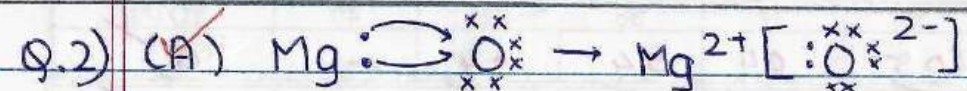


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Section-A

Q.1) (B) Calcium and Magnesium



Q.3) (C) It has weak electrostatic forces of attraction between its oppositely charged ions

Q.4) (A) Salt and water is formed

Q.5) (B) 5

Q.6) (B) Al_2O_3 and MgO

Q.7) (D) 1:8

Q.8) (D) Cytoplasm and Oxygen deficient muscle cells



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Q.9) ☒ (c) 100% round and yellow

Q.10) ☒ (c) (i) and (iii)

Q.11) ☒ (D) Auxins

Q.12) ☒ (c) Starch into simple sugars

Q.13) ☒ (D) 99 %

Q.14) ☒ (D) (ii) and (iv)

Q.15) ☒ (A) scattering of light

Q.16) ☒ (A) (i) and (ii)

Q.17) ☒ (B) Both Assertion(A) and Reason(R) are true, but Reason(R) is not the correct explanation of(A).



Q.18) (A) Both Assertion(A) and Reason(R) are true and Reason(R) is the correct explanation of Assertion(A)

Q.19) (C) Assertion(A) is true, but Reason(R) is false.

Q.20) (B) Both Assertion(A) and Reason(R) are true, but Reason(R) is not the correct explanation of Assertion(A)

Section-B

Q.21) Given -

$u = -10 \text{ cm}$ (object distance)

$f = -15 \text{ cm}$ (Since it is a concave mirror)

To find $\rightarrow v$ (image distance)

$\Rightarrow$ Mirror formula $= \frac{1}{v} + \frac{1}{u} = \frac{1}{f}$



$$\Rightarrow \frac{1}{v} - \frac{1}{10} = -\frac{1}{15}$$

$$\Rightarrow \frac{1}{v} = -\frac{1}{15} + \frac{1}{10}$$

$$\Rightarrow \frac{1}{v} = \frac{-10 + 15}{10 \times 15}$$

$$\Rightarrow \frac{1}{v} = \frac{5}{10 \times 15 \times 2}$$

$$\boxed{v = +30\text{cm}}$$

Position of image formed by mirror = +30cm
on the other side of mirror.

Q22)

(a)

Lamp A →

Power = 50W

Volt = 220V



We know,

$$P = \frac{V^2}{R}$$

$$R = \frac{V^2}{P}$$

$$R_A = \frac{44^2}{25} \times 220$$

$$= 44 \times 22$$

$$= \underline{968 \Omega}$$

Lamp B →

$$\text{Power} = 25W$$

$$\text{Volt} = 220V$$

$$P = \frac{V^2}{R}$$

$$R_B = \frac{44^2}{25} \times 220$$

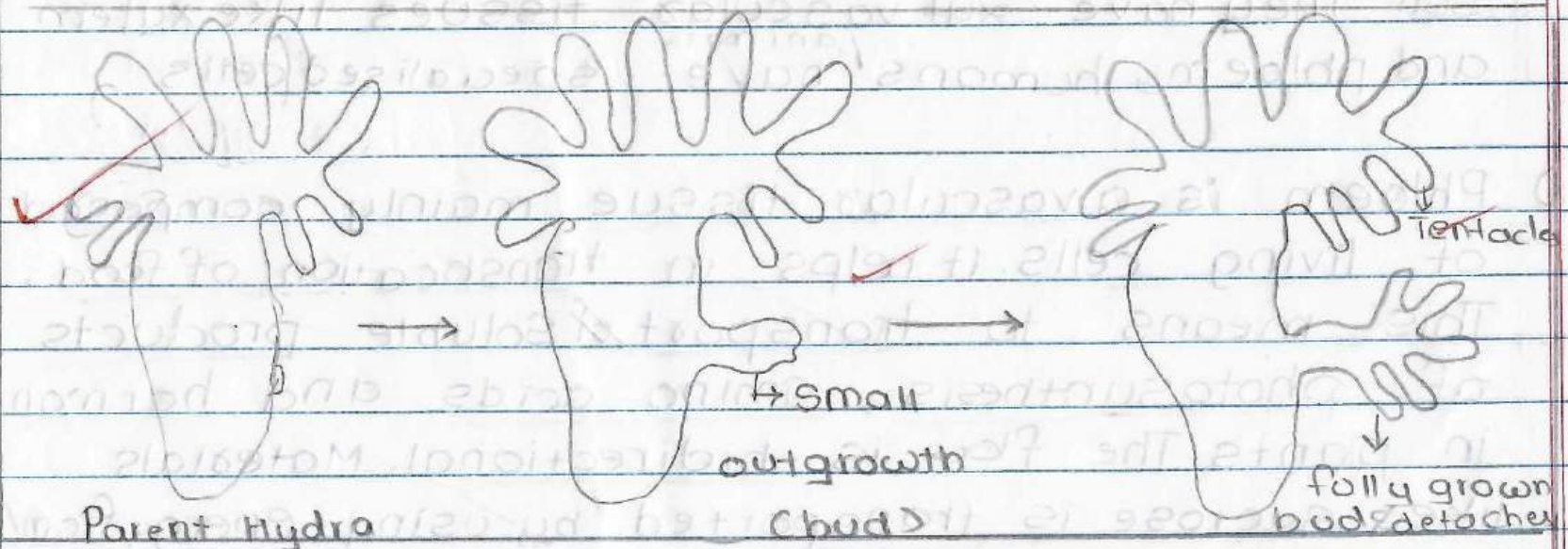
$$= \underline{1936 \Omega}$$



$$\therefore \frac{R_A}{R_B} = \frac{968}{1936}$$

$$R_A : R_B = \boxed{1 : 2}$$

Q.23] Hydra reproduces by the process of budding.
With help of regenerative cells, there is
outgrowth called bud which develops.



Diag^m - Budding in Hydra



Q.24)

(b)(i) The transport system in plants is relatively slower than in animals because plants are mainly composed of dead cells. Plants are stationary and don't require energy to perform activities when compared to ^{of animals} humans. Moreover, simple processes like diffusion and osmosis help in transport of materials from soil. They have ~~not~~ ^{animals} vascular tissues like xylem and phloem, humans ^{animals} have specialised cells.

(ii) Phloem is a vascular tissue mainly composed of living cells. It helps in translocation of food. This means to transport soluble products of photosynthesis, amino acids and hormones in plants. The flow is bidirectional. Materials like sucrose is transported by using energy from ATP for eg. During spring, food stored in stem



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and roots is transported to buds.

Q.25) For a chemical change to occur there has to be

- i) evolution of gas
- ii) change in temperature
- iii) change in odour
- iv) formation of precipitate

Here,

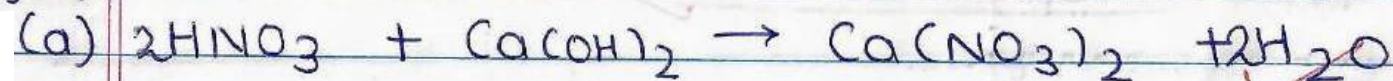


Here 2 observations are seen -

- i) Evolution of gas (H_2)
- ii) Change in temperature since this is an exothermic reaction.



Q.26)



Section-C

Q.27)

(a) When 1 Joule of work is done to move 1 Coloumb of charge from one point to another in an electric field, it is said to be 1 Volt

$$\boxed{V = \frac{W}{Q}}$$

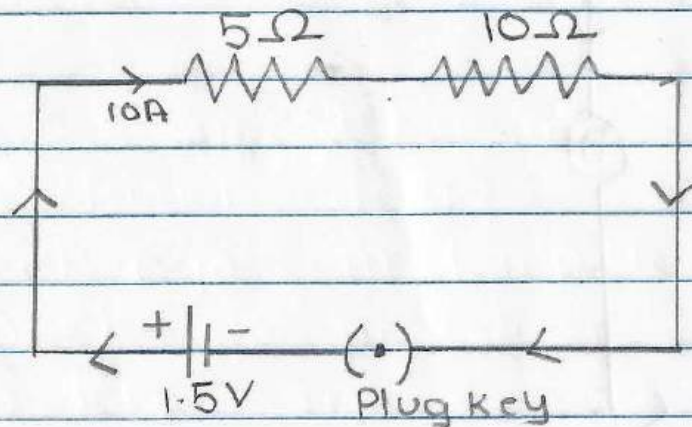
$$1\text{V} = \frac{1\text{J}}{1\text{C}}$$

$$1\text{V} = 1\text{JC}^{-1}$$



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Q.27)
(b)



Let $R_1 = 5\Omega$

$R_2 = 10\Omega$

To find $\rightarrow I$ (current)

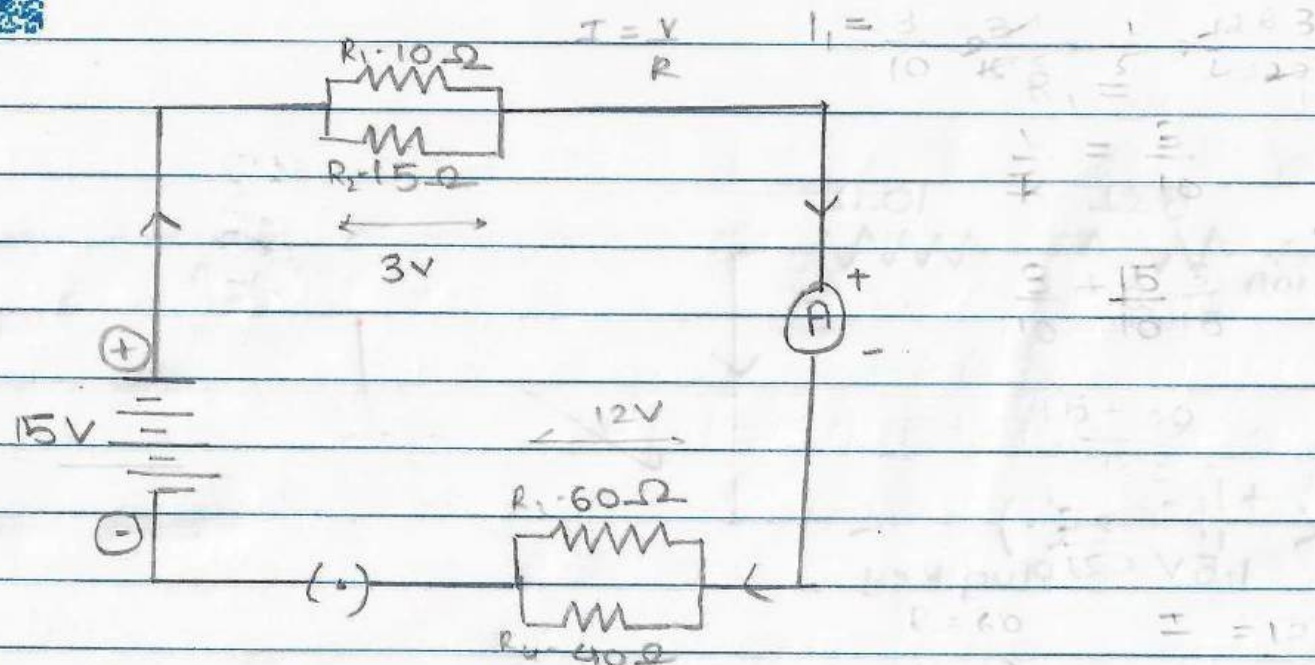
Total resistance (R_s) = $R_1 + R_2$
 $= 5 + 10$
 $= 15\Omega$ ✓

$I = \frac{V}{R}$ (Ohm's law)

$= \frac{1.5}{15} = \frac{10A}{15} \boxed{0.1A}$ ✓



Q.28)



In the given circuit,

Let $R_1 = 10\Omega$

$R_2 = 15\Omega$

$R_3 = 60\Omega$

$R_4 = 40\Omega$

(a) Since R_1 and R_2 are in parallel,

$$\frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{R_5}$$

$\Rightarrow$

$$\frac{1}{10} + \frac{1}{15} = \frac{1}{R_5}$$



$$\Rightarrow \frac{15+10}{150} = \frac{1}{R_5}$$

$$\Rightarrow \frac{25}{30} = \frac{1}{R_5}$$

$$R_5 = \underline{\underline{6\Omega}}$$

Now R_3 and R_4 are in parallel,

$$\frac{1}{R_3} + \frac{1}{R_4} = \frac{1}{R_6}$$

$$\Rightarrow \frac{1}{60} + \frac{1}{40} = \frac{1}{R_6}$$

$$\Rightarrow \frac{100}{60 \times 40} = \frac{1}{R_6}$$

$$\Rightarrow \therefore R_6 = \underline{\underline{24\Omega}}$$

$$\text{Now total } R_S = R_5 + R_6$$

$$= \boxed{30\Omega} \rightarrow \text{Total resistance}$$



(b) Total current $\rightarrow$

$$R = 30\Omega$$

$$V = 15V$$

$$I = \frac{V}{R} \quad (\text{Ohm's law})$$

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

(c) Total Resistance (R_5) of parallel combination
of 10Ω and $15\Omega = 6\Omega$

$$\nabla I = \frac{1}{2} A$$

$$\therefore V = IR \quad (\text{Ohm's law})$$

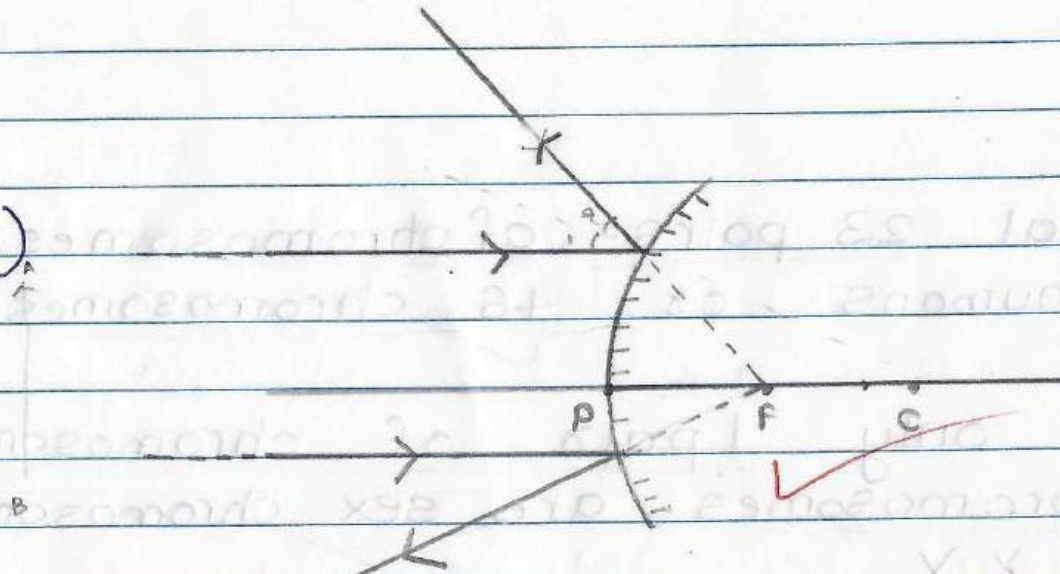
$$= \underline{\underline{3V}}$$

Voltage across them is 3V

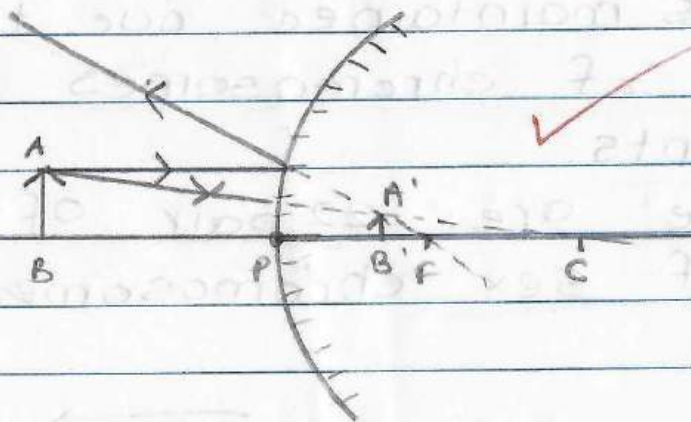


Q29)

(i)

Position of object $\rightarrow$ At infinityNature of image $\rightarrow$ virtual, erect, diminished,
At focus on other side

(ii)

Position of object $\rightarrow$
Between infinity
and PoleNature of image -
Virtual, erect,
diminished, between
F and P on other
side



Q.30)

(a) There are total 23 pairs of chromosomes present in humans or 46 chromosomes are present.

Out of them only 1 pair of chromosomes or only 2 chromosomes are sex chromosomes.

In male $\rightarrow XY$

In female $\rightarrow XX$

(b)(i) In sexually reproducing organisms, the number of chromosomes is maintained due to inheritance of equal number of chromosomes from both the parents.

(ii) In humans, there are 22 pair of autosomes and 1 pair of sex chromosome. In male- XY and female XX .





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- have
- (iii) The gametes ~~half~~ only half the amount of DNA ~~etc~~ and chromosomes present in them.
- (iv) Hence, when ~~these~~ ~~to~~ the ~~two~~ male and female gamete combine during fertilisation, Original number of chromosomes ~~is~~ attained.
- (v) A diploid zygote is formed ($2n$) from haploid gametes (n).

Q.31)

(a) The hormone 'x' is adrenaline and the gland that secretes them ~~is~~ adrenal glands.

(b) Adrenaline hormone prepares the body for fight or flight. There ~~are~~ 3 main process that take place →

- i) It increases the heart rate.
- ii) It decreases blood supply to skin and digestive system due to contraction of



muscles around small arteries in these organs and diverts blood to skeletal muscles.

(iii) It increases breathing rate due to contraction of rib cage and diaphragm.

Q.32)

(a) Aim - To show iron articles get rusted only under specific conditions of moisture and air.

Materials - Iron nails, three test tube, required calcium chlorid, water, soil

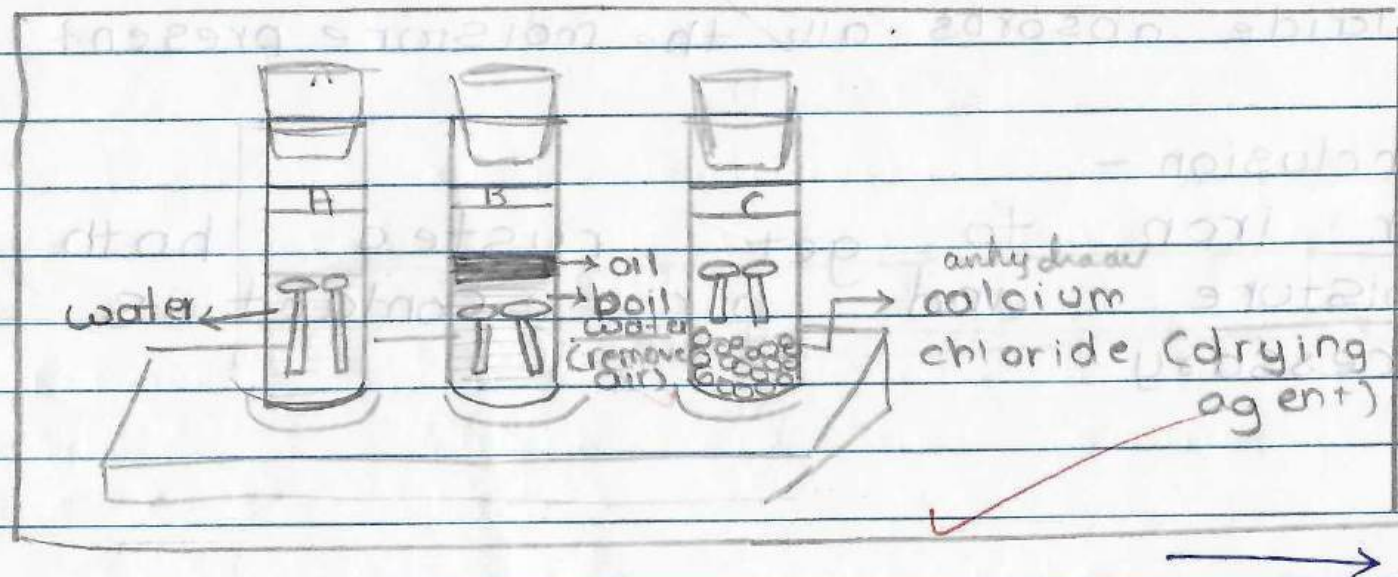
Procedure -

(a) Take three test tubes A, B and C

(b) In test tube A, pour some water and put iron nails in it and cork it.



- (c) In test tube B, put iron nails in boiled distilled water and on top a layer of oil. and cork it
- (d) In test tube C, put calcium chloride along with iron nails and cork it
- (e) Do the experimental set up as shown below →



Observation -

- i) In test tube A, iron nails develop red-brown flaky substance (rust).
- ii) In test tube B and C no rust is observed as in test tube B boiled distilled water and layer of oil prevent air to interact with iron nail. In test tube C, calcium chloride absorbs all the moisture present.

Conclusion -

For iron to get rusted both moisture and air contact is necessary.



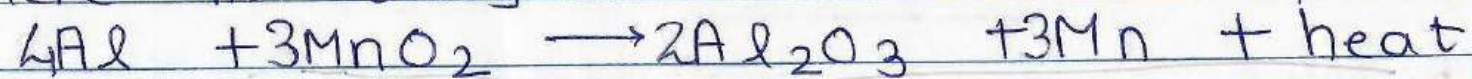
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Q.33)

(a) ~~to~~ Displacement reactions in which a high reactive metal displaces less reactive metal from its salt soln can be used to obtain two metals from middle of reactivity series $\rightarrow$ Manganese and Iron

(i) Reacⁿ of Aluminium with manganese oxide -

Here Al being more reactive displaces Mn.



The heat evolved is so large that Mn is obtained in molten form

(ii) Reacⁿ of ~~Fe~~ ferric oxide with aluminium to obtain Iron $\rightarrow$

Here Al replaces iron from its oxide.



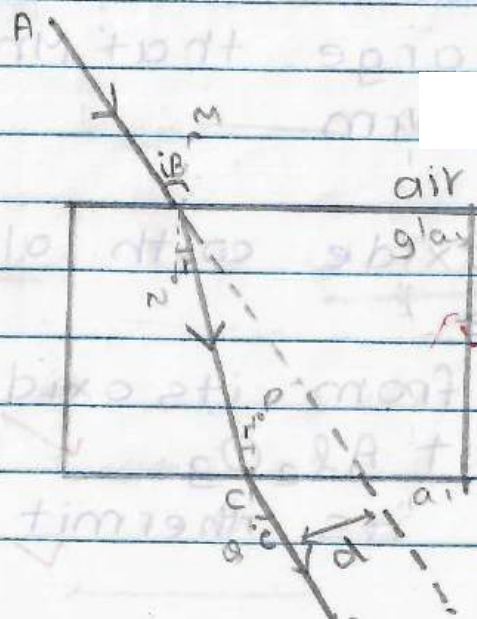
$\rightarrow$ This is also known as thermit reacⁿ.



- (b) Metals high up in the reactivity series cannot be obtained by reduction of ~~metals~~ oxides by carbon as -
- These metals (K, Na, Ca) are highly reactive
 - They have more affinity for oxygen rather than carbon ✓

Section - D

Q.34)
(b)(i)



Here,

AB - ~~is~~ incident ray

$\angle ABM \rightarrow$ angle of incidence

$\angle NBC \rightarrow$ angle of refraction

BC $\rightarrow$ refracted ray

$\angle QCP \rightarrow$ angle of emergence

CP $\rightarrow$ emergent ray

d $\rightarrow$ lateral displacement



- (II) Snell's law of refraction of light $\rightarrow$ The ratio of ^{sine of} angle of incidence to the ^{sine of} angle of refraction is constant for a given colour and given pair of media. ($i < \theta < 90^\circ$)
- $$\frac{\sin i}{\sin r} = \text{constant}$$

This constant is known as refractive index of medium 2 with respect to medium 1.

(III)

Aspect	Virtual image by <u>convex</u> lens	Virtual image by <u>concave</u> lens
(I) Object distance	Between focus and ~~the~~ ^{lens} optical centre	Anywhere from infinity to ~~pole~~ ^{optical} centre
(II) Magnification	Greater than 1 Image is enlarged	Less than 1 Image is diminished



Q.35)

(i) (I) Ovary →

Produces female gametes, eggs which take part in the the process of fertilisation.

(II) Fallopian tube →

It is the site of fertilisation of female gamete (egg) and male gamete (sperm).

(III) Uterus →

Provides nutrients for nourishment of foetus. It has thick and spongy lining which provides necessary conditions if egg is fertilised. During pregnancy, Placenta develops which helps to provide nutrients from mother's body and removal of waste from body of foetus.



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(ii) Two contraceptive methods used by males →

(a) Mechanical barriers - condoms

→ These help to prevent sperm transfer to female body and prevents transmission of STD's (sexually transmitted ~~devices~~ ^{des} diseases)

~~(b) Intra-uter~~

(b) Surgical method → Vasectomy

→ In this the vas deferens of male is blocked, which prevents sperm transfer.

Q.36

(b)

(i) Carbon forms compounds mainly by covalent bonding because —



Carbon is tetravalent (2,4)
It either has to gain or lose e^- .
Hence it forms covalent bonding by sharing of e^- .

(a) If ~~carbon~~ carbon loses $4e^-$ to form C^{4+} cation, then it will be difficult for nucleus to hold on to $2e^-$ with $6p^+$. A lot of energy will be lost.

(b) If carbon gains $4e^-$ to form C^{4-} anion, then the nucleus will have $10e^-$ with just $6p^+$ which is unstable. This process also requires a lot of energy. Hence carbon forms compounds by covalent bonding as there are also other properties which allow it to do so — like catenation, tetravalency and small size.



(II) Covalent compounds have low melting and boiling point as they have weak intermolecular forces of attraction which can easily be overcome due to heat.

(III)

(I) Covalent compounds don't have any free electrons, they only constitute of shared pair of electrons. Hence they are bad conductors of electricity.

(II) Carbon shows self-linkage or property of forming long chain of carbon atoms. It forms saturated, unsaturated compounds. It can even form branched, cyclic chains. Due to its tetravalency, it forms bonds with other carbon atoms.



Section-E

Q.37)

(a)

Wire	Insulation cover
Live wire	Red ✓
Neutral wire	Black ✓
Earth wire	Green

(b)

Given →

$$P = 1000 \text{ W}$$

$$V = 220 \text{ V}$$

To find → I

$$\Rightarrow P = VI$$

$$\Rightarrow I = \frac{P}{V} = \frac{1000}{220}$$

$$\Rightarrow I = \frac{1000}{220}$$

$$I = 4.5 \text{ A}$$

Hence current rating should be atleast 5A.



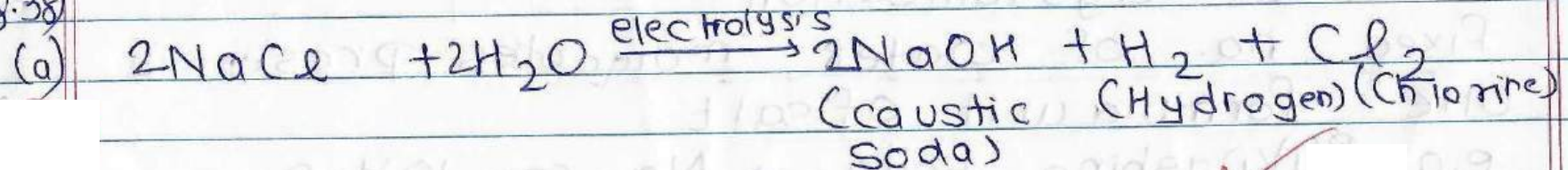
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(c)

(i) Earth wire is connected to the metallic body of appliances to prevent overflow of current in a circuit and to prevent fatal accidents and damaging of appliance.

The earth wire is connected to a metal plate buried inside earth. Whenever there is an excess of current flowing through circuit, it offers low resistance path for current to flow in earth therefore saving appliances such as electric iron from damage and prevent overloading/breaking of circuit.

Q.38)





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(b)	Products obtained	uses
i)	H_2 (hydrogen)	✓ fuels, ammonia for fertilisers, margarine
ii)	NaOH (caustic soda)	✓ De-greasing metal, soap and detergent, artificial papermaking
iii)	Cl_2 (Chlorine)	✓ PVCs, disinfectant, swimming pool

(c) (i) Water of crystallisation -
Fixed no. of water molecules present in one formula unit of salt.

e.g. (i) Washing soda $\rightarrow Na_2CO_3 \cdot 10H_2O$

Sodium carbonate
decahydrate





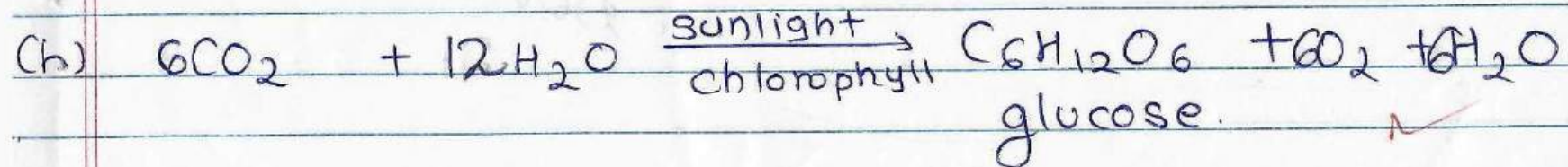
(ii) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
(copper sulphate) ✓

(iii) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$
(ferrous sulphate) ✓

Q.39)

(a) → Photosynthesis is the process by which green plants prepare their own food.

→ Photosynthesis is the process by which some green plants and bacteria prepare their own food by using inorganic substances like carbon dioxide and water in presence of sunlight and chlorophyll to form glucose.





(c)

(i) In desert plants →

(a) Take up Carbon dioxide at night

(b) Prepare an intermediate product

(c) This product is acted upon by energy absorbed by chlorophyll during the day time.

(d) After this they split water to form hydrogen and oxygen and Reduction of carbon dioxide to carbohydrates.