Sample Paper
Class 10 CBSE 2020-21

Time Allowed : 3 Hours **Maximum marks: 80**

General Instructions :

(i) The question paper comprises four sections A, B, C and D. There are 36 questions in the question paper. All questions are compulsory.

(ii) (Section–A - question no. 1 to 20 - all questions and parts thereof are of one mark each. These questions contain multiple choice questions (MCQs), very short answer questions and assertion - reason type questions. Answers to these should be given in one word or one sentence.

(iii) Section–B - question no. 21 to 26 are short answer type questions, carrying 2 marks each. Answers to these questions should in the range of 30 to 50 words.

(iv) Section–C - question no. 27 to 33 are short answer type questions, carrying 3 marks each. Answers to these questions should in the range of 50 to 80 words.

(v) Section–D – question no. - 34 to 36 are long answer type questions carrying 5 marks each. Answer to these questions should be in the range of 80 to 120 words.

(vi) There is no overall choice. However, internal choices have been provided in some questions. Students have to attempt only one of the alternatives in such questions.

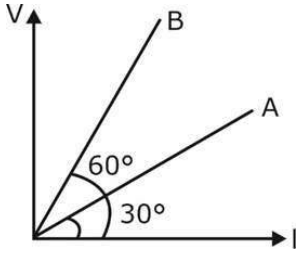
(vii) Wherever necessary, neat and properly labelled diagrams should be drawn.

Section-A

1. What change in colour is observed when white silver chloride is left exposed to sunlight? State the type of chemical reaction in this change.

   (OR)

   Write the chemical name of Plaster of Paris?
2. Write the name and formula of the second member of the series of carbon compounds whose general formula is $C_nH_{2n+1O}H$
3. Which of the following statements are incorrect?
   A. All metal carbonates react with acid to give salt, water, and carbon dioxide.
   B. All metal oxides react with water to give salt and acid.
   C. Some metals react with acids to give salt and hydrogen.
   D. Some non-metal oxides react with water to form an acid.
4. V-I Curves for two conductors *A* and *B* are shown. Which of the two conductors will have more resistance:



   A. A
   B. B
   C. Both have the same resistance
   D. None of these
5. Why does a compass needle get deflected when brought near a bar magnet?
6. An object is 200 mm in front of a concave mirror which produces an upright image (erect image). What is the radius of curvature of the mirror?

   (OR)

   A 1 cm high object is placed at a distance of 2f from a convex lens. What is the height of the image formed?
7. Which of the two is scattered more easily: the light of shorter wavelengths of light of longer wavelengths?

8. If different resistors have the same value of electric potential across them, in which way they are connected?
9. State qualitatively the effect of inserting an iron core into a current-carrying solenoid.

OR

What is the work done by an electron beam that is moving in a magnetic field?

10. In peas, a pure tall plant (TT) is crossed with a short plant (tt). The ratio of pure tall plants to short plants in F2 is:
    A. 1 : 3
    B. 3 : 1
    C. 1 : 1
    D. 2 : 1
11. Name two inorganic substances that are used by autotrophs to make food?

(OR)

Name two substances that are produced in anaerobic respiration by an organism but not in aerobic respiration.

12. What percentage of the solar energy is trapped and utilized by the plants?

(OR)

If 5 Joules of energy are available at the producer level (plants), then how much energy will be transferred to the lion in the following food chain?

Plants → Goat → Lion

13. What will happen if we kill all the organisms at one trophic level?
14. The questions below consist of statements of an assertion and reason. Use the following key to choose the appropriate Answer:
    Assertion (A) : When soft iron nails are dipped in a strong solution of copper sulphate, a greenish-black solution is formed.
    Reason (R) : Iron replaces copper from copper sulphate solution forming iron sulphate.
    A. Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
    B. Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
    C. Assertion is correct and Reason is incorrect.
    D. Assertion is incorrect and Reason is correct.

15. Assertion (A) : Implantation must happen in Uterus.
Reason (R) : Uterus has Endometrium that can support the embryo
A. Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
B. Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
C. Assertion is correct and Reason is incorrect.
D. Assertion is incorrect and Reason is correct.

16. Assertion (A) : Girls have a low pitched voice.
Reason (R) : Their vocal cords are less developed than the boys.
A. Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
B. Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
C. Assertion is correct and Reason is incorrect.
D. Assertion is incorrect and Reason is correct.

17. **Read the following paragraph carefully and answer any four out of the five questions 17 (i) to 17 (v) based on your understanding of the paragraph.**
The chromosomes in the nucleus of a cell contain information for inheritance of features from parents to the next generation in the form of DNA molecules. The DNA in the cell nucleus is the information source for making proteins. If the information is changed, different proteins will be made. Different proteins will eventually lead to altered phenotype.
(i) What is the unit of inheritance present on the DNA known as?
(ii) What is the difference between Phenotype and Genotype?
(iii) Characters that are transmitted from parents to offspring during sexual reproduction show:
A. only similarities with parents
B. only variations with parents
C. both similarities and variations with parents
D. neither similarities nor variations with parents
(iv) Which of the following traits can be passed onto offspring?
A. Curly hair
B. Bulk of muscles
C. Visceral fat
D. Long nails

(v) A trait in an organism is influenced by:
   A. paternal DNA only
   B. maternal DNA only
   C. both maternal and paternal DNA
   D. neither by paternal nor by maternal DNA

18. **Read the following paragraph carefully and answer any four out of the five questions 18 (a) to 18 (e) based on your understanding of the paragraph.**

In graphite, carbon atoms are arranged in flat parallel layers. Each carbon atom in these layers is bonded to three other carbon atoms by covalent bonds forming a network of six-carbon rings. The fourth valence electron of each carbon is free to move. Each layer is bonded to the adjacent layers by weak forces. As a result, each layer can easily slide over the other. This makes the graphite slippery so it is useful as a lubricant.

(a) In graphite, the layers of carbon atoms are held by :
   (i) coordinate bonds
   (ii) covalent bonds
   (iii) ionic bonds
   (iv) vander waals force

(b) Why does graphite's layer slide over the other?

(c) Which among the following statements is/are not correct for Graphite?
   (i) Carbon atoms are arranged in flat parallel layers
   (ii) Each carbon atom in layers of graphite is bonded to three other carbon atoms by covalent bonds
   (iii) The fourth valence electron of each carbon in graphite is free to move
   (iv) None of these

(d) Why is graphite slippery?

(e) List one use of graphite.

19. **Read the following paragraph carefully and answer any four out of the five questions 19 (i) to 19 (v) based on your understanding of the paragraph.**

Electric bulb contains a thick metallic wire made up of tungsten metal. The metal is kept in an inert environment with a neutral gas or vacuum. When current flows through the tungsten wire, it becomes heated and emits light. Two tungsten lamps with resistances R_1, and R_2, respectively.

At full incandescence, they are connected first in parallel and then in series, in a lighting circuit of negligible internal resistance. It is given that: $R_1 > R_2$.

(i) Why the filament of the bulb is kept in an inert environment?

(ii) Which lamp will glow more brightly when they are connected in parallel?

(iii) If the lamp of resistance R_1 now burns out, how will the illumination produced change?

(a) Net illumination will increase

(b) Net illumination will decrease

(e) Net illumination will remain the same

(d) Net illumination will be reduced to zero

(iv) Which lamp will glow more brightly when they are connected in series?

(a) Bulb having lower resistance

(b) Bulb having higher resistance

(c) Both the bulbs

(d) None of the two bulbs

(v) If the lamp of resistance R_2 now burns out and the lamp of resistance R_1 alone is plugged in, will the illumination increase or decrease?

(a) Illumination will remain the same

(b) Illumination will become zero

(a) illumination will increase

(d) Illumination will decrease

20. **Read the following paragraph carefully and answer any four out of the five questions 20 (i) to 20 (v) based on your understanding of the paragraph.**

The electric generator is a machine for producing electric current. The electric generator or dynamo converts mechanical energy into electrical energy The generator is an application of electromagnetic induction. It works on the principle that when a wire is moved in a magnetic field, then the current is induced in the coil. A rectangular coil is made to rotate rapidly in the magnetic field between the poles of a horse shoe type magnet. When the coil rotates, it cuts the lines of magnetic force, due to which a current is produced in the generator coil. This current can be used to run the various electrical appliances.

(i) An electric generator acts as

(a) source of electric charge
(b) source of heat energy
(c) an electromagnet
(d) a converter of energy

(ii) Electromagnetic induction is the
(a) charging of a body with a positive charge
(b) production of current by relative motion between a magnet and a coil
(c) rotation of the coil of an electric motor
(d) generation of magnetic field due to a current carrying solenoid

(iii) The brushes used in electric generator is made of which material
(a) Carbon
(b) Aluminum
(c) Zinc
(d) Soft iron

(iv) A commutator changes the direction of current in the coil of
(a) a DC motor
(b) a DC motor and an AC generator
(c) a DC motor and a DC generator
(d) an AC generator

(v) If the coil is placed perpendicular to field lines then the number of lines passing through the coil is
(a) Minimum
(b) maximum
(c) zero
(d) maybe maximum or minimum

Section-B

21. What is meant by regeneration? Name any two animals which can regenerate fully from their cut body parts.

(OR)

Where are the testes situated in the male body? Why is it an advantage for the testes to be situated there? Can you think of one disadvantage?

22. Where does digestion of fat take place in our body?

23. What are amphoteric oxides? Choose the amphoteric oxides from amongst the following oxides: Na_2O, ZnO, Al_2O_3, CO_2, H_2O

(OR)

State in brief the preparation of washing soda from baking soda. Write balanced
chemical equation of the reaction involved.

24. The elements of the third period of the Periodic Table are given below:

Group	I	II	III	IV	V	VI	VII
Period 3	Na	Mg	Al	Si	P	S	Cl

(a) Which atom is bigger, Na or Mg? Why?

(b) Identify the most (i) metallic and (ii) non-metallic element in Period 3.

25. A direct current is sent through a helical spring. Explain what happens in the helical spring as the current is established in the coil.

26. If a ray of light enters from alcohol to air. The refractive index of alcohol is 1.36. Calculate the speed of light in alcohol with respect to air.

Section-C

27. What will be the sex of a child who inherits Y chromosome from his/her father? Substantiate your answer with an appropriate explanation.

(OR)

Give reasons why acquired characters are not inherited.

28. Why is a lake considered to be a natural ecosystem?

29. (a) Name the blood vessel that brings deoxygenated blood to the human heart.

(b) Which chamber of the human heart receives deoxygenated blood?

(c) Describe how deoxygenated blood from this chamber is sent to lungs for oxygenation.

30. Classify the following reactions into different types.

(i) $AgNO_3(aq) + NaCl(aq) \longrightarrow AgCl(s) + NaNO_3(aq)$

(ii) $CaO(s) + H_2O(l) \longrightarrow Ca(OH)_2(aq)$

(iii) $2KClO_3(s) \xrightarrow{\Delta} 2KCl(aq) + 3O_2(g)$

31. (a) What is meant by periodicity in properties of elements with reference to the periodic table?

(b) Why do all the elements of the same group have similar properties?

(c) How will the tendency to gain electrons change as we go from left to right across a period? Why?

32. What is baking soda chemically called? Give reaction involved in its preparation. Write one of its uses.

33. A. Why does the cord of a heating element not glow while the heating element glows? (1)

    B. Two resistors of 5 Ω and 10 Ω are connected in parallel. Eight such sets are connected in series. Find the equivalent resistance of this combination. (2)

Section-D

34. (a) Mention the pH range within which our body works. Explain how antacids give relief from acidity. Write the name of one such antacid.

    (b) Fresh milk has a pH of 6. How does the pH change as it turns to curd? Explain your answer.

    (c) A milkman adds a very small amount of baking soda to fresh milk. Why does this milk take a longer time to set as curd?

    (d) Mention the nature of toothpastes. How do they prevent tooth decay?

    (OR)

    Atoms of eight elements A, B, C, D, E, F, G and H have the same number of electronic shells but different number of electrons in their outermost shells. It was found that elements A and G combine to form an ionic compound which can also be extracted from sea water. Oxides of the elements A and B are basic in nature while those of E and F are acidic. The oxide of element D is almost neutral. Answer the following questions based on the information given herein:

    1. To which group or period of the periodic table do the listed elements belong?
    2. Which one of the eight elements is likely to be a noble gas?
    3. Which one of the eight elements would have the largest atomic radius?
    4. Which two elements amongst these are likely to be non-metals?
    5. Which one of these eight elements is likely to be a semimetal or metalloid?

35. With the help of a flow chart, write down a detailed account of the composition of blood.

36. (i) Explain the various part of AC generator. (3)

(ii) What is the difference between direct current generator and alternating current generator? (2)

OR

(a) Does the incident and emergent ray coincide in the process of refraction through glass slab? Give reason.

(b) An object of size 7.0 cm is placed at a distance of 27 cm in front of concave mirror of focal length 18 cm. At what distance from the mirror should a screen be placed so that a sharply focused image can be obtained? Find the size and the nature of the image.

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Section-A

1. Answer: Silver chloride becomes grey. It is a photochemical decomposition reaction.

   (OR)

   Answer: Calcium sulphate hemihydrate.
2. Answer: Ethanol, C_2H_5OH or CH_3CH_2OH
3. Answer: B

   Solution:

   dioxide.

   All metal oxides react with water to give base.
4. Answer: B

   Solution:

   We know that slope of *V-I* curve gives resistance so,

   $$R_A = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

   $$R_B = \tan 60^\circ = \sqrt{3}$$

   $$\Rightarrow \quad R_B > R_A$$

   Thus option B is the correct answer
5. Answer: A compass needle is a small bar magnet. when it is brought near to another bar magnet their field lines interact with each other. Hence, the compass needle shows deflection.
6. Answer: The image formed is upright, the object lies within the focus of the concave mirror. So, f > 200 mm. We know R = 2f
   Hence, R > 400 mm i.e. Radius of curvature is more than 400 mm.

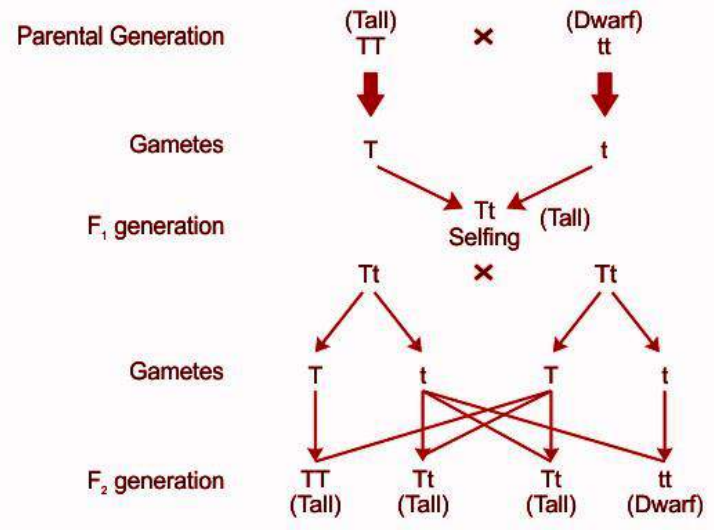
   (OR)

   Answer: When an object is placed at 2f, then its magnification is equal to 1. The height of the image formed is the same as the height of the object that is 1 cm.
7. Answer: The Light of shorter wavelengths scatters more easily.

8. Answer: When different resistors are connected in parallel combination the voltage drop remains the same as the source across each resistor,
9. Answer: The magnetic field becomes very strong when the iron core is inserted into a current-carrying conductor.

OR

Answer: A charge is moving in a magnetic field when the direction of the velocity is normal to the orientation of the magnetic field.
Thus, the network is zero throughout the motion,
10. Answer: B
Solution: In the F2 progeny, there is one pure tall, one pure dwarf and two mixed tall plants.



11. Answer: Inorganic substances such as CO_2 and Water are used by autotrophs to synthesize their food.

(OR)

Answer: Ethanol and Lactic Acid are the substances that are produced in anaerobic respiration by an organism but not in aerobic respiration.
12. Answer: About 1-2% of solar energy is trapped and used by the plant to make food. Rest of the 99-98% energy that reaches the earth is reflected from the surface of leaves.

(OR)

0.05 Joule of energy will be passed from plant to lion because only 10% of energy is transferred at each trophic level. So, the goat will get 0.5 Joule of energy from plants and the lion will get 0.05 Joule of energy from the goat.

13. Answer: If all the organisms in one trophic level are killed then the transfer of energy to the next trophic level will stop. Also, it will cause overpopulation at one of the trophic levels whose predators will be killed. Thus, disturbing the food chain completely.
14. Answer: Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
15. Answer: A
    Solution: Both Assertion and Reason are correct and Reason is the correct explanation of Assertion. The Endometrium layer of the uterus is supplied with lots of blood capillaries and forms a spongy layer that helps support the embryo that gets embedded into it. Implantation anywhere else would not provide enough nutrients and support to the embryo, which will ultimately fail to survive.
16. Answer: D
    Solution: Girls have a high-pitched voice because their vocal cords are less developed than the boys. Boys have a low-pitched voice due to the enlargement of vocal cords that appear as a protrusion in the neck region, also known as the "Adam's apple".
17. Answer:
    (i) Gene
    (ii)

Phenotype	Genotype
The phenotype of an organism is the observable physical or biochemical characteristics of an organism	Genotype is the genetic constitution of any living being.
Example - tall, colour are phenotypic characters	Examples – homozygous, heterozygous

    (iii) Answer: C
    Solution: Characters that are transmitted from parents to offspring during sexual reproduction show both similarities and variations with parents. It is because
    (iv) Answer: A
    Solution: Curly hair is an inheritable trait and corresponds to the change in the respective gene for hairs. Hence, it will be passed on to the future generations. Bulk of muscles, visceral fats in obese people and long nails are acquired traits that are aquired in the

lifetime of the individual. They do not cause any change in the genes and hence, are not inheritable.

(v) Answer: C

Solution: The male gamete, the sperm, travels its way through the uterus and the fallopian tube to meet the female gamete, the ovum, and fertilizes it. The paternal DNA contained in the nucleus at the head of the sperm gets fused with the nucleus of the ovum. Thus, both the paternal and maternal DNA influence the genotype and hence the traits of the offspring as both the parents contribute half the number of chromosomes into the progeny.

18. Answer:

(a) In graphite, each carbon atom is only covalently bonded to three other carbon atoms, rather than to four as in diamond. Graphite contains layers of carbon atoms.

(b) The layers slide over each other easily because there are only weak forces such as Van der Waals force between them.

(c) (iv) All the statements are correct.

(d) The layers in graphite can slide over each other because the forces between them are weak. This makes graphite slippery, so it is useful as a lubricant.

(e) Graphite can be used as a lubricant.

19. (i) Answer: The heat from the tungsten filament generates light and the argon helps prevent the filament from decaying. Inert gases do not usually react with other elements and the argon gas increases the bulb's lifespan.

(ii) Answer: The second lamp will glow brightly when they are connected in parallel. In the parallel connection, the voltage drops across each resistor is the same as the source of voltage.

Thus, current in the lamp 1 is

$$I_1 = \frac{V}{R_1}$$

Current in the lamp 2,

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

It is given than $R_1 > R_2$; therefore, the current through the lamp 1 is lesser than in lamp 2. Consequently, lamp 2 will illuminate brightly.

(iii) Answer: (c)

Solution: When the lamp (R_1) burns out, the illumination produced by the combination will remain the same. The second lamp will draw as much current as it did initially.

(iv) Answer:(b)

Solution: The bulb which dissipates more power will glow brighter. In series, both bulbs have the same current flowing through them. The bulb with the higher resistance will have a greater voltage drop across it and therefore have a higher power dissipation and brightness.

(v) Answer: (c)

Solution: In case of series combination with higher resistance will glow brighter. If a resistance burns out, then the new illumination will decrease.

20. (i) Answer: (d)

Solution: The electric generator is the equipment that transforms mechanical energy into electrical energy.

(ii) Answer: (b)

Solution: Electromagnetic induction is the phenomena in which a current is induced in the conductor due to the relative motion between the magnet and the conductor (coil)

(iii) Answer: (a)

Solution: The brushes are usually made up of carbon material as it is strong and produce almost no spark during contact.

(iv) Answer: (a)

Solution: A commutator is a device that changes the polarity of the device to ensure the continual motion of the armature. It is used in DC motor only. The commutator reverses the current in every half turn producing a steady torque and the armature coil rotates in a single direction. The part of the DC motor that reverses the direction of the current through the coil is the parts of the commutator that touch the brushes.

(v) Answer:(b)

Solution: When the coil (armature) is placed perpendicular to the magnetic field, the maximum number of field lines cuts through the coil, resulting in an increase in the amount of current produced.

Section-B

21. Answer: The process of producing a full organism from broken body parts of the parent organism is called regeneration. It requires specialized cells. *Planaria* and *Hydra* are two organisms that can be regenerated fully from their body parts.

(OR)

Answer: The testes are located outside the abdominal cavity in the scrotum because the temperature of scrotum is less than the normal body temperature which is required for sperm formation. Being outside the main body cavity, testes are more prone to injury than ovaries in females.

22. Answer: Digestion of fat takes place in the small intestine. Bile emulsifies fats and breaks them into smaller fat globules. Lipase secreted from the pancreas split fat into fatty acids and glycerol.

23. Answer: Those oxides which react with acids as well as bases to produce salts and water are called amphoteric oxides, e.g. Na2O, ZnO, are amphoteric oxides among given oxides.

(OR)

Answer: Sodium hydrogen carbonate (baking soda) on heating gives sodium carbonate which on recrystallization gives washing soda

$$2NaHCO_3 \xrightarrow{\text{heat}} Na_2CO_3 + CO_2 + H_2O$$

$$Na_2CO_3 + 10H_2O \longrightarrow Na_2CO_3.10H_2O$$

24. Answer: (a) Sodium is bigger than magnesium as it has a lesser nuclear charge so there is less force of attraction between nucleus and valence electrons and less effective nuclear charge. It is, therefore, bigger.
(b) (i) Sodium is the most metallic as it can lose electrons easily due to its larger atomic size,
(ii) Chlorine is the most non-metallic element because it can gain electrons easily due to its smallest atomic size.

25. Answer: When the current is passed through the spring, each loop of the spring has the same direction of the current. We know that when two wires having the same direction of current are placed near each other, they tend to attract each other due to the magnetic force produced by them. This force of attraction between the loops of the spring will tend to compress the spring,

26. Answer: Given;
Refractive index of alcohol (μ) = 1.36.
Speed of light in vacuum = 3×10^8m/s

The refractive index (μ) of a medium is given by the following expression

$$\frac{\text{c (speed of light in vaccum)}}{\text{v(speed of light in alcohol)}}$$

$$1.36 = \frac{3 \times 10^8}{\text{speed of light in alcohol}}$$

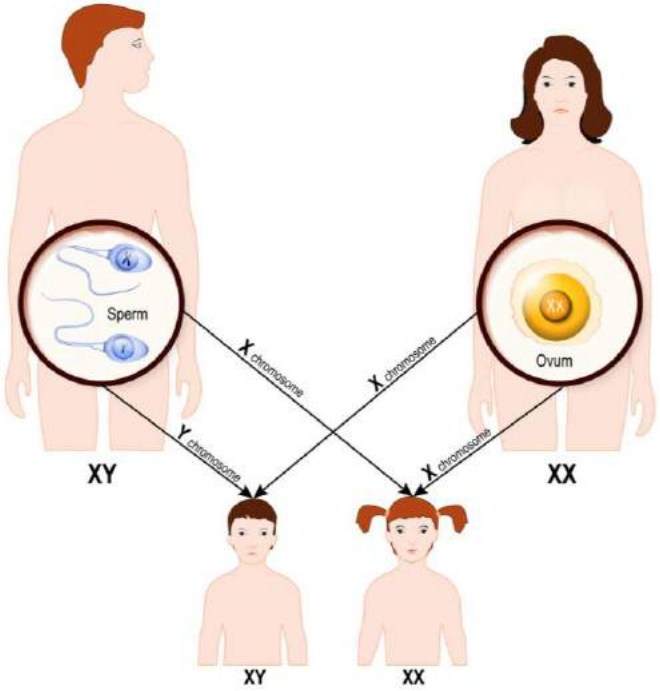
$$\text{speed of light in alcohol} = \frac{3 \times 10^8}{1.36}$$

∴ speed of light in alcohol = 2.21×10^8 m/s

Section-C

27. Answer: A Male child will be born.

Explanation: A male has one X and one Y chromosome which means half the male gametes i.e. sperms have X and the other half will have a Y chromosome, whereas in females both the chromosomes are X thus all the female's gametes will have one X chromosome. In humans, the sex of the child depends on what happens at fertilization. If Y chromosome is inherited by the offspring then it will surely be a male because the child will have XY combination of sex chromosomes.



(OR)

Answer: Acquired characters are developed by an individual over a period of time in response to external stimuli. For example – a wrestler develops good physique and body as a result of continuous exercise and proper diet. Given proper exposure and opportunities, the wrestler may be able to excel in his chosen field. However, it is not necessary that the son of a wrestler would become a wrestler and do equally well. He may choose to be a cricketer or an actor.

These traits develop because of constant exposure to a certain stimulus and the resultant response by the individual. These changes are not made in the Gene (DNA sequence), hence are limited to that individual only. They cannot be passed into their progeny.

28. Answer: Every ecosystem has abiotic (non-living) things) and biotic (living things and there is the interaction between living and nonliving things. In the lake also there is interaction between abiotic components such as water, temperature, soil with biotic components such as plants and animals living in and around the lake. This interaction helps sustain the whole ecosystem on its own, where the producers are the aquatic plants, the consumers are the marine animals and microorganisms and the decomposers like bacteria are also present at the bottom of the lake. This recycles the organic material into inorganic ones and makes it ready for the producers to take up and utilize to produce food.

29. Answer:
    (a) Vena cava brings the deoxygenated blood to the human heart.
    (b) Right atrium receives the deoxygenated blood from the vena cava which it further transfers to the right ventricle.
    (c) Firstly, the right atrium receives deoxygenated blood from the vena cava which brings deoxygenated blood from all over the body. Then, from the right atrium, this blood is transferred to the right ventricle. The right ventricle transfers this blood to the pulmonary artery which carries this deoxygenated blood to the lungs for oxygenation.

30. Answer: (i) Precipitation reaction (Double displacement reaction)
    (ii) Combination reaction
    (iii) Decomposition reaction

31. Answer:
    (a) The repetition of the same properties after a definite interval is called periodicity in properties.

(b) It is because they have the same valence electrons, therefore, have similar properties.

(c) Tendency to gain electrons increases from left to right in a period because atomic size goes on decreasing and effective nuclear charge increases.

32. Answer: Sodium hydrogen carbonate.

$$NH_3 + CO_2 + H_2O + NaCl \longrightarrow NaHCO_3 + NH_4Cl$$

or

$$NaCO_3 + CO_2 + H_2O \longrightarrow 2NaHCO_3$$

Baking soda is used as an antacid.

33. Answer:

A. The glow of an element is due to the power dissipation of the element. The power of an element is given by

$p = i^2R$

As the resistance of the heating element is higher than the cords, the power dissipation of the heating element is greater and it glows.

B. Equivalent resistance of the parallel combination is

$$R_p = \frac{r_1 \times r_2}{r_1 + r_2}$$

$$= \frac{5 \times 10}{5 + 10}$$

$$= \frac{50}{15}$$

$$= \frac{10}{3}\Omega$$

These eight resistances are connected in series, so

$$R = \frac{10}{3} + \frac{10}{3} + \frac{10}{3} + \cdots + \frac{10}{3}$$

$$R = 8 \times \left(\frac{10}{3}\right)$$

$$R = \frac{80}{3}\Omega$$

So, the equivalent resistance of the combination is $\frac{80}{3}\Omega$

Section-D

34. Answer:

(a) Our stomach has a pH equal to 2. Antacids neutralize excess acid in our body and give relief from hyperacidity. Sodium hydrogen carbonate is one of such antacids.

(b) pH will decrease as it turns to curd because curd is acidic due to the presence of lactic acid.

(c) It takes longer to set as curd as bacteria do not work well in presence of sodium hydrogen carbonate, i.e. fermentation will take place slowly.

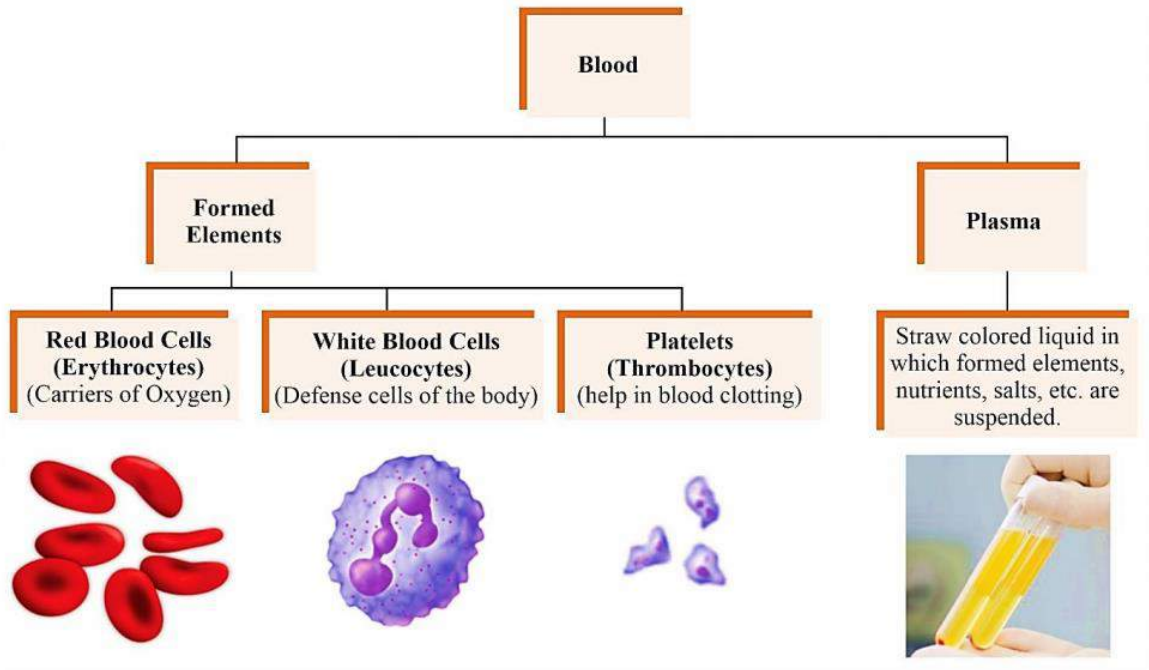
(d) Toothpastes are basic in nature. They neutralize the acid formed in the mouth which causes tooth decay.

(OR)

Answer:

1. A and B belong to group 1 and 2 because they form basic oxides. C belongs to group 13 as it has 3 valence electrons. D belongs to group 14 as it forms almost neutral oxide. E and F belong to group 15 and 16 as they form acidic oxides, G belongs to group 17 as it has 7 valence electrons and H belongs to group 18. They belong to the 3rd period of the Periodic Table because sodium belongs to the 3rd period and AG is NaCI, an ionic compound of sodium that can be obtained from seawater and A(Na) and G(CI) belong to the 3rd period.
2. H belongs to a noble gas.
3. A has the largest atomic radius.
4. E and F are likely to be non-metals.
5. D is likely to be metalloid or semimetal.

35. Answer: Blood is connective tissue. It consists of a fluid matrix, plasma, and formed elements.



1) Blood plasma:- Constitutes 55% of blood, it is pale yellow in color, slightly alkaline and viscous fluid. It consists of about 90% water, 1% inorganic salts in solution and 7-8% proteins in colloidal state. Remaining are gases, cholesterol and waste materials.
2) Formed elements:- Blood corpuscles are known as formed elements. They are produced in the red bone marrow. These include

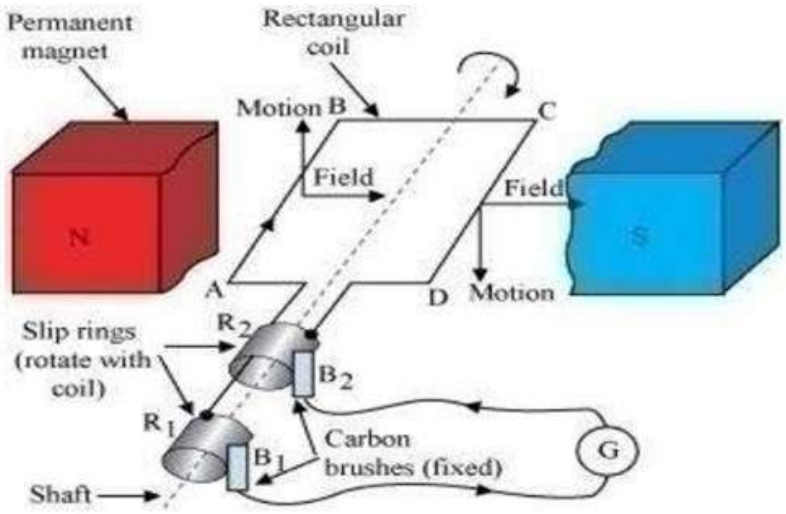
a) Red blood cells:- They are round, uninucleate, membrane-bound cells that carry pigment haemoglobin. A healthy man contains 25 trillion RBCs. Cell organelles are present in mature RBCs. The pigment "Haemoglobin" binds to oxygen and oxygen is then transported throughout the body. The average lifespan of RBCs is120 days.

b) White Blood cells:- They are colorless because they lack haemoglobin. They are nucleated, with cell organelles, have ameboid activity. They are also called "leukocytes". WBCs further consist of "Granulocytes and Agranulocytes".
WBC's are the main defense system of our body. Further, WBCs include Neutrophils, Basophils, Eosinophils, Monocytes, and Lymphocytes.

3) Blood Platelets:- Also called "Thrombocytes". They are uninucleate, colorless, and lack hemoglobin. Their number varies between

150000-350000. The life span of platelets is 3-7 days and they are responsible for clotting.

36. Answer: An AC generator is a device that produces an alternating current when a changing magnetic field is applied on a conductor coil. The frequency of the current is the same as the frequency of rotation of the conductor coil. There are various parts of an AC generator which are shown in the image: -



The parts of AC generator are:

Rectangular Coil: Rectangular Coil is the conductor coil in which current is produced. When the coil rotates in an applied magnetic field due to electromagnetic induction a current is produced.

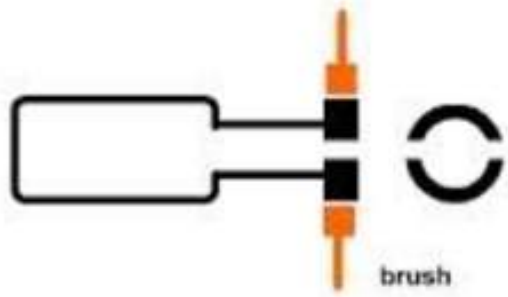
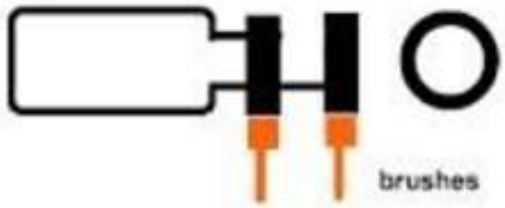
Permanent magnet: Permanent magnets are another most important part. They provide a steady magnetic field in which the coil rotates. Without them, there is no magnetic field and there will be no electromagnetic induction.

Slip Rings: When the coil rotates, the wire attached to them through which we will get electricity will also rotate and will create a problem by as the wire will all get curl up. So the solution to this problem is slip rings. The current which is produced through the coil is transported to the rings. Inner part of the ring is allowed to have a rotation but the exterior part is not allowed and inner and exterior part are both connected. So the current passes to exterior part from inner part and then to the wire.

Carbon brushes: Carbon Brushes are the fixed part which is connected to slip rings. They are fixed and current from slip rings passes to carbon brush and then to the wire.

Shaft: Shaft is like a handle attached to the coil, which is used for moving the coil. It basically makes rotation easier and faster.

(ii) The difference between a DC generator and an AC generator is given as following: -

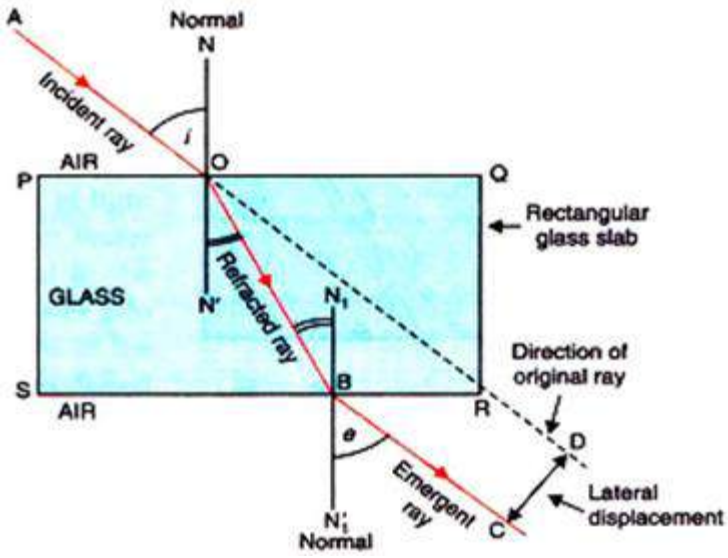
Direct Current Generator	Alternating Current Generator
The current generated is DC (Direct Current).	The current generated is AC (Alternating Current).
DC generator is used to power very large electric motors.	AC generator is used to power small electrical appliances.
DC generator has commutator additional with brushes and slip rings.	AC generator has brushes and slips rings.
	

OR

Answer:

(a) The incident ray and the emergent ray do not coincide they are parallel to each other. The emergent ray is shifted by some distance from the incident ray while passing through the glass slab which is called the lateral displacement.

The figure below illustrates it.



(b) According to the question;
Object distance (u) = -27cm;
Focal length (f) = -18cm;
Image distance = v;
By mirror formula;

$$\frac{1}{v}+\frac{1}{u}=\frac{1}{f}$$

$$\Rightarrow \frac{1}{v}+\frac{1}{-27}=\frac{1}{-18}$$

$$\Rightarrow \frac{1}{v}=\frac{1}{27}-\frac{1}{18}$$

$$\Rightarrow \frac{1}{v}=\frac{-3+2}{54}$$

$$\Rightarrow \frac{1}{v}=-\frac{1}{54}$$

$\Rightarrow$ v = - 54cm.
Thus, screen should be placed 54cm in front of the mirror to obtain the sharp focused image.
Height of object h_1= 7cm;
Magnification of the image is given as

$$m=\frac{H_I}{H_O}=-\frac{v}{u}$$

Putting values of v and u

$$\frac{h_2}{7} = -\frac{-54}{-27}$$

$$\frac{h_2}{7} = -2;$$

$\Rightarrow H_I = 7 \times -2 = -14$.

Height of image is 14 cm.

Negative sign means image is real and invert. Thus, the image is real, inverted image of 14 cm.

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