TickMark.Ai
Mumbai

Class: EM - CLASS 10 **Subject:** Science and Technology - Part 1 **Time:**2 hrs
Date: 06-10-2025 **Paper:** Semester 1 (Solution) **Marks:**40

Q1(A))
(1) 7
(2) Absolute Humidity
(3) Use of fuse
(4) The orbit of a planet is an ellipse with the Sun at one of the foci.
(5) Products

(B))
(1) True
(2) The newton
(3) 1) - b, 2) - a
(4) Centripetal force
(5) Direct current

Q2(A))
(1) i. Occasionally, water enters into the crevices of rocks.
ii. When the temperature of the surroundings falls below 40C, the water begins to expand.
iii. As there is no place in the crevices for expansion of the water, tremendous pressure is exerted on the rocks.
iv. This results in crumbling of rocks into pieces.
v. Hence, in cold regions in winter, the rocks crack due to anomalous expansion of water.
(2) i. It takes time for pieces of Shahabad tile to disappear in HCl, but its powder disappears rapidly because the rate of reaction depends upon the size of the particles of the reactant taking part in the reaction.
ii. Smaller the size of the reactant particles, higher is the rate of reaction.
(3) i. The valency of an element is determined by the number of electrons present in the outermost shell of its atoms, that is the valence electrons.
ii. Same group have same valence electrons hence they have same valency.

(B))
(1) Given: H = 400J , R = 9 ohms, t = 1 sec
To find: P.D = ?
Formula: $H = P \times t$, $P = V^2/R$
Solution: $H = P \times t$
$P = \frac{H}{t} = \frac{400}{1} = 400$ watts
$P = \frac{V^2}{R}$
$400 = \frac{V^2}{9}$
$400 \times 9 = V^2$
$V = \sqrt{400} \times 9$
$V = 20 \times 3$
$V = 60V$
The potential difference applied across the resistance is 60V
(2) i. Dissolution is a process in which a solute completely gets dissolved into a solvent.
ii. Whereas chemical reaction is a process in which one or more substances, the reactants, are converted to

one or more different substances, the products. Substances are either chemical elements or compounds.
iii. A chemical reaction rearranges the constituent atoms of the reactants to create different substances as products.

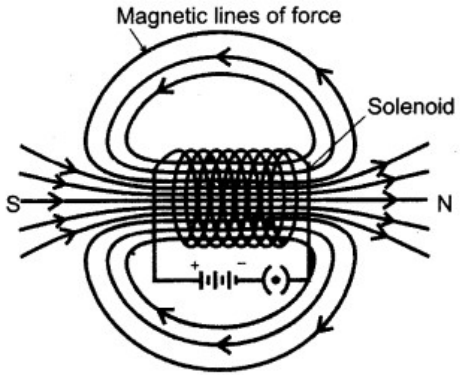
(3) i. According to the modern periodic law, elements are arranged in their increasing order of atomic numbers.
ii. The atomic number of cobalt is 27 comes first (lower atomic number) and nickel with 28 comes next (higher atomic number) even if their atomic masses are in the reverse order.

(4) i. The following figure represents Kepler's second law of planetary motion, the rotation of a planet around the sun.
ii. The law states that - The line joining the planet and the Sun sweeps equal areas in equal intervals of time.
iii. AB and CD are distances covered by the planet in equal time i.e. after equal intervals of time, the positions of the planet starting from A and C are shown by B and D respectively.
iv. The straight lines AS and CS sweep equal area in equal interval of time i.e. area ASB and CSD are equal

(5) Heat can be transferred from one place to another by three methods:
i. Conduction in solids.
ii. Convection of fluids (liquids or gases), and
iii. Radiation through anything that will allow radiation to pass.

Q3)

(1) i. When a copper wire with a resistive coating is wound in a chain of loops, it is called solenoid.
ii. Whenever an electric current passes through a solenoid, magnetic lines of force are produced in pattern.
iii. The properties of the magnetic field of a solenoid are very similar to magnetic field produced by a bar magnet.
iv. One of the open ends of a solenoid acts as a magnetic north pole and the other as the magnetic south pole.



(2) (a) The moisture in the atmosphere is called humidity.
(b) The mass of vapour present in a unit volume of air is called absolute humidity.
(c) The ratio of actual mass of vapour content in the air for a given volume and temperature to that required to make the air saturated with vapour at that temperature is called the relative humidity.
(d) Absolute humidity is measured in kg/m^3.

(3) Step I - Write the chemical equation.

$$H_2S_2O_7(l) + H_2O(l) \rightarrow H_2O_4(l)$$

Step II -

Element	Reactants	Products
H	4	2
S	2	1
O	8	4

Step III - To balance the atoms in product.

Element	Reactants	Product
H	4	2 × 2
S	2	1 × 2
O	8	4 × 2

Step IV - Find balanced equation.

$H_2S_2O_7(l) + H_2O(l) \rightarrow 2H_2SO_4(l)$

(4) (a) $Cu + O_2 \rightarrow 2CuO$

Oxidising agent	Oxidised product
O_2	2CuO

(b) $2FeCl_3 + H_2S \rightarrow 2FeCl_2 + 2HCl + S$

Reducing agent	Reduced product
H_2S	S

(c) $2\ KI + H_2O_2 \rightarrow 2KOH + I_2$

Oxidising agent	Oxidised product
H_2O_2	I_2

(5) (a) Li

(b) First group

(c) While going down a group atomic radius goes on increasing. As a result, atomic size increases.

(6) (e) The term used to describe such special and exceptional behaviour of water is Anomalous Behavior of water.

(b) If water is cooled at room temperature, it contracts till 4°C, but if it is cooled below 4°C to 0°C, then it expands instead of contracting.

(c) If water at 0°C is heated, it contracts in volume instead of expanding till 4°C.Thus, at 4°C, the volume of water is minimum and then the volume increases as the temperature rises above 4°C.

(7) Mass:

i. Mass is the amount matter present in an object.

ii. Mass of any object is universally constant and does not change.

iii. Mass is measured by a beam balance.

iv. It's a scalar quantity.

Weight:

i. Weight is the force on an object due to gravitational pull.

ii. Weight changes with the change in gravitational acceleration.

iii. Weight is measured by a spring balance.

iv. It's a vector quantity.

1. On Mars, the mass will remain same but weight will vary from that on the earth.

2. This is because the gravitational accelerating of Mars is only 3.711 m/s^2 and hence will be different resulting in change of weight. The 'g' on earth is 9.8m/s^2 . Hence the weight on Mars will be lesser or almost $1/3^{rd}$.

(8) Given: P_1 = 100 W, P_2 = 60 W, V = 220 V,

Find: I = ?

Solution: Therefore, I = $\frac{P}{V}$

P = V x I

Therefore, $I_1 = \frac{P_1}{V}$ and $I_2 = \frac{P_2}{V}$

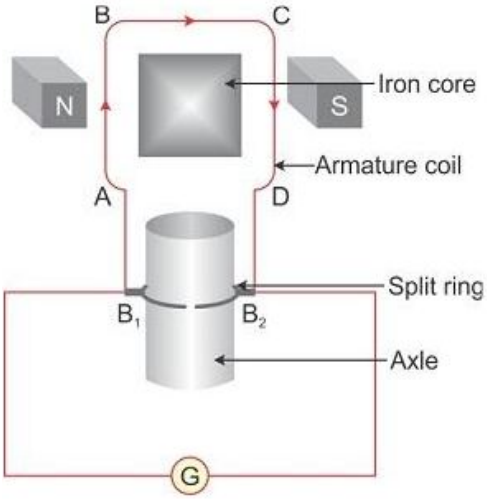
Current in the main conductor, $I = I_1 + I_2$

(parallel connection) $= \frac{P_1}{V} + \frac{P_2}{V} = \frac{P_1+P_2}{V}$

$= \frac{100+60}{220} = \frac{160}{220}$ = 0.727 A = nearly 0.73 A

Q4)

(1)



DC Generator:

Construction:

i. As shown in the diagram, a copper wire coil ABCD, kept between the two pole pieces of a magnet. The coil ABCD consists an iron core.

ii. The two ends of the coil connected to the conducting rings R_1 and R_2 via carbon brushes.

ii. Both the rings are fixed to the axle, but there is a resistive coating in between the ring and the axle.

iv. The stationary carbon brushes B_1 and B_2 are connected to a galvanometer, which shows the direction of current in the circuit. These two brushes are used to press the rings.

v. Bulb/Galvanometer: Instead of galvanometer, a bulb can be connected. When there is current in the circuit then bulb will glows.

Working:

i. The axle is rotated with a machine from outside.

ii. Electric potential difference is produced in the coil due to the electromagnetic induction when the armature coil of the generator rotates in the magnetic field.

iii. This produces a current by the glowing of the bulb or by a deflection in a galvanometer.

iv. The direction of the current depends on the sense of rotation of the coil.

v. In this generator, one brush is always in contact with the arm of the coil moving up while the other brush is in contact with the arm of the coil moving down in the magnetic field.

vi. Hence, the flow of the current in the circuit is always in the same direction and the current flows so long as the coil continues to rotate in the magnetic field.

vii. In a DC generator, the current is in the same direction during both the halves of the rotation of the coil. The magnitude of the current does vary periodically with time.

(2) (a) Light is a type of wave called the electromagnetic wave.

(b) Laser Interferometric Gravitational Wave Observatory.

(c) Gamma rays and X-rays.

(d) Gravitational waves are very weak and it is very difficult to detect them.

All the Best