Chapter 3 :Gravitation

Section A

1. The universal gravitational constant G has the unit

   a) N *b)* N m^2 / kg^2 *c)* m/s^2 *d)* J

2. The earth attracts a body of mass 1 kg kept on its surface with a force of

   a) 1 N *b)* 6.67×10^{-11}N *c)* 9.8 N *d)* 1/9.8 N

3. The value of g.

   a) is constant everywhere in space
   b) is constant on the surface of the earth
   c) is greater at the poles than at the equator
   d) is greater at the equator than at the poles.

4. The force acting on a ball due to the earth has a magnitude F_b and that acting on the earth due to the ball has a magnitude F_e . Thus

   a) $F_b > F_e$ *b)* $F_b = F_e$ *c)* $F_e = 0$ *d)* $F_b < F_e$

5. If the distance between two objects is tripled, the force of attraction between them will become

   a) 4 times *b)* ¼ time *c)* 2 times *d)* remains the same

6. The force of gravitation between two bodies does not depend on

   a) their separation *b)* the product of their masses
   c) sum of their masses *d)* gravitational constant

7. When an object is thrown up, the force of gravity is

   a) in the downward direction
   b) in the upward direction
   c) zero
   d) in the horizontal direction

8. The force acting on a ball due to the earth has a magnitude F_b and that acting on the earth due to ball has a magnitude Fe. The

   a) $F_b > F_e$ *b)* $F_b = F_e$ *c)* $F_e = 0$ *d)* $F_b < F_e$

9. The acceleration due to gravity near the moon's surface is

   a) approximately equal to that near earth's surface
   b) approximately six times that near earth's surface
   c) approximately one-sixth of that near earth's surface
   d) slightly greater than that near earth's surface.

10. If a planet existed where mass and radius were both half those of the earth, the acceleration due to gravity at its surface would be

a) 19.6 m/s^2 *b)* 9.8 m/s^2 *c)* 4.9 m/s^2 *d)* 2.45 m/s^2

11. The weight of a body of mass 2 kg is

a) 15 N *b)* 19.6 N *c)* 49 N *d)* 5.5 N

12. The weight of a body is measured to be 120N on the earth. If it is taken to the moon, its weight will be about

a) 120 N *b)* 60N *c)* 20N *d)* 720N

Section B

1. State whether the following statements are true or false

a) The value of g at the centre of earth is zero
b) G and g are two ways of writing the same quantity.
c) Due to gravitational force, all bodies in the universe attract each other
e) The earth revolves around the sun due to the gravitational attraction of the sun.
f) The value of acceleration due to gravity does not depend on the mass of the body.

2. Distinguish between G and g
3. Fill in the blanks:

a) The force of gravitation exerted on one body by the other is F. If the mass of each body is doubled the force will become_____
b) The force of gravitation between two spherical bodies is $Gm_1 m_2 /r^2$, where r is separation between their _____
c) If the distance between two objects is doubled, the force of gravitation between them becomes_____of initial value.

4. Distinguish between mass and weight.
5. If the moon attracts the Earth, why does the Earth not move towards the Moon?
6. Explain why a 10 kg stone and 1 kg stone dropped from the same height reach the ground at same time?
7. What happens to the weight of a person when he is

a) at the top of a high mountain?
b) deep inside the earth?
c) at the center of the earth?

Section C

1. Calculate the gravitational force between a 10 kg ball and 20 kg ball placed at a

separation of 5 m.

2. Calculate the value of g on the surface of moon

   (Mass of moon = 7.4×10^{22} kg, Radius of moon = 1740 km)

3. Calculate value of acceleration due to gravity at a place 3200 km above the surface of the earth.

4. A body weighs 120 N on the earth. Find its weight on the moon.

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Section A

1. Pascal is a unit of

   a) pressure *b)* force *c)* linear momentum *d)* energy

2. The buoyant force on a body acts in a

   a) vertically downward direction
   b) vertically upward direction
   c) horizontal direction
   d) direction between the horizontal and the vertical

3. The force acting normally on a surface is called

   a) pressure *b)* Thrust *c)* Force *d)* Balanced

4. Mark the statements true (T) or false (F)

   a) The pressure at all points in a liquid at the same horizontal plane is equal.
   b) Pascal and N/m^2 represent the same unit.
   c) Pressure has magnitude as will as direction.

5. 1 bar = _____Pa

   a) 10^5 *b)* 10^{-5} *c)* 10^3 *d)* 10^{-3}

Section B

1. Define pressure at a point.

2. State Archimedes principle.

3. Why is it easier to swim in sea water than in fresh water?

4. Does a liquid press an immersed body from all sides?

Section C

1. A body of volume 50 cm^3 is completely immersed in water. Find the force of buoyancy on it.

2. A block weighing 1 kg is in the shape of a cube of length 10 cm. It is kept on a

horizontal table. Find the pressure on the portion of the table where the block is kept.

3. A bottle weighs 30 g when empty, 53.4 g when filled with a liquid and 48 g when filled with water. Calculate the density of the liquid. Given, density of water at 4^0C = 1000 kg/m^3.

4. A metallic sphere of radius 2.0 cm is completely dipped in water. Find the force of buoyancy on it.

5. A cubical block of copper is dipped completely in water. Each edge of the block is 1cm in length. Find the buoyant force acting on the cube.