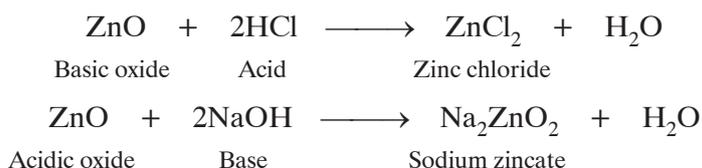


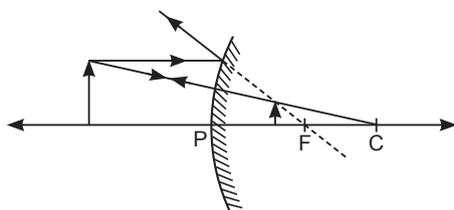
Answers to RSPL/3 (DS2)

1. The safety fuse used in domestic circuits is based on the principle of heating effect of current. An electric heater works on same principle.
2. A food web is formed because each organism is generally eaten by two or more other kinds of organisms, which in turn are eaten by several other organisms.
3. Zinc oxide is called amphoteric oxide as it behaves both acidic oxide and basic oxide.



Aluminium oxide is another amphoteric oxide.

4. The mirror is convex.



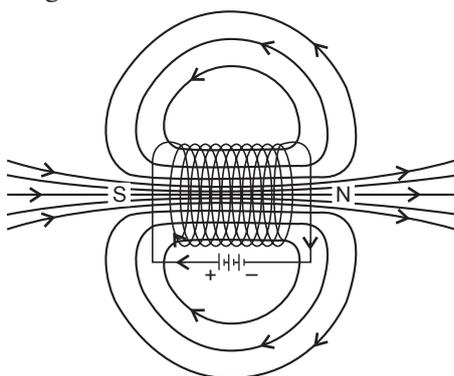
Or

Power of the lens is defined as its ability to converge or diverge light. It is measured as the reciprocal of focal length of the lens expressed in metre.

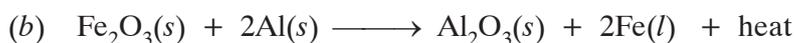
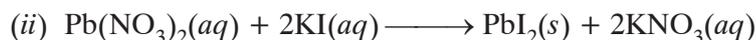
$$\text{If } P_1 = -3\text{D}, P_2 = +5\text{D},$$

$$\text{Resultant power, } P = P_1 + P_2 = -3\text{D} + 5\text{D} = +2\text{D}$$

5. When a coil is wound around a core (soft iron) and current is passed, it behaves like a magnet. The effect of magnetic properties remains only till the current is passing through the coil. This is known as electromagnet.



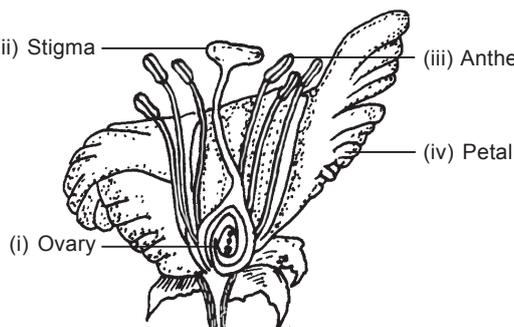
6. (a) (i) The colour of the precipitate is yellow. The name of compound formed as a precipitate is PbI_2 (lead iodide).



Iron (III) oxide Aluminium oxide Aluminium oxide Molten iron

It is a displacement reaction because Al is displacing Fe from Fe_2O_3 .

7. (a) (ii) Stigma ——— (iii) Anther



- (b) (i) Growth of facial hair.
(ii) Voice begins to crack.

8. (a) Differences are as follows:

Homologous organs	Analogous organs
<p>– These are the organs in different groups of organisms, which have a similar basic structure, but are modified to perform different functions.</p> <p>e.g. hands of human beings and wings of birds.</p>	<p>– These are the organs in different groups of organisms, which perform similar function but have different basic structure.</p> <p>e.g. wings of a butterfly and that of a bird.</p>

- (b) (i) Dinosaurs
(ii) Kohlrabi

9. The refractive index of a medium with respect to vacuum is called its absolute refractive index.

$$\mu_A = 2.0, \quad \mu_B = 1.5$$

$$(a) \quad v_B = 2 \times 10^8 \text{ m/s}, \quad \text{Let speed of light in vacuum} = C$$

$$\therefore \mu_B = \frac{C}{v_B} \quad \text{or} \quad C = \mu_B \times v_B = 2 \times 10^8 \times 1.5 = 3 \times 10^8 \text{ m/s}$$

$$(b) \therefore \mu_B = \frac{C}{v_A} \quad \text{or} \quad v_A = \frac{C}{\mu_A} = \frac{3 \times 10^8}{2.0} = 1.5 \times 10^8 \text{ m/s}$$

Or

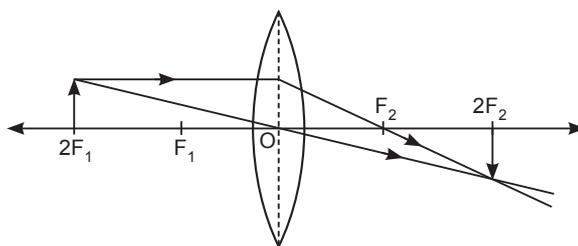
Given $f = 10$ cm, $v = 20$ cm, $h_o = 1$ cm

By lens formula, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$\Rightarrow \frac{1}{u} = \frac{1}{v} - \frac{1}{f}$

or $u = \frac{vf}{f-v} = \frac{(20)(10)}{10-20} = -20$ cm

Thus, object is kept at a distance of 20 cm from the lens, at $2F_1$



Magnification, $m = \frac{v}{u} = \frac{h_i}{h_o}$

$\therefore h_i = h_o \times \frac{v}{u} = 1 \times \frac{20}{-20} = -1$ cm

Thus, image is of equal size as object and is inverted.

10. Action of adrenaline:

- When adrenaline is secreted into the blood, it is carried to different parts of the body.
- It stimulates the heart muscles and the heart beats faster resulting in supply of more oxygen to the muscles.
- The blood supply to the digestive system and skin is reduced as the muscles around the small arteries are contracted; so blood is diverted to skeletal muscles.
- The breathing rate increases due to faster contractions of the diaphragm and the rib muscles.
- All these responses act together and enable the animal body to deal with the situation.

Or

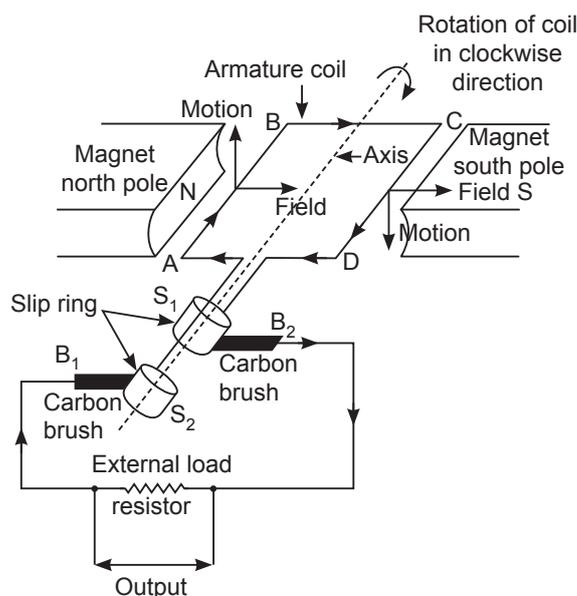
(a) A synapse is the gap between two neurons, usually between the axon of one neuron and the dendrite of the other.

(b) - When a tendril comes in contact with a support, the part of the tendril in contact with the support does not grow as rapidly as the part of the tendril away from the support.

- This causes the tendril to circle around the object and cling to it.

- Since, there is slow growth in a particular direction, it appears as the tendril is moving around the support.

11. (a) Water harvesting refers to the capturing of the water that falls on the land surface.
- The main purpose is to recharge the ground water.
- (b) – The Sal forests of Arabari in West Bengal underwent a remarkable recovery due to the active and willing participation of the local community under the forest officer A.K. Banerjee.
- The villagers were involved in the protection of 1,272 hectares of the badly degraded sal forest.
 - The villagers were given employment in silviculture and harvesting operations, 25 per cent of the final harvest and allowed fodder and fuel wood collection on payment of a nominal fee.
 - With the active and willing participation of the local people, a previously worthless sal forests in Arabari underwent a remarkable recovery, to be valued now ₹ 12.5 crores.
12. (a) A generator is based on the principle of electromagnetic induction. It means when a coil is rotated in a strong external magnetic field, a current is induced in the coil.
- (b) The a.c. generator uses a slip ring commutator and generates alternating currents. The d.c. generator uses a split ring commutator and generates direct currents.
- (c)

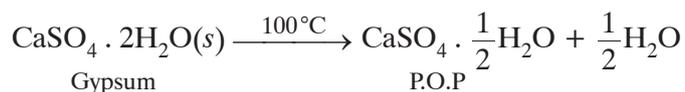


13. (a) Characteristics of an ideal fuel are stated below:
- (i) It should have high calorific value.
 - (ii) It should be safe to handle, use and store.
 - (iii) It should be economical and easily available.
 - (iv) It should not produce toxic gases or solid residue on burning.
- (b) Nuclear reactions involve radioactive elements such as uranium for the reaction.
- Advantage: It has a very high efficiency as compared to any other source of energy.
- Disadvantage: The disposal of radioactive wastes produced in these reactions is difficult.

14. (a) G – It is a noble gas and has zero valency.
 (b) E – Smallest atomic size and more elution affinity.
 (c) (i) B – 2, 8, 1. (ii) E – 2, 7

15. (a) Plaster of paris, $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

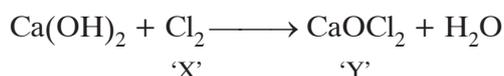
(b) When Gypsum is heated at 100°C or 373 K , it loses its three-fourth water and plaster of Paris is prepared.



(c) When it is heated more than 100°C it will loss all water of crystallization and form hard mass of CaSO_4 (Calcium sulphate).

Or

- (a) Raw materials are: NaCl , H_2O , NH_3 , CO_2 .
 (b) 'X' is chlorine; 'Y' is bleaching powder.

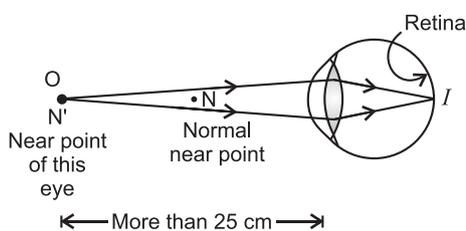


16. (a) Hypermetropia, the image is formed behind retina.

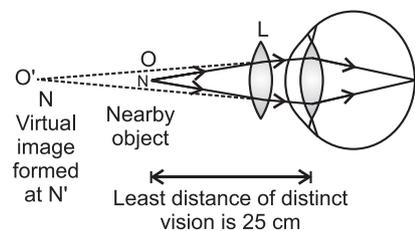
(b) Causes of hypermetropia are:

- Focal length of eye lens becomes larger.
- Eye ball becomes smaller.

(c) **Hypermetropic eye**



Corrected vision



(d) Given: $v = -75\text{ cm}$, $u = -25\text{ cm}$

Focal length of lens required = f

By lens formula, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$$f = \frac{uv}{u-v} = \frac{(-25)(-75)}{-25+75} = 37.5\text{ cm}$$

$$\text{Power} = \frac{1}{f(\text{m})} = \frac{1}{0.375\text{ m}} = 2.67\text{ D}$$

Or

- (a) The ability of eye lens to adjust its focal length in order to obtain a sharp image of the objects at different distances at the retina is called power of accommodation.
- (b) When we look at a nearby objects the ciliary muscles contracts. This increases the curvature of eye lens. The eye lens becomes thicker and its focal length decreases. So the sharp image of nearby object is formed at retina.

When we look at the far off object, the ciliary muscles relax. This decreases the curvature of eye lens. The eye lens becomes thinner and its focal length increases. So the sharp image of far off object is formed at retina.

- (c) Near point: 25 cm
Far point: infinity
- (d) The myopic person can see nearby objects clearly but not the distant object without his spectacles. He has to remove the concave lens while reading or writing, else he has to keep the book at larger distance from his eyes than 25 cm. Thus he removes his spectacles.

17. (a) Structure of placenta:

- It is a disc-like structure, embedded in the uterine wall.
- It contains villi on the side of embryo.
- On the mother's side (uterine wall side) there are blood spaces which surround the villi; this arrangement increases the surface area for exchange of materials.

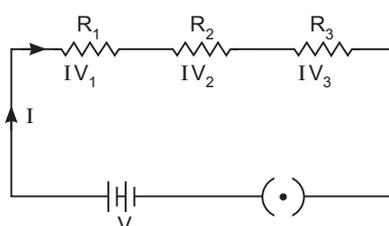
Functions of placenta:

- (i) It facilitates transport of glucose and oxygen from the mother's blood to the embryo.
 - (ii) The metabolic wastes generated by the embryo are removed through the placenta and transferred to mother's blood.
- (b) – The copy of the DNA synthesised should have an organised cellular structure for its functioning and maintaining life processes.
– Hence, DNA copying must be accompanied by the creation of an additional cellular apparatus and DNA copying alone is not sufficient.
- (c) Syphilis and gonorrhoea are two sexually transmitted diseases caused by bacterial infections.

18. (a) **Ohm's Law:** It states that for a conductor of given material, the current flowing through it is directly proportional to potential difference applied across its ends, provided temperature of conductor remains constant.

- (b) Consider three resistors R_1 , R_2 and R_3 be connected in following manner:

Series



Science—10

Potential drop across $R_1 = V_1$

Potential drop across $R_2 = V_2$

Potential drop across $R_3 = V_3$

Current through resistors = I

By Ohm's law, $V_1 = IR_1$

$$V_2 = IR_2$$

$$V_3 = IR_3$$

$$V_1 + V_2 + V_3 = IR_1 + IR_2 + IR_3$$

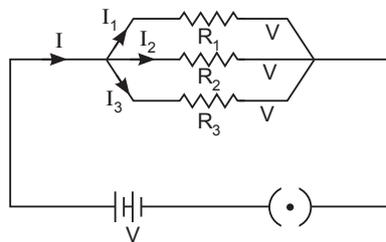
$$V = I(R_1 + R_2 + R_3)$$

Since, $V = IR = I(R_1 + R_2 + R_3)$

or $R = R_1 + R_2 + R_3$

Thus, overall resistance increases in series.

Parallel



Potential across each resistor = V

Current through $R_1 = I_1$

Current through $R_2 = I_2$

Current through $R_3 = I_3$

$$\text{Total current} = I = I_1 + I_2 + I_3$$

By Ohm's law, $I_1 = \frac{V}{R_1}$

$$I_2 = \frac{V}{R_2}$$

$$I_3 = \frac{V}{R_3}$$

$$I_1 + I_2 + I_3 = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$

$$I = V \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right)$$

Since, $I = \frac{V}{R}$, $\frac{V}{R} = V \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right)$

or $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

Thus, overall resistance decreases in parallel.

19. (a) **In fishes**

- In fishes, the heart is two-chambered and it pumps the deoxygenated blood to the gills; oxygenation occurs in the gills and the oxygenated blood is supplied to all parts directly from the gills.
- The blood passes through the heart only once during each cycle and is called single circulation.

In other vertebrates

- The heart is 3 or 4-chambered and oxygenation occurs in the lungs and oxygenated blood reaches the heart and is pumped to all parts of the body.
- Deoxygenated blood from all parts of the body also comes to the heart and is sent to lungs for oxygenation.
- Since, the blood passes through the heart twice during each cycle, the circulation is called double circulation.

(b) The outside raw materials are used

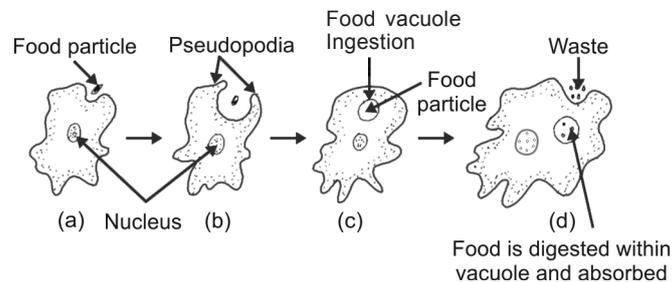
- (i) as source of energy.
- (ii) for the synthesis of new materials needed for building up new tissues (growth) and repair of the old tissues.

(c) Oxygen is transported by the respiratory pigment haemoglobin which is present in the red blood cells of the blood, in the form of oxyhaemoglobin.

Or

(a) Nutrition in *Amoeba*

- *Amoeba* can take in the food material by the entire surface of the cell.
- It puts forth temporary finger-like projections (pseudopodia) of the cell surface.
- These projections fuse over the food particle and form a food vacuole.
- Digestion takes place inside the food vacuole, i.e. the complex substances are broken down into simpler ones.
- The simpler substances diffuse into the cytoplasm.
- The undigested substances are moved to the surface of the cell and are then thrown out.

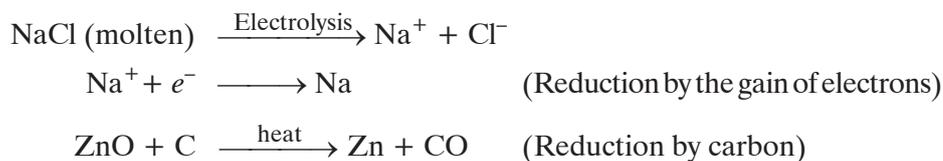


Nutrition in *Amoeba*

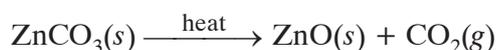
(b) Plant parasite – *Cuscuta*

Animal parasite – Tapeworm

20. (a) The electrolytic reduction takes place at the cathode by the gain of electrons in electrolysis. At the same time, carbon reduction is carried by heating a metal oxide with coke. For example



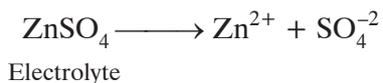
- (b) • Extraction of zinc from carbonate ore can be done in following way:
- Concentration or enrichment of ore is done by placing powdered ore in a tank and then pass a stream of water the heavy ore is settle at bottom and lighter impurities dried away this is called hydraulic washing.
 - Roasting: The ore of first step is heated strongly in absence of air called roasting. It convert carbonate into its oxide



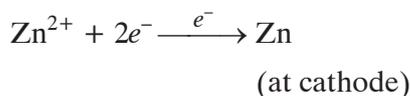
- (iii) The zinc oxide is obtained is reduced to zinc by heating with coke.



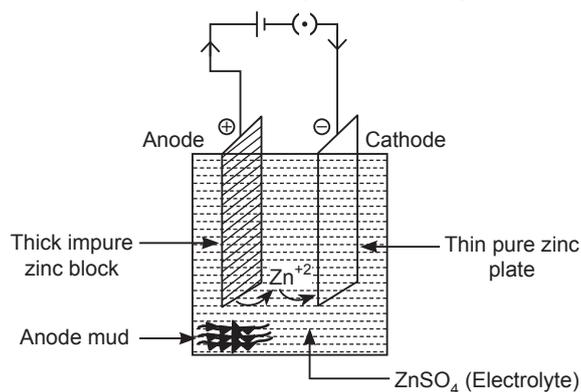
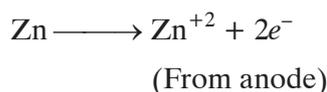
- (iv) The impure zinc is purified by electrolytic refining. Reaction in solution



Reaction at cathode:



Reaction at anode



- Extraction of zinc from its sulphide ore; i.e. ZnS (Zinc blende).

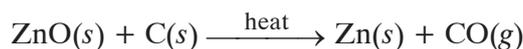
The various steps involved are:

(i) Ore is concentrated by Froth Floatation process.

(ii) ZnS is converted to ZnO with the help of roasting carried in excess of air



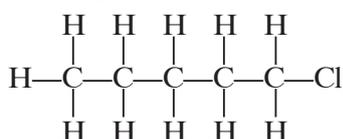
(iii) The oxide ore is reduced to metallic form with coke upon heating. The process is known as smelting.



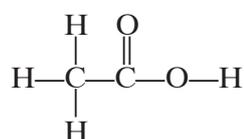
(iv) Impure zinc can be refined by electro-refining process.

21. (a) An atom or group of atom which decide chemical property of hydrocarbons called functional group.

(b) (i) Chloropentane



(ii) Ethanoic acid



(c) When soap reacts with hard water the minerals present in water react with soap and form a white curdy substance known as scum. It reduces the cleaning ability of soap.

(d) (i) Propanone

(ii) Butanal

Or

(a) Methanoic acid, its molecular formula is CH_2O_2 .

Ethanoic acid, its molecular formula is $\text{C}_2\text{H}_4\text{O}_2$.

When acid reacts with sodium hydroxide, its sodium salt and water is formed.



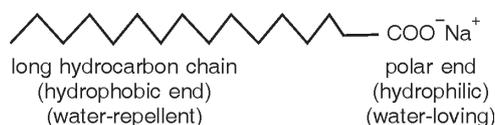
Ethanoic acid

Sodium ethanoate

Water

(b) Mechanism of cleansing action of soap:

Soap molecules consist of a large hydrocarbon tail which is hydrophobic (water-hating or water repelling) with a negatively charged head which is hydrophilic (water-loving) as shown in figure.



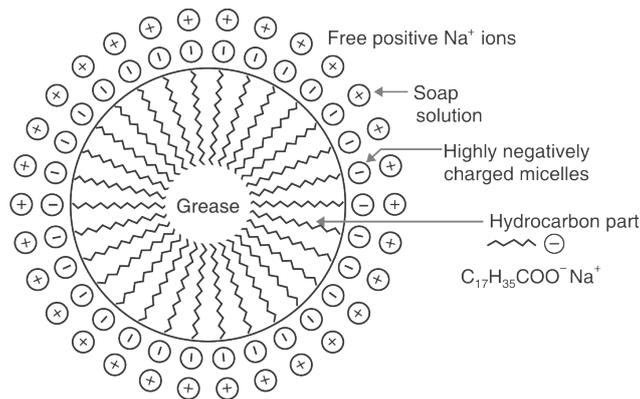
When a soap is dissolved in water, the molecules associate together as clusters called micelles in which water molecules, being polar in nature, surround the ions and the hydrocarbon part of the molecule attracts grease, oil and dirt.

The tails stick inwards and the heads outwards.

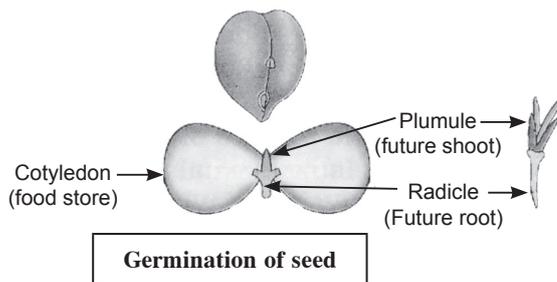
In cleansing, the hydrocarbon tail attaches itself to oily dirt. When water is agitated (shaken vigorously), the oily dirt tends to lift off from the dirty surface and dissociate into fragments.

This gives opportunity to other tails to stick to oil. The solution now contains small globules of oil surrounded by soap molecules.

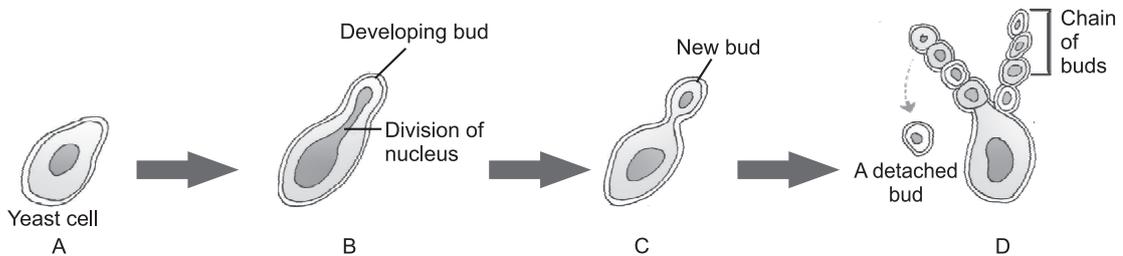
The negatively charged heads present in water prevent the small globules from coming together and form aggregates. Thus, the oily dirt is removed.



22.



23.

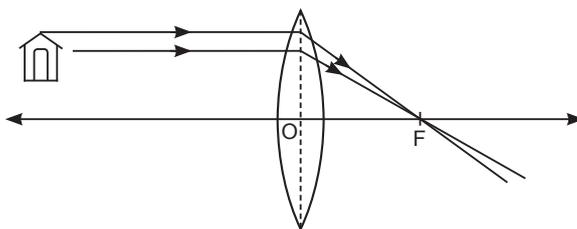


This method of reproduction is known as budding.

Or

- (a) Two cells.
 - (b) It is an asexual method, because a single parent cell is involved and there is no formation or fusion of gametes.
24. (a) Battery eliminator is used to convert the a.c. voltage into d.c. output of desired value. Its output is fed into the circuit as input.
- (b) Rheostat is used to vary the resistance so that potential difference across the resistors changes.

25. The image is obtained at $42.7 + 15 = 57.7$ cm mark on the optical bench.



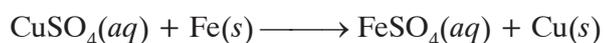
i.e. Real, inverted and diminished image, very close to F, is obtained.

26. • Pair I and IV

• Test tube I



Test tube IV



Or

The student will observe colour change in test tubes A, B and D.

Thus, aluminium metal can displace iron from iron-sulphate solution and copper from copper sulphate solution. So, aluminium is more reactive metal than iron and copper.

Iron can displace copper from copper sulphate. Thus, iron is more reactive metal than copper. From these observation it may be concluded that aluminium is the most reactive metal.

27. Observations:

(a) Brisk effervescence are formed to evolution of CO_2 with bubbles.

(b) The pungent smell of ethanoic acid is not detected now due to neutralization of ethanoic acid with sodium carbonate.

