. Cavendish.
27. Zero.
28. Increases.
29. Decreases.
30. Zero.
31. Remains stationary.
32. Equal to mg.
33. Equal to mg.
34. One ninth.
35. Overcome the state of weightlessness.
36. Increases.
37. One fourth.
38. Both sun and the moon.
39. Couple.
40. Zero.
41. Coincides with the centre of gravity in a uniform gravitational field.
42. ¼ g.
43. Becomes one fourth.
44. One fourth.
45. ¼ g.