NEET PHYSICS PRACITCE PAPER

Time : 60 Mins **6 GRAVITATION 1** **Marks : 200**

1. A satellite moving around the earth in a circular orbit of radius rand speed u suddenly loses some of its energy. Then:
   a) r will increase and v will decrease b) both r and v will decrease c) r will decrease and u will increase
   d) none of the above
2. An earth satellite is moved from one stable circular orbit to a farther stable circular orbit. Which one of the following quantities increases?
   a) Linear orbital speed b) Gravitational force c) Centripetal acceleration d) Gravitational potential energy
3. The ratio of the inertial mass to gravitational mass is equal to
   a) 1/2 b) 1 c) 2 d) No fixed number
4. The gravitational potential at height h above the earth's surface is -5.12 x 10^7 J/kg and acceleration due to gravity at this point is 6.4 ms^{-2} .If radius of the earth is 6400 km, the value of his:
   a) 1200 Km b) 1600 Km c) 1800 Km d) 2400 Km
5. A satellite goes along an elliptical path around the earth. The rate of change of arc length swept by the satellite is proportional to:
   a) r b) r^2 c) $r^{1/2}$ d) r^{-1}
6. The total energy of a satellite moving with an orbital velocity v around the earth is:
   a) $\frac{1}{2}mv^2$ b) $-\frac{1}{2}mv^2$ c) mv^2 d) $\frac{3}{2}mv^2$
7. A missile launched with a velocity less than escape velocity, the sum of its KE and PE is always:
   a) + ve b) Zero c) -ve d) none of these
8. A person will get more quantity of matter (in kg-wt) at:
   a) poles b) at latitude of 60° c) equator d) satellite
9. Which of the following statements is correct regarding the universal gravitational constant G?
   a) G has same value in all systems of units. b) The value of G is same everywhere in the universe
   c) The value of G was first experimentally determined by Johannes Kepler d) G is a vector quantity
10. Which of the following statements is correct about satellites?
    a) A satellite cannot move in a stable orbit in a plane passing through the earth's centre
    b) Geostationary satellites are launched in the equatorial plane
    c) We can use just one geostationary satellite for global communication around the globe
    d) The speed of satellite increases with an increase in the radius of its orbit
11. An artificial satellite is moving in a circular orbit around the earth with a speed equal to half the magnitude of escape velocity from the earth. The height of the satellite above the earth's surface will be:
    a) 6000 Km b) 5800 Km c) 7500 Km d) 6400 Km
12. If the polar ice caps of the earth melt, how will it affect the length of day?
    a) Length of day would remain unchange b) Length of day would increase
    c) Length of day would decrease d) None of the above
13. The masses and radii of the earth and the moon are M_1, R_1 and M_2, R_2 respectively. Their centres are at distance d apart. The minimum speed with which a particle of mass m should be projected from a point midway the two centres so as to escape to infinity is:

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a) $\sqrt{\frac{2G(M_1+M_2)}{d}}$ b) $\sqrt{\frac{4G(M_1+M_2)}{d}}$ c) $\sqrt{\frac{4GM_1+M_2}{d}}$ d) $\sqrt{\frac{G(M_1+M_2)}{d}}$

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14. 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 got the value of acceleration due to gravity at the earth's surface, is
a) $mg_oR^2/2(R+h)$ b) $-mg_oR^2/2(R+h)$ c) $2mg_oR^2/(R+h)$ d) $-2\ mg_oR^2/(R+h)$

15. The change in PE of a body of mass m placed on the earth when it is taken to a height of R (R = radius of the earth) above the earth surface:
a) mgR b) mgR/2 c) 3mgR/4 d) 2/3 mgR

16. (A) For a mass M kept at the centre of a cube of side a, the flux of gravitational field passing through its surfaces is 4 πG M.
(R) If the direction of a field due to a point source is radial and its dependence on the distance rfrom the source is given as $11r^2$, its flux through a closed surface depends only on the strength of the source enclosed by the surface and not on the size or shape of the surface
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false.
e) If assertion is false but reason is true.

17. A projectile is fired from the surface of the earth with a velocity of $5\ \mathrm{ms}^{-1}$ and angle with the horizontal. Another projectile fired from another planet with a velocity of $3\ \mathrm{ms}^{-1}$ at the same angle follows a trajectory which is identical with the trajectory of the projectile fired from the earth. The value of the acceleration due to gravity on the planet is (in ms $^{-2}$) given $\left(g = 9.8\ \mathrm{m/s^2}\right)$____
a) 3.5 b) 5.9 c) 16.3 d) 110.8

18. (A) Gravitational potential of earth at every place on it is negative.
(R) Everybody on the earth is bound by the attraction of the earth.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true

19. Two satellites S and S' revolve around the earth at distances 3R and 6R from the centre of the earth. Their periods of revolution will be in the ratio:
a) 1 : 2 b) 2 : 1 c) $1 : 2^{1.5}$ d) $1 : 2^{0.67}$

20. The potential energy of a satellite, having mass m, rotating at a height of $6.4 \times 10^6\ \mathrm{m}$ from the earth surface, is____
a) $-\mathrm{mgR_e}$ b) $-0.67\mathrm{mgR_e}$ c) $-0.5\mathrm{mgR_e}$ d) $-0.33\mathrm{mgR_e}$

21. For a satellite escape velocity is 11 km/s. If the satellite is launched at an angle of 60° with the vertical, then escape velocity will be :
a) 11 km/s b) $11\sqrt{3}$ km/s c) $11\sqrt{3}$ km/s d) 33 km/s

22. (A) If a body is taken from earth to moon, its gravitational mass becomes one-sixth on moon.
(R) Gravitational mass depends upon acceleration due to gravity.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false
e) If assertion is false but reason is true.

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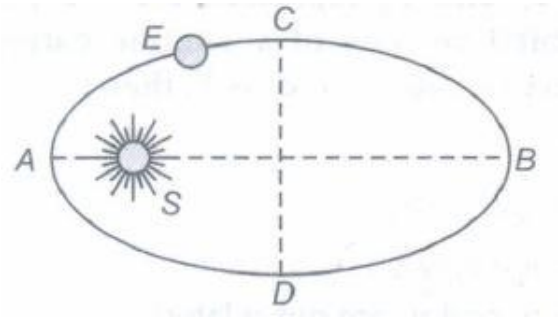
23. The Earth E moves in an elliptical orbit with the Sun S at one of the foci as shown in figure. Its speed of motion will be maximum at the point:



a) C b) A c) B d) D

24. The time period of an earth satellite in circular orbit is independent of:
a) the mass of the satellite b) radius of its orbit c) both the mass of satellite and radius of the orbit
d) neither the mass of satellite nor the radius of its orbit

25. The condition for a uniform spherical mass mofradius r to be a black hole is: (G = gravitational constant and g = acceleration due to gravity)
a) $(2Gm/r)^{1/2} \leq c$ b) $(2gm/r)^{1/2} = c$ c) $(2Gm/ r)^{1/2} \geq c$ d) $(gm/ r)^{1/2} \geq c$

26. A rocket is fired vertically from the ground with resultant vertical acceleration of 10 m/sec^2. If the fuel is finished in one minute and it continues to move up, the maximum height reached by it is nearly:
a) 40 km b) 20 km c) 10 km d) 80 km

27. The time-period of a satellite of the earth is 5 hours. If the separation between the earth and the satellite is increased to 4 times the previous value, the new time period will become:
a) 10 hours b) 20 hours c) 40 hours d) 80 hours

28. Two satellites of masses M_1 and M_2 are revolving around the earth in circular orbits of radii r_1 and r_2. The ratio of their speeds V_1 / v_2 is
a) $\frac{r_1}{r_2}$ b) $\frac{r_2}{r_1}$ c) $\sqrt{\frac{r_1}{r_2}}$ d) $\sqrt{\frac{r_2}{r_1}}$

29. A pendulum beats seconds on the earth. Its time period on a stationary satellite of the earth will be:
a) Zero b) 1 s c) 2 s d) infinity

30. Both earth and moon are subjected to the gravitational force of the sun. As observed from the sun, the orbit of the moon
a) will be elliptical b) will not be strictly elliptical because the total gravitational force on it is not central
c) is not elliptical but will necessarily be a closed curve
d) deviates considerably from being elliptical due to the influence of planets other than earth

31. Which of the following statements is incorrect regarding the polar satellite?
a) A polar satellite goes around the earth's pole in north-south direction.
b) Polar satellites are used to study topography of Moon, Venus and Mars.
c) A polar satellite is a high altitude satellite d) The time period of polar satellite is about 100 minutes.

32. A rubber ball is dropped from a height of 5 m on a planet where the acceleration due to gravity is not known. On bouncing it rises to 1.8 m. The ball loses its velocity on bouncing by a factor of _____
a) 16 / 25 b) 2/5 c) 3 / 5 d) 9 / 25

33. The period of the moon's rotation around the earth is nearly 29 days. If the moon's mass were 2-fold, its present value and all other things remained unchanged, the period of the moon's rotation would be nearly:
a) $29\sqrt{2}$ days b) $29/\sqrt{2}$ days c) 29 x 2 days d) 29/2 days

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34. Assuming that earth and mars move in circular orbits around the sun, with the martian orbit being 1.52 times the orbital radius of the earth. The length of the martian year in days is :
a) $(1.52)^{2/3}$ x 365 b) $(1.52)^{3/2}$ x 365 c) $(1.52)^2$ x 365 d) $(1.52)^3$ x 365

35. A rod of length 3 m and its mass acting per unit length is directly proportional to distance x from its one end. The centre of gravity of the rod from that end will be at:
a) 1.5 m b) 2 m c) 2.5 m d) 3.0 m

36. Weight of a body of mass m decreases by 1% when it is raised to height h above the earth's surface. Ifthe body is taken to a depth h in a mine, change in its weight is:
a) 2% decrease b) 0.5% decrease c) 1% increase d) 0.5% increase

37. Assertion: For a free falling object, the net external force is just the weight of the object.
Reason: In this case the downward acceleration of the object is equal of the acceleration due to gravity.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

38. Two identical spheres of radius R made of the same material are kept at a distance d apart. Then the gravitational attraction between them is proportional to
a) d^{-2} b) d^2 c) d^4 d) d

39. At what height from the earth's surface the acceleration due to gravity will be half the value of g at the surface? (Re = 6400 km)
a) 3050 km b) 3240 km c) 2650 km d) None of these

40. At surface of Earth weight of a person is 72 N then his weight at height R/2 from surface of Earth is (R= radius of earth)
a) 28N b) 16N c) 32N d) 72N

41. Two satellites are in the parking orbits around the earth. Mass of one is 10 times that of the other. The ratio of their periods of revolution is:
a) 1 b) $\sqrt{10}$ c) 10 d) 100

42. Potential energy of a satellite having mass 'm' and rotating at a height of 6.4 x 106 m from the Earth centre is :
a) - 0.5 mgRe b) - mgRe c) -2 mgRe d) 4 mgRe

43. Two spherical bodies of mass M and 5M and radii -R and 2 R released in free space with initial separation between their centres equal to 12 R. If they attract each other due to gravitational force only, then the distance covered by the smaller body better collision is _____.
a) 4.5 R b) 7.5 R c) 1.5 R d) 2.5 R

44. The height at which the weight of a body becomes 1/16th, its weight on the surface of Earth (radius R), is:
a) SR b) 15R c) 3R d) 4R

45. Assertion: The gravitational force on a particle inside a spherical shell is zero.
Reason: The shell shields other bodies outside it from exerting gravitational forces on a particle inside.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

46. Two point masses A and B having masses in the ratio 4 : 3 are separated by a distance of 1 m. When another point mass C of mass M is placed in between A and B, the force between A and C is $\left(\frac{1}{3}\right)^{rd}$ of the force between Band C. Then the distance of C from A is:

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a) $\left(\frac{2}{3}\right)m$ b) $\left(\frac{1}{3}\right)m$ c) $\left(\frac{1}{4}\right)m$ d) $\left(\frac{2}{7}\right)m$

47. Which of the following Kepler's laws is also known as harmonic law?
    a) First law b) Second law c) Third law d) None of these

48. If the earth loses its gravity, then for a body:
    a) weight becomes zero, but not the mass b) mass becomes zero, but not weight
    c) neither mass nor weight is zero d) both mass and weight are zero

49. When the distance between the earth and the sun is halved, the duration of year will become:
    a) more b) less c) can't be determined d) none of these

50. Assuming the radius of the earth as R, the change in gravitational potential energy of a body of mass m, when it is taken from the earth's surface to a height 3 R above its surface, is _____ .
    a) $3mg\mathrm{R}$ b) 3/4mgR c) 1mgR d) 3/2mgR

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