CBSE Class 10 Science Question Paper 2020 Set 3

SCIENCE BOARD EXAM – SET 3

General Instructions:

Read the following instructions very carefully and strictly follow them:

i. This question paper comprises four sections – A, B and C. There are 30 questions in the question paper. All questions are compulsory.

ii. Section A: Question numbers 1 to 14 – all questions or part thereof are of one marl each.These questions comprise multiple choice questions(MCQ), Very Short answer(VSA)and Assertion-Reason type question.Answer to these questions should be given in one word or one sentence.

iii. Section B: Question numbers 15 to 24 are short answer type questions, carrying 3 marks each. Answer to these questions should not exceed 50 to 60 words.

iv. Section C: Question numbers 25 to 30 are long answer type questions, carrying 5 marks each.Answer to these questions should not exceed 80 to 90 words

v. Answer should be brief and to the point. Also the above mentioned word limit be adhered to as far as possible.

vi. 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.

In addition to this, separate instructions are given with each section and question, wherever necessary.

SECTION – A **[10 × 1 = 10 MARKS]**

1. Draw the structure of a carboxylic acid containing three carbon atoms.
2. When is the potential difference between two points in a current carrying conductor said to be 1 volt?
3. Answer question numbers 3(a) – 3(d) on the basis of your understanding of the following paragraph and the related concepts.

   Around the year 1800, only 30 elements were known Dobereiner in 1817 and Newlands in 1866 tried to arrange the then known elements and framed laws which were rejected by the scientists. Even after the rejection of the proposed laws, many scientists continued to search for a pattern that correlated the properties of elements with their atomic masses.

   The main credit for classifying elements goes to Mendeleev for classifying elements goes to Mendeleev for his most important contribution to the early development of a periodic table of elements wherein he arranged the elements on the basis of their fundamental property, the atomic mass and also on the similarity of chemical properties. The format of their hydrides and oxides were treated as basic criteria for the classification of the elements. However, Mendeleev's classification also had some limitations as it could not assign the position to isotopes. He also left some gaps in the periodic table.

3(a). State Mendeleev's periodic law.

3(b). Why did Mendeleev leave some gaps in the periodic table?

3(c). If the letter 'R' was used to represent and of the elements in the group, then the hydride and oxide of carbon would respectively be represented as

(i) RH_4, RO (ii) RH_4, RO_2 (iii) RH_3, RO_2 (iv) RH_2, RO

3(d). Isotopes are

(i) Atoms of elements with similar chemical properties but different atomic masses.
(ii) Atoms of different elements with similar chemical properties but different atomic masses.
(iii) Atoms of elements with different chemical properties but same atomic masses.
(iv) Atoms of different elements with different chemical properties but same atomic masses.

4. Answer question numbers 4(a) – 4(d) on the basis of your understanding of the following paragraph and the related studied concepts:

India today is facing the problem of overuse of resources, contamination of water and soil and luck of methods of processing the waste. The time has come for the world to say goodbye to "single-use plastics". Steps must be undertaken to develop environment -friendly substitutes, effective plastic waste collection and methods of its disposal.

Indore treated 15 lakh metric tonnes of waste in just 3 years, through biomining and bioremediation techniques. Bioremediation involves introducing microbes into a landfill to naturally 'break' it down and biomining involves using trommel machines to sift through the waste to separate the 'soil' and the waste component. The city managed to chip away 15 lakh metric tonnes of waste at a cost of around Rs 10 crore. A similar experiment was successfully carried out in Ahmedabad also.

4(a) State tow methods of effective plastic waste collection in your school.

4(a) State tow methods of effective plastic waste collection in your school.

4(b) Name any two uses of "single-use plastic" in daily life.

4(c) If we discontinue the use of plastic, how can an environment-friendly substitute be provided?

4(d) Do you think microbes will work similarly in landfill sites as they work in the laboratory? Justify your answer.

5. Choose the incorrect statement from the following :
   a) Ozone is a molecule formed by three atoms of oxygen
   b) Ozone shields the surface of the Earth from ultraviolet radiations
   c) Ozone is deadly poisonous
   d) Ozone gets decomposed by UV radiations.
6. Food web is constituted by
   (a) Relationship between the organisms and the environment.
   (b) Relationship between plants and animals.
   (c) Various interlinked food chains in an ecosystem.
   (d) Relationship between animals and environment.
7. Which of the following statements is not true about a 'bud' in 'Hydra'?
   (a) It is an outgrowth
   (b) It forms due to repeated cell division at one specific site.
   (c) It detaches from the parent body as soon as it is produced.
   (d) It becomes a new independent individual
8. Anaerobic process
   a) Takes place in yeast during fermentation
   b) Takes place in the presence of oxygen
   c) Produces only energy in the muscles of human beings.
   d) Produces ethanol, oxygen and energy.

(OR)

Most of the digestion and absorption of the food takes place in the

   a) Small intestine
   b) Liver
   c) Stomach
   d) Large intestine.
9. Which of the following does not represent electrical power?
   a) I^2R b) IR^2 c) VI d) V^2/R

10. Which one of the following statements is not true about nuclear energy generation in a nuclear reactor?

(A) Energy is obtained by a process called nuclear fission.

(B) The nucleus of Uranium is bombarded with high energy neutrons.

(C) A chain reaction is set in the process.

(D) In this process a tremendous amount of energy is released at a controlled rate.

(OR)

The biggest source of energy on Earth's surface is

a) Biomass

b) Solar radiations

c) Tides

d) Winds

11. Which one of the following statements is correct about the human circulatory system?

(a) Blood transports only oxygen and not carbon dioxide

(b) Human heart has five chambers

(c) Valves ensure that the blood does not flow backwards

(d) Both oxygen-rich and oxygen-deficient blood gets mixed in the heart.

12. If a person has five resistors each of value 1/5 Ω, then the maximum resistance he can obtain by connecting them is

(a) 1 Ω b) 5 Ω c) 10 Ω d) 25 Ω

(OR)

The resistance of a resistor is reduced to half of its initial value. In doing so, if other parameters of the circuit remain unchanged, the heating effects in the resistor will become

a) Two times

b) Half

c) One-fourth

d) Four times

For question numbers 13 and 14, two statements are given – one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below : (a) Both (A) and (R) are true and (R) is the correct explanation of the assertion (A). (b) Both (A) and (R) are true, but (R) is not the correct explanation of the assertion (A). (c) (A) is true, but (R) is false. (d) (A) is false, but (R) is true

13. Assertion (A) : The sex of a child in human beings will be determined by the type of chromosome he/she inherits from the father.

Reason (R) : A child who inherits X' chromosome from his father would be a girl (XX), while a child who inherits a `Y' chromosome from the father would be a boy (XY).

14. Assertion (A): Following is a balanced chemical equation for the action of steam iron:

$$3Fe + 4H_2O \longrightarrow Fe_3O_4 + 4H_2$$

15. Reason (R): The law of conservation of mass holds good for a chemical equation.

SECTION – B **[10 × 3 = 30 MARKS]**

15. Define geotropism. Draw a labelled diagram of a plant showing geotropic movements of its parts.
16. A cheetah, on seeing a prey, moves towards him at a very high speed. What causes the movement of his muscles? How does the chemistry of cellular components of muscles change during this event?
17. (a) How is a soap different from a detergent in composition?
    (b) Design an activity to show that a detergent works well with all types of water while a soap does not.
18. Lead Nitrate solution is added to a test tube containing potassium iodide solution.
    (a) Write the name and colour of the compound precipitated.
    (b) Write the balanced chemical equation for the reaction involved.
    (c) Name the type of this reaction justifying your answer.

    (OR)

    What happens when food materials containing fats and oils are left for a long time?
    List two observable changes and suggest three ways by which this phenomenon can be prevented.
19. List three differentiating features between the process of galvanization and alloying.

    (OR)

    Compare in tabular form the reactivity's of the following metals with cold and hot water.
    a) Sodium b) Calcium c) Magnesium
20. Define the term variation. Why is variation beneficial to a species? List two reasons for the appearance among the progeny formed by sexual reproduction.

    (OR)

    List two distinguishing features between inherited and acquired characters. Also give one example for each type.
21. How will you use two identical glass prisms so that a narrow beam of white light incident on one emerges out of the second prism as white light? Draw and label the ray diagram.
22. A concave mirror is used for image formation for different positions of an object. What inferences can be drawn about the following when an object is placed at a distance of 10 cm from the pole of a concave mirror of focal length 15 cm ? (a) Position of the image (b) Size of the image (c) Nature of the image Draw a labelled ray diagram to justify your inferences.
23. Which defect of the eye is known as far-sightedness? When does this defect arise? State two reasons. How is this defect corrected?
24. The refractive index of a medium `x' with respect to a medium `y' is 2/3 and the refractive index of medium `y' with respect to medium `z' is 4/3. Find the refractive index of medium `z' with respect to medium `x'. If the speed of light in medium `x' is 3 x 108 ms^{-1}, calculate the speed of light in medium 'y'.

SECTION – C **[6 × 5 = 30 MARKS]**

25. A cloth strip dipped in onion juice is used for testing a liquid "x". the liquid "x" change its colour. Which type of an indicator is onion juice.

    The juice "x" turns blue litmus red. List observations the liquid "x" will show on reacting with the following.

    a) Zinc granules

    b) Solid sodium carbonate

    Write the chemical equations for the reactions involved.

    (OR)

    Define water of crystallisation. Give the chemical formula for two compounds as examples. How can it be proved that the water of crystallisation makes a difference in the state and colour of the compounds?

26. (a) Define the terms 'alloy' and 'amalgam'. Name the alloy used for welding electric wires together and write its constituents.

    (b) Name the constituents of the following alloys:

    (i) Brass (ii) Stainless steel (iii) Bronze

    State one property in each of these alloys which is different from its constituents.

27. (a) State Fleming's Left-hand rule.

    (b) List three characteristic features of the electric current used in our homes

    (c) What is a fuse? Why is it called a safety device?

    (d) Why is it necessary to earth metallic electric appliances?

28. (a) List the sequence of events in the uterus of a human female from fertilization of egg till childbirth

    (b) State the changes that are observed in the uterus if fertilization of egg does not occur

    (OR)

29. (a) Why is nutrition necessary for the human body?

    (b) What causes movement of food inside the alimentary canal?

    (c) why is small intestine in herbivores longer than in carnivores?

    (d) What will happen if mucus is not secreted by the gastric glands?

30. Draw a schematic diagram of a circuit consisting of a battery of 3 cells of 2 V each, a combination of three resistors of 10 Ω, 20 Ω and 30 Ω connected in parallel, a plug key and an ammeter, all connected in series. Use this circuit to find the value of the following :

    (a) Current through each resistor

    (b) Total current in the circuit

    (c) Total effective resistance of the circuit

    (OR)

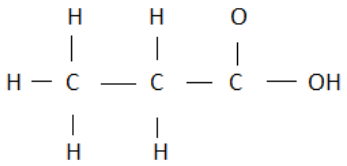
    Two identical resistors, each of resistance 15 Ω, are connected in (i) series, and (ii) parallel, in turn to a battery of 6 V. Calculate the ratio of the power consumed in the combination of resistors in each case

CBSE Class 10 Science Question Paper 2020 Set 3 Solution

SCIENCE BOARD SET 3

Solution:

1. Draw the structure of a carboxylic acid containing three carbon atoms.



CH_3CH_2COOH

Propanoic acid

2. $\upsilon = \frac{W}{Q}$. When 1 joule of work is done on 1 c (coulomb) of charge, to move it from one point to another in a circuit then it is said to be 1 volt.
3. Answer question numbers 3(a) – 3(d) on the basis of your understanding of the following paragraph and the related concepts.

   Around the year 1800, only 30 elements were known Dobereiner in 1817 and Newlands in 1866 tried to arrange the then known elements and framed laws which were rejected by the scientists. Even after the rejection of the proposed laws, many scientists continued to search for a pattern that correlated the properties of elements with their masses.

   The main credit for classifying elements goes to Mendeleev for classifying elements goes to Mendeleev for his most important contribution to the early development of a periodic table of elements where in he arranged the elements on the basis of their fundamental property, the atomic mass and also on the similarity of chemical properties. The format of their hydrides and oxides were treated as basic criteria for the classification of the elements. However, Mendeleev's classification also had some limitations as it could not assign the position to isotopes. He also left some gaps in the periodic table.

   3(a). State Mendeleev's periodic law.

Solution:

Mendeleev's periodic law states that, "The properties of element are the periodic function of their atomic masses."

(b) Why did Mendeleev leave some gaps in the periodic table?

Solution:

Mendeleev left some gaps in the periodic table, because he predicted the existence of few more element that had not been discovered at that time.

(c) If the letter 'R' was used to represent and of the elements in the group, then the hydride and oxide of carbon would respectively be represented as

(i) RH_4, RO (ii) RH_4, RO_2 (iii) RH_2, RO_2 (iv) RH_2, RO

Solution:

(ii) RH_4, RO_2

(d) Isotopes are

(i) Atoms of element with similar chemical properties but different atomic masses.

(ii) Atoms of different elements with similar chemical properties but different atomic masses.

(iii) Atoms of elements with different chemical properties but same atomic masses.

(iv) Atoms of different elements with different chemical properties but same atomic masses.

Solution:

(i) Atoms of element with similar chemical properties but different atomic masses.

4. a. Separate dustbins can be set up at school to collect the plastic and the same can be recycled.

   Certain plastic wastes like bottles can be reused as useful products like pen holder in the school.

   b. Plastic water bottles, grocery plastic bags

   c. We can replace the use of plastic bags with cloth or jute bags .Unlike plastic bags ,jute and cloth bag are reusable and environment friendly .

5. (D) Ozone gets decomposed by UV radiations.
6. (C)Various interlinked food chains in an ecosystem
7. (C) It detaches from the parent body as soon as it is produced

8. (A) Takes place in yeast during fermentation

(OR)

(A) Small intestine

9. (B)

10. (B) or (B)

11. (C) Valves ensure that the blood does not flow backwards.

12. **(B)** Maximum resistance is obtained when all resistors are connected in series.

$R_{max} = R_1 + R_2 + R_3 + R_4 + R_5$

$R_1 = R_2 = R_3 = R_4 = R_5 = R$ given

$R_{max} = 5R \qquad \therefore R = \frac{1}{5}$

$= 5 \times \frac{1}{5}$

(a) $R_{max} = 1\ \Omega$

(OR)

By Joule's law of heating.

$H = I^2 Rt$

$H \alpha R$

$\therefore$ When $R \rightarrow R/2$

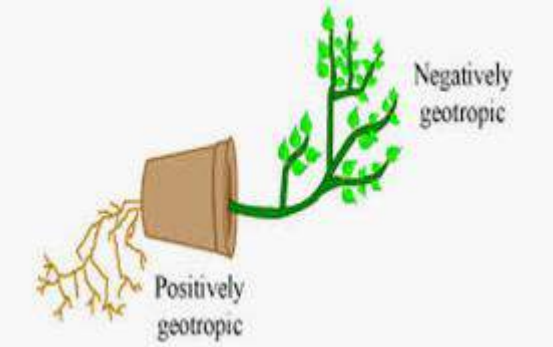
$\therefore$ $H \rightarrow H/2$ As H is also reduced by half.

13. A

14. (a)

SECTION – B

15. The movement of plant growth towards or against the gravity is called geotropism. If the movement is towards gravity, its termed as positive geotropism and away from gravity is known as negative geotropism.



16. The contraction of the muscles causes the movement. The movement of Cheetah can be described using the concept of reflex action.
17. (a) How is a soap different from a detergent in composition?

    Soaps are the long chain carboxylin salts of Na (or) K, where as detergents are the synthetic surfactants usally alkylbenzene sulfonates. (Na (or) k salts of sulphonic acid of benzene)

    (b) Design an activity to show that a detergent works well with all types of water while a soap does not.

    - Take two test tubes with about 10 ml of hard water in each.
    - Add five drops of soap solution to one and five drops of detergent solution to the other.
    - Shake both test tubes for the same period.

    OBSERVATION:

    Curdy solid will be formed in the test tube in which soap solution is added, where as foam will be formed in the test tube in which detergent solution is added. The above observation shows that, the detergent dissolves in all type of water, where as a “scum” is formed by soap solution with hard water (ie) precipitate.

18. Lead Nitrate solution is added to a test tube containing potassium iodide solution.

    (a) Write the name and colour of the compound precipitated.

    (b) Write the balanced chemical equation for the reaction involved.

    (c) Name the type of this reaction justifying your answer.

Solution:

a) Lead Iodide (PbI_2) and it is bright yellow precipitate.

b) $Pb(NO_3)_2 + 2KI \longrightarrow \underset{\text{yellow ppt.}}{PbI_2} + 2KNO_3$

c) It is a double displacement reaction

(OR)

What happens when food materials containing fats and oils are left for a long time?

List two observable changes and suggest three ways by which this phenomenon can be prevented.

Solution:

When food materials containing fats and oils are left for a long time they become rancid (i.e.) fat and oil present in them get oxidised. (Oxidation of food material takes place).

Two observable changes are

(i) They start giving unpleasant smell.

(ii) Their taste changes.

Rancidity can be prevented by,

(i) By adding anti-oxidants to foods containing fats and oils.

(ii) Rancidity can be prevented by storing food in air tight containers. (Slows down oxidation)

(iii) Packing fats and oil foods in nitrogen gas.

19. List three differentiating features between the process of galvanization and alloying.

Galvanisation	**Alloying**
(i) It is a method of protecting steel and iron from rusting by coating them with a thin layer of zinc.	It is a very good method of improving the properties of a metal. We can get the desired properties by this method.

BOARD SET 3

CLASS:

ALL CENTRE

	Ex: Iron is mixed with 'Ni' & 'Cr', we get stainless steel which is hard and does not rust.
(ii) It doesn't modify the property of the metal	It modify the property of the metal.
(iii) If the coating of zinc is removed then rusting takes place.	Alloy will not rust.

OR

Compare in tabular form the reactivity's of the following metals with cold and hot water.

a) Sodium b) Calcium c) Magnesium

Sodium	**Calcium**	**Magnesium**
(i) $2Na_{(s)} + 2H_2O_{(l)} \longrightarrow 2NaOH_{(aq)} + H_{2(g)} + \text{heat energy}$	$Ca_{(s)} + 2H_2O_{(l)} \longrightarrow Ca(OH)_{2(aq)} + H_{2(g)}$	$Mg_{(s)} + 2H_2O_{(l)} \longrightarrow Mg(OH)_{2(aq)} + H_{2(g)}$
The reaction of 'Na' with cold water is very violent. It is highly exothermic. It also reacts with hot water in the same way.	The reaction of calcium with cold water is less violent. Calcium starts floating because the bubbles of hydrogen gas formed stick to the surface of the metal. It also reacts with hot water as well.	Magnesium does not react with cold water. It reacts with hot water to form magnesium hydride. It also starts floating as the bubbles of H_2 gas stick to its surface.

20. Variation is the difference in the DNA among individuals .

Variation is beneficial for species at times as they help in adapting to the surrounding environment .Progeny formed as a result of sexual reproduction exhibits variation because ,sexual reproduction involves two parents ,it also involves fusion of gametes .

OR

Inherited trait :Genetic trait that is passed on from one generation to another is known as inherited trait .

These traits are coded in the DNA

Example : Height ,skin color

Acquired trait : The traits that are developed during ones lifetime .

Since these are not coded on DNA ,they are not passed on from one generation to another.

Example: An offspring born to a bodybuilder will not be having large muscles.

21. (i) When white light is passed through a prism, it splits into its seven constituent colour (VIBGYOR)
(ii) Splitting of white light into its constituent color is called dispersion.

22. u = - 10 cm

f = - 15 cm

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

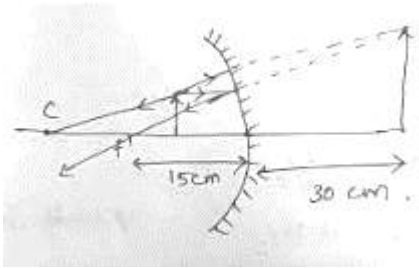
$\frac{1}{-15}=\frac{1}{v}+\frac{1}{(-10)}$

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

$v=30cm$

(b) $m=\frac{h_i}{h_o}=\frac{-v}{u}=\frac{-30}{-10}=3$ $(Enl\arg ed)$

(c) Virtual d erect.

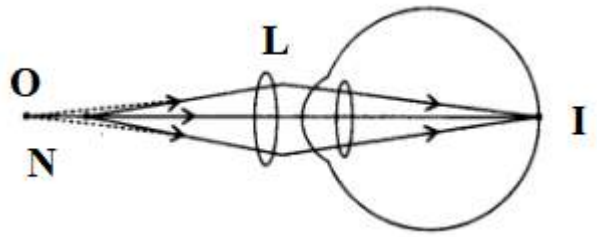


23. Hypermetropia (or) long-sighted ness is the defect of vision due to which a person cannot see near by objects clearly & can see the distant objects clearly

Causes:-

1. Due to 10 W converging power of eye lens (because of large focal length)

2. Due to eye-ball being too short correction



Hypermetropia (for-sightedness) is corrected by using convex lenses

24.

$$\mu_{xy} = \frac{\mu_x}{\mu_y} = \frac{2}{3} \quad \Rightarrow \mu_x = \frac{2}{3}\mu_y$$

$$\mu_{yz} = \frac{\mu_y}{\mu_z} = \frac{4}{3} \quad \Rightarrow \mu_z = \frac{3}{4}\mu_y$$

$$\upsilon_x = 3\times10^8 ms^{-1}$$

$$\mu_{zx} = ? \qquad \upsilon_y = ?$$

$$\mu_{zx} = \frac{\mu_z}{\mu_x} = \frac{\frac{3}{4}\mu_y}{\frac{2}{3}\mu_y} = \frac{3}{4}\times\frac{3}{2} = \frac{9}{8}$$

We know, $\mu \alpha \frac{1}{\upsilon}$

$$\therefore \quad \mu_{xy} = \frac{\mu_x}{\mu_y} = \frac{\upsilon_y}{\upsilon_x}$$

$$\Rightarrow \frac{2}{3} = \frac{\upsilon_y}{3\times10^8}$$

$$\upsilon_y = 2\times10^8 ms^{-1}$$

SECTION – C

25. A cloth strip dipped in onion juice is used for testing a liquid "x". the liquid "x" change its colour. Which type of an indicator is onion juice.

The juice "x" turns blue litmus red. List observations the liquid "x" will show on reacting with the following.

a) Zinc granules

b) Solid sodium carbonate

Write the chemical equations for the reactions involved.

Solution:

Onion juice is an olfactory indicator.

a) $Zn + 2HCl \longrightarrow ZnCl_2 + H_2$. When a burnt match stick is brought close to the mouth of the test tube, the gas burns with a pop sound.

b) $Na_2CO_3 + 2HCl \longrightarrow 2NaCl + H_2O + CO_2$

CO_2 released turns lime water milky.

(OR)

Define water of crystallisation. Give the chemical formula for two compounds as examples. How can it be proved that the water of crystallisation makes a difference in the state and colour of the compounds?

Solution:

Water of crystallisation is the fixed number of water molecules present in one formula unit of a salt.

Eg: $CuSO_4 .5H_2O$, $FeSO_4 .7H_2O$ (Green vitriol)
(Blue vitriol)

By heating these crystals they lose their water molecules and hence result in change in state and colour takes place.

26. (a) Allloy: An alloy is a homogeneous mixture of two (or) more metals (or) a metal and a non-metal

Amalgam: A mixture of mercury with another metal especially to fill holes in teeth.

"Solder" is the alloy used for welding electric wires together.

Composition of solder – Lead and tin.

(b) (i) Brass – copper and zinc Iron,

(ii) Stainless steel – Nickel and chromium

(iii) Bronze – copper and tin .Primarily with copper, 12 – 12.5% of tin and with other metals and sometimes non-metals (or) metalloids.

Brass and Bronze have lower electrical conductivity than their constituents, where as stainless steel does not corrode easily as iron does.

27. Sol.

(a) Fleming's left hand rule: If we stretch the forefinger, middle finger and the thumb of our left hand mutually perpendicular to each other as shown in figure such that the forefinger indicates the direction of the magnetic field and the middle finger indicates the direction of current, then the thumb will indicate the direction of motion (i.e., force) on the conductor.

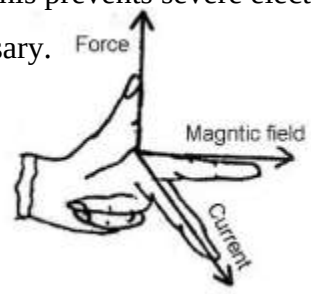
(b) (i) Appliances to be connect in parallel.

(ii) Each appliance has a separate switch to ON/OFF the flow of current through it.

(iii) Fuse connected to avoid damage.

(c) A fuse is an electrical safety device that operates to provide overcurrent protection of an electrical circuit. Its essential component is a metal wire or strip that melts when too much current flows through it thereby stopping or interrupting the current. So it is also called a safety device.

(d) The metallic body of electric appliances is connected to the earth wire so that any leakage of electric current is transfered to the ground. This prevents severe electric shock to the user. That is why earthing of the electrical appliances is necessary.



28. a. Fertilisation – Zygote formation – Morula – Blastocyst – Implantation – Embryo development – Foetus – Parturition

b.If no fertilisation occurs then the endometrial thickening sheds off as blood. The endometrial thickening along with unfertilised egg is released through the vagina as blood. This is know as menstruation .

29. a.The process of taking in nutrients is called nutrition .Nutrients are required for building the various parts of the body ,thus enabling growth and repair of the body .The nutrients also provide us with energy.

b. Peristalsis causes the movement of food inside the alimentary canal.

c.The major nutrient in herbivores is cellulose. It takes a longer time to digest cellulose .Thus herbivore have a longer intestine than carnivores.

d.Due to the concentrated HCL there would be perforations in the stomach walls if there is no mucus secreted.

30.

(a) $I_1 = \frac{\upsilon}{R_1} = \frac{6}{10} = 0.6A$

$I_2 = \frac{\upsilon}{R_2} = \frac{6}{20} = 0.3A$

$I_3 = \frac{\upsilon}{R_3} = \frac{6}{30} = 0.2A$

(b) $I = I_1 + I_2 + I_3 = 0.6 + 0.3 + 0.2$

$I = 1.1A$

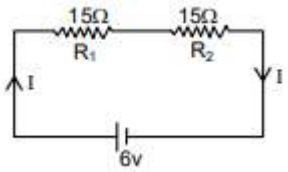
(c) Effective resistance

$\upsilon = IR$

$R = \frac{\upsilon}{I} = \frac{6}{1.1} = 5.45\Omega$

(OR)

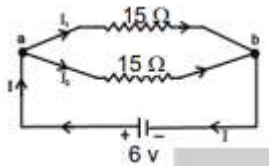
In series,



$R_s = R_1 + R_2 = 30\Omega$

$P_s = \frac{\upsilon^2}{R_3} = \frac{6 \times 6}{30} = 1.2W$

In parallel



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

$$\frac{1}{R_p}=\frac{1}{15}+\frac{1}{15}=\frac{2}{15}$$

$$R_p=\frac{15}{2}\Omega$$

$$R_p=7.5\Omega$$

$$P_p=\frac{\upsilon^2}{R_p}=\frac{36}{7.5}=4.8$$

$$\frac{P_s}{P_p}=\frac{1.2W}{4.8}=\frac{1}{4}$$