Sample Paper-05

Dropper NEET (2024)

PHYSICS

SECTION-A

1. An electron of a stationary hydrogen atom passes from the fifth energy level to the ground level. The velocity that the atom acquired as a result of photon emission will be;

(1) $\frac{25m}{24hR}$ (2) $\frac{24m}{25hR}$

(3) $\frac{24hR}{25m}$ (4) $\frac{25hR}{24m}$

2. The total energy of an electron in the first excited state of hydrogen is about –3.4eV. Its kinetic energy in this state is:

(1) –3.4 eV (2) –6.8 eV

(3) 6.8 eV (4) 3.4 eV

3. "Pascal-Second" has dimension of:

(1) Force

(2) Energy

(3) Pressure

(4) Coefficient of viscosity

4. If an electron in hydrogen atom jumps from third orbit to second orbit, the frequency of the emitted radiation is given by (c is speed of light)

(1) $\frac{3RC}{29}$ (2) $\frac{5RC}{36}$

(3) $\frac{7RC}{36}$ (4) $\frac{8RC}{31}$

5. Which of the following can't be the angular momentum of an electron orbiting in a hydrogen atom?

(1) $\frac{2h}{\pi}$ (2) $\frac{h}{\pi}$

(3) $\frac{3h}{2\pi}$ (4) $\frac{5h}{4\pi}$

6. A car moves for half of its time at 80 km/h and for rest half of time at 40 km/h. Total distance covered is 60 km. What is the average speed of the car

(1) 60 km / h (2) 80 km / h

(3) 120 km / h (4) 180 km / h

7. **Assertion (A):** A body can have acceleration even if its velocity is zero at a given instant of time.
Reason (R): A body is momentarily at rest when it reverses its direction of motion.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A).**

(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A).**

(3) **Assertion (A)** is true and **Reason (R)** is false.

(4) **Assertion (A)** is false and **Reason (R)** is true.

8. The ratio of radius and velocity of electron in the nth state of hydrogen atom is directly proportional to;

(1) $\frac{1}{n^3}$ (2) n^3

(3) n^2 (4) $\frac{1}{n^2}$

9. A cyclist turns around a curve at 15 miles/hour. If he turns at double the speed, the tendency to overturn is;

(1) Doubled

(2) Quadrupled

(3) Halved

(4) Unchanged

10. The electric field in an electromagnetic wave was found to oscillate with an amplitude of 36 Vm^{-1}. The amplitude of the oscillating magnetic field is,

(1) 6×10^{-8}T

(2) 12×10^{-8}T

(3) 18×10^{-8}T

(4) 20×10^{-8}T

11. Magnetic field at the centre of hydrogen like atom due to motion of electron in the n^{th} orbit is proportional to

(1) $\frac{Z^2}{n^2}$ (2) $\frac{Z^3}{n^2}$

(3) $\frac{Z^3}{n^5}$ (4) $\frac{Z^2}{n^4}$

12. Outside a nucleus
(1) Neutron is stable
(2) Proton and neutron both are stable
(3) Neutron is unstable
(4) Neither neutron nor proton is stable

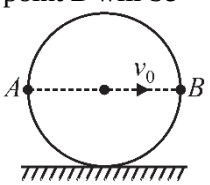
13. The half-life period of radium is 1600 years. The fraction of a sample of radium that would remain after 6400 years in
(1) $\frac{1}{4}$ (2) $\frac{1}{2}$
(3) $\frac{1}{8}$ (4) $\frac{1}{16}$

14. If a radioactive substance reduces to $\frac{1}{16}$ of its original mass in 40 days, what is its half-life?
(1) 10 days
(2) 20 days
(3) 40 days
(4) 60 days

15. A parallel plate capacitor of capacitance 20 μF is being charged by a voltage source whose potential is changing at the rate of 3 V/s. The conduction current through the connecting wires, and the displacement current through the plate of the capacitor, would be, respectively.
(1) Zero, 60 μA
(2) 60 μA, 60 μA
(3) 60 μA, zero
(4) Zero, zero

16. 100 g of water is heated from 30°C to 50°C. Ignoring the slight expansion of the water, the change in its internal energy is (Specific heat of water is 4184 J/kg–k)
(1) 8.4 kJ
(2) 84 kJ
(3) 2.1 kJ
(4) 4.2 kJ

17. A ring of radius R is rolling over rough horizontal surface with velocity v_0. Two points located at A and B on the rim of ring. The angular velocity of point A w.r.t. point B will be



(1) $\frac{v_0}{2R}$
(2) $\frac{v_0}{R}$
(3) $\frac{v_0}{\sqrt{2R}}$
(4) $\frac{\sqrt{2v_0}}{R}$

18. Two nuclei have their mass numbers in the ratio of 1 : 3. The ratio of their nuclear densities would be
(1) 1 : 1
(2) 1 : 3
(3) 3 : 1
(4) $(3)^{1/3}$: 1

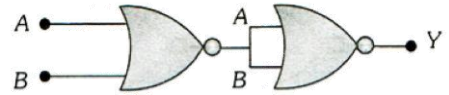
19. If the central portion of a convex lens is wrapped in black paper as shown in the figure

(1) No image will be formed by the remaining portion of the lens
(2) The full image will be formed but it will be less bright
(3) The central portion of the image will be missing
(4) There will be two images each produced by one of the exposed portions of the lens

20. The internal energy of the gas increases in
(1) Adiabatic expansion
(2) Adiabatic compression
(3) Isothermal expansion
(4) Isothermal compression

21. Two slits in Young's experiment have widths in the ratio 1 : 25. The ratio of intensity at the maxima and minima in the interference pattern, $\frac{I_{max}}{I_{min}}$ is
(1) 4/9
(2) 9/4
(3) 121/49
(4) 49/121

22. In the following circuit, the output Y for all possible inputs A and B is expressed by the truth table



(1)
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(2)
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

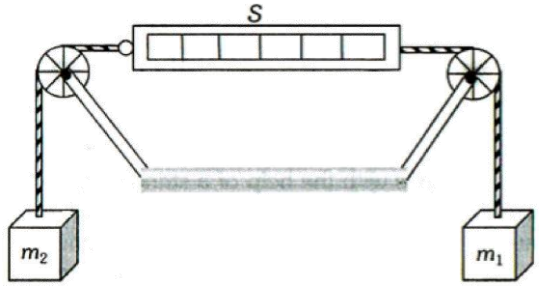
(3)
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

(4)
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

23. The potential in depletion layer is due to
(1) Electrons
(2) Holes
(3) Ions
(4) Forbidden band

24. In the half wave rectifier circuit operating from 50 Hz mains frequency, the fundamental frequency in the rippel would be
(1) 25 Hz
(2) 50 Hz
(3) 70.7 Hz
(4) 100 Hz

25. In the arrangement shown, the pulleys are fixed and ideal, the strings are light, $m_1 > m_2$ and S is a spring balance which is itself massless. The reading of S (in unit of mass) is:



(1) $m_1 - m_2$ (2) $\frac{1}{2}(m_1 + m_2)$
(3) $\frac{m_1 m_2}{m_1 + m_2}$ (4) $\frac{2m_1 m_2}{m_1 + m_2}$

26. Resonant frequency of a series *LCR* circuit is 600 Hz. Quality factor of the circuit is 4. Band width is
(1) 300 Hz
(2) 150 Hz
(3) 1200 Hz
(4) 450 Hz

27. When a system changes from one to another state the value of work done:
(1) Depends on the force acting on the system
(2) Depends on the nature of material present in a system
(3) Does not depend on the path
(4) Depends on the path

28. A body of mass 10 kg is lying on a rough plane inclined at an angle of 30° to the horizontal and the coefficient of friction is 0.5. the minimum force required to pull the body up the plane is
(1) 914 N
(2) 91.4 N
(3) 9.14 N
(4) 0.914 N

29. A block of mass 10 kg is placed on a rough horizontal surface having coefficient of friction μ = 0.5. If a horizontal force of 100 N is acting on it, then acceleration of the block will be
(1) 0.5 m/s^2 (2) 5 m/s^2
(3) 10 m/s^2 (4) 15 m/s^2

30. A mass m is vertically suspended from a spring of negligible mass; the system oscillates with a frequency *n*. What will be the frequency of the system if a mass 4 *m* is suspended from the same spring
(1) *n*/4 (2) 4*n*
(3) *n*/2 (4) 2*n*

31. The minimum phase difference between two simple harmonic oscillations,
$y_1 = \frac{1}{2}\sin\omega t + \frac{\sqrt{3}}{2}\cos\omega t$, $y_2 = \sin\omega t + \cos\omega t$, is
(1) $\frac{7\pi}{12}$ (2) $\frac{\pi}{12}$
(3) $-\frac{\pi}{6}$ (4) $\frac{\pi}{6}$

32. A disc is rolling on the inclined plane, what is the ratio of its rotational KE to the total KE?
(1) 1 : 3
(2) 3 : 1
(3) 1 : 2
(4) 2 : 1

33. If maximum height and range of a projectile are same, what is the angle of projection-
(1) 30°
(2) 76°
(3) 50°
(4) 90°

34. Displacement between maximum potential energy position and maximum kinetic energy position for a particle executing S.H.M. is
(1) – a
(2) + a
(3) ± a
(4) ± a/4

35. The time period of a simple pendulum in a lift descending with constant acceleration g is
(1) $T = 2\pi\sqrt{\frac{l}{g}}$
(2) $T = 2\pi\sqrt{\frac{l}{2g}}$
(3) Zero
(4) Infinite

SECTION-B

36. A circular thin disc of mass 2 kg has a diameter 0.2 m. Calculate its moment of inertia about an axis passing through the edge and perpendicular to the plane of the disc (in kg-m^2)
(1) 0.01 (2) 0.03
(3) 0.02 (4) 3

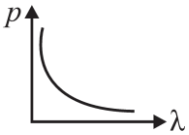
37. A body B lies on a smooth horizontal table and another body A is placed on B. The coefficient of friction between A and B is μ. What acceleration given to B will cause slipping to occur between A and B
(1) μg (2) $\frac{g}{\mu}$
(3) $\frac{\mu}{g}$ (4) $\sqrt{\mu g}$

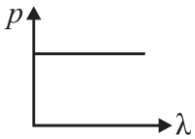
38. A thin metal disc of radius 0.25 m and mass 2 kg starts from rest and rolls down an inclined plane. If its rotational kinetic energy is 4 J at the foot of the inclined plane, then its linear velocity at the same point is
(1) 1.2 ms^{-1}
(2) $2\sqrt{2}ms^{-1}$
(3) 20 ms^{-1}
(4) 2 ms^{-1}

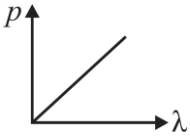
39. A flywheel rotating about a fixed axis has a kinetic energy of 360 joule when its angular speed is 30 rad/sec. The moment of inertia of the wheel about the axis of rotation is
(1) 0.6 kg × m^2
(2) 0.15 kg × m^2
(3) 0.8 kg × m^2
(4) 0.75 kg × m^2

40. The de-Broglie wavelength λ of a particle with mass m and having kinetic energy $2K$ is
(1) $\lambda = \frac{h}{\sqrt{2mK}}$
(2) $\lambda = \frac{h}{2\sqrt{mK}}$
(3) $\lambda = h\sqrt{2mK}$
(4) $\lambda = 2h\sqrt{mK}$

41. The wavelength of the first line of the Lyman series of hydrogen atom is nearly
(1) 1216 Å
(2) 3600 Å
(3) 2432 Å
(4) 608 Å

42. Which of the following figures represent the correct variation of particle momentum (p) and the associated de-Broglie wavelength (λ)?
(1) 

(2) 

(3) 

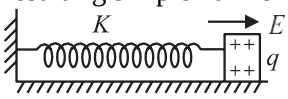
(4) 

43. If kinetic energy of electron in an orbit of hydrogen atom is K, then potential energy of the atom with this electron, in the same orbit will be

(1) K (2) $-K$

(3) $2K$ (4) $-2K$

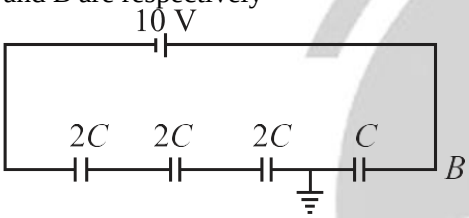
44. A small block having a charge q is placed on a smooth horizontal table and is connected to a wall through an unstretched spring of spring constant K as shown in figure. A horizontal electric field E parallel to spring is switched on. The amplitude of resulting simple harmonic motion is



(1) $\frac{qE}{K}$ (2) $\frac{qE}{2K}$

(3) $\frac{qE}{3K}$ (4) $\frac{2qE}{K}$

45. In the circuit shown in figure, potential of points A and B are respectively



(1) –8V, 2V

(2) 10 V, 20 V

(3) 6V, – 4V

(4) – 10 V, 20 V

46. The two plates of a parallel-plate capacitor are 4 mm apart. A slab of dielectric constant 3 and thickness 3 mm is introduced between the plates with its faces parallel to them. The distance between the plates is adjusted such that the capacitance becomes equal to capacitance without dielectric. The new distance between the plates is

(1) 5 mm (2) 6 mm

(3) 8 mm (4) 9 mm

47. Magnitude of magnetic field near the end of long solenoid is B_1 and at mid-point it is B_2. The ratio B_1: B_2 is

(1) 1 : 2

(2) 2 : 1

(3) 1 : 4

(4) 4 : 1

48. A magnetising field of 3×10^3 A/m produces a magnetic flux density of 6π tesla in an iron rod. The relative permeability of the rod is

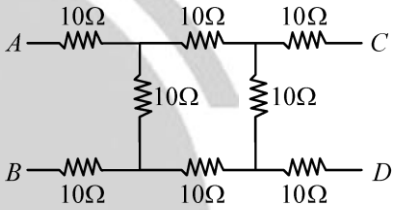
(1) 500

(2) 5000

(3) 2000

(4) 100

49. What will be the equivalent resistance between the points A and D for the circuit shown in figure?



(1) 10 Ω

(2) 20 Ω

(3) 30 Ω

(4) 40 Ω

50. The maximum current that flows in the fuse wire, before it blows out, varies with radius 'r' of fuse wire as

(1) $r^{3/2}$

(2) r

(3) r^3

(4) $r^{1/2}$