DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth **SUBJECT : PHYSICS**
Date : **DPP No. : 9**

Topic :- GRAVITATION

1. The binding energy of a satellite of mass m in a orbit of radius r is (R = radius of earth, g = acceleration due to gravity)
   a) $\frac{mgR^2}{r}$ b) $\frac{mgR^2}{2r}$ c) $-\frac{mgR^2}{r}$ d) $-\frac{mgR^2}{2r}$

2. Who among the following gave first the experimental value of G
   a) Cavendish b) Copernicus c) Brook Teylor d) None of these

3. An asteroid of mass m is approaching earth, initially at a distance of 10 R_e with speed v_i. It hits the earth with a speed v_f (R_e and M_e are radius and mass of earth), then
   a) $v_f^2 = v_i^2 + \frac{2Gm}{M_eR}\left(1-\frac{1}{10}\right)$ b) $v_f^2 = v_i^2 + \frac{2GM_e}{R_e}\left(1+\frac{1}{10}\right)$
   c) $v_f^2 = v_i^2 + \frac{2GM_e}{R_e}\left(1-\frac{1}{10}\right)$ d) $v_f^2 = v_i^2 + \frac{2Gm}{R_e}\left(1-\frac{1}{10}\right)$

4. According to Kepler's law T^2 is proportional to
   a) R^3 b) R^2 c) R d) R^{-1}

5. The gravitational field due to a mass distribution is $1 = \frac{C}{x^2}$ in x direction. Hence C is constant. Taking the gravitational potential to be zero at infinity, potential at x is
   a) $\frac{2C}{x}$ b) $\frac{C}{x}$ c) $\frac{2C}{x^2}$ d) $\frac{C}{2x^2}$

6. A body falls freely under gravity. Its speed is v when it has lost an amount U of the gravitational energy. Then its mass is
   a) $\frac{Ug}{v^2}$ b) $\frac{U^2}{g}$ c) $\frac{2U}{v^2}$ d) $2Ugv^2$

7. For the moon to cease to remain the earth's satellite, its orbital velocity has to increase by a factor of
   a) 2 b) $\sqrt{2}$ c) $1/\sqrt{2}$ d) $\sqrt{3}$

8. If the radius of a planet is R and its density is ρ, the escape velocity from its surface will be

a) $v_e \propto \rho R$ b) $v_e \propto \sqrt{\rho R}$ c) $v_e \propto \frac{\sqrt{\rho}}{R}$ d) $v_e \propto \frac{1}{\sqrt{\rho} R}$

9. The distance of neptune and saturn from sun are nearly 10^{13} and $10^{12} m$ respectively. Assuming that they move in circular orbits, their periodic times will be in the ratio

a) $\sqrt{10}$ b) 100 c) $10\sqrt{10}$ d) $1/\sqrt{10}$

10. Planetary system in the solar system describes

a) Conservation of energy b) Conservation of linear momentum
c) Conservation of angular momentum d) None of these

11. A mass M is split into two parts m and $(M - m)$, which are then separated by a certain distance. The ratio m/M which maximizes the gravitational force between the parts is

a) 1 : 4 b) 1 : 2 c) 4 : 1 d) 2 : 1

12. If the mass of moon is$\frac{1}{90}$ of earth^' s mass, its radius is$\frac{1}{3}$ of earth^' sradius and if g is acceleration due to gravity on earth, then the acceleration due to gravity on moon is..

a) $\frac{g}{3}$ b) $\frac{g}{90}$ c) $\frac{g}{10}$ d) $\frac{g}{9}$

13. If the angular speed of the earth is doubled, the value of acceleration due to gravity (g) at the
north pole

a) Doubles b) Becomes half c) Remains same d) Becomes zero

14. The change in potential energy when a body of mass m is raised to a height nR from the centre of earth (R= radius of earth)

a) $mgR\frac{(n - 1)}{n}$ b) $nmgR$ c) $mgR\frac{n^2}{n^2+1}$ d) $mgR\frac{n}{n+1}$

15. A mass of 6×10^{24}kg is to be compressed in a sphere in such a way that the escape velocity from the sphere is 3×10^8 m/s. What should be the radius of the sphere?
($G = 6.67 \times 10^{-11}$ N–m^2/kg^2)

a) 9 km b) 9 m c) 9 mc d) 9 mm

16. For a body to escape from earth, angle at which it should be fired is?

a) 45° b) $> 45°$ c) $< 45°$ d) any angle

17. The radius of the earth is R. The height of a point vertically above the earth's surface at which acceleration due to gravity becomes 1% of its value at the surface is

a) 8 R b) 9 R c) 10 R d) 20 R

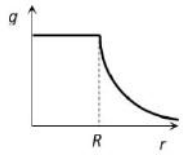
18. The density of earth in terms of acceleration due to gravity (g), radius of earth (R) and universal gravitational constant (G) is

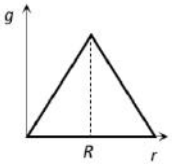
a) $\frac{4\pi RG}{3g}$ b) $\frac{3\pi RG}{4g}$ c) $\frac{4g}{3\pi RG}$ d) $\frac{3g}{4\pi RG}$

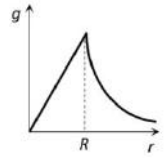
19. Escape velocity of a body of 1 kg mass on a planet is 100 m/sec. Gravitational Potential energy of the body at the Planet is

a) -5000 J b) -1000 J c) -2400 J d) 5000 J

20. Assuming the earth to have a constant density, point out which of the following curves show the variation of acceleration due to gravity from the centre of earth to the points far away from the surface of earth

a) 

b) 

c) 

d) None of these