CBSE (AI) EXAMINATION PAPER—2019
SCIENCE

Time : 3 hrs. *Max. Marks : 100*

GENERAL INSTRUCTIONS:

(*i*) *This question paper comprises five section A, B, C, D and E. You are to attempt* ***All*** *the questions.*

(*ii*) ***All*** *questions are compulsory*

(*iii*) *Internal choice is given in section B, C, D and E.*

(*iv*) *Questions number* ***1*** *and* ***2*** *in Section A are one-marks questions. They are to be answered in one word or in one sentence.*

(*v*) *Questions number* ***3*** *to* ***5*** *in Section B are two-marks questions. These are to be answered in about 30 words each.*

(*vi*) *Questions number* ***6*** *to* ***15*** *in Section C are three-marks questions. These are to be answered in about 50 words each.*

(*vii*) *Questions number* ***16*** *to* ***21*** *in Section D are five-marks questions. These are to be answered in about 70 words each.*

(*viii*) *Questions number* ***22*** *to* ***27*** *in Section E are base on practical skills. Each question is a two-marks question. These are to be answered in brief.*

Set–I

SECTION A

1. Define resistance. Give its S.I. unit **(1)**

2. Name any two elements that are used in fabricating solar cells. **(1)**

SECTION B

3. State laws of reflection of light. **(2)**

OR

Define absolute refractive index and express it mathematically. **(2)**

4. Draw magnetic field lines around a bar magnet. **(2)**

5. What happens when 5% alkaline potassium permanganate solution is added drop by drop to warm propyl alcohol (propanol) taken in a test tube? Explain with the help of a chemical equation. **(2)**

SECTION C

6. What are fossils? Describe briefly two methods of determining the age of fossils. **(3)**

7. What is the cause of dispersion of white light through a glass prism? Draw a ray diagram to show the path of light when two identical glass prisms are arranged together in inverted position with respect to each other and a narrow beam of white light is allowed to fall obliquely on one of the faces of the prisms. **(3)**

OR

What is the scattering of light? Use this phenomenon to explain why (*i*) the Sun appears reddish at the sun-rise and (*ii*) the clear sky appears blue. **(3)**

8. (*a*) 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*) $2KClO_3(s) \xrightarrow{\Delta} 2KCl(aq) + 3O_2(g)$

(*iv*) $Zn + CuSO_4 \longrightarrow ZnSO_4 + Cu$

(*b*) Translate the following statement into a balanced chemical equation:

"Barium chloride reacts with aluminium sulphate to give aluminium chloride and barium sulphate". **(3)**

OR

When potassium iodide solution is added to a solution of lead (II) nitrate in a test tube, a precipitate is formed.

(*a*) What is the colour of this precipitate? Name the compound precipitated.

(*b*) Write the balanced chemical equation for this reaction.

(*c*) List two types of reactions in which this reaction can be placed. **(3)**

9. (*a*) Natural water bodies are not regularly cleaned whereas an aquarium needs regular cleaning. Why?

(*b*) What are decomposers? What will be the consequence if the decomposers are completely eradicated from an ecosystem? Give justification in support of your answer. **(3)**

OR

How is ozone formed in the upper atmosphere? State its importance. What is responsible for its depletion? Write one harmful effect of ozone depletion. **(3)**

10. A white powder is used by doctors to support fractured bones. **(3)**

(*a*) Write the name and chemical formula of the powder.

(*b*) How is this powder prepared?

(*c*) When this white powder is mixed with water, a hard solid mass is obtained. Write a balanced chemical equation for the change.

(*d*) Give one more use of this white powder.

11. A coil of insulated copper wire is connected to a galvanometer. What would happen if a strong bar magnet is

(*a*) pushed into the coil?

(*b*) withdrawn from inside the coil?

(*c*) held stationary inside the coil?

Give justification for each observation. **(3)**

12. (*a*) Write the function of the following in the human alimentary canal:

(*i*) Saliva (*ii*) HCl in stomach

(*iii*) Bile juice (*iv*) Villi **(3)**

(*b*) Write one function each of the following enzymes:

(*i*) Pepsin (*ii*) Lipase **(3)**

13. (*a*) Plants do not have any nervous system but yet, if we touch a sensitive plant, some observable changes take place in its leaves. Explain how could this plant respond to the external stimuli and how it is communicated.

(*b*) Name the hormone that needs to be administered to

(*i*) increase the height of a dwarf plant.

(*ii*) cause rapid cell division in fruits and seeds. **(3)**

14. What is biodiversity? Why are forests considered as "biodiversity hot spots"? List two factors responsible for causing deforestation. **(3)**

15. How is the method of extraction of metals high up in the reactivity series different from that for metals in the middle? Why can the same process not be applied for them? Name the process used for the extraction of these metals. **(3)**

SECTION D

16. (*a*) Distinguish between esterification and saponification reactions with the help of chemical equations for each.

(*b*) With a labelled diagram describe in brief an activity to show the formation of an ester. **(3)**

OR

What is the difference between soaps and detergents? State in brief the cleansing action of soaps in removing an oily spot from a fabric. Why are soaps not very effective when a fabric is washed in hard water? How is this problem resolved?

17. A person is unable to see objects distinctly placed within 50 cm from his eyes.

(*a*) Name the defect of vision the person is suffering from and list its two possible causes.

(*b*) Draw a ray diagram to show the defect in the above case.

(*c*) Mention the type of lens used by him for the correction of the defect and calculate its power. Assume that the near point for the normal eye is 25 cm.

(*d*) Draw a labelled diagram for the correction of the defect in the above case.

18. (*a*) How is the valency of an element determined if its electronic configuration is known? Determine the valency of an element of atomic no. 9.

(*b*) Given below are some elements of the Modern Periodic Table. Atomic numbers of the elements are given in parentheses:

A(4), B(9), C(14), D(19), E(20)

(*i*) With the help of the electronic configuration, find out which one of the above elements will have one electron in its outermost shell.

(*ii*) Which two elements belong to the same group? Give reasons for your answer.

(*iii*) Which one of the above elements belonging to the fourth period has bigger atomic radius and why? **(5)**

19. (*a*) Define electric power. An electrical device of resistance R is connected across a source of voltage V and draws a current I. Derive an expression for power in terms of current and resistance.

(*b*) Two electric bulbs rated 100 W; 220 V and 60 W; 220 V are connected in parallel to an electric mains of 220 V. Find the current drawn by the bulbs from the mains. **(5)**

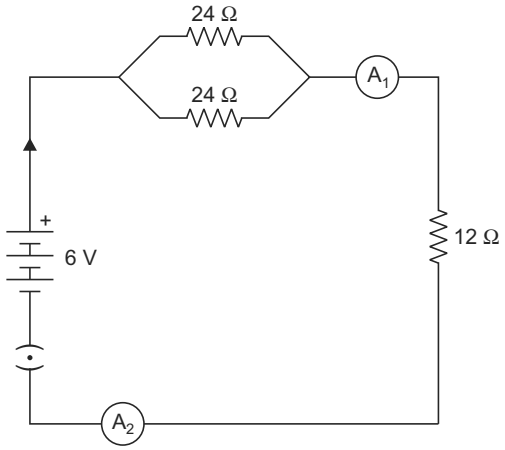
OR

(*a*) How will you infer with the help of an experiment that the same current flows through every part of the circuit containing three resistors R_1, R_2 and R_3 in series connected to a battery of V volts?

(*b*) Study the following circuit and find out:

(*i*) Current in 12 Ω resistor.

(*ii*) Difference in the readings of A_1 and A_2, if any **(5)**



20. (*a*) Define vegetative propagation. List its two methods.

(*b*) Why is this mode practised for growing some types of plants?

(*c*) Explain this process of budding in Hydra with the help of labelled diagrams. **(5)**

OR

What is contraception? List its four different methods. State four reasons for adopting contraceptive methods. **(5)**

21. (*a*) List two visible traits of graden pea that Mendel considered in his experiments. How do Mendel's experiments show that traits may be dominant or recessive?

(*b*) With the help of a flow diagram, how would you establish that in human beings the sex of a newborn is purely a matter of chance and none of the parents may be considered responsible for a particular sex of a newborn child? **(5)**

SECTION E

22. A student mixes sodium sulphate powder in barium chloride power. What change would the student observe on mixing the two powders? Justify your answer and explain how he can obtain the desired change. **(2)**

OR

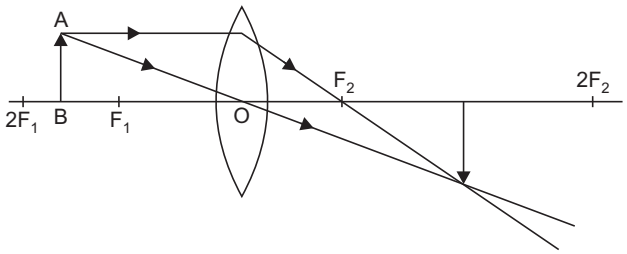
(*a*) Arrange the following metals in the increasing order of their reactivities:

Copper, Zinc, Aluminium and Iron

(*b*) List two observations you would record in your notebook 30 minutes after adding iron filings to copper sulphate solution. **(2)**

23. A solution 'X' gives orange colour when a drop of it falls on pH paper, while another solution 'Y' give bluish colour when a drop of it falls on pH paper. What is the nature of both the solutions? Determine the pH of solutions 'X' and 'Y'. **(2)**

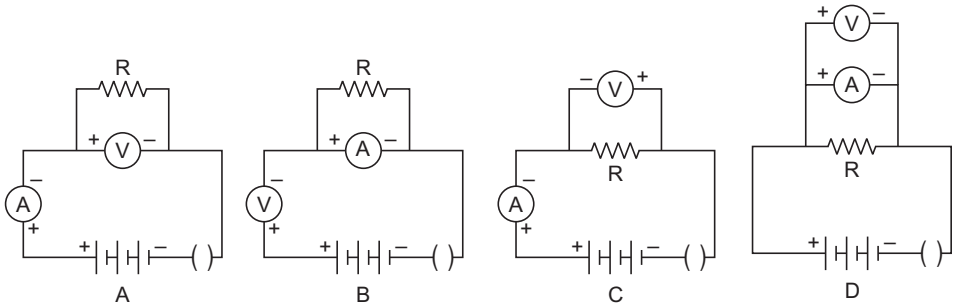
24. Study the following ray diagram and list two mistakes committed by the student while tracing it. Rectify these mistakes by drawing the correct ray diagram to show the real position and size of the image corresponding to the position of the object AB. **(2)**



OR

A student has to trace the path of a ray of light through a glass prism. List four precautions he should observe for better results. **(2)**

25. Which one of the following is the correct set-up for studying the dependence of the current on the potential difference across a resistor and why? **(2)**



26. Write four sequential steps of the procedure of the experiment "Preparing a temporary mount of a leaf peel to show stomata". **(2)**

OR

In the experimental set-up show that "the germinating seeds give out carbon dioxide", answer the following questions:

(*i*) Why do we keep the conical flask airtight?

(*ii*) Name the substance kept in the small test tube inside the conical flask. Write its role.

(*iii*) Why does water rise in the delivery tube? **(2)**

27. List two observations on the basis of which it may be concluded that the given slide shows binary fission in Amoeba. **(2)**

Set–II

SECTION A

Questions which are different from Set I.

1. Define current. Give its S.I. unit **(1)**

2. Name the component of sunlight which facilitates drying of wheat after harvesting. **(1)**

SECTION B

3. State laws of refraction of light. **(2)**

OR

List four characteristics of the image formed by a concave mirror of focal length 40 cm when the object is placed in front of it at a distance of 20 cm from its pole. **(2)**

4. Draw magnetic field lines in and around a current carrying straight solenoid. **(2)**

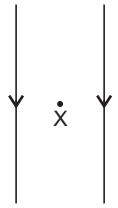
5. Write the name and molecular formula of a carbon compound having its name suffixed with "-ol" and having two carbon atoms in its molecule. With the help of chemical equation indicate what happens when this compound is heated with excess conc. H_2SO_4. **(2)**

SECTION C

6. Define the term evolution. "Evolution cannot be equated with progress." Give examples to justify this statement. **(3)**

9. Salt 'P', commonly used in bakery products, on heating gets converted into another salt 'Q' which itself is used for the removal of hardness of water and a gas 'R' is evolved. The gas 'R' when passed through freshly prepared lime water turns milky. Identify 'P', 'Q' and 'R', giving chemical equation for the justification of your answer. **(3)**

12. The following diagram shows two parallel straight conductors carrying same current. Copy the diagram and draw the pattern of the magnetic field lines around them showing their directions. What is the magnitude of magnetic field at a point 'X' which is equidistant from the conductors? Give justification for your answer. **(3)**



15. What is exploitation of resources with short terms aims? List its four advantages. **(3)**

SECTION D

16. (*a*) If we cross pure-bred tall (dominant) pea plants with pure-bred dwarf (recessive) pea plants we get pea plants of F_1 generation. If we now self-cross the pea plants of F_1 generation, then we obtain pea plants of F_2 generation.

(*i*) What do the plants of F_1 generation look like?

(*ii*) What is the ratio of tall plants to dwarf plants in F_2 generation?

(*iii*) State the type of plants not found in F_1 generation but appeared in F_2 generation, mentioning the reason for the same.

(*b*) What are homologous structures? Give an example. Is it necessary that homologous structures always have common ancestors? **(5)**

18. (*a*) List two limitations of Newlands' Law of Octaves.

(*b*) Write the electronic configuration of two elements A and B whose atomic numbers are 20 and 17 respectively. Write the molecular formula of the compound formed when element A reacts with element B. State whether this compound is acidic, basic or neutral. Give reason to justify your answer.

Set–III

SECTION A

Questions which are different from Set I and Set II.

1. Mention the condition under which a current can flow in a conductor. **(1)**

2. List two merits of solar cells. **(1)**

SECTION B

3. List four characteristics of the image formed by a convex lens of focal length 20 cm when the object is placed in front of it at a distance of 10 cm from its optical centre. **(2)**

OR

Define refractive index of a transparent medium. The speed of light in a medium of absolute refractive index 1.5 is 2×10^8 ms^{-1}. What is the speed of light in vacuum? **(2)**

4. It is established that an electric current through a conductor produces a magnetic field around it. Is there a similar magnetic field produced around a thin beam of moving (*i*) alpha particles, (*ii*) neutrons? Justify your answer in each case. **(2)**

5. "Conversion of ethanol to ethanoic acid is an oxidation reaction." Justify this statement giving the relevant equation for the chemical reaction involved. **(2)**

SECTION C

6. List three roles of forests in conserving the environment. How do the forests get depleted? State two consequences of deforestation on the environment. **(3)**

8. State right-hand thumb rule to determine the direction of magnetic field around a current carrying conductor. Apply this rule to find the direction of magnetic field inside and outside a circular loop of wire lying in the plane of a table and current is flowing through its clockwise. **(3)**

10. A metal X, which is used in thermit process, when heated with oxygen gives an oxide Y which is amphoteric in nature. Identify X and Y. Write balanced chemical equations of the reactions of oxide Y with hydrochloric acid and sodium hydroxide. **(3)**

13. Draw a diagram of human excretory system and label the following:

(*i*) Urinary bladder (*ii*) Left kidney (*iii*) Left ureter **(3)**

17. (*a*) List in tabular form two differences between acquired traits and inherited traits.

(*b*) Give an example of body characteristics used to determine how close two species are in terms of evolution and explain it. **(3)**

19. (*a*) List two criteria Mendeleev used in his Periodic Table to classify the elements. State Mendeleev's Periodic Law and explain why no fixed position was assigned to hydrogen in Mendeleev's Periodic Table.

(*b*) How and why does the atomic size of elements vary as we move (*i*) from left to right in a period, and (*ii*) down a group in the Modern Periodic Table? **(5)**