PHYSICS

BOOKS - SAI PHYSICS (TELUGU ENGLISH)

GRAVITATION

Mcqs

1. Infinite number of spheres , each of mass m are placed on the X- axis at distance 1,2,4,8,16,

... meter from origin . The magnitide of the gravitational field at the origin is

A. $\frac{2}{3}$Gm

B. $\frac{4}{3}$Gm

C. Gm

D. 6Gm

Answer: B

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2. A body is projected vertically from the surface of the earth of radius 'R' with a velocity equal t half of the escape velocity . The maximum heign reached by the body is

A. $\frac{R}{2}$

B. $\frac{R}{3}$

C. $\frac{R}{4}$

D. $\frac{R}{5}$

Answer: B

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3. A satellite revolving around a planet has orbit velocity 10km/s . The additional velocity required for the satellite to escape from the gravitational field of the planet is

A. 14.14km/s

B. 1.2km/s

C. 4.14km/s

D. 41.4 km/s

Answer: C

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4. A setellite os revolving very close to a planet of density p. The period of revolution of satellite is

A. $\sqrt{3}\pi\frac{p}{G}$

B. $\sqrt{3}\frac{\pi}{2}pG$

C. $\sqrt{3}\frac{\pi}{p}G$

D. $\sqrt{3}\pi\frac{G}{p}$

Answer: C

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5. A body is projected at an angle $thita$ so that its range is maximum . If T is the time of light , then the value of maximum range is (acceleration due to gravity = g)

A. $\frac{g^2T}{2}$

B. $g\frac{T}{2}$

C. $g\frac{T^2}{2}$

D. $\frac{g^2T^2}{2}$

Answer: C

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6. The gravitational force acting on a particle due to a solid sphere of uniform density and radius R, at a distance of 3R from the center of the sphere is F_1 . A spherical hole of radius (R/2) is now made in the sphere as shown in the figure . The sphere with hole now exert a

force F_2 on the same particle , Ratio of F_1 and F_2 is

A. $\frac{50}{41}$

B. $\frac{41}{50}$

C. $\frac{41}{42}$

D. $\frac{25}{41}$

Answer: A

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7. The gravtational field in a region is given by equation E= (5i+12j) N/kg . If a particle of mass 2kg is moved the change in gravitational potential energy is

A. (-) 225 j

B. (-) 240 j

C. (-) 245 j

D. (-) 250 j

Answer: B

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8. Assertion A An astronaut inside a massive spaceship orbiting around the earth will experience a finite but small gravitational force .

Reason R The centripetal force necessary to keep the spaceship in orbit around the earth is provide by the gravitational force between the earth and the spaceship .

A. (a) Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) abd (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is not true

D. (A) is not true but (R) is true

Answer: D

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9. A launching vehicle carrying an artificial satellite of mass m is set for launch on the surface of the earth of mass M and radius R . If

the satellite is intended to move in a circular orbit of radius 7R , the minimum energy . Required to be spent by the launching vehicle on the required to be spent by the launching vehicle on the satellite is (Gravitational constant =G)

A. $GM\frac{m}{R}$

B. $-13GM\frac{m}{14}R$

C. $GM\frac{m}{7}R$

D. $GM\frac{m}{14}R$

Answer: B

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10. A body is projected vertically from the surface of the earth of radius 'R' with a velocity equal t half of the escape velocity . The maximum heign reached by the body is

A. $\frac{R}{6}$

B. $\frac{R}{3}$

C. $2R3$

D. R

Answer: B

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11. The orbit of geostationary satelite is circular , the time period of satellite depend on (I) Mass of the satellite

(ii) mass of the earth

(iii) Radius of the orbit

(iv) Height of the satellite from the surface of earth

which of the following is correct ?

A. (i) only

B. (i) and (ii)

C. (i) , (ii) and (iii)

D. (ii), (iii)and (iv)

Answer: D

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12. The mass of a planet is half that of the earth and the radius of the planet is one - fourth that of earth . If we plan to send an

artificail satellite from the planet , the escape velocity will be (escape velocity on earth $v_e = 11km - s^{-1}$)

A. $11km - s^{-1}$

B. $1.5km - s^{-1}$

C. $15.55km - s^{-1}$

D. $7.78km - s^{-1}$

Answer: D

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13. Assertion (A) A particle of mass m dropped into a hole made along the daimeter of the earth from onr end to the other and passess simple harmonic motion .

Reason (R) Gravitational force between any two particle is inversely proportianal to the sqaure o fthe distance between them .

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true but (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A

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14. The escape velocity of a body on the earth's surface is v_e. A body is thrown up with a speed $\sqrt{5}v_e$, Assuming that the sun and planet do not influlence the motion of the body , velocity of the bidy at infinite distance , is

A. Zero

B. V_e

C. $\sqrt{2}v_1$

D. $2V_e$

Answer: D

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15. A satellite is launched in a circular orbit of radius R around earth while a second satellite is launched into a orbit of radius 1.02 R . The

Percentage difference in the time period of the two satellite is

A. 0.7

B. 1 .0

C. 1.5

D. 3

Answer: D

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16. A body is projected up with a velocity up with a velocity equal to $\frac{3}{4}$ of the escape velocity from the surface of the earth . The height it reaches is (Radius of the earth = R)

A. $10\frac{R}{9}$

B. $9\frac{R}{7}$

C. $9\frac{R}{8}$

D. $10\frac{R}{3}$

Answer: B

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17. Mass M is divided into two parts xm and (1-x)m . For a given separation the value of x for which the gravitational attraction between the two pieces becomes maximum is

A. $\frac{1}{2}$

B. $\frac{3}{5}$

C. 1

D. 2

Answer: A

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18. R and r are the radii of the earth and moon respectively , p_e and P_m are densities of earth and mon respectively . The ratio of the acceleration due to geavity on the surfaces of moon and earth is

A. $\frac{R}{r}.\frac{p_e}{p_m}$

B. $\frac{r}{R}.\frac{p_e}{p_m}$

C. $\frac{r}{R} \cdot \frac{P_m}{p_e}$

D. $\frac{R}{r} \cdot \frac{P_m}{P_e}$

Answer: A

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19. The height of the point verrtically aboce the earth 's surface at which acceleration due to gravity become 1% if its value at the surface is (Radius of the earth = R)

A. 8R

B. 9R

C. 10R

D. 20R

Answer: B

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20. Taking that earth revolves round the sun ina circular orbit of radius 15×10^{10} m, with a time period 1 yr the time taken by another

planet , which is at a distance of 540×10^{10} m, to revolve rounnd the sun in circular orbit once , will be

A. 216 yr

B. 144yr

C. 72yr

D. 36yr

Answer: A

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21. If R is the radius of earth , the height ,at which the weight of a body becomes $\frac{1}{4}$ of its weight on the surface of earth , is

A. 2R

B. R

C. $\frac{R}{2}$

D. `R/4

Answer: B

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22. value of g is

A. Maximum at poles

B. Maximum at equator S

C. Same every where

D. Minimum at poles

Answer: A

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23. A satellite is revolving near the earth's surface, Its orbit velocity is

A. $5.8km - s^{-1}$

B. $18.4km - s^{-1}$

C. $11.2Km - s^{-1}$

D. $8.0km - s^{-1}$

Answer: D

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24. The orbital speed for an earth satellite near the surface of the earth $7km - s^{-1}$ „. If the radius of the orbit is 4 times the radius of the earth is the orbital speed would be

A. $3.5km - s^{-1}$

B. $7km - s^{-1}$

C. $7\sqrt{2}km - s^{-1}$

D. $14km - s^{-1}$

Answer: D

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25. Mass of the palnet is `1/9 of the mass of earth and its

radius is half that of the earth . IF a body weight 9 N on the earth , its weight on the planet would be

A. 6 N

B. 4N

C. 2N

D. 1N

Answer: B

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26. The escape velocity of a body from the earth is u. What is the escape velocity from a palnet whose mass and radius are twice those of the earth ?

A. 2u

B. u

C. 4u

D. 12h

Answer: B

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27. The orbit period for an earth satellite near the surface of earth is

A. 2h

B. 5h

C. 24h

D. 12h

Answer: C

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28. The escape velocity of an object on a planet whose radius is 4 times that of the earth and value of g is same as that on the earth , in $km - s^{-1}$ is

A. 33.6

B. 22.4

C. 16.8

D. 25.2

Answer: B

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29. If the earth suddenly stops rotating , the value of g at equater would

A. Decrease

B. Remain unchanged

C. Increase

D. Become Zero

Answer: C

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30. If the accelaeration due to gravity g at the earth's surface is 9.8 ms^{-2} and mass of earth is 80 times that of moon and radius of earth 4

times that of moon , the value of g at the moon's surface will be

A. $1.96ms^{-2}$

B. $2.96ms^{-2}$

C. $0.96ms^{-2}$

D. $3.96ms^{-2}$

Answer: A

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31. Two satellite A and B go around the earth in circulaar orbits at a height of R_A and R_B respectively from the surface of the earth , Assume earth to be a uniform sphere of radius R_e . The ratio of the magnitude of the velocities of the satllilte $\frac{V_A}{V_B}$

A. $\frac{\sqrt{R}_B}{R_A}$

B. $(R_s + R_e)/(R_A + R_E)$

C. $\frac{\sqrt{R}_s + R_E}{R_A + R_E}$

D. $\left(\frac{R_A}{R_B}\right)^2$

Answer: C

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32. Let A be the area swept out by the line joining the earth and the sun during first week of Feb, 1991. The area swept out by the line during a typical week in Feb, 1992 is

A. Equal

B. High

C. Reduce

D. Cannot say

Answer: A

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33. Earth is flattened at poles and bulging at the equator . This is due to

A. Central force is less at the equater than at poles

B. Angular velocity is more at poles

C. Centrifugal force is more at the rquator than at poles

D. None of the above

Answer: C

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34. If the escape velocity on the earth is $11.2km - s^{-1}$, its value for a planet having double the radius and 8 times the mass of earth is

A. $11 \times 10^3 m - s^{-1}$

B. $22.4 m - s^{-1}$

C. $1100 m - s^{-1}$

D. $22.4 \times 10^3 m - s^{-1}$

Answer: D

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35. The acceleration due to gravity at a height (take g= 10 ms^{-2} on the earth surface) above earth,s surface is 9 ms^-2 . It value at a point ,

at an equal distance below the surface of the earth is

A. $9.5ms^{-2}$

B. $8.5ms^{-2}$

C. $7.5ms^{-2}$

D. $5.5ms^{-2}$

Answer: A

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