## AIPMT 2007

**1.** Two satellites of earth, $S_1$ and $S_2$, are moving in the same orbit. The mass of $S_1$ is four times the mass of $S_2$. Which one of the following statements is true?

(1) The kinetic energies of the two satellites are equal

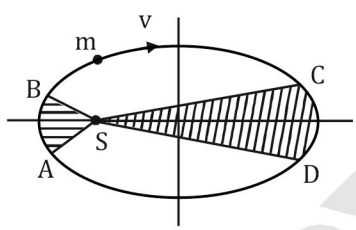
(2) The time period of $S_1$ is four times that of $S_2$

(3) The potential energies of earth and satellite in the two cases are equal

(4) $S_1$ and $S_2$ are moving with the same speed

## AIPMT 2009

**2.** The figure shows elliptical orbit of a planet m about the sun S. The shaded area SCD is twice the shaded area SAB. If $t_1$ is the time for the planet to move from C to D and $t_2$ is the time to move from A to B then :-




(1) $t_1 = t_2$ (2) $t_1 < t_2$

(3) $t_1 = 4t_2$ (4) $t_1 = 2t_2$

## AIPMT 2010

**3.** The radii of circular orbits of two satellites A and B of the earth are 4R and R, respectively. If the speed of satellite A is 3V, then the speed of satellite B will be :-

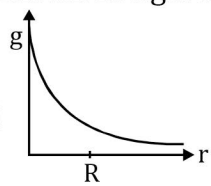
(1) 3V/2 (2) 3V/4 (3) 6V (4) 12V

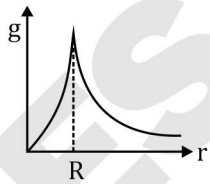
**4.** A particle of mass M is situated at the centre of a spherical shell of same mass and radius a. The gravitational potential at a point situated at $\frac{a}{2}$ distance from the centre, will be :-

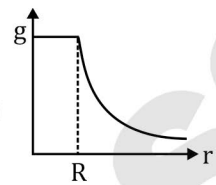
(1) $-\frac{4GM}{a}$ (2) $-\frac{3GM}{a}$

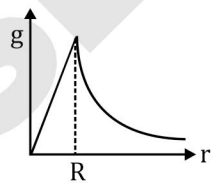
(3) $-\frac{2GM}{a}$ (4) $-\frac{GM}{a}$

**5.** The dependence of acceleration due to gravity 'g' on the distance 'r' from the centre of the earth, assumed to be a sphere of radius R of uniform density, is as shown in figure below :-

(a) 


(b) 


(c) 


(d) 


The correct figure is :-

(1) (a) (2) (b) (3) (c) (4) (d)

**6.** The additional kinetic energy to be provided to a satellite of mass m revolving around a planet of mass M, to transfer it from a circular orbit of radius $R_1$ to another of radius $R_2 (R_2 > R_1)$ is :-

(1) $GmM\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

(2) $2GmM\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

(3) $\frac{1}{2}GmM\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

(4) $GmM\left(\frac{1}{R_1^2}-\frac{1}{R_2^2}\right)$

## AIPMT 2011

**7.** A planet moving along an elliptical orbit is closest to the sun at a distance $r_1$ and farthest away at a distance of $r_2$. If $v_1$ and $v_2$ are the linear velocities at these points respectively, then the ratio $\frac{v_1}{v_2}$ is :-

(1) $(r_1/r_2)^2$ (2) $r_2/r_1$

(3) $(r_2/r_1)^2$ (4) $r_1/r_2$

## AIPMT Pre. 2012

**8.** A spherical planet has a mass $M_p$ and diameter $D_p$. A particle of mass m falling freely near the surface of this planet will experience an acceleration due to gravity, equal to :-

(1) $GM_p/D_p^2$ (2) $4GM_pm/D_p^2$

(3) $4GM_p/D_p^2$ (4) $GM_pm/D_p^2$

**9.** A geostationary satellite is orbiting the earth at a height of 5R above that surface of the earth, R being the radius of the earth. The time period of another satellite in hours at a height of 2R from the surface of the earth is :-

(1) $6\sqrt{2}$ (2) $6/\sqrt{2}$ (3) 5 (4) 10

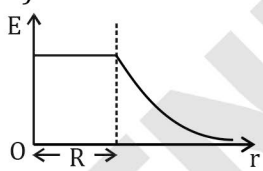
**10.** The height at which the weight of a body becomes $1/16^{th}$ of its weight on the surface of earth (radius R), is :-

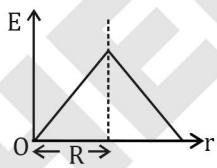
(1) 3R (2) 4R

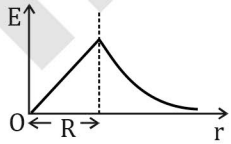
(3) 5R (4) 15R

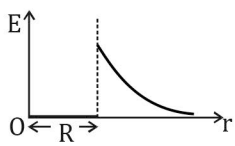
## AIPMT Mains 2012

**11.** Which one of the following plots represents the variation of gravitational field on a particle with distance r due to a thin spherical shell of radius R? (r is measured from the centre of the spherical shell)

(1) 


(2) 


(3) 


(4) 


**12.** If $v_e$ is escape velocity and $v_0$ is orbital velocity of a satellite for orbit close to the earth's surface, then these are related by :

(1) $v_e = \sqrt{2v_0}$ (2) $v_e = \sqrt{2}v_0$

(3) $v_0 = \sqrt{2}v_e$ (4) $v_0 = v_e$

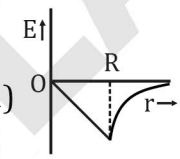
## AIPMT 2014

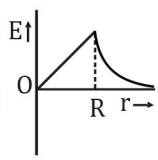
**13.** A black hole is an object whose gravitational field is so strong that even light cannot escape from it. To what approximate radius would earth (mass = $5.98 \times 10^{24}$ kg) have to be compressed to be a black hole ?

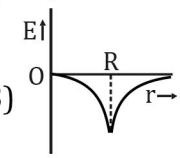
(1) $10^{-9}$ m (2) $10^{-6}$ m

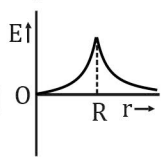
(3) $10^{-2}$ m (4) 100 m

**14.** Dependence of intensity of gravitational field (E) of earth with distance (r) from centre of earth is correctly represented by :-

(1) 


(2) 


(3) 


(4) 


## AIPMT 2015

**15.** Kepler's third law states that square of period of revolution (T) of a planet around the sun, is proportional to third power of average distance r between sun and planet i.e. $T^2 = Kr^3$ here K is constant. If the masses of sun and planet are M and m respectively then as per Newton's law of gravitation force of attraction between them is $F = \frac{GMm}{r^2}$, here G is gravitational constant. The relation between G and K is described as :

(1) $GMK = 4\pi^2$ (2) $K = G$

(3) $K = \frac{1}{G}$ (4) $GK = 4\pi^2$

## Re-AIPMT 2015

**16.** A satellite S is moving in an elliptical orbit around the earth. The mass of the satellite is very small compared to the mass of the earth. Then,

(1) the acceleration of S is always directed towards the centre of the earth.

(2) the angular momentum of S about the centre of the earth changes in direction, but its magnitude remains constant.

(3) the total mechanical energy of S varies periodically with time.

(4) the linear momentum of S remains constant in magnitude.

**17.** A remote - sensing satellite of earth revolves in a circular orbit at a height of $0.25 \times 10^6$ m above the surface of earth. If earth's radius is $6.38 \times 10^6$ m and g = 9.8 m/s$^2$, then the orbital speed of the satellite is :

(1) 6.67 km/s

(2) 7.76 km/s

(3) 8.56 km/s

(4) 9.13 km/s

## NEET-I 2016

**18.** At what height from the surface of earth the gravitation potential and the value of g are $-5.4\times10^7$ J/kg and 6.0 m/s$^2$ respectively ?

Take the radius of earth as 6400 km :

(1) 2600 km (2) 1600 km

(3) 1400 km (4) 2000 km

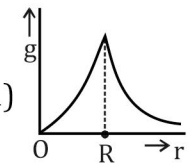
**19.** The ratio of escape velocity at earth ($v_e$) to the escape velocity at a planet ($v_p$) whose radius and mean density are twice as that of earth is :-

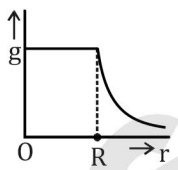
(1) 1 : 2 (2) 1 : $2\sqrt{2}$

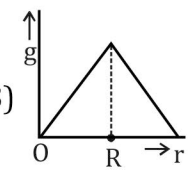
(3) 1 : 4 (4) 1 : $\sqrt{2}$

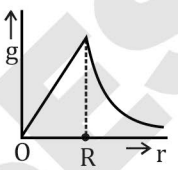
## NEET-II 2016

**20.** Starting from the centre of the earth having radius R, the variation of g (acceleration due to gravity) is shown by :-

(1) 


(2) 


(3) 


(4) 


**21.** A satellite of mass m is orbiting the earth (of radius R) at a height h from its surface. The total energy of the satellite in terms of $g_0$, the value of acceleration due to gravity at the earth's surface, is:-

(1) $\frac{2mg_0R^2}{R+h}$ (2) $-\frac{2mg_0R^2}{R+h}$

(3) $\frac{mg_0R^2}{2(R+h)}$ (4) $-\frac{mg_0R^2}{2(R+h)}$

## NEET(UG) 2017

**22.** The acceleration due to gravity at a height 1 km above the earth is the same as at a depth d below the surface of earth. Then :-

(1) d = 1 km (2) d = $\frac{3}{2}$ km

(3) d = 2 km (4) d = $\frac{1}{2}$ km

**23.** Two astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will :-

(1) Move towards each other.

(2) Move away from each other.

(3) Will become stationary

(4) Keep floating at the same distance between them.

## NEET(UG) 2018

**24.** If the mass of the Sun were ten times smaller and the universal gravitational constant were ten time larger in magnitude, which of the following is ***not*** correct ?

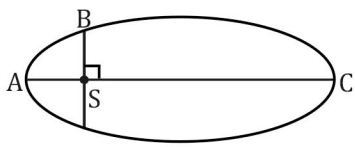
(1) Raindrops will fall faster

(2) Walking on the ground would become more difficult

(3) Time period of a simple pendulum on the Earth would decrease

(4) 'g' on the Earth will not change

**25.** The kinetic energies of a planet in an elliptical orbit about the Sun, at positions A, B and C are $K_A$, $K_B$ and $K_C$ respectively. AC is the major axis and SB is perpendicular to AC at the position of the Sun S as shown in the figure. Then




(1) $K_A < K_B < K_C$ (2) $K_A > K_B > K_C$

(3) $K_B < K_A < K_C$ (4) $K_B > K_A > K_C$

## NEET(UG) 2019

**26.** A body weighs 200 N on the surface of the earth. How much will it weigh half way down to the centre of the earth ?

(1) 150 N (2) 200 N

(3) 250 N (4) 100 N

**27.** The work done to raise a mass m from the surface of the earth to a height h, which is equal to the radius of the earth, is :

(1) mgR (2) 2 mgR

(3) $\frac{1}{2}$ mgR (4) $\frac{3}{2}$ mgR

## NEET(UG) 2019 (Odisha)

**28.** The time period of a geostationary satellite is 24 h, which is at a height $6R_E$ ($R_E$ is radius of earth) from surface of earth. The time period of another satellite whose height is 2.5 $R_E$ from surface will be,

(1) $6\sqrt{2}$ h (2) $12\sqrt{2}$ h

(3) $\frac{24}{2.5}$ h (4) $\frac{12}{2.5}$ h

**29.** Assuming that the gravitational potential energy of an object at infinity is zero, the change in potential energy (final – initial) of an object of mass m, when taken to a height h from the surface of earth (of radius R), is given by,

(1) $-\frac{GMm}{R+h}$ (2) $\frac{GMmh}{R(R+h)}$

(3) mgh (4) $\frac{GMm}{R+h}$

## NEET (UG) 2020

**30.** A body weighs 72 N on the surface of the earth. What is the gravitational force on it, at a height equal to half the radius of the earth?

(1) 24 N (2) 48 N

(3) 32 N (4) 30 N

## NEET (UG) 2020 (Covid-19)

**31.** What is the depth at which the value of acceleration due to gravity becomes 1/n times the value that at the surface of earth? (radius of earth = R)

(1) $R/n^2$ (2) $R(n-1)/n$

(3) $Rn/(n-1)$ (4) $R/n$

## NEET (UG) 2021

**32.** The escape velocity from the Earth's surface is $\upsilon$. The escape velocity from the surface of another planet having a radius, four times that of Earth and same mass density is:

(1) $\upsilon$ (2) $2\upsilon$ (3) $3\upsilon$ (4) $4\upsilon$

**33.** A particle of mass 'm' is projected with a velocity $\upsilon = kV_e$ ($k < 1$) from the surface of the earth. ($V_e$ = escape velocity) The maximum height above the surface reached by the particle is :

(1) $R\left(\frac{k}{1-k}\right)^2$ (2) $R\left(\frac{k}{1+k}\right)^2$

(3) $\frac{R^2k}{1+k}$ (4) $\frac{Rk^2}{1-k^2}$

## NEET (UG) 2022

**34.** A body of mass 60g experiences a gravitational force of 3.0 N, when placed at a particular point. The magnitude of the gravitational field intensity at that point is:

(1) 50 N/kg (2) 20 N/kg

(3) 180 N/kg (4) 0.05 N/kg

**35.** Match List - I with List - II :

| List - I | | List – II | |
|---|---|---|---|
| (a) | Gravitational constant (G) | (i) | $[L^2T^{-2}]$ |
| (b) | Gravitational potential energy | (ii) | $[M^{-1}L^3T^{-2}]$ |
| (c) | Gravitational Potential | (iii) | $[LT^{-2}]$ |
| (d) | Gravitational intensity | (iv) | $[ML^2T^{-2}]$ |

Choose the correct answer from the options given below :

(1) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

(2) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

(3) (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

(4) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

## RE-NEET (UG) 2022

**36.** In a gravitational field, the gravitational potential is given by, $V = -\frac{K}{x}$ (J/kg). The gravitational field intensity at point (2, 0, 3) m is:

(1) $+\frac{K}{2}$ (2) $-\frac{K}{2}$

(3) $-\frac{K}{4}$ (4) $+\frac{K}{4}$



## EXERCISE-II (Previous Year Questions) ANSWER KEY

| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Answer | 4 | 4 | 3 | 2 | 4 | 3 | 2 | 3 | 1 | 1 | 4 | 2 | 3 | 1 | 1 |
| Question | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Answer | 1 | 2 | 1 | 2 | 4 | 4 | 3 | 4 | 4 | 2 | 4 | 3 | 1 | 2 | 3 |
| Question | 31 | 32 | 33 | 34 | 35 | 36 | | | | | | | | | |
| Answer | 2 | 4 | 4 | 1 | 1 | 3 | | | | | | | | | |