DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth **SUBJECT : PHYSICS**
Date : **DPP No. : 8**

Topic :- GRAVITATION

1. Two spherical planets A and B have same mass but densities in the ratio 8:1. For these planets, the ratio of acceleration due to gravity at the surface of A to its value at the surface of B is

   a) 1 : 4 b) 1 : 2 c) 4 : 1 d) 8 : 1

2. An earth satellite is moved from one stable circular orbit to farther stable circular orbit. Which one of the following quantities increase?
   a) Linear orbit speed b) Gravitational force
   c) Centripetal acceleration d) Gravitational potential energy

3. A man starts walking from a point on the surface of earth (assumed smooth) and reaches diagonally opposite point. What is the work done by him?
   a) Zero b) Positive c) Negative d) Nothing can be said

4. The acceleration to gravity at a height 1/20th of the radius of the earth above the earth surface is $9ms^{-2}$. Its value at a point at an equal distance below the surface of the earth in m s^{-2} is about below the surface of the earth in ms^{-2} is about
   a) 8.5 b) 9.5 c) 9.8 d) 11.5

5. Gravitational potential on the surface of earth is ($M =$ mass of the earth, $R =$ radius of earth)
   a) $-GM/2R$ b) $-gR$ c) gR d) GM/R

6. The escape velocity of an object from the earth depends upon the mass of the earth (M), its mean density, (ρ), its radius (R) and the gravitational constant (G). Thus the formula for escape velocity is
   a) $v = R\sqrt{\frac{8\pi}{3}G\rho}$ b) $v = M\sqrt{\frac{8\pi}{3}GR}$ c) $v = \sqrt{2GMR}$ d) $v = \sqrt{\frac{2GM}{R^2}}$

7. Earth binds the atmosphere because of
   a) Gravity b) oxygen between earth and atmosphere
   c) Both (a) and (b) d) None of the above

8. The acceleration due to gravity about the earth's surface would be half of its value on the surface of the earth at an altitude of ($R = 4000\ mile$)
   a) $1200\ mile$ b) $2000\ mile$ c) $1600\ mile$ d) $4000\ mile$

9. The acceleration due to gravity on the planet A is 9 times the acceleration due to gravity on planet B. A man jumps to height of 2 m on the surface of A. What is the height of jump by the same person on the planet B ?
   a) 6 m b) $\frac{3}{2}$ m c) 2/9 m d) 18 m

10. The time period of a geostationary satellite is
    a) 12 hours b) 24 hours c) 6 hours d) 48 hours

11. A satellite is revolving around the planet. The gravitational force between them varies with $R^{-5/2}$, where R is the radius of the satellite. The square of the time period T will be directly proportional to
    a) R^3 b) $R^{7/2}$ c) $R^{3/2}$ d) $R^{5/7}$

12. The mass of a planet is six times that of the earth. The radius of the planet is twice that of the earth. If the escape velocity from the earth is v, then the escape velocity from the planet is
    a) $\sqrt{3}v$ b) $\sqrt{2}v$ c) v d) $\sqrt{5}v$

13. Choose the correct statement from the following. The radius of the orbit of a geostationary satellite depends upon
    a) Mass of the satellite, its time period and the gravitational constant
    b) Mass of the satellite, mass of the earth and the gravitational constant
    c) Mass of the earth, mass of the satellite, time period of the satellite and the gravitational constant
    d) Mass of the earth, time period of the satellite and the gravitational constant

14. If the radius of earth decreases by 1% and its mass remains same, then the acceleration due to gravity
    a) increases by 1% b) decreases by 1% c) increases by 2% d) decreases by 2%

15. Acceleration due to gravity is maximum at (R is the radius of earth)
    a) A height $\frac{R}{2}$ from the earth's surface
    b) The centre of the earth
    c) The surface of the earth
    d) A depth $\frac{R}{2}$ from the earth's surface

16. If satellite is revolving around a planet of mass M in an elliptical orbit of semi-major axis a, find the orbital speed of the satellite when it is at a distance r from the focus
    a) $v^2 = GM\left[\frac{2}{r} - \frac{1}{a}\right]$ b) $v^2 = GM\left[\frac{2}{r^2} - \frac{1}{a}\right]$ c) $v^2 = GM\left[\frac{2}{r^2} - \frac{1}{a^2}\right]$ d) $v^2 = G\left[\frac{2}{r} - \frac{1}{a}\right]$

17. Three equal masses of $1kg$ each are placed at the vertices of an equilateral triangle PQR and a mass of $2kg$ is placed at the centroid O of the triangle which is at a distance of $\sqrt{2}\ m$ from each of the vertices of the triangle. The force, in newton, acting on the, mass of $2kg$ is
a) 2 b) $\sqrt{2}$ c) 1 d) Zero

18. LANDSAT series of satellites move in near polar orbits at an altitude of
a) 3600 km b) 3000 km c) 918 km d) 512 km

19. A particle of mass 10 g is kept on the surface of a uniform sphere of mass 100 kg and radius 10 cm. Find the work to be done against the gravitational force between them, to take the particle far away from the sphere.
(You may take $G = 6.67 \times 10^{-11}\text{Nm}^2\text{kg}^2$)
a) 13.34×10^{-10}J b) 3.33×10^{-10}J c) 6.67×10^{-9}J d) 6.67×10^{-10}J

20. Choose the correct statement from the following :
Weightlessness of an astronaut moving in a satellite is a situation of
a) Zero g b) No gravity c) Zero mass d) Free fall