Physics Set-4

1. A particle was thrown in the vertically upward direction with an initial velocity such that it moved in the upward direction for more than10 sec before starts moving downwards. What was its displacement in the last but four sec during its upward motion?(Take g = 10 m/s^2)
   (A) 5m (B) 15m (C) 25 m (D) 45m

2. A particle is moving uniformly along a circle of radius 7m with a constant speed 11m/s. The magnitude of its average acceleration in a time interval of 2s is
   (A) 5.5 m/s^2 (B) 11m/s^2 (C) 22m/s^2 (D)7m/s^2

3. In fig-1, the pulley is massless and frictionless.What will be the acceleration of the pulley if it is pulled up by the rope by a force of 300N?(Take g =10 m/s^2)
   (A) 5.5 m/s^2 (B) 7.5m/s^2 (C) 12.5m/s^2 (D) 10m/s^2

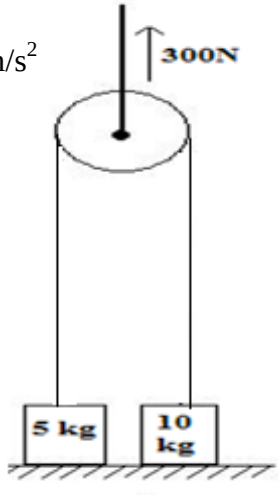
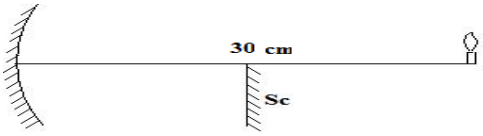


fig-1

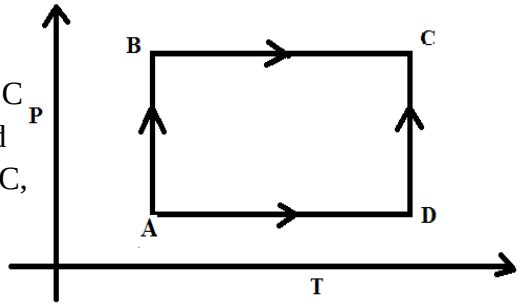
4. If the mass of a planet is 10% less that of the Earth and the radius 20% greater than that of the Earth, the gravitational acceleration on the planet's surface will be
   (a) $\frac{5}{8}$ times that on the surface of the Earth
   (b) $\frac{3}{4}$ times that on the surface of the Earth
   (c) $\frac{1}{2}$ times that on the surface of the Earth
   (d) $\frac{9}{10}$ times that on the surface of the Earth

5. A concave mirror and an object (fig) are 30 cm apart. A sharp image of the object occurs on a screen when it is kept midway between the two. The focal length of the mirror is



   (a) -10 cm (b) -7.5 cm (c) 12 cm (d) none of these

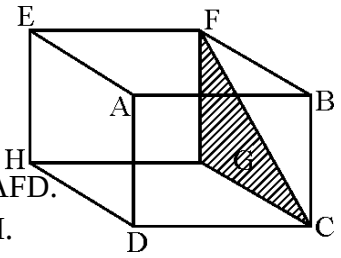
6. A thermodynamic system, when taken from state A to state C along the path ABC, absorbs an amount of heat Q = 40 cal and does work W = 20 cal on the environment. Along the path ADC, Q = 55 cal. Then along ABC, W =?
   (a) 20 cal (b) 25 cal (c) 30 cal (d) 35 cal



7. The average kinetic energy of a particle executing a simple harmonic motion over one cycle is *K*. Its average potential energy as it moves from the mean position to one extreme position is

(a) $\frac{K}{2}$ (b) $\frac{K}{\sqrt{2}}$ (c) K (d) $\sqrt{2}K$

8. In the figure, a point charge $+q$ is placed at the vertex E of the cube ABCDEFGH. Which one of the following statement is true?



(a) Electric flux through triangle GHD is more than that through ΔCDG.

(b) Electric flux through triangle ABD is equal go electric flux through triangle CDB.

(c) Electric flux through triangle CEG is equal to that through triangle AFD.

(d) Electric flux through face ABCD is equal to that through face EFGH.

9. Two coherent point sources of light of wavelength λ are there at (0, 0) and $(0, 3\lambda)$ in the x-y plane. The number of dark fringes on the entire x-axis at finite distances from the origin is

(a) 3 (b) 6 (c) 8 (d) infinite

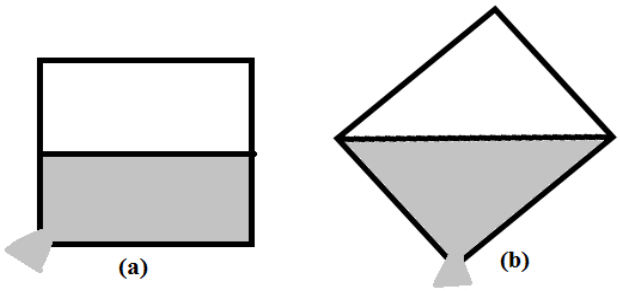
10. The kinetic energy of the electron in the second orbit in a hydrogen atom in electron volts is

(a) 3.4 eV (b) 6.8 eV

(c) 13.6 eV (d) 10.2 eV

11. A cubical container which has a small opening at the midpoint of one of the sides of its base is exactly half-filled with water. Water is coming out through the hole with velocity *v* fig-(a). With what velocity does water comes out if it is tilted to the position shown if fig-(b)?

(A) v (B) $\sqrt{v}$ (C) $\sqrt[3]{v}$ (D) $\sqrt[4]{v}$



12. The six edges of a tetrahedron are having a resistance R each. What is the resistance between the ends of an edge of it?

(A) 4R (B) 2R (C) R (D) R/2

13. If you replace the proton in a hydrogen atom by a positron, a particle having the same mass as an electron but opposite charge, what you will get is a positronium. In technical language, a positronium is a bound state of an electron and a positron. What is the ground state energy of a positronium if the same for an H-atom is E

(A) 2 E (B) E (C) E/2 (D) E/4

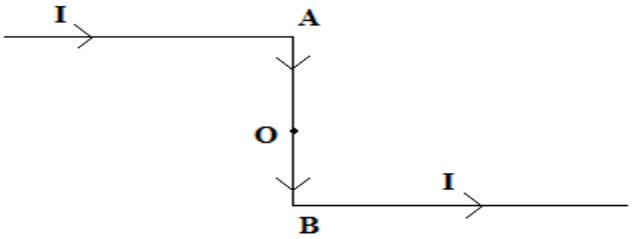
14.The work function of a metal is 2.2eV. The maximum kinetic energy of an photoelectron ejected by a photon of frequency f is 0.8 eV. The maximum kinetic energy of photoelectrons form the same metal what the incident has frequency $1.5f$ is

(a) 2.3eV (b) 1.2eV (c) 1.8 eV d) 2 eV

15. A uniform circular ring having a uniform charge on it is bent at two diametrically opposite points such that the resulting two semicircles are planar and at right angles to each other. The electric field intensity at the centre has magnitude E. The electric field intensity at the center due to a quarter of this ring will be

(a) E (b)$\frac{E}{2}$ (c) $\frac{E}{2\sqrt{2}}$ (d) $\frac{E}{4}$

16. A very long conductor of the shape shown in fig. below carries current I. The magnetic field at the midpoint of AB is



(a) $(\mu_0 I)/(4\pi a)$ (b) $(\mu_0 I)/(2\pi a)$ (c) $(\mu_0 I\sqrt{2})/(4\pi a)$ (d) zero

17. If $_{92}U^{238}$ changes to $_{85}At^{210}$ by a series of α and β decays, the number of α and β particles emitted during these decays is:

(a) 7 and 5 (b) 7 and 7 (c) 5 and 7 (d) 7 and 9

18. A projectile projected with an initial velocity 30 m/s at an angle 60^0 to the horizontal reaches the two points on its path at the height 10 m from the ground at instants t_1, and t_2. The magnitude of its average velocity vector in between these two instants is

(a) 30 m/s (b) 25 m/s (c) 20 m/s (d) 15 m/s

19. Two soap bubbles are of two different sizes. Two sides of a narrow straw is pierced one into each of them such that the air in them are in communication. Then

(a) The two ultimately acquire the same size
(b) The bigger one goes on becoming bigger and the other goes on becoming smaller.
(c) The two bubbles maintain their sizes even though their pressures inside changes.
(d) The smaller one goes on becoming bigger to biggest

20. Of two identical circular discs, one is rolling on a horizontal surface on a straight line and the other is sliding on it with one of its circular faces touching the ground. At one instant, the speeds are equal. The ratio of their kinetic energies at this instant are

(a) 2: 1 (b) 3: 2 (c) 2: 3 (d) 5: 2

ANSWERS

1.(D)
2.(B)
3.(C)
4.(A)
5.(A)
6.(D)
7.(C)
8.(A)
9.(A)
10. (A)
11. (D)
12. (D)
13. (C)
14. (A)
15. (B)
16. (D)
17. (B)
18. (D)
19. (B)
20. (B)