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Science–X
SAMPLE QUESTION PAPER
(With Hints & Answers)

1

As per 2020 CBSE Sample Question Paper

Time Allowed : 3 hours *Maximum Marks : 80*

General Instructions:

(*i*) *The question paper comprises three sections – **A, B** and **C**. Attempt all the sections.*
(*ii*) *All questions are compulsory.*
(*iii*) *Internal choice is given in each section.*
(*iv*) *All questions in **Section A** 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**.*
(*v*) *All questions in **Section B** are **three-mark** short-answer type questions. These are to be answered in about **50-60 words** each.*
(*vi*) *All questions in **Section C** are **five-mark** long-answer type questions. These are to be answered in about **80-90 words** each.*
(*vii*) *This question paper consists of a total of **30** questions.*

SECTION A

Q.1. Name *two* tissues which provide control and coordination in animals. **1**

[Ans. Nervous and Muscular Tissues

Q.2. Write the name of the part of human eye which controls the amount of light entering the eye. **1**

[Ans. Pupil/Iris

Q.3. Answer question numbers 3(*a*)–3(*d*) on the basis of your understanding of the given diagram and the related studied concepts.

3(*a*) What is the principle of solar cooker? **1**

3(*b*) What is the use of black painted surface in a solar cooker? **1**

3(*c*) 'Solar cooker is covered with a glass lid.' Give reason. **1**

3(*d*) Why there is a need of non-conventional sources of energy? **1**

Q.4. Question numbers 4(*a*)–4(*d*) are based on the variation in the atomic radii of first group elements given below. Study and answer the questions that follow.

Group 1 Elements:	Na	Li	Rb	Cs	K
Atomic radii (pm):	186	152	244	262	231

4(*a*) Arrange them in proper order as in the Periodic table of group 1. Name the elements which have the smallest and the largest atoms. **1**

4(*b*) Why the size of the atom increases on going down in a group? **1**

4(*c*) Which element of group 1 is most reactive and why? **1**

4(*d*) Which element of group 1 is most metallic and why? **1**

[Ans. 4(a) [Li, Na, K, Rb, Cs]; Li—Smallest, Cs—Largest
4(b) One energy shell is added at every step on going down in a group.
4(c) Li—as it loses electrons very easily and form cation easily.
4(d) Li—as it loses electrons to form cation easily.

Q.5. $MnO_2 + 4\ HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$. **1**
Identify the substance oxidized in the above equation.
(*a*) $MnCl_2$ (*b*) HCl (*c*) H_2O (*d*) MnO_2
[Ans. (b) HCl

Q.6. Which of the following will undergo addition reactions? **1**
(*a*) CH_4 (*b*) C_3H_8 (*c*) C_2H_6 (*d*) C_2H_4
[Ans. (d) C_2H_4

Q.7. Which region of the alimentary canal absorbs the digested food? **1**
(*a*) Stomach (*b*) Small Intestine (*c*) Large Intestine (*d*) Liver
[Ans. (b) Small Intestine

Q.8. The process of release of eggs from the ovary is called: **1**
(*a*) Menstruation (*b*) Reproduction (*c*) Insemination (*d*) Ovulation
[Ans. (d) Ovulation

Q.9. Image formed by reflection from a plane mirror is: **1**
(*a*) Real and inverted (*b*) Real and erect
(*c*) Virtual and erect (*d*) Virtual and inverted *[Ans. (c) Virtual and erect*

Q.10. Myopia is corrected by the use of a **1**
(*a*) Concave lens (*b*) Convex lens
(*c*) Bifocal lens (*d*) Cylindrical lens *[Ans. (a) Concave lens*

Q.11. Three resistors of 1Ω, 2Ω and 3Ω are connected in parallel. The combined resistance of 3 resistors should be **1**
(*a*) greater than 3Ω (*b*) lesser than 1Ω
(*c*) equal to 2Ω (*d*) between 1Ω and 3Ω *[Ans. (b) lesser than 1Ω*

Q.12. Magnetic lines of force inside a current carrying solenoid are **1**
(*a*) Perpendicular to axis (*b*) Along the axis and are parallel to each other
(*c*) Parallel inside the solenoid and circular at the ends
(*d*) Circular *[Ans. (c) Parallel inside the solenoid and circular at the ends*

For question numbers 13 and 14, two statements are given—one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below:

(*i*) Both A and R are true and R is correct explanation of the assertion.
(*ii*) Both A and R are true but R is not the correct explanation of the assertion.
(*iii*) A is true but R is false.
(*iv*) A is false but R is true.

Q.13. ***Assertion:*** Energy flow in food chains is always unidirectional. **1**
Reason: Only 10% energy is transferred to the next trophic level. *[Ans. (ii)*

Q.14. ***Assertion:*** Graphite is a good conductor of electricity. **1**
Reason: In graphite each carbon atom is linked to four carbon atoms and forms a sheet like structure. *[Ans. (iv)*

SECTION B

Q.15. (*a*) How chloride of lime chemically differs from calcium chloride? **3**
(*b*) What happens when chloride of lime reacts with sulphuric acid? Write chemical equation involved.
(*c*) Mention *two* uses of chloride of lime.

[Ans. (*a*) *Chloride of lime is calcium oxychloride ($CaOCl_2$) while calcium chloride is $CaCl_2$.*
(*b*) *$CaOCl_2 + H_2SO_4 \rightarrow CaSO_4 + Cl_2(g) + H_2O$*
Cl_2 (Chlorine) gas is evolved during this reaction.
(*c*) (*i*) *It is used for bleaching of wool and cotton in textile industry.*
(*ii*) *For disinfecting of drinking water.*

Or

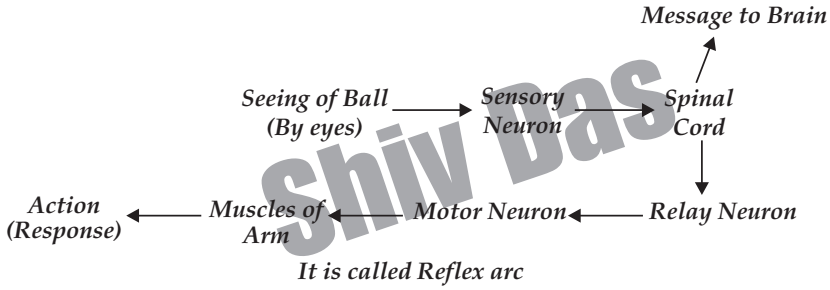
Q.15. Define acids. Explain *two* chemical properties of an acid and write the chemical equation for *one* example of each property.

[Ans. Acids are compounds, which give H^+ ions in their aqueous solutions.
Chemical Properties:
(*i*) *Acids react with bases to form salt and water (Neutralisation reaction).*
$HCl + NaOH \longrightarrow NaCl + H_2O$
(*ii*) *Dilute acids react with metals to release H_2 gas.*
$Zn + 2HCl\ (aq) \longrightarrow ZnCl_2 + H_2$

Q.16. Give reasons for the following: **3**
(*a*) Arteries are thick walled.
(*b*) Blood goes only once in one cycle through the heart in fishes.
(*c*) Plants have low energy needs.

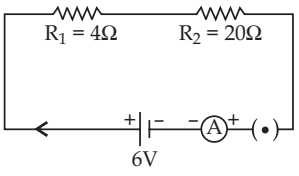
Q.17. For a receiving tennis player. Explain what the path from the stimulus to the response is. **3**

[Ans.



It is called Reflex arc

Q.18. In the given circuit, calculate— **3**
(*a*) the total resistance of the circuit,
(*b*) the current through the circuit, and
(*c*) the potential differences across R_1 and R_2



[Ans. (*a*) *Total $R = 4 + 20 = 24\ \Omega$;*

(*b*) $I = \frac{V}{R} = \frac{6}{24} = 0.25\ A$

(*c*) *$V_1 = 4 \times 0.25 \Rightarrow V$ of $R_1 = 1$ Volt*

$V_2 = 20 \times 0.25 \Rightarrow V$ of $R_2 = 5$ Volts.

Q.19. Write the sign conventions for spherical mirrors. **3**

[Ans. Sign conventions for spherical mirrors:
(*i*) *All the distances are measured from the 'P' (pole) of the mirror.*
(*ii*) *Distances measured in the direction of incident ray are taken as positive.*
(*iii*) *Distances measured opposite to the direction of incident ray are taken as negative.*
(*iv*) *Distances measured perpendicular to and above the Principal axis are taken as positive.*
(*v*) *Distances measured perpendicular to and below Principal axis are taken as negative.*

Q.20. What is meant by isomerism? Why do first three members of the alkane series not show isomerism? Write the structure of *two* isomers of the fourth member of this series. **3**

[Ans. Isomerism is the existence of two or more compounds having same molecular formula but different structures. It is not possible for them to have different structures/only one structure is possible for each of them.

Structures: $CH_3-CH_2-CH_2-CH_3$; $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$

Q.21. The atomic number of three elements A, B and C are given below: **3**

Element	A	B	C
Atomic number	5	7	10

Answer the following:

(*a*) Write the group number of the three elements in the Modern Periodic Table.

(*b*) Mention the period of these elements in the Modern Periodic Table.

(*c*) Out of these three elements which one has the smallest atomic radius and why?

[Ans. (a) Element: A B C
Group No.: 13 15 18

(b) All the three elements belong to the second period.

(c) 'C' is smallest, as the atomic size decreases from left to right in a period.

Q.22. The reproductive parts of angiosperms are located in the flower. State the changes that take place in the flower after the germinated pollens reach the ovules. **3**

Or

Q.22. Why is DNA copying an essential part of the process of reproduction? State *one* main advantage of sexual reproduction over asexual reproduction?

Q.23. A spherical mirror produces an image of magnification –1, when an object is placed on the principal axis of the mirror at a distance of 40 cm from its pole. **3**

(*a*) Identify the nature of image.

(*b*) Identify the nature of spherical mirror.

(*c*) Find the distance between the object and its image.

(*d*) How will the nature of the image change, if the object is shifted 10 cm towards the mirror? Draw a ray diagram to justify your answer.

[Hints. (a) Image is real, inverted/same size as the object; (b) Concave mirror; (c) Zero; (d) Image will be formed beyond C. It will be larger in size. Image real and inverted.

Or

Q.23. A 1.5 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 15 cm. Distance of object from the lens is 20 cm. Use lens formula to find the nature, position and size of the image.

[Ans. $h_1 = +1.5$ *cm,* $f = +15$ *cm,* $u = -20$ *cm. As we know,* $\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{v} = \frac{1}{f} + \frac{1}{u}$

$\frac{1}{v} = \frac{1}{(+15)} + \frac{1}{(-20)} = \frac{1}{15} - \frac{1}{20} = +\frac{1}{60}$ $\therefore v = +60$ *cm*

Now, $\frac{h_2}{h_1} = \frac{v}{u} \Rightarrow h_2 = \frac{v \times h_1}{u} = \frac{+60 \times 1.5}{-20} = -4.5$ *cm; Nature: Real and inverted.*

Q.24. Local people have a major stake in forest resources. Illustrate giving *four* examples how conservation of forests is essential for the existence of their life. **3**

[Ans. Involvement of local people in the protection/conservation of forests as well as avoiding the exhaustion of the forest resources which fulfill the varied needs of local people. Such as—(i) Large quantity of firewood, small timber and thatch; (ii) Bamboo to make slats for huts and baskets; (iii) Wood for making implements for agriculture, hunting and fishing and (iv) Leaves for fodder, etc.

SECTION C

Q.25. Compose *an* activity to arrange Ca, Mg and Fe metals in the decreasing order of reactivity with water. Write suitable balanced chemical equations and draw diagrams. **5**

Q.26. (*a*) Draw a well-labelled diagram of human alimentary canal. **5**
(*b*) Discuss nutrition in amoeba with the help of a diagram.

Or

Q.26. (*a*) What is fragmentation in organisms? Name a multicellular organism which reproduces by this method.
(*b*) What is regeneration in organisms? Describe regeneration in Planaria with the help of a suitable diagram.

Q.27. (*a*) Design an activity with the help of two nails, a very thin aluminium strip, a 12 V Battery and a key to illustrate how an electric fuse works. **5**
(*b*) Cable of a microwave oven has three wires inside it which have insulation of different colours black, green and red. Mention the significance of the three colours and the potential difference between red and black one.
[Ans. (b) Red colour is for Live wire. Black colour for Neutral wire. Green colour for the Earth wire. P.D. between Red and Black wire is 220 volts.

Or

Q.27. (*a*) Define 1 watt.
(*b*) State the commercial unit of electric energy. Express it in terms of SI unit of energy.
(*c*) An electric refrigerator rated as 750 W operates 8 hours per day. What is the cost of the energy to operate it for the month of June at ₹2.50 per kWh? ***[Ans. (c) Cost of 180 kWh=₹ 450.00***

Q.28. Ethanoic acid reacts with sodium hydrogen carbonate to produce a salt 'X' and a gas 'Y'. Identify 'X' and 'Y' and write their chemical names. With the help of a labelled diagram describe an activity to confirm that the gas 'Y' is correctly identified by you. Also write the chemical equation of the reaction involved. **5**
[Ans. X: CH_3COONa, Sodium ethanoate; Y: CO_2, Carbon dioxide.
A diagram showing passage of CO_2 through lime water.
$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$ $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + CO_2 + H_2O$

Or

Q.28. (*a*) What is a soap? Why are soaps not suitable for washing clothes when the water is hard?
(*b*) Explain the action of soap in removing an oily spot from a piece of cloth.

Q.29. Draw diagram of human female reproductive system and label on it the parts that perform the functions: (*a*) Carry eggs from ovary to uterus; (*b*) Where the fertilised egg gets implanted. Explain the role played by placenta in providing nutrition to a growing embryo due to its special design. **5**

Q.30. A student focussed the flame of a candle on a screen with the help of a convex lens. He noted the positions of candle, lens and screen on the scale as given below: **5**
Position of candle = 14.0 cm; Position of convex lens = 50.0 cm; Position of screen = 86.0 cm
(*i*) Find the focal length of the lens.
(*ii*) If under the given condition, height of the flame is 1.5 cm, what would be the height of image obtained on the screen?
(*iii*) If he displaces the candle to 32.0 cm, where will the image be formed and what will be its nature? Give reason for your answer.
(*iv*) After this if he further displaces the candle towards the lens, what will be the nature of the image formed and where will it be?
(*v*) Draw a ray diagram to show the formation of image in the above mentioned case.
[Hints. (i) u = (50 – 14) cm = 36 cm; v = (86 – 50) cm = 36 cm. Thus the object is at 2f. Therefore f = 18 cm
(ii) Height will be same, i.e., 1.5 cm
(iii) u = 50 – 32 = 18 cm. Thus, object will be at focus. Therefore, image will be at infinity and is real, inverted and enlarged.
(iv) Object will come in between focus and optical centre.
Image will be virtual, erect and enlarged and formed on the same side of lens as the object.

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Science–X
SAMPLE QUESTION PAPER
(With Hints & Answers)

2

As per 2020 CBSE Sample Question Paper

Time Allowed : 3 hours *Maximum Marks : 80*

General Instructions:
Same as in Sample Question Paper 1.

SECTION A

Q.1. Will current flow more easily through a thick wire or thin wire of the same material when connected to the same source? Why? **1**

[Ans. Current will flow more easily through a thick wire as a thick wire has lesser resistance than a thin wire.

Q.2. Name *two* main abiotic factors, which affect the human environment. **1**

[Ans. These factors are Temperature and Humidity.

Q.3. Answer question numbers 3(*a*)–3(*d*) on the basis of your understanding of the given paragraphs and the related studied concepts.

Para 1: Pure gold, known as 24 carat gold, is very soft. It is, therefore, not suitable for making jewellery. It is alloyed with either silver or copper to make it hard. Generally, in India 22 carat gold is used for making ornaments. It means that 22 parts of pure gold is alloyed with 2 parts of either copper or silver.

Para 2: The iron pillar near the Qutub Minar in Delhi was made around 400 BC by the iron workers of India. They had developed a process which prevented wrought iron from rusting. This is likely because of formation of a thin film of magnetic oxide (Fe_3O_4) on the surface, as a result of finishing treatment given to the pillar, painting it with a mixture of different salts, then heating and quenching. The iron pillar is 8 m high and weighs 6 tonnes (6000 kg).

3(*a*) State *two* ways to prevent the rusting of iron. **1**

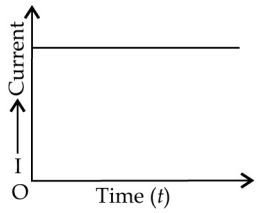
3(*b*) What are alloys? **1**

3(*c*) Which metals do not corrode easily? Name any *two*. **1**

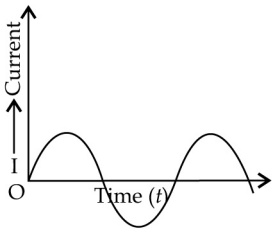
3(*d*) Name the alloy in which one of the metals is mercury. **1**

[Ans. 3(a) (i) Galvanization; (ii) Paint
3(b) Homogeneous mixture of two or more metals or metal and non-metals.
3(c) Gold, Platinum (noble metals)
3(d) Amalgam

Q.4. Question number 4(*a*)–4(*d*) are based on the following current-time graphs. Study the graphs and answer the questions that follow.



(*i*)



(*ii*)

4(*a*) Name the type of current in the above two cases. **1**

4(*b*) Name *one* source each for these currents. **1**

4(*c*) What is the frequency of current in India? **1**

4(*d*) List *two* differences between the current in the above two graphs. **1**

[Ans. **4(*a*) (*i*) *Direct current; (ii) Alternating current***

4(*b*) *(i) Battery; (ii) Household electricity*

4(*c*) *50 Hz*

4(*d*) *Difference between DC and AC:*

(*i*) If the current flows in one direction only, it is called direct current (DC). If the current reverses its direction after equal intervals of time, it is called alternating current (AC).

(*ii*) Sources of direct current are dry cell, dry cell battery, car battery. Some sources of alternating current are power house generators, car alternators and bicycle dynamos.

Q.5. Mention any *one* reason due to which most of the thermal plants are set up near the coal or oil fields. **1**

[Ans. It is easier to transmit electricity over longer distances than to carry coal or oil from their fields over the same distance, so most of the thermal plants are established near coal or oil fields.

Or

Q.5. Write the relation between electric power of a device with potential difference across its two ends and its resistance.

[Ans. This relation is: $P = \frac{V^2}{R}$ ***where, P = Power, V = Potential difference and 'R' is resistance of the device.***

Q.6. Tomato is a natural source of which acid? **1**

(*a*) Acetic Acid **(*b*)** Citric acid

(*c*) Tartaric Acid **(*d*)** Oxalic acid ***[Ans. (d) Oxalic acid***

Q.7. Which of the following oxides of Iron would be obtained on prolonged reaction of Iron with steam? **1**

(*a*) FeO **(*b*)** Fe_2O_3

(*c*) Fe_3O_4 **(*d*)** Fe_2O_4 ***[Ans. (c)*** Fe_3O_4 ***(Ferro-ferric oxide)***

Q.8. Which plant hormone promotes cell division? **1**

(*a*) Auxin **(*b*)** Gibberellin

(*c*) Cytokinin **(*d*)** Abscisic Acid ***[Ans. (c) Cytokinin***

Q.9. The theory of evolution of species by natural selection was given by— **1**

(*a*) Mendel **(*b*)** Darwin

(*c*) Lamarck **(*d*)** Weismann

[Ans. (b) Darwin

Q.10. The defect of vision in which the image of nearby objects is formed behind the retina is: **1**

(*a*) Myopia **(*b*)** Hypermetropia

(*c*) Presbyopia **(*d*)** Short-sightedness

[Ans. (b) Hypermetropia

Q.11. If the potential difference across the ends of a conductor is doubled, the current flowing through it gets— **1**

(*a*) doubled (*b*) halved
(*c*) four times (*d*) No change *[Ans. (a) doubled*

Q.12. Ocean thermal energy is produced due to— **1**

(*a*) Pressure difference at different levels in the ocean.
(*b*) Temperature difference at different levels in the ocean.
(*c*) Energy stored by the waves in the ocean.
(*d*) Tides rising out of the ocean.

[Ans. (b) Temperature difference at different levels in the ocean.

Or

Q.12. Flow of energy in an ecosystem is—

(*a*) Unidirectional (*b*) Bidirectional
(*c*) Multidirectional (*d*) No specific direction *[Ans. (a) Unidirectional*

For question numbers 13 and 14, two statements are given—one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below:

(*i*) Both A and R are true and R is correct explanation of the assertion.
(*ii*) Both A and R are true but R is not the correct explanation of the assertion.
(*iii*) A is true but R is false.
(*iv*) A is false but R is true.

Q.13. ***Assertion:*** The power of a convex lens is positive and that of concave lens is negative. **1**
Reason: The degree of convergence or divergence of light rays achieved by a lens is its power. *[Ans. (ii)*

Q.14. ***Assertion:*** Elements of group 1 and 2 are metals. **1**
Reason: Elements of group 1 and 2 can lose electrons easily to form cations (*i.e.,* positive ions). *[Ans. (i)*

SECTION B

Q.15. (*a*) State Joule's Law of heating. **3**
(*b*) Name *two* devices where heating effect of current is utilised.
(*c*) What is the name given to the commercial unit of electrical energy? Express this unit in Joules.

[Ans. **(*b*)** *In the electric fuse which is a safety device and in the heating elements of electric devices like toaster, electric iron, microwave, etc.*
(*c*) *It is Kilowatthour (kwh);* $1\ kwh = 3.6 \times 10^6\ Joules$

Q.16. (*a*) Justify the following statements:
(*i*) Tungsten is used exclusively for filament by electric lamps.
(*ii*) We do not use series arrangement for domestic circuits.
(*b*) A wire of resistance 8 Ω is bent in the form of a closed circle. What is the effective resistance between two points A and B at the ends of any diameter of the circle? **3**

[Ans. **(*a*)** **(*i*)** *Tungsten has higher resistance and higher melting point.*
(*ii*) *So that each appliance gets the required current according to its resistance value, when these are connected in parallel combination.*
(*b*) *In this arrangement two semicircles of wire will have 4 Ω resistance each and will get connected in parallel.*

$$So,\ \frac{1}{R} = \frac{1}{4} + \frac{1}{4} \Rightarrow \frac{1}{R} = \frac{1+1}{4} = \frac{2}{4} = \frac{1}{2}$$

So, R(effective resistance) = 2 Ω

Q.17. What is the chemical formula of GYPSUM? Write chemical equation for its preparation. **3**

[Ans. Chemical formula of Gypsum is $CaSO_4 . 2H_2O$.

Equation for its preparation:

$$CaSO_4 . \frac{1}{2} H_2O \quad + \quad 1\frac{1}{2} H_2O \quad \rightarrow \quad CaSO_4 . 2H_2O.$$

(Plaster of Paris)

Q.18. Answer the following with respect to excretory system in humans: **3**

(*a*) What is the location of kidneys in the body?

(*b*) What is glomerulus? What role does it play during urine formation?

(*c*) What is the rate of fluid filtered out in Bowman's capsule?

Q.19. A coil of insulated copper wire is connected to a galvanometer. What will happen if a bar magnet is: **3**

(*a*) pushed into the coil. (*b*) withdrawn from the coil. (*c*) held stationary near the coil.

Draw diagram to represent each situation and explain the deflection in the galvanometer.

[Ans. (a) Pointer of galvanometer is deflected to the right side.

***(b)** Pointer of galvanometer is deflected to the left side.*

***(c)** No deflection of the pointer of galvanometer; showing current is not induced in this case.*

Or

Q.19. Draw a circuit diagram of an electric circuit containing a cell, a key, an ammeter, a resistor of 4 Ω in series with a combination of two resistors (8 Ω each) in parallel and a voltmeter across parallel combination. Each of them dissipate maximum energy and can withstand a maximum power of 16 W without melting. Find the maximum current that can flow through the three resistors. **3**

[Ans. $\frac{1}{R'} = \frac{1}{8} + \frac{1}{8} \Rightarrow \frac{1}{R'} = \frac{1}{4} \Rightarrow R' = 4\ \Omega$; Total $R = 4 + 4 = 8\ \Omega$; $I^2 = \frac{P}{R} \Rightarrow \frac{16}{8} \Rightarrow 2\ A \quad \therefore I = \sqrt{2} A$

Q.20. When electrolysis of water is done then: **3**

(*a*) Identify the gases evolved at cathode and anode. (Write equations also)

(*b*) Why is amount of gas collected in one of the test tubes double the amount in the other? Name this gas.

[Ans. ***(a)** At cathode H_2 gas; At anode O_2 gas.*

***(b)** The volume of H_2 gas at cathode is double than volume of O_2 gas collected at anode as in H_2O molecule, two parts of hydrogen combine with one part of oxygen (by their volume).*

Q.21. Ethanol is used on a large scale at commercial level. This is a very useful chemical. It is commonly called alcohol and is the active ingredient of alcoholic drinks. But consumption of alcohol also causes drunkenness and this practice is socially condemned.

Read the text given and answer the following questions:

(*a*) Give *two* physical properties of ethanol.

(*b*) As a responsible student of the class, what steps would you take to discourage the use of alcohol? **3**

[Ans. (a) (i) It is a colourless liquid at room temperature.

(ii) It has very low melting point (156 K) and low boiling point (351 K or 78° C).

***(b)** By sensitizing people about harmful effects of liquor consumption, by making posters, banners and writing articles on this issue.*

Q.22. (*a*) What is fertilization? **3**

(*b*) Distinguish between internal and external fertilization.

(*c*) What is the site of fertilization in human beings?

[Ans. (a) Union of male gamete with female gamete.

***(b)** Internal: fertilization takes place inside the female body.*

External: fertilization takes place outside the female body.

***(c)** Fallopian tube*

Or

Q.22. Describe surgical method of birth control. **3**

[Ans. Tubectomy in females; Vasectomy in males

Q.23. An object is kept in front of a concave mirror of focal length 15 cm. The image formed is three times the size of the object. Calculate *two* possible distances of the object from the mirror. **3**

[Ans. Concave mirror, $f = -15$ cm, $h_2 = 3\,h_1$, $u = ?$

(a) If the image is virtual then $h_2 = +3h_1$ ($\because$ virtual image is erect)

As we know, $\frac{h_2}{h_1} = \frac{-v}{u} \Rightarrow \frac{3h_1}{h_1} = \frac{-v}{u} \Rightarrow v = -3u$ *...(By using $h_2 = 3h_1$)*

Here, $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$ $\frac{-1}{3u}$ $\frac{1}{u}$ $\frac{-1}{15} \Rightarrow \frac{-1+3}{3u} = \frac{-1}{15} \Rightarrow \frac{2}{3u} = \frac{-1}{15} \Rightarrow \frac{3u}{2} = \frac{-15}{1}$

$u = \frac{-15 \times 2}{3} = -10$ *cm (Object is placed at 10 cm in front of the mirror)*

(b) If the image is real then $h_2 = -3h_1$ (real image is inverted)

$\frac{h_2}{h_1} = \frac{-v}{u} \Rightarrow \frac{-3h_1}{h_1} = \frac{-v}{u} \Rightarrow v = 3u$; *Now,* $\frac{1}{v} + \frac{1}{u} = \frac{1}{f} \Rightarrow \frac{1}{3u} + \frac{1}{u} = \frac{1}{-15} \Rightarrow \frac{1+3}{3u} = \frac{-1}{15}$

$\frac{4}{3u} = \frac{-1}{15} \Rightarrow u = -15 \times \frac{4}{3} \Rightarrow u = -20$ *cm (Object is placed at 20 cm in front of the mirror)*

Q.24. (*a*) State Snell's law of refraction of light.

(*b*) A transparent medium A floats on another transparent medium B. When a ray of light travels obliquely from A into B, the refracted ray bends away from the normal. Which of these two media A or B are optically denser and why? **3**

[Hint. (a) Statement of Snell's law; (b) Medium 'A' is optically denser.

Or

Q.24. Explain Joule's law of heating. Explain the role of earth's wire in the domestic circuits.

SECTION C

Q.25. (*a*) With the help of a labelled diagram explain how will you refine impure copper. **5**

(*b*) What is anode mud?

(*c*) What are the important uses of copper metal?

Or

Q.25. (*a*) What is reactivity series? How does the reactivity series of metals help in predicting the relative activities of various metals?

(*b*) Suggest different chemical processes used for obtaining a metal from its oxides for metals in the middle of the reactivity series and metals towards the top of the reactivity series. Support your answer with *one* example each.

Q.26. (*a*) What is an electric motor? Write the principle on which its working is based. **5**

(*b*) What is short circuit? Give its possible cause.

[Ans. (a) Electric Motor is a device which transforms the electric energy into kinetic energy for doing work.

The working of electric motor is based on 'Fleming's left hand rule'.

This rule states that, "If we hold the forefinger, middle finger and thumb of our left hand, mutually perpendicular to each other, and if forefinger gives the direction of magnetic field, the middle finger gives the direction of current, then the thumb gives the direction of motion of the conductor due to force acting on it.

(b) Short circuit: When live wire comes in contact with the neutral wire in between the circuit, then a lot of current flows abruptly through the circuit. Such a phenomenon is known as short circuit.

When many electric appliances are connected in one circuit (through the same switch), then short circuit can occur.

Q.27. (*a*) Mention *three* advantages and *three* disadvantages of producing hydroelectricity by building dams on rivers. **5**

(*b*) Give reason for the following:

(*i*) A solar cooker box is covered with a glass plate.

(*ii*) A solar cooker box is painted black from inside.

[Ans. (b) (i) Glass plate increases the inside temperature of the solar cooker due to the green house effect of infrared rays of sun.

(ii) Black colour absorbs the heat energy quickly.

Or

Q.27. "Improvements in our lifestyle have resulted in greater amounts of waste generation." Give *two* examples to support the given statement. Suggest *one* change that we can incorporate in our lifestyle in order to reduce non-biodegradable waste.

Q.28. (*a*) Write the name and symbol of group 17 element belonging to second period.

(*b*) Write electronic configuration of K(19). To which group of periodic table does it belong?

(*c*) What are substitution reactions? Give *one* example.

(*d*) What happens when acetic acid reacts with sodium bicarbonate? Give the chemical reaction involved.

(*e*) Why does carbon form covalent bonds? **5**

[Ans. (a) F ***(b) K(19) = 2, 8, 8, 1 $\Rightarrow$ 1^{st} group***

(c) $CH_4 + Cl_2 \xrightarrow{\text{Sunlight}} CH_3Cl + HCl$

(d) $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2$

(e) Carbon contains four electrons in its outermost shell.

Or

Q.28. (*a*) Write the name and molecular formula of an organic compound having its name suffixed with –ol and having two carbon atoms in the molecule. With the help of a balanced chemical equation indicate what happens when it is heated with excess of conc. H_2SO_4?

(*b*) What is addition reaction? Give *an* example.

[Ans. (a) Ethanol; $H-\underset{H}{\overset{H}{C}}-\underset{OH}{\overset{H}{C}}-H \Rightarrow C_2H_6O$; $CH_3 - CH_2OH \xrightarrow[(-H_2O)]{\Delta, H_2SO} \underset{\text{Ethene}}{CH_2 = CH_2}$

(b) Example: $\underset{\text{Ethene}}{C_2H_4} + H_2 \xrightarrow{Ni} \underset{\text{Ethane}}{C_2H_6}$

Q.29. (*a*) Give *three* important features of fossils which have helped in the study of evolution.

(*b*) How does taxonomy support evolution? **5**

Q.30. What do you mean by linear magnification produced by mirrors? The power of a lens is +2.5 D. What kind of lens is it and what is its focal length? **5**

Draw a ray diagram of an image when an object is placed on the principal axis of a convex lens between focus and optical centre.

[Ans. (i) Convex lens (converging lens)

$P = +2.5\ D, f = \frac{1}{P} = \frac{1}{2.5\ m} = \frac{100 \times 10}{2.5} = +40\ cm$

(ii) When an object is placed between focus and optical centre of the convex lens then the image will be virtual, magnified, erect.

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