DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth **SUBJECT : PHYSICS**
Date : **DPP No. : 10**

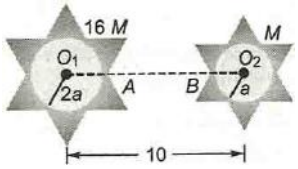
Topic :- GRAVITATION

1. If the distance between two masses is doubled, the gravitational attraction between them
   a) Is doubled b) Becomes four times
   c) Is reduced to half d) Is reduced to a quarter

2. A body weighs 700 $g\ wt$ on the surface of the earth. How much will it weigh on the surface of a planet whose mass is $\frac{1}{7}$ and radius is half that of the earth
   a) 200 $g\ wt$ b) 400 $g\ wt$ c) 50 $g\ wt$ d) 300 $g\ wt$

3. A satellite in a circular orbit of radius R has a period of 4 h. Another satellite with orbital radius $3R$ around the same planet will have a period (in hour)
   a) 16 b) 4 c) $4\sqrt{27}$ d) $4\sqrt{8}$

4. Distance between the centres of two stars is 10 a. The masses of these stars are M and 16 M and their radii a and $2a$ respectively. A body of mass m is fired straight from the surface of the larger star towards the smaller star. The minimum initial speed for the body to reach the surface of smaller star is



   a) $\frac{2}{3}\sqrt{\frac{GM}{a}}$ b) $\frac{3}{2}\sqrt{\frac{5GM}{a}}$ c) $\frac{2}{3}\sqrt{\frac{5GM}{a}}$ d) $\frac{3}{2}\sqrt{\frac{GM}{a}}$

5. Three particles each of mass m are kept at verities of an equilateral triangle of side L. The gravitational field at centre due to these particle is
   a) Zero b) $\frac{3GM}{L^2}$ c) $\frac{9GM}{L^2}$ d) $\frac{12}{\sqrt{3}}\frac{GM}{L^2}$

6. The escape velocity of projectile on the earth's surface is 11.2 kms^{-1}. A body is projected out with thrice this speed. The speed of the body for away from the earth will be
   a) 22.4 kms^{-1} b) 31.7 kms^{-1} c) 33.6 kms^{-1} d) None of these

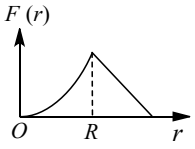
7. The distance of a geo-stationary satellite from the centre the earth (Radius $R = 6400\ km$) is nearest to

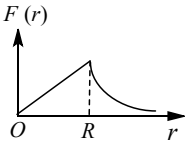
a) $5\ R$ b) $7\ R$ c) $10\ R$ d) $18\ R$

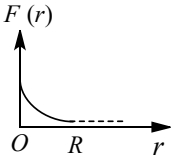
8. Kepler's second law regarding constancy of aerial velocity of a planet is consequence of the law of conservation of

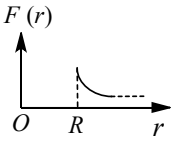
a) Energy b) Angular momentum c) Linear momentum d) None of these

9. In the above problem, if the shell is replaced by a sphere of same mass and radius then the graph of $F(r)\ versus\ r$ will be

a) 

b) 

c) 

d) 

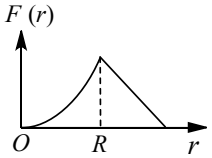
10. The weight of a body on surface of earth is 12.6 N. When it is raised to a height half the radius of earth its weight will be

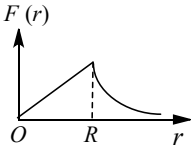
a) 2.8 N b) 5.6 N c) 12.5 N d) 25. 2N

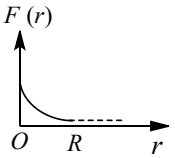
11. A man inside an artificial satellite feels weightlessness because the force of attraction due to earth is

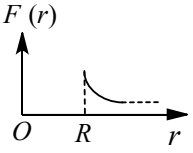
a) Zero at that place
b) Is balanced by the force of attraction due to moon
c) Equal to the centripetal force
d) Non-effective due to particular design of the satellite

12. A particle of mass m is located at a distance r from the centre of a shell of mass M and radius R. The force between the shell and mass is $F(r)$. The plot of $F(r)\ versus\ r$ is

a) 

b) 

c) 

d) 

13. Two particles each of mass m are moving around a circle of radius R due to their mutual gravitational force of attraction, velocity of each particle is

a) $v = \sqrt{\frac{Gm}{2R}}$ b) $v = \sqrt{\frac{Gm}{R}}$ c) $v = \sqrt{\frac{Gm}{4R}}$ d) None of these

14. A particle is fired vertically upwards from the surface of earth and reaches a height 6400 km. The initial velocity of the particle is ($R = 6400$ km, g = $10 ms^{-2}$)

a) 11.2 ms^{-1} b) 8 kms^{-1} c) 3.2 kms^{-1} d) None of these

15. What will be the effect on the weight of a body placed on the surface of earth, if earth suddenly starts rotating with half of its angular velocity of rotation?
    a) No effect
    b) Weight will increase
    c) Weight will decrease
    d) Weight will become zero

16. Imagine a light planet revolving around a very massive star in a circular orbit of radius r with a period of revolution T. If the gravitational force of attraction between the planet and the star is proportional to $R^{-3/2}$, then T^2 is proportional to
    a) R^3 b) $R^{5/2}$ c) $R^{3/2}$ d) $R^{7/2}$

17. In planetary motion the areal velocity of position vector of a planet depends on angular velocity (ω) and the distance of the planet from sun (r). If so the correct relation for areal velocity is
    a) $\frac{dA}{dt} \propto \omega r$ b) $\frac{dA}{dt} \propto \omega^2 r$ c) $\frac{dA}{dt} \propto \omega r^2$ d) $\frac{dA}{dt} \propto \sqrt{\omega r}$

18. Energy required to move a body of mass m from an orbit of radius 2 $R$to $3R$ is
    a) $GMm/12R^2$ b) $GMm/3R^2$ c) $GMm/8R$ d) $GMm/6R$

19. An artificial satellite is revolving round the earth in a circular orbit. Its velocity is half the escape velocity. Its height from earth's surface is
    a) 6400 km b) 12800 km c) 3200 km d) 1600 km

20. Two astronauts have deserted their space ships in a region of space far from the gravitational attraction of any other body. Each has a mass of 100 kg and they are 100 m apart. They are initially at rest relative to one another. How long will it be before the gravitational attraction brings them 1 cm closer together?
    a) 2.52 days b) 1.41 days c) 0.70 days d) 0.41 days