DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth | **SUBJECT: PHYSICS**
Date : | **DPP No. : 5**

TOPIC :- GRAVITATION

1. The angular velocity of rotation of star (of mass M and radius R) at which the matter start to escape from its equator will be

   a) $\sqrt{\frac{2GM^2}{R}}$ b) $\sqrt{\frac{2GM}{g}}$ c) $\sqrt{\frac{2GM}{R^3}}$ d) $\sqrt{\frac{2GR}{M}}$

2. A synchronous satellite goes around the earth once in every 24 h. What is the radius of orbit of the synchronous satellite in terms of the earth's radius (Given mass of the earth, $m_e = 5.98 \times 10^{24} kg$. radius of earth, $r_e = 6.37 \times 10^6 m$, Universal constant of gravitation, $G = 6.67 \times 10^{-11} N\ m^2/kg^2$)

   a) $2.4r_e$ b) $3.6r_e$ c) $4.8r_e$ d) $6.6r_e$

3. The total energy of a circularly orbiting satellite is

   a) Twice the kinetic energy of the satellite b) Half the kinetic energy of the satellite
   c) Twice the potential energy of the satellite d) Half the potential energy of the satellite

4. The gravitational force F_g between two objects does not depends on

   a) Sum of the masses b) Product of the masses
   c) Gravitational constant d) Distance between the masses

5. What is the intensity of gravitational field at the centre of a spherical shell

   a) Gm/r^2 b) g c) Zero d) None of these

6. The gravitational attraction between the two bodies increases when their masses are

   a) Reduced and distance is reduced b) Increased and distance is reduced
   c) Reduced and distance is increased d) Increased and distance is increased

7. Two satellites of mass m and $9m$ are orbiting a planet in orbit of radius R. Their periods of revolution will be in the ratio of

   a) 1:3 b) 1:1 c) 3:1 d) 9:1

8. A projectile is projected with velocity kv_e in vertically upward direction from the ground into the space. (v_e is escape velocity and $k < 1$). If resistance is considered to be negligible then the maximum height from the centre of earth to which it can go, will be :($R =$ radius of earth)

a) $\frac{R}{k^2 + 1}$ b) $\frac{R}{k^2 - 1}$ c) $\frac{R}{1 - k^2}$ d) $\frac{R}{k + 1}$

9. Two spherical bodies of mass M and $5M$ and radii R and $2R$ respectively are released in free space with initial separation between their centres equal to $12R$. If they attract each other due to gravitational force only, then the distance covered by the smaller body just before collision is

a) 2.5 R b) 4.5 R c) 7.5 R d) 1.5 R

10. A satellite is moving with a constant speed v in a circular orbit about the earth. An object of mass m is ejected from the satellite such that it just escapes from the gravitational pull of the earth. At the time of its ejection, the kinetic energy of the object is

a) $\frac{1}{2}mv^2$ b) mv^2 c) $\frac{3}{2}mv^2$ d) $2mv^2$

11. Acceleration due to gravity is g on the surface of the earth. Then the value of the acceleration due to gravity at a height of 32 km above earth's surface is (Assume radius of earth to be 6400 km)

a) 0.99 g b) 0.8 g c) 1.01 g d) 0.9 g

12. If acceleration due to gravity on the surface of a planet is two times that on surface of earth and its radius is double that of earth. Then escape velocity from the surface of that planet in comparison to earth will be

a) 2 v_e b) 3 v_e c) 4 v_e d) None of these

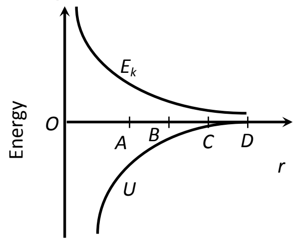
13. A body of mass $m\ kg$. starts falling from a point $2R$ above the Earth's surface. Its kinetic energy when it has fallen to a point $'R'$ above the Earth's surface [R-Radius of Earth, M-Mass of Earth, G-Gravitational Constant]

a) $\frac{1}{2}\frac{GMm}{R}$ b) $\frac{1}{6}\frac{GMm}{R}$ c) $\frac{2}{3}\frac{GMm}{R}$ d) $\frac{1}{3}\frac{GMm}{R}$

14. The gravitational force between a point like mass M and an infinitely long, thing rod of linear mass density perpendicular to distance L from M is

a) $\frac{MG\lambda}{L}$ b) $\frac{1}{2}\ \frac{MG\lambda}{L}$ c) $\frac{2MG\lambda}{L^2}$ d) Infinite

15. The curves for potential energy (U) and kinetic energy (E_k) of a two particle system are shown in figure. At what points the system will be bound



a) Only at point D b) Only at point A c) At point D and A d) At points A,B and C

16. A satellite whose mass is M, is revolving in circular orbit of radius r around the earth. Time of revolution of satellite is

a) $T \propto \frac{r^5}{GM}$ b) $T \propto \sqrt{\frac{r^3}{GM}}$ c) $T \propto \sqrt{\frac{r}{GM^2/3}}$ d) $T \propto \sqrt{\frac{r^3}{GM^1/4}}$

17. The ratio of the radius of a planet $'A'$ to that of planet $'B'$ is $'r'$. The ratio of acceleration due to gravity on the planets is $'x'$. The ratio of the escape velocities from the two planets is

a) xr b) $\sqrt{\frac{r}{x}}$ c) $\sqrt{rx}$ d) $\sqrt{\frac{x}{r}}$

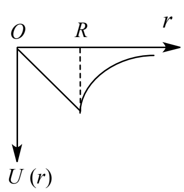
18. The depth d at which the value of acceleration due to gravity becomes $1/n$ times the value of the surface, is [R = radius of the earth]

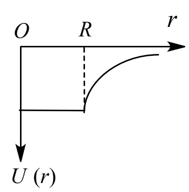
a) $\frac{R}{n}$ b) $R\left(\frac{n-1}{n}\right)$ c) $\frac{R}{n^2}$ d) $R\left(\frac{n}{n+1}\right)$

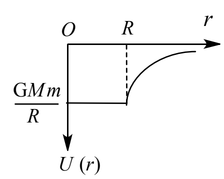
19. If g is the acceleration due to gravity at the earth's surface and r is the radius of the earth, the escape velocity for the body to escape out of earth's gravitational field is

a) gr b) $\sqrt{2\,gr}$ c) g/r d) r/g

20. A shell of mass M and radius R has a point mass m placed at a distance r from its centre.

a) 

b) 

c) 

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