INDUS RANGERS INSTITUTE PVT. LTD

GRAVITATION

1.If the radius of the earth were to shrink by one percent, it mass remaining the same ,the value of g on the earth's surface would.
(a)increased by 0.5 % (b)increase by 2%
(c)decrease by 0.5 % (d)decrease by 2%

2.The escape velocity from the earth is 11 km/s. The escape velocity a from a planet having twice the radius and the same mean density as those of the earth is
(a)5.5 km/s (b)11km/s
(c)22km/s (d)none of these

3.The orbital speed of Jupiter is
(a)greater than the orbital speed of the earth
(b)less than the orbital speed of the earth
(c)equal to the orbital speed of the earth
(d)zero

4. A body of mass m is taken from the earth's surface to a height equal to the radius R of the earth .If g is the acceleration due to gravity at the surface of the earth, then the change in the potential energy of the body is
(a)$\frac{1}{4}$ mgR (b)$\frac{1}{2}mgR$
(c)mgR (d)2 mgR

5.If the distance between two masses is doubles ,the gravitational attraction between them
(a)is doubled
(b)becomes four times
(c)is reduced half
(d)is reduced to quarter

6.The relay satellite transmits the television programme continuously from one part of the world to another because its
(a)period is greater than the period of rotation of the earth its axis
(b)period is less than the period of rotation of the earth about its axis
(c)period to equal to the period of rotation of the earth about its axis
(d)mass is less than the mass of the earth

7.Imagine a light planet revolving around a very massive star in a circular orbit of radius R with period T. If the gravitational force of attraction between the planet and the star is proportional to $R^{-5/2}$,then T^2 is proportional to
(a)R^3 (b) $R^{7/2}$ (c)$R^{3/2}$ (d) $R^{3.75}$

8.A satellite of mass m is revolving around the earth at a height R above the surface of the earth. If g is the gravitational field of the earth .If g is the gravitational field intensity at the earth's surface and R is the radius of

the earth, the kinetic energy of the satellite is

(a)$\frac{mgR}{4}$ (b)$\frac{mgR}{2}$

(c)mgR (d)2 mgR

9.The ratio of the inertia mass to gravitational mass is equal to

(a)1/2 (b)1

(c)2 (d)no fixed number

10.A missile is launched with a velocity less than the escape velocity .The sum of its kinetic energy and potential energies is :

(a)positive (b)negative

(c)zero

(d)may be positive or negative depending upon is initial velocity

11. The radius of the earth is 6400 km and g=10m/s^2.In order that a body of 5 kg weighs zero at the equator ,the angular speed of the earth should be

(a)$\frac{1}{80}$rad/s (b) $\frac{1}{400}$rad/s

(c)$\frac{1}{800}$rad (d)$\frac{1}{1600}$rad/s

12.A planet moves around the sun. At a point Pit is closest to the sun at a distance d_1 and has a speed v_1 .At another point Q, when it is farthest from the sun at a distance d_2,It speed will be

(a)$\frac{d_1^2 v_1}{d_2}$ (b) $\frac{d_2 v_1}{d_1}$

(c) $\frac{d_1 v_1}{d_2}$ (d) $\frac{d_2^2 v_1}{d_1^2}$

13.Two planets have radii R_1 *amd* R_2 and densities p_1 *and* p_2 respectively .The ratio of the acceleration due to gravity at their surfaces is

(a) $\frac{p_1 R_1}{p_2 R_2}$ (b) $\frac{p_1 R_2^2}{p_2 R_1^2}$

(c)$\frac{R_1 R_2}{P_1 P_2}$ (d) $\frac{p_2 R_1}{p_1 R_2}$

14.The mass of moon is $\frac{1}{81}$ of earth's mass and its radius is $\frac{1}{4}$ of that of the earth .If the escape velocity from the earth's surface is 11.2km/s, is value for the moon is

(a)0.14 km/s (b)0.5 km/s

(c)2.5 km/s (d)5.0 km/s

15.A satellite of moving in a circular orbit around the earth. If gravitational pull suddenly disappear, then it

(a)continues to move with the same speed along the same path

(b)moves with the same speed tangential to the original orbit

(c)falls down with increasing speed

(d)comes to rest after moving a certain distance along the original path

16.If the distance between the earth and the sun were half its present value, the number of days in a year would have been about

(a)64.5 (b)129 (c)182.5 (d)730

17.If the earth were at one-fourth its present distance from the sun ,the duration of the year will be

(a)half the present year

(b)one –fourth the present year

(c)one –sixth the present year
(d)one –eight the present year

18.A planet is moving in a elliptic orbit .If T,V,E and L stand respectively, for its kinetic energy, gravitational potential energy ,total energy and angular momentum about the centre of force ,then
(a)T is conserved
(b)V is always positive
(c)E is always negative
(d)magnitude of L is conserved but its direction changes continuously

19.If the mean radius of earth is R, its angular velocity is ω , and the acceleration due to gravity at the surface of the earth is g, then the cube of the radius of the orbit of a geostationary satellite will be
(a)R^2g/ω^2 (b)R^2g/ω
(c)$R^2\omega^2/g$ (d)R g/ω^2

20.Two planes of radii R_1 *and* R_2 are made of the same material. The ratio of the acceleration due to gravity at the surfaces of the two planet is
(a)R_1/R_2 (b)R_2/R_1
(c)$(R_1/R_2)^2$ (d) $(R_2/R_1)^2$

21.Select the only correct statement from the following
(a)The orbital velocity of a satellite increase with the radius of the orbit
(b)Escape velocity of a particle from the surface of the earth depends on the speed with which it is fired
(c)The time period of a satellite does not depend on the radius of the orbit
(d)The orbital velocity is inversely proportional to the square root of the radius of the orbit

22. The time period of an earth satellite close to the surface of the earth is 8.3 minutes .The time period of another earth satellite in an orbit at a distance of three earth radii from its surface will be
(a)83 minutes (b)$83\sqrt{8}$ minutes
(c)664 minutes (d)249minutes

23.The gravitational field due to a mass distribution is E=K/x in the x-direction ,where K is a constant Taking at a distance x is
(a)K/x (b)K/2x (c)K/x^2 (d)$K/2x^2$

24.Two satellites A and B go round a planet P in circular orbits having radii 4R and R respectively .If the speed of A is 3 V, that of B will be
(a)12 V (b)6V (c)$\frac{4}{3}$V (d)$\frac{3}{2}V$

25.If the value of g at the surface of the earth is 9.8m/s^2,then the value of g at a place 480 km above the surface of the earth will be (radius of earth =6400 km)
(a)4.2 m/s^2 (b)7.2m/s^2
(c)8.5m/s^2 (d)9.8m/s^2

26. The average distance of two planets from the sun are in the ratio 1:2.The time period of revolution are I approximately ratio

(a)1:2 (b)1:$2\sqrt{2}$ (c)1:4
(d)1:8

27.The escape velocity from the surface of a planet is 10^4m/s. If a mass of 2 kg falls from infinity to the surface of the planet, its kinetic energy on reaching the surface will be
(a)10^8J, zero
(b) 10^8J, 10^{-8}J
(c)0.5 x 10^8J,0.5 x 10^{-8}J
(d))10^8J,)10^8J

28.The gravitational force between two points masses m^1 and m^2 at a separation r is given by F=k$\frac{m_1 m_2}{r^2}$
.The constant K.
(a)depends only on the system of unit
(b)depends only on the medium between the masses
(c)depends on both
(d)in independent of both (a) and (b)

29.If a rocket is to be projected vertically upwards from the surface of the earth ,it requires an escape velocity of 11 km/s .If the rocket is to be projected at an angle of 60° with the vertical, the escape velocity required will be about
(a)5.5 km/s (b)11$\sqrt{2}$km/s
(c)11km/s (d)5.5 x$\sqrt{3}$ km/s

30. If R is the radius of the earth then the altitude at which the acceleration due to gravity will be 25% if its value at the earth's surface is
(a)R/4 (b)R (c)3R/8 (d)R/2