# NEET PHYSICS 2018-19 - Chennai

**Periodic Test :** 10 **Test ID :** 022

**Number of questions:** 150 **Test date: 29.03.2019**

**Name:** _____ **Time**: 3HRS

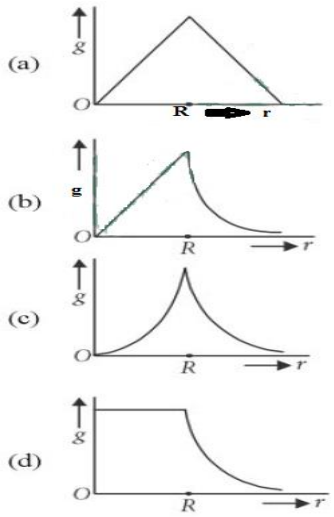
**ID No**: _____

**Negative Marks : 4 marks for correct attempt & 1 mark deducted for every wrong attempt.**

1. 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
   (a) d= 1 km
   (b) d = $\frac{3}{2}\ Km$
   (c) d=2 krn
   (d) d = $\frac{1}{2}\ Km$

2. Two astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will
   (a) move towards each other.
   (b) move away from each other
   (c) will become stationary.
   (d) keep floating at the same distance between them

3. Starting from the centre of the earth having radius R. the variation of g(acceleration due to gravity) is shown by




4. 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 go, the value of acceleration due to gravity at the earth's surface, is

$(a)\quad \frac{mg_{oR^2}}{2(R+h)}$

$(b - \frac{mg_{oR^2}}{2(R+h)}$

$(c)\quad \frac{2mg_{oR^2}}{R+h}$

$(d) - \frac{2mg_{oR^2}}{R+h}$

5. At what height from the surface of earth the gravitation potential and the value of g are -5.4 x $10^7$ $Jkg^{-1}$ and 6.0 $ms^{-2}$ respectively? Take the radius of earth as 6400 km.
   (a) 1400 km
   (b) 2000km
   (c) 2600 km
   (d) 1600km

6. The ratio of escape velocity at earth (Ve) to the escape velocity at a planet (Vp) whose radius and mean density are twice as that of earth is
   (a) 1:4
   (b) 1:$\sqrt{2}$
   (c) 1:2
   (d) 1:$2\sqrt{2}$

7. A remote sensing satellite of earth revolves in a circular orbit at a height of 0.25 x $10^6$ m above the surface of earth. If earth's radius is 6.38 x $10^6$ m and g 9.8 $ms^{-2}$, then the orbital speed of the satellite is
   (a) 9.13 $kms^{-1}$
   (b) 6.67 $kms^{-1}$
   (c) 7.76 $kms^{-1}$
   (d) 8.56 $kms^{-1}$

8. 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,
   (a) the linear momentum of S remains constant in magnitude.
   (b) the acceleration of S is always directed towards the centre of the earth
   (c) the angular momentum of S about the centre of the earth changes in direction but its magnitude remains constant.
   (d) the total mechanical energy of S varies periodically with time.

9. 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 $T_2$= $Kr^3$ hero K is constant. If the masses of sun and planet, arc M and m respectively then as per Newtons 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
   (a) K= G
   (b) K = 1/G
   (c) GK= $4\pi^2$
   0
   (d) GMK= 4 $\pi^2$

10. Two spherical bodies of mass M and 5M and radii R and 2R are released in free space with separation between

their centres equal to 12R. if the attract each other due to gravitational force only. Then the distance covered by smaller body before collision is.

(a) 7.5 R

(b) 1.5R

(c) 2.5R

(d) 4.5R

11. 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 x $10^{24}$Kg) have to be Compressed to be a black hole?

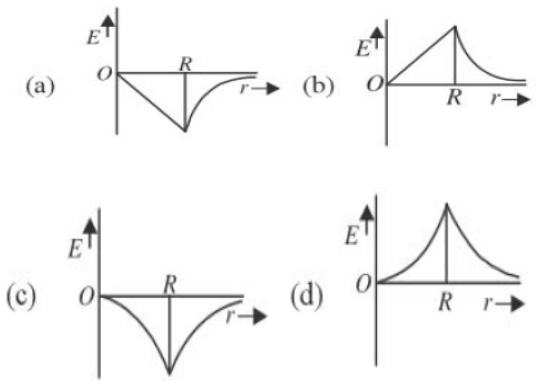
(a) $10^{-9}$ m

(b) $10^{-6}$ m

(c) $10^{-2}$m

(d) 100m

12.Dependence of intensity of gravitational field (E) of earth with distance (r) from centre of earth is correctly represented by




13. Infinite number of bodies, each of mass 2 kg are situated on x-axis at distances 1m, 2m, 4 m,8m respectively, from the origin. The resulting gravitational potential due to this system at the origin will he

(a)$-\frac{4}{3}G$

(b) - 4G

(c) -G

(d) $-\frac{8}{3}G$

14. A body of mass ‘m’ hoe is taken from the earth's surface to the height equal to twice the radius (R) of the earth. The change in potential energy of body.

(a) 3mgR

(b) $\frac{1}{3}$mgR

(c) 3mgR

(d) $\frac{2}{3}$mgR

15.The radius of a planet is twice the radius of earth. Both have almost equal average mass- densities. $V_p$ and $V_E$. are escape velocities of the planet and the earth, respectively, then

(a) $V_p = 1.5\ V_E$

(b) $V_p = 2_E$

(c) $V_E = 3Vp$

(d) $1.5\ _{Vp}$

16. A particle of mass 'm' is kept at rest at a height 3R from the surface of earth. Where ‘R' is radius of earth and 'M’ is mass of earth. The minimum speed

with which it should be projected, so that it does not return back, is (g is acceleration due to gravity on the surface of earth)

(a) $\left[\frac{GM}{2R}\right]^{1/2}$

(b) $\left[\frac{gR}{4}\right]^{1/2}$

(c) $\left[\frac{2g}{R}\right]^{1/2}$

(d) $\left[\frac{GM}{R}\right]^{1/2}$

17. The height at which the weight of a body becomes $\left[\frac{1}{16}\right]^{TH}$ its weight on the surface of earth (radius R), is

(a) 5R

(b) 15R

(c) 3R

(d) 4R

18. 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 acceleration due to gravity, equal to

(a) $\frac{4GM_P}{D_P^2}$

(b) $\frac{GM_Pm}{D_P^2}$

(c) $\frac{GM_P}{D_P^2}$

(d) $\frac{4GM_Pm}{D_P^2}$

19. A geostationary satellite is orbiting the earth at a height of 5R above the surface of the earth 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

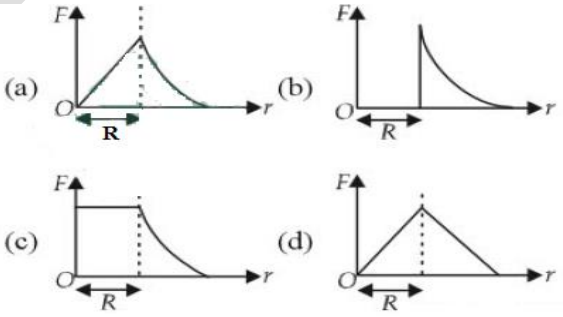
(a) 5

(b) 10

(c) $6\sqrt{2}$

(d) $\frac{6}{\sqrt{2}}$

20. 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)




21. A planet moving along an elliptical orbit is closest to the sun at a distance r1 and farthest away at a distance of r2. If v1 and v2 are the linear velocities at these points respectively then the ratio $\frac{v_1}{v_2}$ is

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

(b) $r_2/r_1$

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

(d) $r_1/r_2$

22. A particle of mass m is thrown upwards from the surface of the earth, with a velocity u. The mass and the radius of the earth are respectively, M and R G is gravitational constant and g is acceleration due to gravity on the surface of the earth. The minimum value u so that the particle does not return back to earth, is

(a) $\sqrt{\frac{2GM}{R^2}}$

(b) $\sqrt{\frac{2GM}{R}}$

(c) $\sqrt{\frac{2gM}{R^2}}$

(d) $\sqrt{2gR^2}$

23. A particle of mass M is situated at the centre of a spherical shell of same mass and radius a. The magnitude of the gravitational potential at a point situated at a/2 distance from the centre will be

(a) $\frac{GM}{a}$

(b) $\frac{2GM}{a}$

(c) $\frac{3GM}{a}$

(d) $\frac{4GM}{a}$

24. 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

(a) $\frac{3V}{4}$

(b) 6V

(c) 12V

(d) $\frac{3V}{2}$

25. A man of 50 kg mass is standing in a gravity free space at a height of 10 m above the floor. He throws a stone of 0.5 kg mass downwards with a speed 2 m/s.When the stone reaches the floor, the distance of the man above the floor will be

(a) 9.9m

(b) 10.1m

(c) 10 m

(d) 20m

26. The acceleration due to gravity on the planet A is 9 times the acceleration due to gravity on planet B. A man jumps to a height of 2 m on the surface of A. What is the height of jump by the same person on the planet B?

(a) (2/9) m

(b) 18 m

(c) 6m

(d) (2/3) m

27. A body of mass in is placed on earth's surface which is taken from earth surface to a height of h = 3R, then

change in gravitational potential energy is

(a) $\frac{mgR}{4}$

(b) $\frac{2}{3}mgR$

(c) $\frac{3}{4}mgR$

(d) $\frac{mgR}{2}$

28. With what velocity should a particle be projected so that its height becomes equal to radius of earth

(a) $\left(\frac{GM}{R}\right)^{1/2}$

(b) $\left(\frac{8GM}{R}\right)^{1/2}$

(c) $\left(\frac{2GM}{R}\right)^{1/2}$

(d) $\left(\frac{4GM}{R}\right)^{1/2}$

29. For a planet having mass equal to mass of the earth but radius is one fourth of radius of the earth. Then escape velocity for this planet will be

(a) 11.2 km/sec

(b) 22.4 km/sec

(c) 5,6 km/sec

(d) 44.8 km/sec

30. Gravitational force is required for

(a) Stirring of liquid

(b) convection

(c) conduction

(d) radiation

31. A body of weight 72 N moves from the surface of earth at a height half of the radius of earth, then gravitational force exerted on it win be

(a) 36 N

(b) 32 N

(c) 144 N

(d) 50N

32. The escape velocity of a body on the surface of the earth is 11.2 km/s. If the earth's mass increase to twice its present value and radius of the earth becomes half, the escape velocity becomes

(a) 22.4 km/s

(b) 44.8 km/s

(c) 5.6 km/s

(d) 11.2 km/s

33. The period of revolution of planet A around the sun is 8 times that of B.The distance of A from the sun is how many times greater than that of B from the sun?

(a) 4

(b) 5

(c) 2

(d) 3

34. What will be the formula of mass of the earth in terms of g, Rand G?

(a) G $\frac{R}{g}$

(b) $g\frac{R^2}{g}$

(c) $g^2\frac{R}{g}$

(d) $G\frac{g}{R}$

35. A ball is dropped from a space craft revolving around the earth at a height of 120 km. What will happen to the ball?
    (a) it will fall down to the earth gradually
    (b) it will go very far in the space
    (c) it will continue to move with the same speed along the original orbit of space craft
    (d) it will move with the same speed, tangentially to the spacecraft.

36. The acceleration due to gravity g and mean density of the earth ρ are related by which of the following relations? (Where G is the. gravitational constant and R is the radius of the earth.)
    (a) $\rho = \frac{3g}{4\pi GR}$
    (b) $\rho = \frac{3g}{4\pi GR^3}$
    (c) $\rho = \frac{4\pi gR^2}{3G}$
    (d) $\rho = \frac{4\pi gR^3}{3G}$

37. Two particles of equal mass go around a circle of radius R under the action of their mutual gravitational attraction. The speed υ of each particle is
    (a) $\frac{1}{2}\sqrt{\frac{Gm}{R}}$
    (b) $\sqrt{\frac{4Gm}{R}}$
    (c) $\frac{1}{2R}\sqrt{\frac{1}{Gm}}$
    (d) $\sqrt{\frac{Gm}{R}}$

38. The earth (mass = $6x\ 10^{24}$ kg) resolves around the sun with an angular velocity in a circular orbit of radius 1.5 x $10^8$.The force exerted by the sun on the earth in newton is
    (a) $36 \times 10^{21}$
    (b) $27 \times 10^{39}$
    (c) Zero
    (d) $18\ x10^{25}$

39. The radius of earth is about 6400 km and that of mars is 3200 km.The mass of the earth is about 10 time mass of mars. An object weighs 200 N on the surface of earth. Its weight on the surface of mars will be
    (a) 20N
    (b) 8N
    (c) 80 N
    (d) 40 N.

40. The distance of two planets from the sun are $10^{13}$m and $10^{12}$ m respectively. The ratio of time periods of the planets is

(a) $\sqrt{10}$

(b) $10\sqrt{10}$

(c) 10

(d) $1\sqrt{10}$

41. If the gravitational force between two objects were proportional to 1/R (and not as $1/R^2$).where R is the distance between them, then a particle in a circular path (under such a force) would have its orbital speed υ proportional to

(a) R

(b) R° (independent of R)

(c) $1/R^2$

(d) 1/R.

42. A satellite in force free space sweeps stationary interplanetary dust at a rate of dM/dt = αυ where M is mass and υ is the speed of satellite and α is a constant. The acceleration a satellite is

(a) $\frac{-\alpha\upsilon^2}{2M}$

(b) $-\alpha\upsilon^2$

(c) $\frac{-2\alpha\upsilon^2}{M}$

(d) $\frac{-\alpha\upsilon^2}{M}$

43. The escape velocity from earth is 11.2 km/s, If a body is to be projected in a direction making an angle 45° to the vertical, then the escape velocity is

(a) 11.2 x 2km/s

(b) 11.2 km/s

(c) 11.2 /$\sqrt{2}$km/s

(d) 11.2 $\sqrt{2}$km/s

44. A satellite A of mass m is at a distance of r from the surface of the earth. Another satellite B of mass 2m is at a distance of 2r from the earth's centre. Their time periods are in the ratio of

(a) 1:2

(b) 1:16

(c) 1:32

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

45. The mean radius of earth is R, its angular speed on its own axis is ω and the acceleration due to gravity at earth's surface is g. what will be the radius of the orbit of a geostationary satellite.

(a) $(R^2g/\omega^2)^{1/3}$

(b) $(Rg/\omega^2)^{1/3}$

(c) $(R^2\omega^2/g)^{1/3}$

(d) $(R^2g/\omega)^{1/3}$

46. The satellite of mass m is orbiting around the earth in a circular orbit with

a velocity υ. what will be its total energy

(a) (3/4) m $\upsilon^2$

(b) (1/2) m $\upsilon^2$

(c) m $\upsilon^2$

(d) -(1/2) m $\upsilon^2$

47. A planet is moving in an elliptical orbit around the sun. If T, V, E and L stand respectively for its kinetic energy, gravitational potential energy, total energy and magnitude of angular momentum about the centre of force, which of the following is correct ?

(a) T is conserved (b) is always positive

(b) E is always negative

(c) L is conserved. but direction of vector L

(d) changes continuously.

48. For a satellite escape velocity is 11 km/s. If the satellite is launched at an angle of $60^0$ with the vertical, then escape velocity will be

(a) 11km/s

(b) $11\sqrt{3}$ k/ms

(c) $\frac{11}{\sqrt{3}}$ km/s

(d) 33 km/s

49. The largest and the shortest distance of the earth from the sun are r1 and r2. Its distance from the sun when it is at perpendicular to the major-axis of the orbit drawn from the sun is

(a) $\frac{r_1+r_2}{4}$

(b) $\frac{r_1+r_2}{r_1-r_2}$

(c) $\frac{2r_1r_2}{r_1+r_2}$

(d) $\frac{r_1+r_2}{3}$

50. Two spheres of masses m and M are situated in air and the gravitational force between them is F. The space around the masses is now filled with a liquid of specific gravity 3. The gravitational force will now be

(a) 3F

(b) F

(c) F/3

(d) F/9