CBSE 2020 Science — Set 2

English Medium

Time Allowed: 3 Hours | Maximum Marks: 80

General Instructions:

1. This question paper contains 39 questions. All questions are compulsory.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 6 questions carrying 2 marks each.
4. Section C has 7 questions carrying 3 marks each.
5. Section D has 3 questions carrying 5 marks each.
6. Section E has 3 case-study based questions carrying 4 marks each.
7. Draw neat diagrams wherever required.

Section A

Multiple Choice Questions (1 mark each)

Q.1 [1 mark]

Covalent compounds have low melting and boiling point. Why?

Q.2 [1 mark]

How many metals are present in second period of periodic table?

Q.3(a) [1 mark]

Read the passage on geothermal energy and answer:

Geothermal energy is the energy produced by the heat of molten rocks formed in the deeper hot regions of the earth's crust. This energy is harnessed to generate electricity. When water is made to flow deep underground in the rocks it returns as steam (or hot water, which is later converted to steam) to drive a turbine on an electric power generator.

In India, exploration and study of geothermal fields started in 1970. The Geological Survey of India has identified 350 geothermal energy locations in the country. The most promising of these is in Puga valley of Ladakh. The estimated geothermal potential for energy in India is about 10000 MW. There are seven geothermal provinces in India namely the Himalayas, Sohna, West coast, Cambay, Son-Narmada-Tapi, Godavari and Mahanadi. Most power stations in India produce Alternating Current (A.C.).

(a) What are geothermal energy hot-spots?

Q.3(b) [1 mark]

(Based on geothermal energy passage) (b) Name two countries, other than India, where power plants based on geothermal energy are operational.

Q.3(c) [1 mark]

(Based on geothermal energy passage) (c) Name the phenomenon that explains the working of an electric generator.

Q.3(d) [1 mark]

(Based on geothermal energy passage) (d) State an important advantage of using AC over DC.

Q.4(a) [1 mark]

Read the passage on thyroid gland and answer:

Thyroid gland is a bilobed structure situated in our neck region. It secretes a hormone called thyroxine. Iodine is necessary for the thyroid gland to make thyroxine. Thyroxine regulates carbohydrate, protein and fat metabolism in the body. It promotes growth of body tissues also. When there is an excess of thyroxine in the body, a person suffers from hyperthyroidism and if this gland is underactive it results in hypothyroidism. Hyperthyroidism is diagnosed by blood tests that measure the levels of thyroxine and Thyroid Stimulating Hormone (TSH). Hypothyroidism is caused due to the deficiency of iodine in our diet resulting in a disease called goitre. Iodised salt can be included in our diet to control it.

(a) Where is thyroid gland situated in our body?

Q.4(b) [1 mark]

(Based on thyroid gland passage) (b) State the function of thyroxine in human body.

Q.4(c) [1 mark]

(Based on thyroid gland passage) (c) What is hyperthyroidism?

Q.4(d) [1 mark]

(Based on thyroid gland passage) (d) How can we control hypothyroidism?

Q.5 [1 mark]

Consider the following reasons for the reddish appearance of the sun at the sunrise or the sunset:

A. Light from the sun near the horizon passes through thinner layers of air.

B. Light from the sun covers larger distance of the earth's atmosphere before reaching our eyes.

C. Near the horizon, most of the blue light and shorter wavelengths are scattered away by the particles.

D. Light from the sun near the horizon passes through thicker layers of air.

The correct reasons are:

(a) A and C only
(b) B, C and D
(c) A and B only
(d) C and D only

OR

Q.5 [1 mark]

A person suffering from cataract has:

(a) elongated eyeball
(b) excessive curvature of eye lens
(c) weakened ciliary muscles
(d) opaque eye lens

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Q.6 [1 mark]

The maximum resistance which can be made using four resistors each of 2 Ω is:

(a) 2 Ω
(b) 4 Ω
(c) 8 Ω
(d) 16 Ω

Q.7 [1 mark]

A student plots V-I graphs for three samples of nichrome wire with resistances R_1, R_2 and R_3. Choose from the following the statement that holds true for this graph.
(In the graph, R_3 has the steepest slope, R_1 is in the middle, and R_2 has the least slope, with I on the y-axis and V on the x-axis)

(a) $R_1 = R_2 = R_3$
(b) $R_1 > R_2 > R_3$
(c) $R_3 > R_2 > R_1$
(d) $R_2 > R_1 > R_3$

Q.8 [1 mark]

Which of the following are water intensive crops?

(a) Wheat and rice
(b) Wheat and sugarcane
(c) Sugarcane and rice
(d) Wheat and gram

OR

Q.8 [1 mark]

The most poisonous product formed by incomplete combustion of fossil fuels is:

(a) Carbon dioxide

(b) Nitrogen dioxide
(c) Carbon monoxide
(d) Sulphur dioxide

Q.9 [1 mark]

Bandharas and Tals are age old water harvesting concepts / structures found in:

(a) Bihar
(b) Maharashtra
(c) Tamil Nadu
(d) Rajasthan

Q.10 [1 mark]

Identify 'x', 'y' and 'z' in the following reaction:

$2\ KClO_3(x) \xrightarrow{(y)} 2\ KCl(x) + O_2(z)$

(a) x = gas; y = reaction condition; z = gas
(b) x = solid; y = liquid; z = gas
(c) x = number of moles of $KClO_3$; y = reaction condition; z = no. of molecules of oxygen
(d) x = physical state of $KClO_3$ and KCl; y = reaction condition; z = physical state of O_2

Q.11 [1 mark]

A visually challenged student, has to perform a lab test to detect the presence of acid in a given solution. The acid-base indicator preferred by him will be:

(a) Blue litmus
(b) Clove oil
(c) Red cabbage extract
(d) Hibiscus extract

Q.12 [1 mark]

On the basis of electronic configuration of $^{9}_{5}X$, the group number and period of the element 'X' is:

(a) Group 15 period 2
(b) Group 13 period 2
(c) Group 9 period 5
(d) Group 13 period 5

OR

Q.12 [1 mark]

An element 'X' with atomic number 11 forms a compound with element 'Y' with atomic number 8. The formula of the compound formed is:

(a) XY
(b) X_2Y
(c) XY_2
(d) X_2Y_3

Q.13 [1 mark]

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

Assertion (A): Ethanoic acid is also known as glacial acetic acid.
Reason (R): The melting point of pure ethanoic acid is 290 K and hence it often freezes during winters in cold climates.

Q.14 [1 mark]

Assertion (A): The metals and alloys are good conductors of electricity.

Reason (R): Bronze is an alloy of copper and tin and it is not a good conductor of electricity.

Q.15 [1 mark]

A compound 'A' is used in the manufacture of cement. When dissolved in water, it evolves a large amount of heat and forms compound 'B'.

(i) Identify A and B.

(ii) Write the chemical equation for the reaction of A with water.

(iii) List two types of reactions in which this reaction may be classified.

Q.16 [1 mark]

Give reasons for the following:

(i) Only one half of a water molecule is shown in the formula of Plaster of Paris.

(ii) Sodium hydrogen carbonate is used as an antacid.

(iii) On strong heating, blue coloured copper sulphate crystals turn white.

OR

Q.16 [1 mark]

OR:

(i) Draw a labelled diagram to show the preparation of hydrogen chloride gas in laboratory.

(ii) Test the gas evolved first with dry and then with wet litmus paper. In which of the two cases, does the litmus paper show change in colour?

(iii) State the reason of exhibiting acidic character by dry HCl gas / HCl solution.

Q.17 [1 mark]

From the elements $^{39}_{19}A$, $^{28}_{14}B$, $^{16}_{8}C$ and $^{40}_{18}D$ identify:

(a) the most electro positive element.
(b) a noble gas.
(c) a metalloid.
(d) an element which will gain 2 electrons to attain nearest noble gas configuration.
(e) formula of compound formed between A and C.
(f) elements belonging to same period.

Q.18 [1 mark]

(a) Construct a terrestrial food chain comprising four trophic levels.
(b) What will happen if we kill all the organisms in one trophic level?
(c) Calculate the amount of energy available to the organisms at the fourth trophic level if the energy available to the organisms at the second trophic level is 2000 J.

OR

Q.18 [1 mark]

OR:
(a) Complete the following table:

	Oxygen	Ozone
Formula	(i) _____	(ii) _____
Benefits to biotic component	(iii) _____	(iv) _____

(b) How is ozone formed at the higher levels of atmosphere?

Q.19 [1 mark]

Complete the following flow chart as per the given instructions:
Gastric Glands Present in the wall of Stomach → Secretions → (a), (b), (c)
Each secretion has a Function: (d), (e), (f) respectively.
Identify the three secretions (a, b, c) and their functions (d, e, f).

Q.20 [1 mark]

Explain giving an example how the following provide evidences in favour of evolution in organisms.

(i) Homologous organs

(ii) Fossils

Section B

Very Short Answer Questions (2 marks each)

Q.21 [2 marks]

What are chromosomes? Explain how in sexually reproducing organisms the number of chromosomes in the progeny is maintained.

Q.22 [2 marks]

What happens after refraction, when:

(i) a ray of light parallel to the principal axis passes through a concave lens?

(ii) a ray of light falls on a convex lens while passing through its principal focus?

(iii) a ray of light passes through the optical centre of a convex lens?

Q.23 [2 marks]

Two coils of insulated copper wire are wound over a non-conducting cylinder as shown. Coil 1 has comparative large number of turns. State your observations, when:

(i) Key K is closed.

(ii) Key K is opened.

Give reason for each of your observations.

Q.24 [2 marks]

(a) List two causes of hypermetropia.

(b) Draw ray diagrams showing (i) a hypermetropic eye and (ii) its correction

using suitable optical device.

OR

Q.24 [2 marks]

OR:

(a) State the relation between colour of scattered light and size of the scattering particle.

(b) The apparent position of an object, when seen through the hot air, fluctuations or wavers. State the basic cause of this observation.

(c) Complete the path of white light when it passes through two identical prisms placed as shown (Prism 2 inverted on top of Prism 1, with white light entering Prism 1).

Q.25 [2 marks]

(a) What are conventional sources of energy? Name any two conventional sources of energy and state their one limitation each.

(b) Burning of fossil fuels is a major cause of global warming. Give reason and suggest what steps you would take to reduce global warming. List any four steps.

OR

What is meant by 'bio-gas'? Name the main components of bio-gas. Explain the working of a bio-gas plant with the help of a labelled diagram. State two advantages of using bio-gas over fossil fuels.

OR

Q.25 [2 marks]

(a) How is the method of extraction of metals high up in the reactivity series different from that for metals in the middle? Why cannot the same process be applied for them? Name and explain the process of extraction of sodium.

(b) Draw a labelled diagram of electrolytic refining of copper.

OR

What happens when (Write the balanced equation involved) —
(i) Copper is heated in air?
(ii) Aluminium oxide is reacted with hydrochloric acid?
(iii) Potassium reacts with water?
(iv) Cinnabar is heated in air?
(v) Aluminium oxide reacts with sodium hydroxide?

Q.26 [2 marks]

(a) What is a homologous series? Explain with an example.
(b) Define the following terms giving one example of each.
(i) Esterification
(ii) Addition reaction

Section C

Short Answer Questions (3 marks each)

Q.27 [3 marks]

(a) Describe the structure and function of the basic filtering unit of kidney.
(b) List two factors on which reabsorption of water from urine depends.

Q.28 [3 marks]

(a) List three different categories of contraception methods.
(b) Why has Government of India prohibited prenatal sex determination by law? State its benefits in the long run.
(c) Unsafe sexual act can lead to various infections. Name two bacterial and two viral infections caused due to unsafe sex.

OR

Q.28 [3 marks]

OR:

(a) In the female reproductive system of human beings, state the functions of:

(i) ovary

(ii) oviduct

(b) Mention the changes which the uterus undergoes, when:

(i) it has to receive a zygote.

(ii) no fertilization takes place.

(c) State the function of placenta.

Q.29 [3 marks]

(a) Find the ratio of resistances of two copper rods X and Y of lengths 30 cm and 10 cm respectively and having radii 2 cm and 1 cm respectively.

(b) A current of 500 mA flows in a series circuit containing an electric lamp and a conductor of 10 Ω when connected to a 6 V battery. Find the resistance of the electric lamp.

Q.30 [3 marks]

(a) A concave mirror of focal length 10 cm can produce a magnified real as well as virtual image of an object placed in front of it. Draw ray diagrams to justify this statement.

(b) An object is placed perpendicular to the principal axis of a convex mirror of focal length 10 cm. The distance of the object from the pole of the mirror is 10 cm. Find the position of the image formed.

OR

Q.30 [3 marks]

OR:

(a) Define the following terms:

(i) Power of a lens

(ii) Principal focus of a concave mirror

(b) Write the relationship among the object distance (u), image distance (v) and the focal length (f) of a:

(i) Spherical lens

(ii) Spherical mirror

(c) An object is placed at a distance of 10 cm from the optical centre of a convex lens of focal length 15 cm. Draw a labelled ray diagram to show the formation of image in this case.