B1023

MAHARAJA AGGARSAIN ADARSH PUBLIC SCHOOL
FIRST PREBOARD EXAMINATION(2023-24)
CLASS-X
SCIENCE (086)

Time: 3 Hours **Max. Marks: 80**

General Instructions:

1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. Section A consists of 20 Objective Type questions carrying 1 mark each.
4. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.
5. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words.
6. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
7. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

SECTION-A

Select and write one most appropriate option out of the four options given for each of the questions (1 – 20)

Q1. Mild non-corrosive basic salt is:

a) $Ca(OH)_2$ b) NaCl c) NaOH d) $NaHCO_3$

Q2. During purification of a metal by electrolysis, what happens at the negative electrode?

(a) Metal ions lose electrons to become neutral atoms.
(b) Neutral metal atoms gain electrons to become ions.
(c) Neutral metal atoms lose electrons to become ions.
(d) Metal ions gain electrons to become neutral metal atoms

Q3. Which of the following is the correct representation of the electron dot structure of nitrogen?

a) :N⋮⋮N: b) :N⋮⋮N: c) :N⋮⋮N: d) :N⋮⋮N:

Q4. When Ag is exposed to air it gets a black coating of:

(a) $AgNO_3$ (b) Ag_2S (c) Ag_2O (d) Ag_2CO_3

Q5.Which of the following oxide(s) of iron would be obtained on prolonged reaction of iron with steam?

(a) FeO (b) Fe_2O_3 (c) Fe_3O_4 (d) Fe_2O_3 and Fe_2O_4

Q6.An element with atomic number_____ will form a basic oxide.

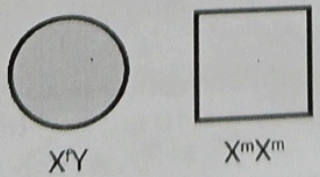
a) 7 (2,5) b) 17 (2,8,7) c) 14 (2,8,4) d) 11 (2,8,1)

Q7. An element 'M' has 50% of the electrons filled in the 3rd shell as in the 2nd shell. The atomic number of 'M'

a) 10 b) 12 c) 14 d) 18

Q8. Two individuals are as shown using geometric shapes.

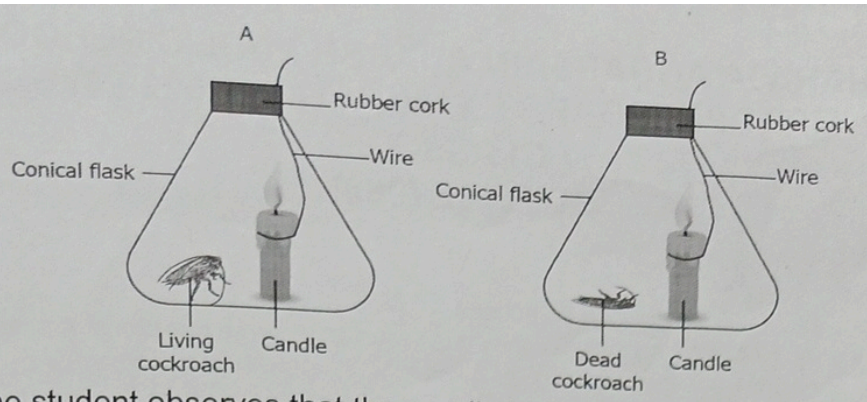
Their sex chromosomes are respectively denoted by X^fX^m, and Y. What are the possible combinations of sex chromosomes for their male and female offspring respectively?



X^fY X^mX^m

(a) X^fX^m and X^mX^m (b) X^mY and X^mX^m (c) X^fY and X^mY (d) X^mY and X^mX^f

Q9. A student setup an experiment to study the human respiratory system. In the experiment, the student places candle and a living cockroach in the flask A, while a candle and a dead cockroach in flask B. The burning of candle needs oxygen.



After 10 minutes, the student observes that the candle in flask A extinguish faster while candle in flask B

keeps burning for a longer time. What can be evaluated from this experiment?

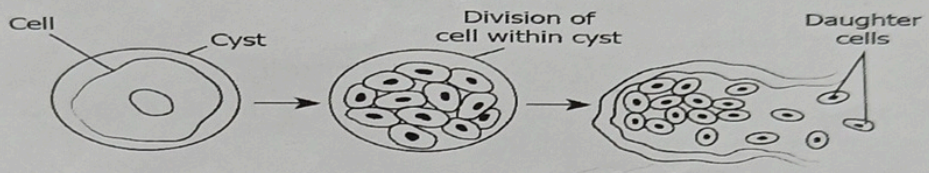
(a) candle produces high amount of carbon dioxide

(b) living beings consume oxygen during respiration

(c) burning of candle decreases the life span of cockroach

(d) water vapours produced by living beings prevents burning of candle

Q10. The image shows the process of division in plasmodium.



What can be concluded about the division in plasmodium?

(a) The cyst divides repeatedly to form many daughter cells.

(b) The cell divides multiple times giving rise to many daughter cells.

(c) The nucleus divides repeatedly inside the cell to form new daughter cells.

(d) The cyst enlarges in size and then bursts producing many new daughter cells.

Q11.Disease cause by Thyroxine deficiency is:

a) Osteoporosis b) Anaemia c)Scurvy d) Goitre

Q12. Hema bought some unripe tomatoes and left half of them in a brown paper bag and other half in an open tray. After 2 days she noticed that the tomatoes in the paper bag had ripened but the ones in the open tray had not. Which hormone facilitated the ripening of tomatoes?

a) Auxins c) CytokininEthylene d) Gibberellins

Q13 When light enters the atmosphere it strikes on extremely fine particles, which deflect the rays of light in all possible directions, This is due to :

a) reflection of light b) atmospheric refraction c) scattering of light d) dispersion of light

Q14 For a convex mirror ,the image distance (v) = 5 cm, focal length (f) = 10 cm and height of the image

(h) = 7.5 cm. The correct representation according to sign conventions is:

a) v = -5 cm, f = - 10 cm and hi = - 7.5 b) v = -5 cm, f = + 10 cm and hi = - 7.5 cm

c) v = +5 cm, f = - 10 cm and hi = + 7.5 cm d) v = +5 cm, f = + 10 cm and hi = + 7.5 cm

Q15.Name the common nutrient that is absorbed in the small intestine and reabsorbed by kidney tubule.

Q16.Find out the energy at second trophic level in food chain if fourth trophic level has 10 Joules of energy.

Q. no 17 to 20 are Assertion - Reasoning based questions. These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true and R is not the correct explanation of A

(C) A is true but R is false (D) A is False but R is true

Q17. **Assertion (A)**: Pea plant is considered ideal for hybridisation experiments.
Reason (R): Pea is self as well as cross pollinating plant with short life cycle and bears visible contrasting traits

Q18 **Assertion:** All consumers depend upon producers either directly or indirectly for their nutrition.
Reason :Consumers are heterotrophs.

Q19 **Assertion:**.The magnitude of the magnetic field at a point on the axis of a current-carrying solenoid is inversely proportional to the current flowing through the solenoid.
Reason :The magnitude of the magnetic field at a point on the axis of a current-carrying solenoid is directly proportional to the number of turns per unit length of a solenoid.

Q20.**Assertion:**Copper ions migrate from the anode to the cathode during electro refining of copper.
Reason : In the electro refining process, metal ions accept electrons at the anode and are deposited as pure metal.

SECTION-B

Q. no. 21 to 26 are very short answer questions

Q21.Salts are formed by the neutralisation reaction between an acid and a base. Complete the following table by filling the missing data:

Sl.no	Name of the salt	Formula	Parent Base	Parent Acid
1	Ammonium Chloride	NH_4Cl	----------	----------
2	Copper Sulphate	----------	$Cu(OH)_2$	----------

Q22. "Transpiration is necessary evil." Justify the statement by highlighting the harmful and useful aspects of this process.

Q23.Given below is the food chain:

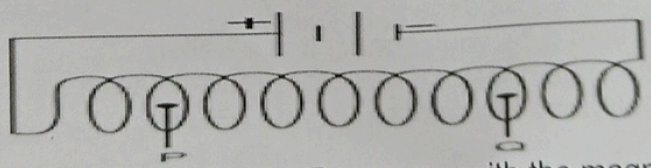
Grass → Grasshopper →Frog → Snake → Peacock

What will happen to the members of different trophic levels in the food chain if all the frogs of that area are removed?

Q24(a)A person needs a lens of power -5.5 dioptres for correcting his distant vision. For correcting his near vision he needs a lens of power +1.5 dioptre. What is the focal length of the lens required for correcting his (i) distant vision, and (ii) near vision?

(b)A student has difficulty reading the blackboard while sitting in the last row. What could be the defect the child is suffering from? How can it be corrected?

Q25 A helical coil whose length is greater than its diameter is connected to a battery as shown below.



(a) How does the magnetic field at point P compare with the magnetic field at point Q? Justify your answer.

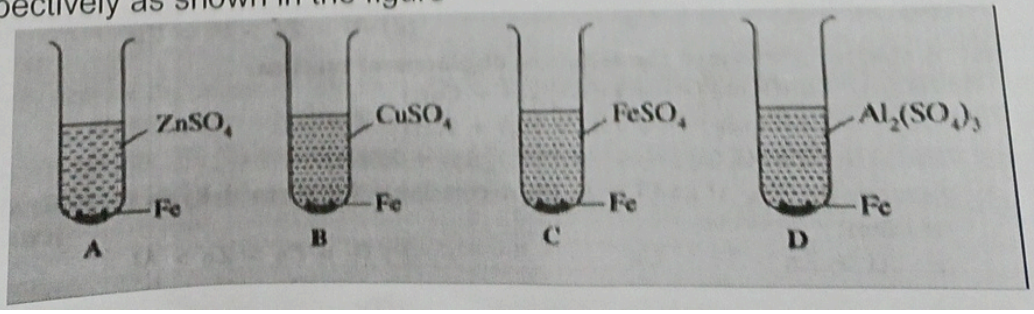
(b) State one way in which the strength of the magnetic field inside a current carrying helical coil can be changed?

Q26. List two differences between pollen grains and ovule.

SECTION-C

Q.no. 27 to 33 are short answer questions.

Q27. Sakshi was comparing the reactivity of different metals for her science project. She added iron filings in four test tubes A,B,C,D containing aqueous solutions of ZnSO4, CuSO4, FeSO4 and Al2(SO4)3 respectively as shown in the figure –



a. In which of the test tubes she will observe the reaction to be most vigorous
b. What is the reason for her observation?
c. Write a well-balanced equation of the reaction in (b)

Q28.The electronic configuration of some elements is given in the table below.

Element	Electronic configuration	Element	Electronic configuration
Q	2, 8, 8, 1	P	2, 8, 8
S	2, 5	R	2, 6
U	2, 8, 7	T	2, 8, 2

(a) Identify any two pairs of elements that will react to form compounds by a transfer of electrons.
(b) Write the molecular formula of the compounds formed by the pairs of elements identified in (a).

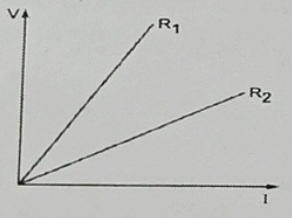
OR

a) "Carbon cannot be used to reduce metal oxides of sodium, magnesium, calcium, and aluminium to respective metals". Comment.
b) These metals are obtained by electrolytic reduction of their molten chloride. Write the reactions that occur at the anode and cathode during the electrolytic reduction of molten sodium chloride.
c) Illustrate with the help of a chemical equation reduction of manganese dioxide with Aluminium powder.

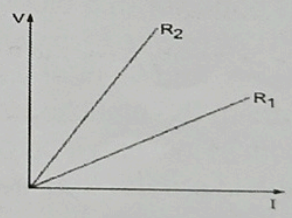
Q29 Write the characteristics of progeny in the following crosses:
a)RrYy x RrYy b) rryy x rryy c) RRYY X rryy

Q30. A variegated leaves with green and yellow patches are used for an experiment to prove that chlorophyll is required for photosynthesis. Before the experiment, the green portion-(A) and yellow portion-(B), are observed. What will be the colour of (A) just before and after the starch test? Justify your answer giving reason. Write the equation of photosynthesis and markas well as validate from which by-product molecule is obtained.

Q31(a)Two students perform experiments on two given resistors R_1 and R_2 and plot the following V-I graphs. If $R_1 > R_2$, which of the two diagrams correctly represents the givensituation. Justify your answer.

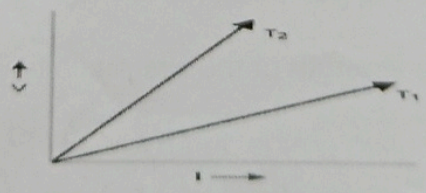


Student-1



Student-2

(b) Why is an ammeter likely to bum out if you connect it in parallel?
(c)The voltage-current (V-I) graph of a metallic conductor at two different temperatures T1 and T2 is shown in the figure. Which temperature higher? Justify your answer.



Q32Absolute refractive indices of two media P and Q are 1.33 (n_P) and 2.52 (n_Q) respectively. The speed of light in medium P is 2×10^8 m/s.
(a) What would be the speed of light in medium Q (V_Q)?
(b) If the angle of incidence for a ray of light travelling from medium P to Q is 0°, then what will be the path of light in the medium Q? Draw ray diagram of given situation.
(c)Explain why the refractive index of any material with respect to air is always greater 1.

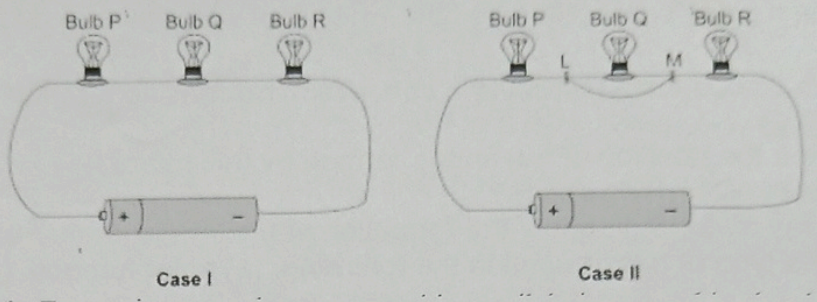
Q33 Radha conducted an experiment to study the energy efficiency of different bulbs. She connected a bulb A having a resistance of 100 ohms to a 240 V power supply in a laboratory.

(a) How much energy will be consumed by the bulb, if it is kept ON for 4 hours each day for a week? Express your answer in kJ.

(b) Kaveri connects another similar bulb B in series with bulb A and connects the combination to a 240 V supply. Will there be any change in the brightness with which bulb A glows now? Explain mathematically.

OR

(a) Geeta connects three bulbs P, Q and R is series with a battery in two different ways using identical conducting wires as shown below.



She notices that in case I all three bulbs glow but in case II only the bulbs P and R continue to glow. What could be the reason for the bulb Q to not glow in case II? Explain.

(b) Two resistances when connected in parallel give a combined resistance of 10/3 ohms. When the same two resistors are connected in series, the combined resistance becomes 15 ohms. Calculate the individual resistance of each resister.

SECTION-D

Q.no. 34 to 36 are Long answer questions

Q34. An organic compound 'P' is a constituent of wines. 'P' on reacting with acidified $K_2Cr_2O_7$ forms another compound 'Q'. When a piece of sodium is added to 'Q', a gas 'R' evolves which burns with a pop sound when a burning matchstick is brought near it.

a) Give the chemical name of compound P.

b) Mention another use of the compound 'P' apart from the use mentioned in the question.

c) Illustrate with the help of chemical equation the conversion of 'P' into 'Q'.

d) Give a balanced equation to depict the reaction of Q with sodium.

e) What happens when 'P' is heated with conc. H_2SO_4 at 443 K, write its chemical equation.

OR

An organic compound 'X' is a liquid at room temperature. It is also a very good solvent and has the molecular formula C_2H_6O. Upon oxidation 'X' gives 'Y'. 'Y' releases a gas 'W' with brisk effervescence on reacting with $NaHCO_3$. X reacts with Y in the presence of conc.$H_2SO_4$to give another compound 'Z' which has a pleasant smell. Z.

a) Give the chemical name and chemical formula of Y. b) How will you test for the gas 'W'?

c) Depict the formation Y and Z using chemical equations. d) Name the reaction of formation of 'Z'.

e) Give any one use of 'Z'?

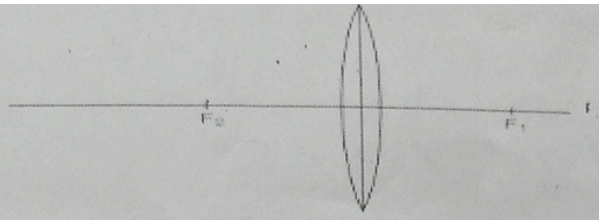
Q35.The image shows the structure of a flower:

a) Identify 'P' and state how it changes post fertilization.

b) What are such type of flowers known as? Give two examples of such flowers.

c) Explain how the uterus and placenta provide necessary conditions for proper growth and development of the embryo after implantation

Q36The above image shows a thin lens of focal length 5m.



(i) What is the kind of lens shown in the above figure?
(ii) If a real inverted image is to be formed by this lens at a distance of 7m from the optical centre, then show with calculation where should the object be placed?
(iii) Draw a neatly labelled diagram of the image formation mentioned in (ii) .
(iv) Why does a glass prism disperses the white light whereas a glass slab does not?

OR

A 10 cm long pencil is placed 5 cm in front of a concave mirror having a radius of curvature of 40 cm.

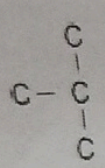
(i) Determine the position of the image formed by this mirror.
(ii) What is the size of the image?
(iii) Draw a ray diagram to show the formation of the image as mentioned in the part (i).
(iv) Name the type of mirror used in the following: (a) solar furnace (b)search mirrors.

SECTION-E

Q.no. 37 to 39 are case - based/data -based questions with 2 to 3 short sub - parts

Q37. Given below is a four carbon skeleton of a hydrocarbon compound.

(a)



Fill in the hydrogen atoms/bonds to form:
(i) a saturated hydrocarbon
(ii) an unsaturated hydrocarbon

(iii)If the four-carbon skeleton is of a straight chained alkene, draw the structures of all the possible compounds.

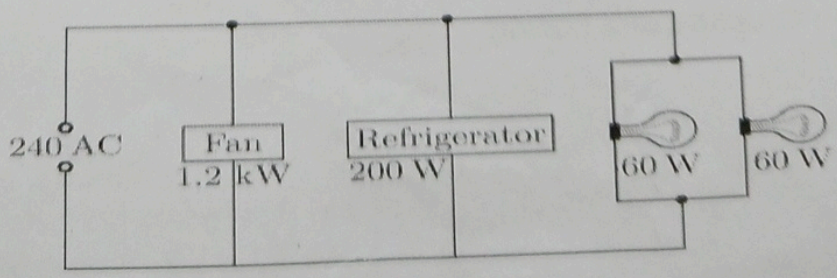
OR

If the four-carbon skeleton is of a straight chained alkyne:
(i) How many carbon atoms may NOT be bonded to any hydrogen atoms?
(ii) How many hydrogen atoms will there be in the compound?

Q38In human, the allele for brown eyes (B) is dominant over that for blue eyes (b). A brown eyed woman marries a blue-eyed man, and they have four children. Three of the children are brown eyed and one of them is blue eyed.

(i) What is the genotype of blue-eyed offspring?
(ii) What is the woman's genotype?
(iii) The ovum produced by the mother carries what gene regarding eye colour?
(iv) Find out the ratio of F1 progeny, if both the parents are heterozygous for the above trait.

Q39



(i) Give two advantages of connecting appliances in parallel.
(ii) Find out the value of electric current in the refrigerators.
(iii) Calculate energy used by the fan in 2 hours.
(iv) Calculate resistance of the filament of one lamp