Solutions

(*Ref: Question Paper Code 31/1/1*)

SECTION A

1. Cyclopentene/Benzene-formula or structure (or any other).

2. Electromagnetic Induction.

3. (*a*) Thick hair growth in armpits, genital area. Thinner hair on arms, legs, face. More active oil secretion from glands on skin. Occurrence of pimples **(Any two)**

(*b*) It results in imbalance in male-female ratio, *i.e.*, decline in child sex ratio.

(*c*) Oral pills.

(*d*) Rate of birth and death.

4. (*a*) Because human beings are at the top level in any food chain.

(*b*) (*i*) Washing of vegetables, fruits, grains thoroughly. (*ii*) Organic farming. (*iii*) Use of bio pesticides. **(Any one)**

(*c*) (*b*) Trophic level

(*d*) (*a*) consumer

5. (*d*) (A) and (B)

OR

(*d*) Double displacement reaction

6. (*d*) (B), (C) and (D)

7. (*c*) Sodium hydrogen carbonate and tartaric acid.

8. (*c*) $CaSO_4 \cdot \frac{1}{2} H_2O$

9. (*d*) all reflecting surfaces

OR

(*d*) virtual and erect

10. (*d*) increases heavily

OR

(*d*) 1A

11. (*d*) Afforestation

12. (*b*) (A) and (D)

13. (*b*) Both (A) and (R) are true but (R) is not the correct explanation of the assertion (A).

14. (*a*) Both (A) and (R) are true and (R) is the correct explanation of the assertion (A).

SECTION B

15. ● A black colour is formed on the surface.

$$2Cu + O_2 \xrightarrow{\text{Heat}} 2CuO$$

Brown — Copper Oxide; Black Colour

● Original/brown colour is restored.

$$CuO + H_2 \xrightarrow{\text{Heat}} Cu + H_2O$$

Black — Copper; Brown

16. Products: Hydrogen, Chlorine, Sodium hydroxide

Uses:

Hydrogen: In the production of margarine/ammonia/as a fuel.

Chlorine: Water treatment/swimming pools/production of PVC/Disinfectants/CFCs/ Pesticides.

Sodium hydroxide: For degreasing metal surfaces/in making soaps and detergents/ paper making/artificial fibres.

OR

● Washing soda is prepared by recrystallisation of sodium carbonate.

● Chemical Eqn: $Na_2CO_3 + 10\ H_2O \longrightarrow Na_2CO_3.10\ H_2O$

● $Na_2CO_3.10\ H_2O$ is a Basic Salt. ● It removes permanent hardness.

17. (*i*) By dissolving 5 g of $KMnO_4$ in 100 mL of water;

or by dissolving 5 g of $KMnO_4$ in water to make a final volume of 100 mL.

(*ii*) Alkaline potassium permanganate acts as an oxidising agent.

On adding in excess, purple colour persists.

(*iii*) $CH_3CH_2OH \xrightarrow[\text{Heat}]{\text{Alkaline } KMnO_4} CH_3COOH$

18. ● The adrenaline hormone is secreted into the blood.

● The heart beats faster resulting in supply of more oxygen to the muscles.

● Blood is diverted to skeletal muscles.

● The breathing rate increases.

● The blood supply to digestive systems and skin is reduced.

OR

● Electrical impulses have limited access to only those cells that are connected by nervous tissue/neurons, whereas chemical signals can reach each and every cell of the body.

● Cells need time to reset in order to create repeated/new electrical impulses whereas no such time is required for chemical communication.

19. ● Pollination is the transfer of pollen from anther to stigma.

Self Pollination	Cross Pollination
Transfer of pollen in the same flower.	Transfer of pollen from one flower to another.

● Pollination leads to fertilisation resulting in the formation of zygote.

20. ● Homologous structures are those which have similar basic structure and origin but perform different functions.

- Example: forelimbs of reptiles, amphibians, humans, wings of birds.
- Yes
- Similarity in basic design of the structure indicates that their ancestors were common.

21. Because of scattering of light.

Instances:

- When a fine beam of light enters a smoke-filled dark room through a small hole.
- When sunlight passes through a canopy of dense forest in foggy/misty conditions.
- Blue colour of sky.
- Red colour of the sun during sunrise or sunset.

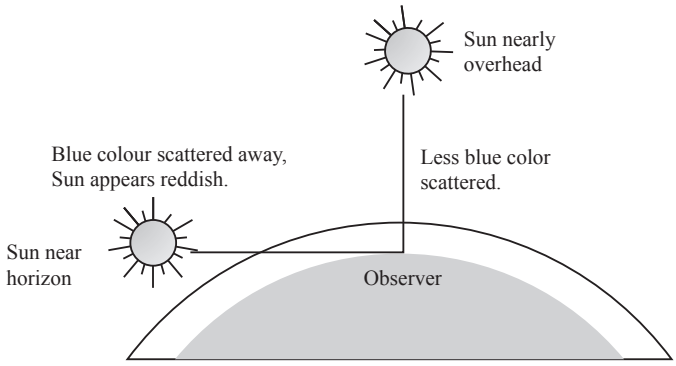
OR

- Prism has 2 inclined refracting surfaces whereas a glass slab has 2 parallel refracting surfaces.

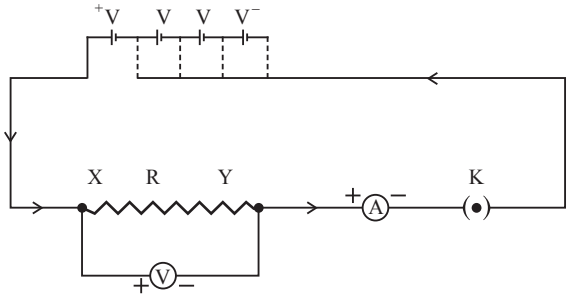
(*i*) When monochromatic light passes through a glass slab it gets displaced laterally whereas in prism it gets angularly displaced.

(*ii*) When white light passes through a glass slab, it gets laterally displaced whereas in prism, dispersion takes place.

22.



23. V α I or Potential difference is directly proportional to current.



24. (*a*) Mathematical Expression: $H = I^2Rt$, where H is the heat generated in time *t* due to a current I flowing through a resistor of resistance R.

(*b*) Heat generated, H = V.I.t,

= V.Q

Given: V = 40 volts, Q = 96000 C

$\therefore$ H = 40 V × 96000 C

$= 3.84 \times 10^6$ J

SECTION C

25.
- These metals have more affinity for oxygen than carbon.
- These metals are placed towards the top of the reactivity series.
- These metals are obtained by electrotytic reduction of their molten ores.
- Example: Extraction of sodium from molten sodium chloride by electrolysis.

  Process:

  Molten NaCl is taken in an electrolytic cell and on passing electricity Na is deposited at cathode and chlorine is liberated at anode.

  Reactions–

  At cathode: $Na^+ + e^- \rightarrow Na$

  At anode: $2Cl^- \rightarrow Cl_2 + 2e^-$

26. (*i*) E, it has 4 valence electrons.

(*ii*) B, it needs only 2 electrons to attain stable configuration.

(*iii*) D, it loses two electrons to attain stable configuration.

(*iv*) F, it has the largest size since size increases down the group.

(*v*) H, C and F are noble gases as their outermost shell is complete.

OR

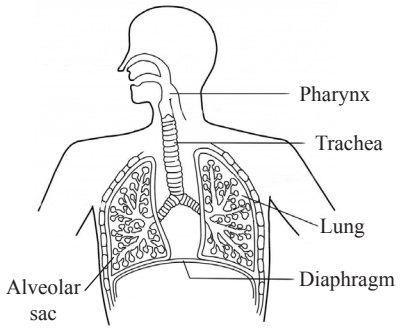
- Atomic size is the distance between the centre of the nucleus and the outermost shell of an isolated atom. It is measured in picometre/pm (1 pm = 10^{-12} m).
- Trends in Atomic radius—

  In a group: atomic radius increases down the group; it is due to addition of a new shell in each period.

  In a period: atomic radius decreases from left to right; it is due to increase in nuclear change which in turn is due to the increase in the atomic number that pulls the electrons towards the nucleus.

27. (*a*) Rate of breathing is faster in aquatic organisms because the amount of dissolved oxygen in water is lower as compared to the amount of oxygen in air.

(*b*) Diagram with 5 labellings is given alongside.



OR

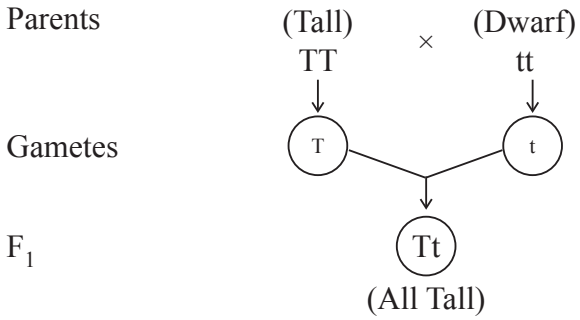
(*a*) A pair of kidneys, a pair of ureters, a urinary bladder and a urethra.

(*b*) A kidney has a large number of filteration units called nephrons. Each nephron has cup shaped Bowman's capsule containing a bunch of capillaries called glomerulus. Blood gets filtered in the glomerulus. Filterate gets collected in Bowman's capsule. Some useful substances such as glucose, amino acids, salts and water are selectively reabsorbed as urine flows through nephron tube. The urine formed in each kidney is eventually stored in the urinary bladder.

28. (*a*) Law of Dominance of Traits:

It states that dominant alleles always mask the recessive alleles. In a cross between a pair of contrasting characters, only one parental character will be expressed in F_1 generation which is called dominant trait and the other is called recessive trait.

For example in Pea plants,

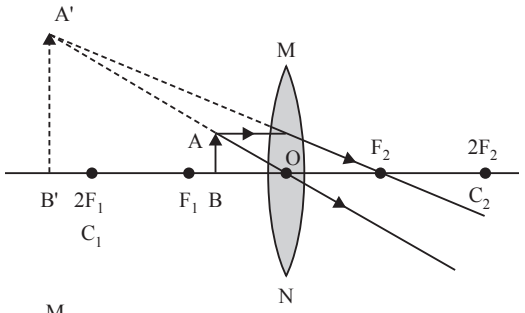


All plants in F_1 generation mere tall proving that the gene for tallness is dominant over the gene for dwarfness, which is not able to express itself in the presence of dominant trait.

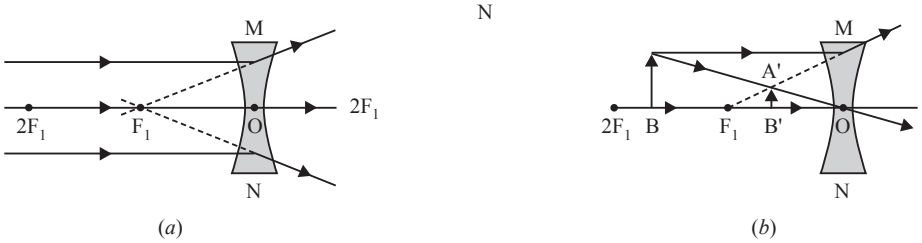
(*b*) Traits acquired by an organism during its lifetime are known as aquired traits.

These traits are not inherited because they occur in somatic cells only and do not cause any change in the DNA of the germ cells.

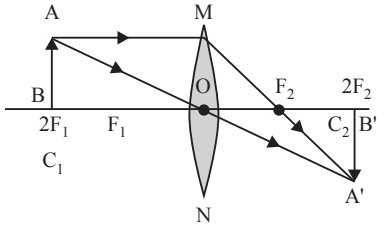
29. (*i*)



(*ii*)



(*iii*)



In case (*i*) sign of magnification is positive and m > 1.

(*ii*) sign of magnification is positive and m < 1.

OR

Given $h = +4.0$ cm, $u = -25.0$ cm, $f = -15.0$ cm, h is the height of the object, u is the object distance and f is the focal length.

(*i*) Image distance v = ?; Mirror formula: $\frac{1}{v}+\frac{1}{u}=\frac{1}{f}$

or $$\frac{1}{v}=\frac{1}{f}-\frac{1}{u};\ =-\frac{1}{15}-\left(-\frac{1}{25}\right)$$

$$=\frac{-1}{15}+\frac{1}{25}=\frac{-5+3}{75}=\frac{-2}{75}$$

$\therefore$ $v = -37.5$ cm

The screen should be placed 37.5 cm in front of the mirror.

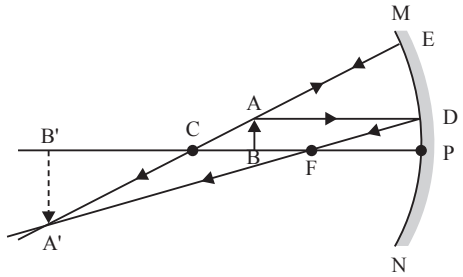
(*ii*) If h denotes the size of the object, h' denotes the size of the image, u denotes the object distance and v denotes the image distance, then the magnification

$$m=\frac{h'}{h}=-\frac{v}{u}$$

$$h'=-\frac{v}{u}.h=-\frac{(-37.5\times 4)}{-25}$$

$h' = -6.0$ cm (size of the image).

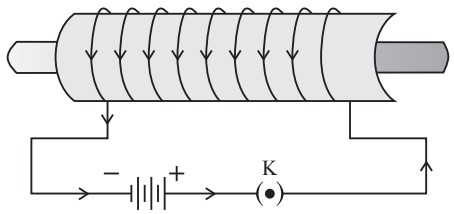
(*iii*)



30. (*a*) A current carrying solenoid is called an electromagnet. When soft iron is placed inside a solenoid carrying current, the soft iron piece behaves like a magnet as long as electric current passes through it. The magnet so formed is electromagnet.

Uses: In electric motors, electric bells, etc.

(*b*)



(Direction of current)

(*c*) Soft iron core is used to increase the magnetic field produced by the electromagnet. Also, it loses all of its magnetism the moment, the current flowing in the solenoid is switched off.

(*d*) (*i*) By increasing the current.

(*ii*) By increasing the number of turns in the coil.