Odisha LTR Practice Mock Test - Physics

Q1. When a strong beam of light is passed through a colloidal solution, the light will _____.
(a) be scattered
(b) pass unchanged
(c) be absorbed
(d) be reflected

Q2. The Formula of Ohm's law is
(a) V = IR
(b) V = I/R
(c) R = VI
(d) R = I/V

Q3. Three resistors of 3 Ω, 6 Ω and 12 Ω respectively, are connected in parallel combination. Calculate their equivalent resistance.
(a) 21 Ω
(b) 12/7 Ω
(c) 7/12 Ω
(d) 1/21 Ω

Q4. An external resistance R is connected to a cell of internal resistance r. The largest amount of current flows in the external resistance when
(a) R < r
(b) R = r
(c) R > r
(d) R = 0

Q5. Fleming's left-hand rule used to find the direction of force acting on the winding of
(a) Motor
(b) Generator
(c) Both
(d) None

Q6. Magnetic field lines being more crowded towards the pole of a magnet indicates that the magnetic field due to the magnet in that region is _____
(a) the weakest
(b) the outcome of a property of a ferromagnetic substance
(c) aligned with the magnetic field of earth
(d) the strongest

Q7. A equivalent lens is made of a convex lens of focal length 20 cm and a concave lens of focal length 10 cm. Find the equivalent focal length-
(a) 10 cm
(b) 20 cm
(c) 30 cm
(d) 40 cm

Q8. What is the nature of image formed on the retina of human eye:
(a) Virtual and erect
(b) Virtual and inverted
(c) Real and erect
(d) Real and inverted

Q9. The method of detecting the presence, position and direction of motion of distant objects by reflecting a beam of sound waves is known as _____.
(a) RADAR
(b) SONAR
(c) MIR
(d) CRO

Q10. When white light passes through a prism, then it splits into seven colours which are known as the dispersion of light. So, after coming out of a prism, which of the colour of
light scatters the least?
(a) Red
(b) Violet
(c) Blue
(d) Green

Q11. According to Hook's law, if stress is increased the ratio of stress to strain will, _____.
(a) increase
(b) decrease
(c) remain constant
(d) first increase then decrease

Q12. The translatory motion of an object moving on a smooth surface is represented by following distance - time Graph. What can be inferred from the graph?
I. No force is required to keep the object in motion.
II. The speed me graph of the object is a straight line parallel to the time axis.
III. The acceleration of the object is zero.
(a) I and II only
(b) I and III only
(c) II and III only
(d) I, II and III

Q13. If gravitational acceleration on a planet is half of gravitational acceleration on earth, find weight of 5 kg object on that planet. (given g on earth = 10 m/s^2)
(a) 5N
(b) 50 N
(c) 25 N
(d) 15 N

Q14. Relative density of water is measured by-
(a) Hydrometer
(b) Lactometer
(c) Galvanometer
(d) Sonometer

Q15. Compared to audible sound waves, ultrasound waves have
(a) higher speed
(b) higher frequency
(c) longer wavelength
(d) both higher speed and frequency

Q16. With decrease in the viscosity of a medium, the brownian motion _____.
(a) increases
(b) remains constant
(c) decreases
(d) None of the above

Q17. According to Bohrs model of hydrogen atom, relation between principal quantum number n and radius of stable orbit:
(a) $r \propto \frac{1}{n}$
(b) $r \propto n$
(c) $r \propto \frac{1}{n2}$
(d) $r \propto n^2$

Q18. In different Isotopes what characteristics are differ
(a) Negative charge
(b) Mass
(c) Positive charge
(d) All of the above

Q19. The half-life of a radioactive element is 5 days, then the time taken by in decaying 7/8th of its initial amount:
(a) 2.5 day
(b) 5 day
(c) 10 day
(d) 15 day

Q20. The echo-receiver of a sonar attached to a ship, receives the echo from the bottom of sea 4 seconds after the ultrasonic waves were sent into the sea. If the speed of sound
in water is 1500 m/s, then what is the depth of the sea?
(a) 6000 m
(b) 3000 m
(c) 1500 m
(d) 3500 m

Q21. Which of the following does not work on the Archimedes Principle?
(a) Submarines
(b) Hydrometer
(c) Ships
(d) Rocket

Q22. Acceleration of all freely falling bodies on a planet
(a) increases with time
(b) decreases with time
(c) remains constant
(d) remains zero.

Q23. A ball moving with a momentum of 7 kg m/s strikes against a wall at an angle of 45° and is reflected at the same angle. Calculate the change in momentum?
(a) -9.9 kg m/s
(b) -6.7 kg m/s
(c) -12 kg m/s
(d) -14.5 kg m/s

Q24. When a boy is playing on a swing in the sitting position, the time-period of oscillations of the swing is T. If the boy stands up, the time-period of oscillation of the spring will be
(a) more than T
(b) less than T
(c) equal to T
(d) cannot be predicted

Q25. If the band of 7 colours obtained after dispersion from a prism is passed through another inverted prism, then
(a) The band of 7 colours split into 14 colours
(b) The band of seven colours do not split further and we get 7 colours at the output of the second prism
(c) Beam of white light is observed at output of second prism
(d) The band of seven colours split in 10 colours

Q26. The focal length of the spherical mirror depends on the:
(a) Aperture
(b) Radius of curvature
(c) Medium
(d) None of these

Q27. If an equivalent lens is made of two convex lenses of focal length 10 cm and 20 cm. Find the equivalent focal length.
(a) 20 cm
(b) -20 cm
(c) -6.67 cm
(d) +6.67 cm

Q28. When a moving charge particle passes through magnetic field. The force on it due to magnetic field does not depend on
(a) charge on the particle
(b) mass of the particle
(c) velocity of the particle
(d) magnetic field strength

Q29. The direction of electric current is always opposite to
(a) direction of conventional current in metallic conductors
(b) one ohm
(c) the electric work done
(d) none of these

Q30. In photoelectric effect, the photoelectric current
(a) depends on both an intensity and frequency of incident beam
(b) does not depend on frequency but depends only on intensity of incident beam
(c) increases when frequency of incident beam increases
(d) decreases when frequency of incident beam increases

Q31. An electric heater is rated at 800 W. If the supply voltage is 200 V. What is the current rating?
(a) 2.5 A
(b) 4 A
(c) 3 A
(d) 2A

Q32. Which of the following statement is incorrect regarding magnetic field lines?
(a) Magnetic field lines form a closed loop.
(b) They denote the direction of the magnetic field.
(c) Inside the magnet, the direction of the magnetic field lines is from the north pole to the south pole.
(d) Outside the magnet, Magnetic field lines appear to emerge from the north pole and terminate at the south pole.

Q33. When an object is placed at near point 25 cm by using a convex lens of focal length 5 cm. How much magnification can be obtained?
(a) 2
(b) 4
(c) 3
(d) 6

Q34. Which one of the following is not a unit of Young's modulus?
(a) Nm^{-1}
(b) Nm^{-2}
(c) dyne cm^{-2}
(d) Mega Pascal

Q35. Source of Sun's energy is:
(a) fission
(b) fusion
(c) both (a) and (b)
(d) none of these

Q36. What do you call the phenomenon when Moon blocks the light coming from a star?
(a) Eclipse
(b) Occultation
(c) Transit
(d) Blockage

Q37. The value of acceleration due to gravity will be highest at
(a) A distance R above earth surface
(b) At surface of earth
(c) At center of Earth's core
(d) is same at all points

Q38. A 800 g solid cube having an edge of length 10 cm floats in water. How much volume of the cube is outside the water?
(a) 800 cm^3
(b) 700 cm^3
(c) 300 cm^3
(d) 200 cm^3

Q39. The viscosity of gases increases with-
(a) Increase in temperature.
(b) Decrease in temperature.
(c) Increase in volume.
(d) Decrease in volume.

Q40. Which of the following is the correct reason behind the Tyndall effect?
(a) Scattering
(b) Dispersion
(c) Refraction
(d) Interference

Q41. If a radioactive element reduces to 25% of its initial mass in 1000 years, then its half-life is _____.
(a) 100 years
(b) 600 years
(c) 500 years
(d) 200 years

Q42. The condition for the validity of Ohm's law is that the
(a) Current should be proportional to resistance
(b) Temperature should remain constant
(c) Temperature should be variable
(d) All of the above

Q43. Three resistors of equal resistance R are connected in series and then connected in parallel. What will be the ratio of equivalent resistance in series and parallel?
(a) 1:9
(b) 1:3
(c) 3:1
(d) 9:1

Q44. When current drawn from a cell is increased, potential difference of its terminal
(a) remains same
(b) increases
(c) decreases
(d) none of the above

Q45. Which of the following particle will not experience any magnetic force in a magnetic field?
(a) proton moving in a magnetic field
(b) An electron moving in a magnetic field
(c) An alpha particle moving in a magnetic field
(d) A neutron moving in a magnetic field

Q46. A concave mirror forms 3 times magnified real, inverted image of an object kept at 5 cm in front of mirror. Find the distance of image from the mirror.
(a) 15 cm in front of mirror
(b) 15 cm behind the mirror
(c) 10 cm in front of mirror
(d) 10 cm behind the mirror

Q47. When stress is applied to a solid body, and it produces strain. Which of the following relation is correct regarding stress and strain?
(a) Stress ∝ 1/Strain
(b) Stress ∝ $1/\text{Strain}^2$
(c) Stress ∝ Strain
(d) Stress ∝ Strain^2

Q48. What is the stress known as when there is a relative displacement between various layers of solid?
(a) Tangential
(b) Linear
(c) Lateral
(d) Longitudinal

Q49. Which of the following motion is not a periodic motion?
(a) rotation of earth around the sun
(b) motion of a simple pendulum
(c) motion of the hands of a clock
(d) an arrow released from the bow

Q50. The audible frequency range of a human ear is
(a) 20 hertz to 200 hertz
(b) 2 hertz to 20 hertz
(c) 200 hertz to 2000 hertz
(d) 20 hertz to 20000 hertz

Solutions

S1. Ans.(a)
Sol. The correct answer is be scattered.
When a beam of light is passed through a colloidal sol, colloidal particles scatter light and we can see the path of light. Thus, the Tyndall effect is observed.
Tyndall Effect:
- The Tyndall effect is the phenomenon in which the particles in a colloid scatter the beams of light that are directed at them. This effect is exhibited by all colloidal solutions and some very fine suspensions. Therefore, it can be used to verify if a given solution, is a colloid. The intensity of scattered light depends on the density of the colloidal particles as well as the frequency of the incident light.
- When a beam of light passes through a colloid, the colloidal particles present in the solution do not allow the beam to completely pass through. The light collides with the colloidal particles and is scattered (it deviates from its normal trajectory, which is a straight line). This scattering makes the path of the light beam visible.

S2. Ans.(a)
Sol. The correct answer is V = IR.
Ohm's law: At constant temperature, the current flowing through a resistance is directly proportional to the potential difference across its end.
V = RI
Where V is potential difference. R is resistance and I is current flowing.
Ohmic resistance: The resistance that follows ohm's law is called ohmic resistance.
All resistance don't follow ohm's law,
From the above explanation, we can see that,
The Formula of Ohm's law is V = IR.
i.e. The resistance R in ohms (Ω) is equal to the voltage V in volts (V) divided by the current I in amps (A).

S3. Ans.(b)

Sol. The correct answer is 12/7 Ω.

Given that:

$\Longrightarrow R_1 = 3\ \Omega, R_2\ 6\ \Omega, R_3 = 12\ \Omega$

$\Longrightarrow$ Let R be the total resistance of the parallel combination.

We know that,

$\frac{1}{R} = \frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3}$

$= \frac{1}{3} + \frac{1}{6} + \frac{1}{12} = \frac{4+2+1}{12} = \frac{7}{12}$

Or, $R = \frac{12}{7}$

Therefore, the total resistance of the circuit is 12/7 Ω.

S4. Ans.(b)

Sol. The correct answer is R = r.

Given: a battery of e.m.f. V; internal resistance r, external resistance R.

As V_{TH} V; $R_{TH} = r$; $R_L = R$.

From the equation (1) as given above.

$(R_L+R_{TH})^2=2R_L (R_{TH}+R_L)$ --------- (1)

$(R+r)^2 = 2R (r + R)$

$(R+r) = 2R$

$r = R$

For maximum current flow

$I = \frac{Vth}{RL+RTH}$

$I = \frac{Vth}{R+r}$

The largest amount of current flows in the external resistance when R = r.

S5. Ans.(a)

Sol. The correct answer is Motor.

- Fleming's left-hand rule: When we arrange three fingers (point, middle, and thumb) as such all three are perpendicular to each other. Then,
  - The pointer finger points in the direction of the magnetic field.
  - The middle finger points in the direction of the current.
  - The thumb points in the direction of the magnetic thrust of force.
- Fleming's left hand is used to find the direction of force or motion acting on the moving coil in the motor.
- Electric motors have magnets, a coil, and use electricity to move.

S6. Ans.(d)

Sol. The correct answer is the strongest.

Magnetic field strength:

- The space or region around the current-carrying wire/moving electric charge or around the magnetic material in which force of magnetism can be experienced by
  other magnetic material is called a magnetic field by that material.
- The value of this magnetic field is called magnetic field strength of that magnetic material.

Properties of Magnetic Field Lines:

1. A magnetic field link is directed from north-pole to south-pole outside the magnet.
2. A magnetic field line is a closed and continuous curve. (Magnetic field lines inside the magnet where these are directed from south pole to north pole).
3. The magnetic field lines are crowded near the pole where the magnetic field is strong and are far apart near the middle of the magnet and far from the magnet
where the magnetic field is weak.

4. The magnetic field lines never intersect each other because if they do so, there would be two directions of the magnetic field at that point which is absurd.
5. In case the field lines are parallel and equidistant, these represent a uniform magnetic field. The Earth's magnetic field is uniform in a limited space
From the above, it is clear that the magnetic field due to the magnet in the crowded region is the strongest.

S7. Ans.(b)
Sol. The correct answer is 20 cm.
Calculation:-
We know, $\frac{1}{Feq} = \frac{1}{f1} + \frac{1}{f2}$
Here, f_1= 20 cm and f_2 = -10 cm
$\frac{1}{Feq} = \frac{1}{20} + \frac{1}{-10} = -\frac{1}{20} \Longrightarrow$ F = -20 cm
So, the magnitude of the net focal length is 20 cm.
The focal length of convex lens is positive, and the focal length of the concave lens is negative according to the sign convention of the lens.

S8. Ans.(d)
Sol. The correct answer is Real and inverted.
The image is formed on the retina by successive refractions at the cornea, the aqueous humour, the lens, and the vitreous humour. The real and inverted image is formed on the retina.

S9. Ans.(b)
Sol. The correct answer is SONAR.
- **Echolocation:** The waves of sound are continuously emitting high-frequency waves, it gets hit with objects so, they reflect and received by the electronic devices.
- This helps to recognise the size and distance of the object. This whole process of sending and receiving waves is called echolocation.
- **RADAR:** Radar is an object-detection system that uses radio waves to determine the range, angle, or velocity of objects. Radar uses radio waves.
- Full form: Radio Detection and Ranging.
- **SONAR:** It a technique that uses sound propagation (usually underwater, as in submarine navigation) to navigate, communicate with or detect objects on or under the surface of the water.
- Full-Form: Sound Navigation and Ranging.
- **MIR:** Micro powered impulse Radar (MIR) is a type of RADAR that uses radio waves for sensing and measuring distances to objects in proximity to each other.
- **CRO:** Cathode Ray Oscilloscope is an instrument used to see the waveform generated by a generator.

S10. Ans.(a)
Sol. The correct answer is Red.
Dispersion of light:
- Dispersion of light is the phenomenon of splitting of a beam of white light into its constituent colours on passing through a prism.
- The band of seven colours so obtained is called the (visible) spectrum.
- The dispersion of white light occurs because the colours of white light travel at different speeds through the glass prism.

When the dispersion of white light takes place through a prism, the maximum deviation is suffered by violet colour and minimum deviation suffered red colour.

S11. Ans.(c)

Sol. The correct answer is remain constant.

According to Hooke's law, we know that

Stress = k × strain

$k = \frac{stress}{strain}$

Here k is the ratio of stress and strain, and this ratio is the property of the material and is constant.

So, if we increase the stress value, the ratio of stress and strain (proportionality constant k) will not change because it remains constant.

S12. Ans.(d)

Sol. The correct answer is I, II and III.

- The displacement time graph is a straight line, so its slope is constant. Hence the object is moving with a constant velocity.
- Since velocity is constant, so there is no acceleration and hence force is zero.
- Since the velocity is constant, so the speed is also constant. The speed-time graph will be parallel to the time axis.
- Thus, all three I, II, and III are correct.

S13. Ans.(c)

Sol. The correct answer is 25 N.

Given that m = 5 Kg and $g_{planet} = G_{earth}/2 = 10/2 = 5\ m/s^2$

From the definition, the weight of the body at a place is given by W = mg

Weight on the planet = $W = mg_{planet}$

W = 5 × 5 = 25 N

S14. Ans.(a)

Sol. The correct answer is Hydrometer.

- **Relative density:** It is the ratio of a density of an object to the density of water at 4°C (1000 kgm^{-3})

  Relative density ($\rho_{relative}$) = $\frac{Density\ of\ fluid\ (\rho fluid)}{Density\ of\ water\ (\rho water)}$
- It is a unitless term.
- The instrument which is used to measure the relative density of any fluid is called a hydrometer. Therefore option 1 is correct
- The instrument which is used to measure the purity of milk is called a Lactometer. Therefore option (b) is incorrect.
- The instrument which is used for detecting and indicating electric current is called a galvanometer. Therefore option 3 is incorrect
- Sonometer is a diagnostic instrument used to measure the tension, frequency, or density of vibrations. Therefore option 4 is incorrect

S15. Ans.(b)

Sol. The correct answer is higher frequency.

Waves-

- Waves can occur whenever a system is disturbed from equilibrium and when the disturbance can travel or propagate from one region of the system to another.

Types of Waves

Audible or sound waves

- Range 20 Hz to 20 KHz
- These are generated by vibrating bodies such as vocal cords, stretched strings, or membranes

Infrasonic waves

- Frequency lies below 20 Hz and wavelengths are greater than 16.6 cm.
- Examples: waves produced during earthquakes, ocean waves, etc.

Ultrasonic waves

- Frequency greater than 20 kHz.
- The human ear cannot detect these waves, and certain creatures such as mosquitoes, dogs, and bat show responses to these.
- As the velocity of sound in air is 332 m/sec so the wavelength λ < 1.66 cm.
- These waves are used for navigation underwater (SONAR).
- They are used in ultrasonography (in photography or scanning soft tissue of the body)

Explanation-

- From above it is very much clear that the frequency of ultrasound waves is much more than that of the audible wave.
- Sound waves are independent of wave characteristics such as frequency, period, and amplitude.
- Its speed depends on the properties of the medium through which it travels.
- Sound waves travel faster in solid, fast in liquid, and slow in air.
- It cannot travel in a vacuum.

S16. Ans.(a)

Sol. The correct answer is increases.

Brownian motion is inversely proportional to the viscosity of the medium.

Brownian Motion $\alpha = \frac{1}{viscosity}$

As with the decrease in viscosity decrease in the resistance for motion, motion becomes easier, therefore, with the decrease in viscosity, Brownian motion increases.

S17. Ans.(d)

Sol. The correct answer is $r \alpha n^2$.

According to the Bohr model of the hydrogen atom, the radius of the n^{th} orbit is given as,

$\Rightarrow r_n = n^2 r_1$ ---------- (1)

where n = number of orbit and r_1, radius of the first orbit

From equation 1 it is clear that the radius indirectly proportional to the n^2.

S18. Ans.(b)

Sol. The correct answer is Mass.

The Isotopes having the same number of protons. Since, the number of neutrons change their masses change. So, Isotopes having different masses.

S19. Ans.(d)

Sol. The correct answer is 15 day.

Given – $t_{1/2}$ = 5 Days

The amount of substance left after decaying 7/8th of its initial amount is

$\Rightarrow N = N_0 - \frac{7N0}{8} = \frac{N0}{8}$ ---------- (1)

If N_0 is the initial concentration, then after n half-lives the amount of substance(N) left is given by

$\Rightarrow N = N_0(1/2)^n$

According to the above equation N in equation 1 can be written as

$\Rightarrow N = N_0 (1/2)^3$

From the above equation, it is clear it took 3 half-lives is needed for N_0 to $\frac{N0}{8}$

The total time required for N_0 to become $\frac{N0}{8}$ can be written as

$\Rightarrow T = 3 \times$ time of half-life

$\Rightarrow T = 3 \times 5 = 15$ Days

S20. Ans.(b)

Sol. The correct answer is 3000 m.

Speed of sound in water s = 1500 m/s

time t = 4s

depth d? (we have to calculate)

Now, in order to reach the ground and come back, the sound has to travel 2d distance.

distance = speed × time

2d = 1500 m/s × 4s = 6000 m

⇒2d = 6000 m

⇒ d = 3000 m

So, the depth is 3000 m

S21. Ans.(d)

Sol. The correct answer is Rocket.

Rockets work on the principle of Newton's Third law of motion which states that to every action there is an equal and opposite reaction.

S22. Ans.(c)

Sol. The correct answer is remains constant.

Acceleration due to gravity (g): The acceleration achieved by any object due to the gravitational force of attraction by any planet is called acceleration due to gravity by the earth.

As each planet has a different mass and radius so the acceleration due to gravity will be different for a different planet.

The acceleration due to gravity on earth (g) = 9.8 m/s^2

It is constant for any object falling freely.

S23. Ans.(a)

Sol. The correct answer is -9.9 kg m/s.

Given - momentum (p) = 7 kg m/s

Initial momentum is along AO. It has two rectangular components:

p cos 45° is along CO and p sin 45° is along DO

Final momentum p is along OB. It has two rectangular components:

p cos 45° is along OC and p sin 45° is along OE.

Change in momentum along the vertical direction is

Δp_v = Final momentum - Initial momentum

$\Rightarrow \Delta p_v$ = p sin 45° -p sin 45° $p/\sqrt{2} - p/\sqrt{2} = 0$

Change in momentum along horizontal direction is

ΔP_H = Final momentum - Initial momentum

$\Rightarrow \Delta P_H$ = -p cos 45° - p cos 45° = -2p cos 45°

$\Rightarrow \Delta P_H = -2 \times 7 \times \frac{1}{\sqrt{2}} = -9.9$ kg m/s

The negative sign indicates that the direction of change in momentum is away from the wall.

S24. Ans.(b)

Sol. The correct answer is less than T.

As the boy stands up, the centre of gravity of the pendulum is raised up, decreasing the effective length of the pendulum of the swing and hence the time period T decreases.

S25. Ans.(c)

Sol. The correct answer is Beam of white light is observed at output of second prism.

- If the beam of white light is passed through a prism it splits into seven colours.
- If an inverted prism is kept in the path of seven colours, then these seven colours will recombine to form a beam of white light.

S26. Ans.(b)

Sol. The correct answer is Radius of curvature.

We know that if the radius of curvature of the spherical mirror is R, then the focal length (f) of the spherical is given as

$\Rightarrow f = \frac{R}{2}$ -----(1)

By equation 1 it is clear that the focal length of the spherical mirror depends on the radius of curvature.

S27. Ans.(d)

Sol. The correct answer is +6.67 cm.

We know, $\frac{1}{Feq} = \frac{1}{f1} + \frac{1}{f2}$

Here, f_2 = +20 cm and f_1 = +10 cm

$\frac{1}{Feq} = \frac{1}{20} + \frac{1}{10} = \frac{3}{20} \Rightarrow F_{eq}$ = +6.67 cm

The focal length of the convex lens is positive, and the focal length of the concave lens is negative according to the sign convention of the lens.

S28. Ans.(b)

Sol. The correct answer is mass of the particle.

When moving through a magnetic field, the charged particle experiences a force.

This force is given by the charge times the vector product of velocity and magnetic field.

F = q (v × B)

where q is the charge on particle, v is perpendicular velocity and B is the magnetic field.

When a moving charged particle passes through a magnetic field.

The force on the charge particle is given by:

F = q(v × B)

So the force depends on the charge of the particle, the velocity of the particle, and the magnetic field strength.

It does not depend on the mass of the particle.

S29. Ans.(a)

Sol. The correct answer is direction of conventional current in metallic conductors.

- Electric current: The rate of flow of electric charge is called electric current. The SI unit of electric current is Ampere (A). Hence, Electric current (I) Q/t = Charge/time
- The passage of current is due to the flow of positive charges. This is what we call the conventional flow of current, re in the direction of how of positive charges.
- The direction of the conventional current corresponds to the direction of positive charge which is from higher potential (positive) to lower potent al(negative).
- After the discovery of electrons, it was observed that electrons are the particles that flow in a conductor.
- Electrons being negatively charged flow from the negative terminal to the positive terminal of the voltage source. So, the actual direction of the current should be from the negative to the positive terminal.
- Electric current is associated with the movement of electrons which is from lower potential (negative) to higher potential (positive), therefore, the direction of electric current is opposite to that of conventional current.
- Thus, the direction of electric current is always opposite to the direction of conventional current in metallic conductors.

S30. Ans.(b)
Sol. The correct answer is does not depend on frequency but depends only on intensity of incident beam.
Photoelectric current only depends upon the intensity of incident beam and is independent of frequency of incident beam.

S31. Ans.(b)
Sol. The correct answer is 4A.
Given: Power (P) = 800 W;
Voltage (V) = 200 V;
Current (I) = ?
The electric power of an electric heater is given by:
Power (P) = V x I
800 = 200 x I
I = 4 A

S32. Ans.(c)
Sol. The correct answer is Inside the magnet, the direction of the magnetic field lines is from the north pole to the south pole.
Option a: Magnetic field lines form a closed loop.
Option b: At a point, the tangent drawn on the magnetic field line gives the direction of the magnetic field at that point.
Option c: Inside a magnet, the magnetic field lines go from the south pole to the north pole.
- In the option, the opposite of it is written.
- So, this is an incorrect statement.

Option d: Outside magnet, Magnetic field lines appear to emerge or start from the north pole and merge or terminate at the south pole.
So, the correct answer is option c.

S33. Ans.(d)
Sol. The correct answer is 6.
Given that D = 25 cm and f = 5 cm.
magnification m = $1+\frac{D}{f}$
$m=1+\frac{25}{5}$
m = 6

S34. Ans.(a)
Sol. The correct answer is Nm^{-1}.
Young's modulus:
Young's modulus a modulus of elasticity, applicable to the stretching of wire, etc., equal to the ratio of the applied load per unit area of the cross-section to the increase in length per unit length.
It is denoted as E or Y.
The unit of Young's modulus is $N\ m^{-2}$.
$Y=\frac{\sigma}{\epsilon}$
Where σ = stress, ϵ = strain in wire
Young's Modulus Formula by using other quantities:
$Y = FL_0/A\Delta L$
Where F = force exerted under tension, A = actual cross-sectional area,
L_0 = actual length, ΔL = change in length.
- From the above, it is clear that the unit of Young's modulus is Nm^{-2}. Therefore option (a) is incorrect, and option (b) is correct.
- The unit of Young's modulus in the cgs system is dyne cm^{-2}. Therefore, option (c) is correct.
- Mega Pascal is the pressure and hence of Young's modulus. Therefore option (d) is correct.

S35. Ans.(b)

Sol. The correct answer is Fusion.

- Nuclear fusion in the sun is a type of nuclear reaction in which there is a collision of two or more atomic nuclei at high energy levels. There is a formation of nucleus.
- In the Sun, the temperature is around 15 million kelvins and pressure are millions of times higher than the Earth's surface.
- At this high temperature and pressure, the Coulomb barrier is overcome, and nuclear fusion takes place.
- This fission happens inside the core of the sun and the energy later escapes to the surface of the sun.
- It is responsible for the generation of solar radiation.

S36. Ans.(b)

Sol. The correct answer is Occultation.

When two heavenly bodies apparently cross each other's path as seen from the Earth, there are 3 possibilities: 1. Eclipse: It occurs when two heavenly objects having apparently the same size cross each other. E.g. During the eclipse of sun, even though the Moon is much smaller, it appears to be of the same size as the Sun, because it is nearer to us. Therefore, it can completely hide the Sun behind it. 2.Occultation: It occurs when an apparently larger heavenly object covers an apparently smaller one. E.g. When Moon blocks the light coming from a star. 3.Transit: It occurs when an apparently smaller object traverses in front of an apparently larger one. E.g. Inferior planets Mercury and Venus can occasionally cross the Sun's disc when viewed from the Earth.

S37. Ans.(b)

Sol. The correct answer is At surface of earth.

The value of acceleration due to gravity decreases as we go above the surface or below the surface. So, the maximum value of g is at the surface of the earth.

S38. Ans.(d)

Sol. The correct answer is 200 cm^3.

In floating bodies,

Weight of fluid = Buoyant force

Buoyant force = weight of water displaced. If V is the volume of cube inside the water, then the weight of water displaced $V\rho g$.

$\Rightarrow V\rho g = 0.8\ g$

$\Rightarrow V = \frac{0.8g}{\rho g} = \frac{0.8}{1000} = 8 \times 10^{-4}\ m^3 = 800\ cm^3$

Total volume of the cube $(10\ cm)^3 = 1000\ cm^3$

$\therefore$ Volume outside the water = $1000 - 800 = 200\ cm^3$

S39. Ans.(a)

Sol. The correct answer is Increase in temperature.

- In gases, the cohesive force among the particles is less because of more inter-molecular spacing. Thus, the molecular moment transfer is responsible for of the gas.
- With an increase in temperature, the molecules vibrate faster due to gain in kinetic energy thereby increasing the molecular moment transfer.
- Thus, with an increase in temperature, molecular moment transfer increases, and therefore viscosity increases.

S40. Ans.(a)

Sol. The correct answer is Scattering.

Tyndall effect: It is also known as Tyndall scattering. The scattering of light by particles in a colloid or else particles in a very fine suspension is called Tyndall effect. Under this effect, the longer wavelength light is more transmitted while the shorter wavelength light is more reflected.

Scattering of light: The phenomenon in which the light ray is redirected in all other directions on passing through particles of dimensions comparable to the wavelength of the light used is called scattering of light.
Tyndall scattering occurs when the dimensions of the particles that are causing the scattering are larger than the wavelength of the scattered radiation. This effect is used to determine whether a mixture is a true solution or a colloid. Milk, starch solution, and emulsions show Tyndall effect whereas sugar solution doesn't show Tyndall effect.

S41. Ans.(c)
Sol. The correct answer is 500 years.
Given T = 1000 years and N = 25% of N_o
Where T = total time, N = quantity remaining after decay, and N_o = initial quantity
- We know that the fraction of substance remains after n half-lives,

$\Rightarrow N = N_0/2^n$ _____(1)
Where n = number of half-life's in the given time period
Here,
$\Rightarrow N = 25\%$ of N_o
$\Rightarrow N = 25/100\ N_0$
$\Rightarrow N = N_0 / 4$ _____(2)
By equation 1 and equation 2,
$\Rightarrow N_0/4 = N_0/2^n$
$\Rightarrow n = 2$ _____(3)
We know that,
$\Rightarrow nt_{1/2} = T$ -----(4)
Where $t_{1/2}$ half-life
By equation 3 and equation 4,
$\Rightarrow 2t_{1/2} = 1000$
$\Rightarrow t_{1/2} = 500$ years
Hence, option c is correct.

S42. Ans.(b)
Sol. The correct answer is Temperature should remain constant.
For the validity of Ohm's law, two conditions must be followed:
- The temperature must remain constant.
- The potential difference should be proportional to current so option (a) is wrong because the proportionality holds good for voltage proportional to current not for current proportional to voltage.
- The first voltage is applied then the current is developed in the circuit so the voltage is proportional to the current. Hence, the correct option is (b).

S43. Ans.(d)
Sol. The correct answer is 9 : 1.
Given that,
$R_1 = R_2 = R_3\ R = R$
When resistor are connected in series, then the equivalent resistance is
$R_{ser} = R_1 + R_2 + R_3 = R + R + R = 3R$ ---(1)
When the resistor is connected in parallel, then the equivalent resistance is
$\frac{1}{R\ para} = \frac{1}{R1} + \frac{1}{R2} + \frac{1}{R2} = \frac{1}{R} + \frac{1}{R} + \frac{1}{R} = \frac{3}{R}$
$\therefore R_{para} = R/3$ ---(2)
Divide equation 1 and 2, we get
$\frac{Rser}{Rpara} = \frac{3R}{R/3} = 9:1$

S44. Ans.(c)
Sol. The correct answer is decreases.
The terminal potential difference of the cell is given as
⇒ V = E - Ir
So as the current I increase, the potential difference decreases. Hence option (c) is correct.

S45. Ans.(d)
Sol. The correct answer is A neutron moving in a magnetic field.
Magnetic field (B):
- The region or space around a current – carrying wire or around a magnet in which magnetic force can be experienced by other magnets is called a magnetic field.
- When a moving charged particles enters a magnetic field then the path followed by the charged particles is circular if the magnetic field is perpendicular to the velocity of the particle.
- While moving through a magnetic field, the charged particle experiences a force.
- This force is given by the charge times the vector product of velocity and magnetic field.

F = q (v x B) = 0
Where q is the charged on particle, v is perpendicular velocity and B is the magnetic field.
- According to the above discussion, it is clear that the magnetic force can act only on moving charged particles, magnets, and current element.
- So there will be a magnetic force on electrons, protons, and alpha particles. Because they have a charge and they are moving.

But for a neutron, q = 0
F = q (v x B) = 0
- Thus a neutron moving in a magnetic field will not experience any magnetic force.

S46. Ans.(a)
Sol. The correct answer is 15 cm in front of mirror.
The image is inverted, so magnification is negative. It is three times magnified, So magnification m is
m = 3
Object distance u = - 5 cm
Image distance v
By formula of magnification,
m = (-v)/u
⇒ v = 3u = 3 x -5 cm = 15 cm
So, the image is formed 15 cm in front of the mirror.

S47. Ans.(c)
Sol. The correct answer is Stress ∝ Strain
EXPLANATION:
According to Hook's law, the strain produced in the solids is proportional to the stress applied to the body.
Stress ∝ strain
When we remove the proportional sign.
stress = Y x strain
Y = stress/strain
Here Y is the modulus of elasticity.

S48. Ans.(a)
Sol. The correct answer is Tangential.
When successive layers of solid move on each other i.e. when there is a relative displacement between various layers of solid, the stress produced is called as Tangential stress.

S49. Ans.(d)

Sol. The correct answer is an arrow released from the bow.

Periodic motion: A motion that repeats itself after a period is called periodic motion.

Examples are the motion of the earth around the sun, the motion of a simple pendulum.

Option a: The earth repeats its path of revolution around the sun every year.

So it is a periodic motion with a period of 1 year.

Option b: The motion of a simple pendulum is also a periodic motion because it repeats its path after a time period of T.

Option c: The motion of the hands of a clock is also a periodic motion because every hand of the clock repeats its path after a fixed time.

The period of the second hand is 60 seconds.

The period of the minute hand is 60 minutes.

The period of the hour hand is 12 hours.

Option d: An arrow released from the bow is not a periodic motion since it does not repeat its path of motion because of the friction it losses its energy and finally stops after some time.

Thus, Once the arrow reached its destination point, it does not comes again and go back.

S50. Ans.(d)

Sol. The correct answer is 20 hertz to 20000 hertz.

The audible frequency range of human year is between 20 Hz to 20000 Hz.