

All India CBSE Board 2020 Solved Paper

GENERAL INSTRUCTIONS

- (i) The question paper comprises three Sections, **A**, **B** and **C**. There are **30** questions in the question paper.
- (ii) All questions are compulsory.
- (iii) Section **A** - all questions / or parts (question no. **1** to **14**) there of in this section are **one** mark questions comprising **MCQ**, **VSA** type and **Assertion-Reason** type questions. They are to be answered in **one** word or in one sentence.
- (iv) Section **B** - question no. **15** to **24** are short answer type questions, carrying **three** marks each. Answer to these questions should not exceed **50** to **60** words.
- (v) Section **C** - question no. **25** to **30** are long answer type questions, carrying **five** marks each. Answer to these questions should not exceed **80** to **90** words.
- (vi) Answer should be brief and to the point. Also the above mentioned word limit be adhered to as far as possible.
- (vii) There is no overall choice in the question paper. However, an internal choice has been provided in some questions in each section. Only one of the choices in such questions have to be attempted.
- (viii) In addition to this, separate instructions are given with each section and question, wherever necessary.

SECTION - A

1. How are covalent bonds formed?
2. Define electropositivity.

OR

The atomic radii of first group elements are given below :

Group-I element	Atomic Radii (pm)
Na	86
K	231
Rb	244
Cs	282

State the reason behind the observed trend in the above elements.

3. Answer question numbers 3(a) to 3(d) on the basis of your understanding of the following paragraph and the related studies concepts.
The Tehri dam is the highest dam in India and one of the highest in the World. The Tehri dam withholds a reservoir of capacity 4.0 km^3 and surface area 52 km^2 . It is used for irrigation, municipal water supply and the generation of 1000 MW of hydro electricity.

The Tehri Dam has been the object of protests. Environment activist Shri Sunder Lal Bahuguna led the “Anti Tehri Dam Movement” from 1980s to 2014. The protest was against the displacement of town inhabitants and environmental consequences of the weak ecosystem. The relocation of more than 1,00,000 people from the area has led to protracted legal battles over resettlement rights and ultimately resulted in the delayed completion of the project.

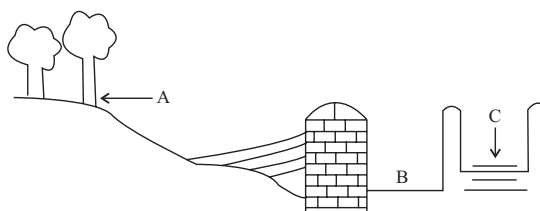
- (a) How is hydropower harnessed?
 - (b) Define 1 MW.
 - (c) Mention two disadvantages of constructing Tehri Dam.
 - (d) What happens when water from great heights is made to fall on blades of turbine?
4. Questions numbers 4(a) to 4(d) are based on table given below, Study the table in which the levels of Thyroid Stimulating Hormone (TSH) in women are given and answer the questions that follow on the basis of understanding of the following paragraph and the related studied concepts.

Age Range	Normal (mU/L)	Low (mU/L)
18 - 29 years	0.4 - 2.34 mU/L	< 0.4 mU/L
30 - 49 years	0.4 - 4.0 mU/L	< 0.4 mU/L
50 - 79 years	0.46 - 4.68 mU/L	< 0.46 mU/L

Women are at greater risk for developing abnormal TSH levels during menstruation, while giving birth and after going through menopause.

Around 5% of women in the United States have some kind of thyroid problem compared to 3% of men. Despite claims that high TSH increases your risk for heart disease, a 2013 study found no link between high TSH and heart diseases. But a 2017 study showed that older women are especially at risk for developing thyroid cancer if they have high TSH levels along with thyroid nodules.

- (a) A 35 year old woman has TSH level 6.03 mU/L. What change should she bring in her diet to control this level?
- (b) When do women face a greater risk of abnormal TSH level?
- (c) State the consequence of low TSH level.
- (d) Name the mineral that is responsible for synthesis of hormone secreted by thyroid gland.
5. The sky appears dark to passengers flying at very high altitudes mainly because :
- (a) Scatterings of light is not enough at such heights.
- (b) There is no atmosphere at great heights.
- (c) The size of molecules is smaller than the wavelength of visible light.
- (d) The light gets scattered towards the earth.
6. A cylindrical conductor of length ' l ' and uniform area of cross section ' A ' has resistance ' R '. The area of cross section of another conductor of same material and same resistance but of length ' $2l$ ' is
- (a) $\frac{A}{2}$ (b) $\frac{3A}{2}$ (c) $2A$ (d) $3A$
7. The maximum resistance which can be made using four resistors each of resistance $\frac{1}{2} \Omega$ is
- (a) 2Ω (b) 1Ω (c) 2.5Ω (d) $S\Omega$
8. A diagram of traditional water harvesting system is given below :
The statement which defines the system and its parts is



- (a) This is an ideal setting of the Khadin system and A = Catchment area; B = Saline area & C = Shallow dugwell
- (b) This is an ideal setting of the Shallow dugwell system and A = Catchment area; B = Saline area and C = Khadin
- (c) This is an ideal setting of Catchment area and A = Khadin, B = Saline area and C = Shallow dugwell
- (d) This is showing Saline area and A = Catchment area; B = Khadin and C = Shallow dugwell

OR

The major ill effect of mono culture practice in forests is on the

- (a) biodiversity which faces large destruction
- (b) local people whose basic needs can no longer be met from such forests
- (c) industries
- (d) forest department
9. Several factories were pouring their wastes in rivers A and B. Water samples were collected from these two rivers. It was observed that sample collected from river A was acidic while that of river B was basic. The factories located near A and B are
- (a) Soaps and detergents factories near A and alcohol distillery near B.
- (b) Soaps and detergents factories near B and alcohol distillery near A.
- (c) Lead storage battery manufacturing factories near A and soaps and detergents factories near B.
- (d) Lead storage battery manufacturing factories near B and soaps and detergents factories near A.
10. In which of the following the identity of initial substance remains unchanged?
- (a) Curdling of milk
- (b) Formation of crystals by process of crystallisation
- (c) Fermentation of grapes
- (d) Digestion of food

11. An aqueous solution 'A' turns phenolphthalein solution pink. On addition of an aqueous solution 'B' to 'A', the pink colour disappears. The following statement is true for solution 'A' and 'B'.
- A is strongly basic and B is a weak base.
 - A is strongly acidic and B is a weak acid.
 - A has pH greater than 7 and B has pH less than 7.
 - A has pH less than 7 and B has pH greater than 7.
12. An element 'X' is forming an acidic oxide. Its position in modern periodic table will be
- Group 1 and Period 3
 - Group 2 and Period 3
 - Group 13 and Period 3
 - Group 16 and Period 3

OR

Consider the following statements about an element 'X' with number of protons 13.

- It forms amphoteric oxide
- Its valency is three
- The formula of its chloride is $XC l_3$

The correct statement(s) is/are

- only (A)
- only (B)
- (A) and (C)
- (A), (B) and (C)

Direction : For question numbers 13 and 14, two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :

- Both (A) and (R) are true and (R) is correct explanation of the assertion.
 - Both (A) and (R) are true but (R) is not the correct explanation of the assertion.
 - (A) is true but (R) is false.
 - (A) is false but (R) is true.
13. **Assertion (A) :** Following are the members of a homologous series :
 CH_3OH , CH_3CH_2OH , $CH_3CH_2CH_2OH$
- Reason (R) :** A series of compounds with same functional group but differing by $-CH_2-$ unit is called a homologous series.
14. **Assertion (A) :** Alloys are commonly used in electrical heating devices like electric iron and heater.
- Reason (R) :** Resistivity of an alloy is generally higher than that of its constituent metals but the alloys have low melting points than their constituent metals.

SECTION - B

15. Mention with reason the colour changes observed when :
- silver chloride is exposed to sunlight.
 - copper powder is strongly heated in the presence of oxygen.
 - a piece of zinc is dropped in copper sulphate solution.
16. Complete and balance the following chemical equations :
- $NaOH(aq) + Zn(s) \rightarrow$
 - $CaCO(aq) + H_2O(l) + CO_2(g) \rightarrow$
 - $HCl(aq) + H_2O(l) \rightarrow$

OR

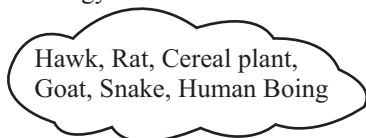
During electrolysis of brine, a gas 'G' is liberated at anode. When this gas 'G' is passed through slaked lime, a compound 'C' is formed, which is used for disinfecting drinking water.

- Write formula of 'G' and 'C'.
 - State the chemical equation involved
 - What is common name of compound 'C'? Give its chemical name.
17. Study the data of the following three categories A, B and C.

Category	Name of the element	Atomic Mass
A	Li	7
	Na	23
	K	39
B	N	14
	P	31
	As	74
C	B	10.8
	Al	27
	Ga	69.7

- From the given three categories A, B and C, Pick the one which forms Dobereiner's Triads.
- Why did Mendeleev placed elements of category A, B and C in three different groups?
- Is Newland law of octaves applicable to all the three categories?
Give reason to justify your answer.

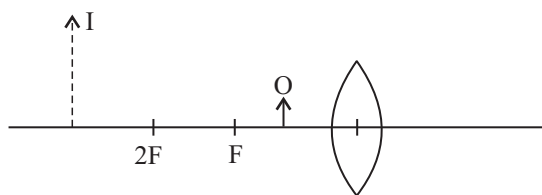
18. (a) From the following group of organisms create a food chain which is the most advantageous for Human beings in terms of energy.



- (b) State the possible disadvantage if the cereal plant is growing in soil rich in pesticides.
 (c) Construct a food web using the organisms mentioned above.

OR

- (a) Write two harmful effects of using plastic bags on the environment. Suggest alternatives to the usage of plastic bags.
 (b) List any two practices that can be followed to dispose off the waste produced in our homes.
19. (a) State the role played by the following in the process of digestion.
 (i) Enzyme trypsin
 (ii) Enzyme lipase
 (b) List two functions of finger like projections present in the small intestine.
20. (a) Classify the following as homologous or analogous pairs :
 (i) Broccoli and Cabbage
 (ii) Ginger and Raddish
 (iii) Fore limbs of birds and lizard
 (iv) Wings of a bat and Wings of a bird
 (b) State the main feature that categories a given pair of organs as homologous or analogous.
21. A green stemmed rose plant denoted by GG and a brown stemmed rose plant denoted by gg are allowed to undergo a cross with each other.
 (a) List your observations regarding
 (i) Colour of stem in their F_1 progeny
 (ii) Percentage of brown stemmed plants in F_2 progeny if F_1 plants are self pollinated.
 (iii) Ratio of GG and Gg in the F_2 progeny.
 (b) Based on the findings of this cross, what conclusion can be drawn?
22. The diagram given below shows an object O and its image I.



Without actually drawing the ray diagram, state the following :

- (i) Type of lens (Converging/Diverging)
 (ii) Name two optical instruments where such an image is obtained.
 (iii) List three characteristics of the image formed if this lens is replaced by a concave mirror of focal length 'f' and an object is placed at a distance 'f/2' in front of the mirror.
23. Give reasons for the following :
 (i) There is either a convergence or a divergence of magnetic field lines near the ends of a current carrying straight solenoid.
 (ii) The current carrying solenoid when suspended freely rests along a particular direction.
 (iii) The burnt out fuse should be replaced by another fuse of identical rating.
24. (a) With the help of labelled ray diagram show the path followed by a narrow beam of monochromatic light when it passes through a glass prism.
 (b) What would happen if this beam is replaced by a narrow beam of white light?

OR

- (a) A person is suffering from both myopia and hypermetropia.
 (i) What kind of lenses can correct this defect?
 (ii) How are these lenses prepared?
 (b) A person needs a lens of power + 3D for correcting his near vision and -3D for correcting his distant vision. Calculate the focal lengths of the lenses required to correct these defects.

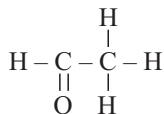
SECTION - C

25. Write balanced chemical equations to explain what happens, when
 (i) Mercuric oxide is heated.
 (ii) Mixture of cuprous oxide and cuprous sulphide is heated.

- (iii) Aluminium is reacted with manganese dioxide.
 (iv) Ferric oxide is reduced with aluminium.
 (v) Zinc carbonate undergoes calcination.

OR

- (i) By the transfer of electrons, illustrate the formation of bond in magnesium chloride and identify the ions present in this compound.
 (ii) Ionic compounds are solids. Give reasons.
 (iii) With the help of a labelled diagram show the experimental set up of action of steam on a metal.
26. (a) Compare soaps and detergents on the basis of their composition and cleansing action in hard water.
 (b) What happens when ethanol is treated with sodium metal? State the behaviour of ethanol in this reaction.
 (c) Draw the structure of cyclohexane.
 (d) Name the following compound.



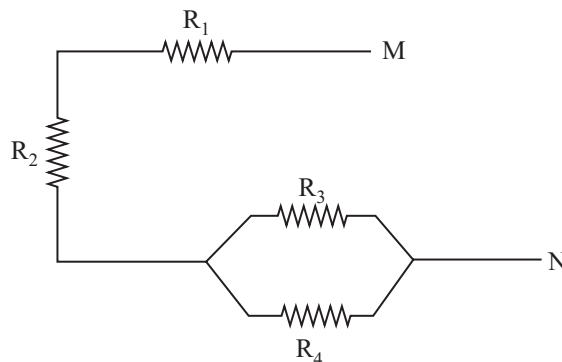
27. (a) Write the correct sequence of steps followed during journey of oxygen rich blood from lungs to various organs of human body.
 (b) What happens when the system of blood vessels develop a leak?
28. (a) Draw a diagram showing germination of pollen on stigma of a flower and mark on it the following organs/parts :
 (i) Pollen Grain
 (ii) Pollen tube
 (iii) Stigma
 (iv) Female germ cell
 (b) State the significance of pollen tube.
 (c) Name the parts of flower that develop after fertilization into
 (i) Seed
 (ii) Fruit

OR

- (a) "Use of a condom is beneficial for both the sexes involved in a sexual act." Justify this statement giving two reasons.
 (b) How do oral contraceptive help in avoiding pregnancies?

- (c) What is sex selective abortion? How does it affect a healthy society?
 (State any one consequence)

29. (a) For the combination of resistors shown in the following figure, find the equivalent resistance between M & N.



- (b) State Joule's law of heating.
 (c) Why we need a 5 A fuse for an electric iron which consumes 1 kW power at 220 V?
 (d) Why is it impracticable to connect an electric bulb and an electric heater in series?
30. (a) A security mirror used in a big showroom has radius of curvature 5m. If a customer is standing at a distance of 20 m from the cash counter, find the position, nature and size of the image formed in the security mirror.
 (b) Neha visited a dentist in his clinic. She observed that the dentist was holding an instrument fitted with a mirror. State the nature of this mirror and reason for its use in the instrument used by dentist.

OR

Rishi went to a palmist to show his palm.

The palmist used a special lens for this purpose.

- (i) State the nature of the lens and reason for its use.
 (ii) Where should the palmist place/hold the lens so as to have a real and magnified images of an object?
 (iii) If the focal length of this lens is 10 cm and the lens is held at a distance of 5 cm from the palm, use lens formula to find the position and size of the image.

Solutions

SECTION - A

1. A covalent bond is formed by sharing of electrons from both the participating atoms. **(1 Mark)**
2. Electropositivity is the measure of the ability of elements (mainly metals) to donate electrons to form positive ions. **(1 Mark)**

OR

The atomic size (atomic radii) increases while going down the group because new shells are being added at each step. **(1 Mark)**

3. (a) Water is collected in a reservoir behind the dam. The stored water is released to turn a turbine in order to produce electricity **(1 Mark)**
- (b) A megawatt is a unit for measuring power. i.e., 1 MW = 1000000 W. **(1 Mark)**
- (c) Construction of Tehri Dam has resulted in large scale destruction of biodiversity in catchment area and large scale displacement of people. **(1 Mark)**
- (d) Blades of turbine move and convert kinetic energy of water into electric energy. **(1 Mark)**
4. (a) By maintaining the level of omega-3 to omega-6 fatty acids as well as diet rich in protein helps in controlling the level of TSH. **(1 Mark)**
- (b) During menstruation, child birth and menopause. **(1 Mark)**
- (c) Low TSH level can result in hyperthyroidism which causes drastic weight loss and weakness. **(1 Mark)**
- (d) Iodine. **(1 Mark)**



Note

Thyroid stimulating hormone is a pituitary hormone which stimulates the thyroid gland to secrete thyroxin hormone that is responsible for the regulation of carbohydrates, proteins and fat metabolism.

5. (a) Scattering of light is not enough at such heights. **(1 Mark)**

6. (c) Resistance of conductor, $R = \rho \frac{l}{A}$

Resistance of another conductor $R' = \rho \frac{2l}{A'}$

[Here, A' = area of cross-section of another conductor]

According to Question

$$R = R'$$

$$\therefore \rho \frac{l}{A} = \rho \frac{2l}{A'}$$

$$\Rightarrow A' = 2A \quad \textbf{(1 Mark)}$$



Note

Resistivity (ρ) of the material is independent of length and area of cross-section of the material. It depends upon the nature of the material and temperature of the conductor.

7. (a) To get the maximum resistance, all four resistors should be connected in series,

$$\therefore R = \frac{1}{2}\Omega + \frac{1}{2}\Omega + \frac{1}{2}\Omega + \frac{1}{2}\Omega = 2\Omega \quad \textbf{(1 Mark)}$$



Note

The total resistance in series combination is more than greatest individual resistance in the circuit.

8. (a) This is an ideal setting of the Khadin system and A = Catchment area; B = Saline area & C = Shallow dugwell. **(1 Mark)**

OR,

- (a) Biodiversity which faces large destruction. **(1 Mark)**
9. (b) Soaps and detergents factories near B and alcohol distillery near A. **(1 Mark)**
10. (b) Formation of crystals by process of crystallization. **(1 Mark)**

**Note**

Basic solution turns phenolphthalein solution pink while in acidic solution it remain colourless.

11. (c) Aqueous solution of A is basic while that of B is acidic. Therefore A has pH greater than 7 and B has pH less than 7. **(1 Mark)**
12. (d) Elements of group 16 and period 3 are non metals. Non metals generally form acidic oxides. Elements of group 1 and 2 form basic oxides while elements of group 13 form amphoteric oxides. **(1 Mark)**

OR

- (d) Element X has 13 protons therefore number of electrons also equal to 13. Therefore statement A, B, C are correct statements. **(1 Mark)**
13. (a) CH_3OH , $\text{CH}_3\text{CH}_2\text{OH}$, $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ belongs to same homologous series with –OH functional group and each member is differ by $-\text{CH}_2-$ unit. **(1 Mark)**
14. (c) Alloys are used in electrical heating device because they have high resistivity or resistance as compared to pure metals and high melting point. **(1 Mark)**

**Note**

Heating element of electrical heating device made up of alloys do not burn (or oxidize) easily even at high temperature.

SECTION - B

15. (i) Photo decomposition of silver chloride takes place which results in formation of silver and colour changing to grey. **(1 Mark)**
- $$2\text{AgCl}_2 \rightarrow 2\text{Ag} + 2\text{Cl}_2$$
- (ii) Copper undergoes oxidation and black coloured copper oxide is formed. **(1 Mark)**
- $$2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$$
- (iii) Zinc displaces copper from its solution and colour of the solution changes from blue to colourless.
- $$\text{Zn (s)} + \text{CuSO}_4 \text{ (aq.)} \rightarrow \text{Cu (s)} + \text{ZnSO}_4 \text{ (aq.)}$$
- (1 Mark)**

**Note**

Zinc is placed above copper in the reactivity series therefore zinc is able to displace copper from its solution. Reverse of this reaction is not possible.

16. (i) $2\text{NaOH (aq.)} + \text{Zn (s)} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2$ **(1 Mark)**
- (ii) $\text{CaCO}_3 \text{ (s)} + \text{H}_2\text{O (l)} + \text{CO}_2 \text{ (g)} \rightarrow \text{Ca(HCO}_3)_2$ **(1 Mark)**
- (iii) $\text{HCl (aq.)} + \text{H}_2\text{O (l)} \rightarrow \text{H}_3\text{O}^+ + \text{Cl}^-$ **(1 Mark)**
- OR**
- (i) 'G' is Chlorine (Cl) and 'C' is bleaching powder (CaOCl_2). **(1 Mark)**
- (ii) Chemical equation:-
 $\text{Ca(OH)}_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$ **(1 Mark)**
- (iii) Common name is bleaching powder and chemical name is calcium oxychloride. **(1 Mark)**

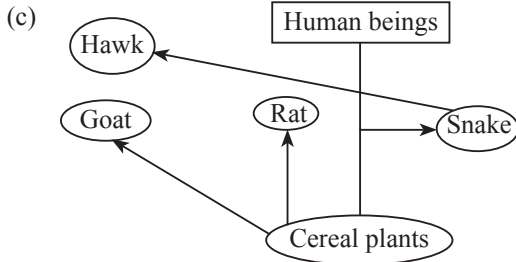
**Note**

Electrolysis of aqueous solution of NaCl (brine) liberate chlorine gas at anode and hydrogen gas at cathode.

17. (i) Dobereiner's Triads is A. **(1 Mark)**
- (ii) Mendeleev placed elements of category A,B and C in three different groups because they have different physical and chemical properties. **(1 Mark)**
- (iii) No, Newland's Law of octaves is not applicable for all three categories. Because the **law of octaves** states that every eighth element has similar properties when the elements are arranged in the increasing order of their atomic masses. **(1 Mark)**
18. (a) Cereal plant \rightarrow Goat \rightarrow Human beings **(1 Mark)**
- This chain is most advantageous for food purposes.
- (b) The cereal plant which is growing in soil rich in pesticides may cause detrimental effects on human as well as animals. It also causes harm to the environment. Use of

chemical pesticides also harms the fertility of soil and reduction in crop yield.

(1 Mark)



(1 Mark)



Note

A food chain is a linear sequence of organisms through which nutrients and energy can pass on from one organism to another from lower to higher in an ecological system.

OR

- (a) Harmful effects- (i) It causes land, water and air pollution. (ii) Plastic bags when consumed along with food by animals, cause harm to their life.

Suggestions- Jute bags are a good old alternative to plastic bags and the other alternatives are paper bags, cotton bags, etc.

(2 Marks)

- (b) (i) Two practices are- (1) Composting and Vermicomposting (this method is useful for the disposal of biodegradable waste)
(ii) By following the 3R rule recycle, reduce and reuse.

(1 Mark)

19. (a) The role played by-

- (i) Enzyme Trypsin breaks down the protein into peptides and peptide into amino acids. (i.e., trypsin involved in the digestion of protein.)
(ii) Enzyme lipase breaks emulsified fats into fatty acids and glycerol.
(i.e., lipase for digestion of fats) (2 Marks)

- (b) Finger like projections are called villi.

- (i) Increase the surface area for absorption of nutrients from digested food.
(ii) They also increases the surface area of intestinal walls.

(1 Mark)

20. (a) (i) Homologous
(ii) Analogous pair

- (iii) Homologous pair

- (iv) Analogous pair. (1 Mark)

- (b) (i) In broccoli and cabbage, both are belonging to cruciferous vegetables. So, this pair is homologous.
(ii) In ginger and raddish, both have different origin & i.e. have different ancestry.
(iii) In forelimbs of birds and lizard, both are belong to the same group of vertebrates.
(iv) In wings of a bat and a bird, the structural dissimilarities (bat & bird wings were not inherited from a common ancestor with wings.)

(2 Marks)



Note

Homologous organs refers to the different organisms have similar structure but different functions whereas analogous organs refers to the different organism having similar functions but different structures.

21. (a) (i) By the Punnett Square for F1 progeny- So, all plants of F1 generation will have green stem.

GG/gg	G	G
G	Gg	Gg
G	Gg	Gg

(1 Mark)

- (ii) By the Punnett Square for F2 progeny- Here, GG, Gg & Gg= green stem (75% out of 100%)

and gg= brown stem (100-75=25%)

So, 25% plants in F2 generation will have brown stem(gg).

Gg/Gg	G	G
G	GG	Gg
g	Gg	Gg

(1 Mark)

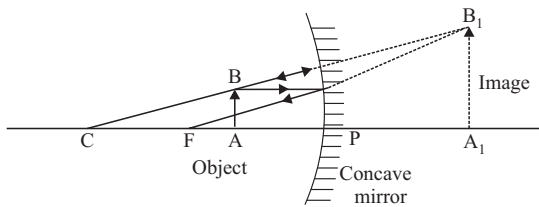
- (iii) In the 2nd table, the ratio of GG and Gg is 1:2.

- (b) Conclusion from this cross:- Every individual possesses a pair of alleles for a particular trait. During gamete formation, a gamete receives only one trait from the

alleles. A particular trait can be dominant or recessive in a particular generation.

(1 Mark)

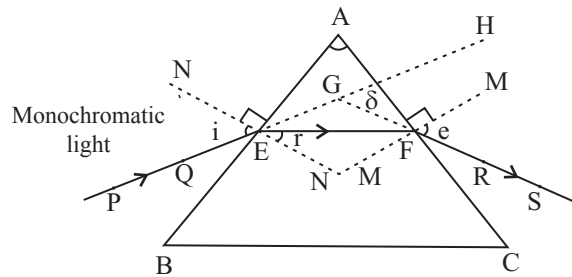
22. (i) Converging (1 Mark)
 (ii) Simple microscope and Telescope (1 Mark)
 (iii) If lens is replaced by concave mirror and object is placed at $f/2$
 (a) Reflected rays are divergent, therefore image A_1B_1 is formed behind the mirror.
 (b) Image is virtual and erect.
 (c) Size of image A_1B_1 is larger than object AB. (see the fig.)



(1 Mark)

23. (i) One end of current carrying solenoid behaves as a magnetic north pole, while the other behaves as the south pole. Like in bar magnet, the field lines emerge from one end and merge into another. So, there is either a convergence at S-pole or a divergence from N-pole of magnetic field lines near the ends of solenoid. (1 Mark)
 (ii) A current carrying solenoid behaves like a bar magnet. We know that a freely suspended bar magnet aligns itself in the north-south direction. Hence, it rests along north-south direction when suspended freely. (1 Mark)
 (iii) Fuse of lower rating will blow off immediately (and require frequent replacements). Fuse of higher rating will not break the circuit, even in case of higher load. So, burnt out fuse should be replaced by another fuse of identical rating for electrical safety. (1 Mark)

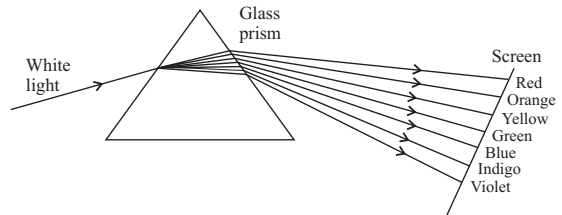
24. (a) Ray diagram of path of monochromatic light when it passes through a prism.



- PE – Incident ray $\angle i$ – Angle of incidence
 EF – Refracted ray $\angle r$ – Angle of refraction
 FS – Emergent ray $\angle e$ – Angle of emergence
 $\angle A$ – Angle of the prism $\angle \delta$ – Angle of deviation

(2 Marks)

- (b) When a narrow beam of white light passes through a prism, it emerges as a spectrum of all components (VIBGYOR) of white light. (see the fig.)



(1 Mark)

Note

The different component colours (VIBGYOR) of the white light have different wavelengths. The wavelength of violet light is smaller than that of red light. As, wavelength vary inversely with refractive index, so refractive index of material of prism is maximum for violet colour and minimum for red colour. This cause violet colour to bend more than red colour.

OR

- (a) (i) Bifocal lenses are used to correct the defect when a person suffers from both the defects of vision myopia and hypermetropia. (1 Mark)
 (ii) Bifocal lens is made by using two lenses in one eyepiece. Convex lens of

appropriate focal length is positioned below while concave lens of appropriate focal length is positioned above. (1 Mark)

- (b) We know that, Power of lens(P) = 1/f

$$\text{Or, } f = 1/P$$

So, focal length (f) of lens for near vision = $1/3 = +0.33\text{m}$

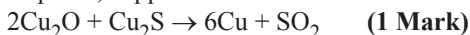
And focal length of lens for distant vision = $-1/3 = -0.33\text{m}$ (1 Mark)

SECTION - C

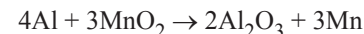
25. (i) Mercuric oxide decomposes to mercury and oxygen gas on heating.



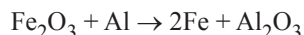
- (ii) When cuprous oxide is heated with cuprous sulphide, copper metal is obtained.



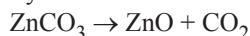
- (iii) When manganese dioxide reacts with aluminium then it results into the formation of aluminium trioxide and manganese.



- (iv) When Ferric oxide is heated with aluminium, iron metal is obtained. (1 Mark)

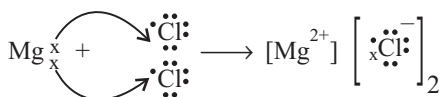
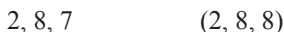


- (v) When zinc carbonate is heated in calcination process it converted to zinc oxide then it can be easily converted to metal. (1 Mark)



OR

- (i) Bond of Magnesium chloride-



In MgCl_2 , Cation is Magnesium (Mg^{2+})
Anion is Chloride (Cl^-). (2 Marks)

- (ii) The crystal structure of ionic compounds is strong and rigid. It takes a lot of energy to

break all those ionic bonds. As a result, ionic compounds are solids with high melting and boiling points.

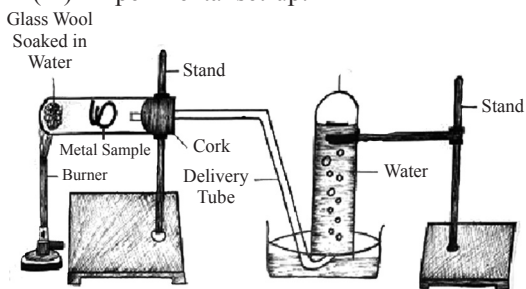
The strong bonds between their oppositely charged ions lock them into place in the crystal form. (1 Mark)



Note

Ionic bonds are stronger bonds than covalent bonds due to electrostatic attraction between oppositely charged ions.

- (iii) Experimental set-up:-



(2 Marks)

- 26 (a) The Difference between the soaps and detergents-

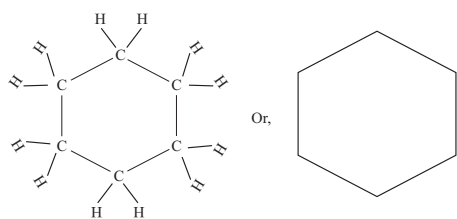
Composition	Soaps are sodium (Na) salts or Potassium (K) salts of some long chain carboxylic acids.	Detergents are ammonium or sulphonated salts of long chains of carboxylic acids.
Cleansing action	Produces scum in hard water which affects it's cleansing action.	Hard water does not affects it's cleansing action.

(2 Marks)

- (b) If a small piece of sodium is dropped into some ethanol, it reacts steadily to give off bubbles of hydrogen gas and leaves a colourless solution of sodium ethoxide ($\text{CH}_3\text{CH}_2\text{ONa}$).
 $2\text{CH}_3\text{CH}_2\text{OH} + 2\text{Na} \rightarrow 2\text{CH}_3\text{CH}_2\text{ONa} + \text{H}_2$
 Ethanol behaves as mild acid in the reaction and liberate Hydrogen gas.

(1 Mark)

- (c) Structure of cyclohexane-



(1 Mark)

(d) Acetaldehyde (IUPAC- Ethanal) (1 Mark)

27. (a) Firstly, the left auricles receive oxygenated blood through pulmonary vein and transfer this oxygenated blood to the left ventricles and is transferred to different parts of the body through aorta. (Lungs → Pulmonary veins → Left atrium → Left ventricle → Aorta → Body parts). (3 Marks)

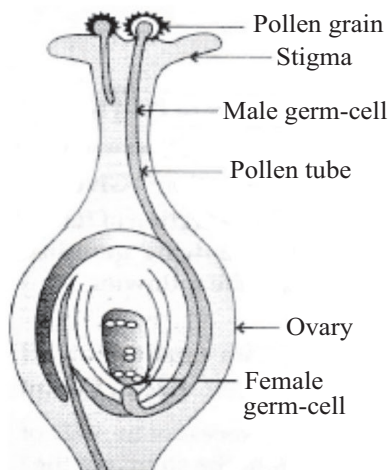
(b) When blood vessels or the circulatory tubes are damaged or injured and get punctured, blood can leak into the surrounding tissues leading to accumulation of blood in the surrounding tissues. This condition is referred to as Hematoma and is caused when a capillary, vein or artery is subjected to trauma. (2 Marks)

**Note**

Circulatory system in humans is made up of blood vessels away from and towards the heart. It carries oxygen, nutrients to the different parts of the body & remove carbon dioxide from different parts of the body.

OR

28 (a) Germination of pollen on stigma of a flower:-



(2 Marks)

(b) A pollen tube is a tubular structure produced by the male gametophyte of seed plants when it germinates. Pollen tube elongation is an integral stage in the plant life cycle. The pollen tube acts helps in the transportation of the male gamete cells from the pollen grain-either from the stigma (in flowering plants) to the ovules at the base of the pistil or directly through ovule tissue in some gymnosperms. In maize, this single cell can grow longer than 30 cm to transverse the length of the pistil. (2 Marks)

(c) (i) Seed - Ovules

(ii) Fruit – ovary (1 Mark)

OR

(a) Use of condom helps in preventing STDs (sexually transmitted diseases) to both partners, it also helps in preventing unwanted pregnancy. (2 Marks)

(b) Oral contraceptives contain hormones which prevent ovulation in females. Thus, they help in preventing pregnancy. (1 Mark)

(c) Abortion of female foetus to obey the social custom of preference to a male child can be termed as sex selective abortion. This affects the gender ratio which is against women. It also results in mental and physical torture of the girl child and her mother. (2 Marks)

29. (a) In the given figure, R_3 and R_4 are connected in parallel.

So, according to the figure the expression for the equivalent resistance of the resistors connected: $R_{MN} = R_1 + R_2 + [1/R_3 + 1/R_4]$ (1½ Marks)

(b) Joule's heating law states the heating effect of current as heat energy released by a conductor when current passes through it. If the conductor is having resistance 'R' and current 'i' passes through it for time 't' then heat produced, $H \propto i^2 R t$

The mathematical expression of heat energy, $H = i^2 \times R \times t$. (1½ Marks)

(c) Power (P) = 1 kW = 1000 W
Voltage (V) = 220 V

So, electric current (i) = $P/V = 1000/220 = 4.5 \text{ A} \approx 5 \text{ A}$

Here, rating of fuse wire is 5A, so we need it. **(1 Mark)**

- (d) As we know that, in a series circuit the current is constant throughout the electric circuit. Thus, it is obviously impracticable to connect an electric bulb and an electric heater in series, because they need currents of widely different values to operate properly. **(1 Mark)**

30. (a) For security mirror (convex mirror)
Object distance (u) = -20 m
and focal length (f) = radius of curvature/2 = $5/2 = 2.5 \text{ m}$

Using mirror formula

$$1/v + 1/u = 1/f$$

$$\Rightarrow 1/v + 1/(-20) = 1/2.5$$

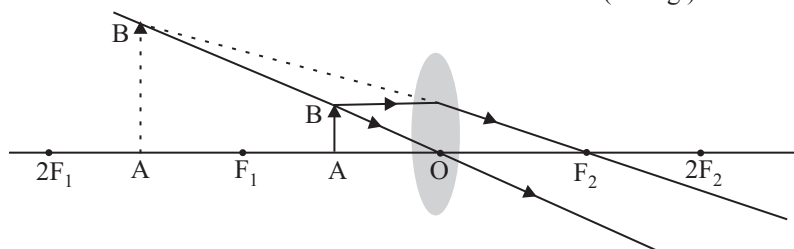
$$\Rightarrow 1/v = 1/2.5 + 1/20 = 9/20$$

$$\therefore \text{Image distance, } v = 20/9 \quad \textbf{(1 Mark)}$$

Here, Image distance (v) is positive hence image formed on the other side of mirror as object.

Nature of image: Virtual and erect.

(1 Mark)



(1 Mark)

- (ii) If the palmist wants real and magnified image, he should put object between F and $2F$ (see in fig.). But in that case he will have to use a screen to see the image.

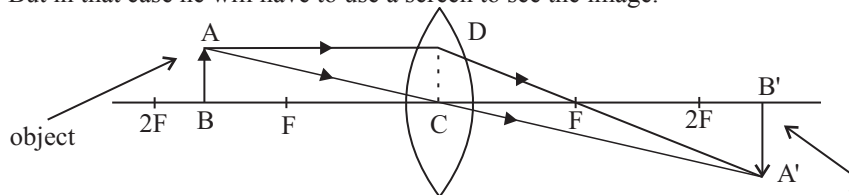


image **(1 Mark)**

- (iii) Given, $f = 10 \text{ cm}$, $u = -5 \text{ cm}$
Using lens formula: $1/v - 1/u = 1/f$
 $\Rightarrow 1/v - 1/(-5) = 1/10$
 $\Rightarrow 1/v = 1/10 - 1/5 = -1/10$
Image is formed at 10 cm on the same side of lens (as object). It is erect and virtual.

(1 Mark)

Size of the image formed in the security mirror.

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

[h_i & h_o = size of image & object respectively]

$$\text{So, } h_i/h_o = (20/9)/20 = 1/9$$

Magnification will be 1/9th of size of customer.

Hence, image should be smaller than object (customer). **(1 Mark)**



Note

Convex mirror is also used as rear view mirror in vehicles because it has a wider field of view.

- (b) Dentists use concave mirror because when object is placed between focus (F) and pole (P) of concave mirror then a virtual, erect and enlarged image is formed behind the mirror. It helps the doctor to see a larger image of tooth. **(2 Mark)**

OR

- (i) Palmists use convex lens because it produces enlarged, virtual and erect image when object is placed between focus (F_1) and optical center (O) of convex lens (see fig.) **(1 Mark)**

Magnification, $m = v/u = (-10)/(-5) = 2$
i.e., Image is twice as big as object or, image is magnified two times. **(1 Mark)**



Note

Convex lens gives positive magnification for virtual image and negative magnification for real image.