Sample Question Paper - 9
Science (086)
Class- X, Session: 2021-22
TERM II

Time Allowed: 2 hours **Maximum Marks: 40**

General Instructions:

1. All questions are compulsory.
2. The question paper has three sections and 15 questions. All questions are compulsory.
3. Section–A has 7 questions of 2 marks each; Section–B has 6 questions of 3 marks each; and Section–C has 2 case-based questions of 4 marks each.
4. Internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

Section A

1. The table shows the electronic structures of four elements. **[2]**

Element	Electronic Structure
P	2, 6
Q	2, 8, 1
E	2, 8, 7
S	2, 8, 8

   i. Identify which element(s) will form covalent bonds with carbon
   ii. **Carbon reacts with an element in the above table to form several compounds.** Give suitable reason.

2. a. List any three observations which posed a challenge to Mendeleev's Periodic Law. **[2]**
   b. How does the metallic character of elements vary on moving from
      i. left to right in a period,
      ii. from top to bottom in a group of the Modern Periodic Table? Give reason for your answer.

3. i. Which glands provide fluid to the semen? **[2]**
   ii. State two advantages of semen in relation to sperms.

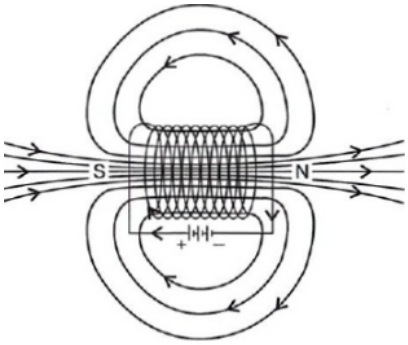
4. The sperms are tiny bodies that consist of mainly genetic material and a long tail **[2]**
   i. Where are the sperms produced and What is the role of the long tail?
   ii. How are the sperms delivered from the site of their production?

5. i) Name any two organs that are homologous to human hand **[2]**
   ii) To which category of organs would you place wings of birds and insects.

OR

A study found that children with light-coloured eyes are likely to have parents with light-coloured eyes. On this basis, can we say anything about whether the light eye colour trait is dominant or recessive? Why or why not?

6. We know a current-carrying conductor placed in a magnetic field experiences a force due to which the conductor moves. How do we think the conductor displaces if- **[2]**



i. current in a conductor is increased.
ii. a stronger horse shoe is inserted.

7. What are decomposers? What will be the consequence of their absence in an ecosystem? **[2]**

Section B

8. Four elements P, Q, R and S have atomic numbers 12, 13, 14 and 15 respectively. Answer the following questions giving reasons. **[3]**
   i. What is the valency of Q?
   ii. Classify these elements as metals and non-metals.
   iii. Which of these elements will form the most basic oxide?

9. i. Where do compounds of carbon find applications? **[3]**
   ii. Draw the electron dot structures of CO_2 and state the type of bonding.

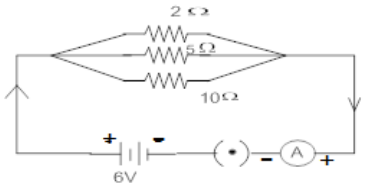
   OR

   i. Why -CHO group cannot be present in the middle of the carbon atom chain?
   ii. Two carbon atoms cannot be linked to each other by more than three covalent bonds. Why?

10. In human beings blue eye colour is recessive to brown eye colour. A brown eyed man has a blue eyed mother. **[3]**
    a. What is the genotype of man and his mother?
    b. What are possible genotypes of his father?
    c. If man marries a blue eyed woman, what are the possible genotypes of their offsprings?

11. The length of different metallic wires, but of the same area of cross-section and made of the same material are given below: **[3]**
    Wire - Length
    A - 1 m
    B - 1.5 m
    C - 2.0 m
    (i) Out of these three wires, which wire has higher resistance?
    (ii) Which wire has higher electrical resistivity? Justify your answer.

12. In the circuit diagram given here,calculate- **[3]**



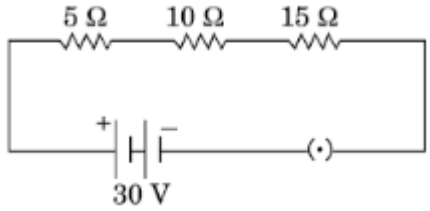
i. The total effective resistance and the total current

ii. The current through each resistor

OR

a. How will you infer with the help of an experiment that the same current flows through every part of a circuit containing three resistors in series connected to a battery?

b. Consider the given circuit and find the current flowing in the circuit and potential difference across the 15 Ω resistors when the circuit is closed.



13. Rama went to picnic with her friends to a nearby park. All of them took with themselves, eatables packed either in aluminium foils, polythenes, paper bags, plastic bottles, cans or in paper cups. They enjoyed their picnic and when teacher called them to be ready for going back, her friends picked up their bags and left all the waste material scattered here and there. But, Rama called them and asked each one to pick up the left over things and put them in the bins marked 'biodegradable' and 'non-biodegradable'. She also explained the advantages of doing so. Her friends accepted her advice and cleaned the park. **[3]**

Read the given passage and answer the following questions:

1. Classify waste into biodegradable and non-biodegradable categories.
2. What arguments Rama must have given to convence her friends to segregate waste into biodegradable and non-biodegradable bins?
3. Mention the value reflected by Rama's initiative.

Section C

14. **Read the Case study followed by 3 questions Part (i) and (ii) are compulsory. However, an internal choice has been provided in part (iii):** **[4]**

In fruitflies, the gene for wing shape has two alleles, an unusual allele for curled wings (c) and the normal allele for straight wings (C). The given phenotypes are observed for each genotype.

Genotype	Phenotype
CC	Normal, straight wings
Cc	Wings curled up at the ends, has difficulty flying
cc	Unable to hatch from egg

i. Which of the following crosses would produce live offspring from 50% of the eggs?

ii. Which of the following crosses would be able to produce offspring that would fly normally from 50% of the egg?

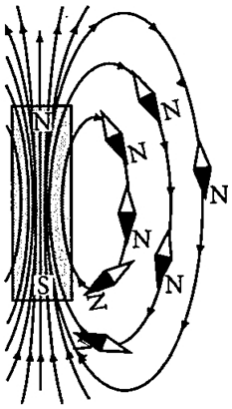
iii. Two curly winged flies are crossed, and they produce 150 eggs. What is the proportion of straight-winged flies expected among the live offspring?

OR

Normal straight-winged flies are self-crossed and they produce 120 eggs. What is the proportion of curly winged flies expected among the live offspring?

15. **Read the Case study followed by 3 questions Part (i) and (ii) are compulsory. However, an internal choice has been provided in part (iii):** **[4]**

A magnetic field is described by drawing the magnetic field lines. When a small north magnetic pole is placed in the magnetic field created by a magnet, it will experience a force. And if the north pole is free, it will move under the influence of the magnetic field. The path traced by a north magnetic pole free to move under the influence of a magnetic field is called a magnetic field line.



Since the direction of magnetic field line is the direction of force on a north pole, so the magnetic field lines always begin from the N-pole of a magnet and end on the S-pole of the magnet. Inside the magnet, however the direction of magnetic field lines is from the S-pole of the magnet to the N-pole of the magnet. Thus, the magnetic field lines are closed curves. When a small compass is moved along a magnetic field line, the compass needle always sets itself along the line tangential to it. So, a line drawn from the south pole of the compass needle to its north pole indicates the direction of the magnetic field at that point.

i. Do the magnetic field lines intersect? if not why?

ii. A strong bar magnet is placed vertically above a horizontal wooden board. What would be the magnetic lines of force?

iii. Where do we use Magnetic field lines?

OR

Draw the pattern of magnetic field lines for a bar magnet.

Solution

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Class 10 - Science

Section A

1. i. P and R
   ii. Carbon has a valency four or Tetravalency & Catenation
2. a. i. There is no fixed position of Hydrogen in the Mendeleev's periodic table.
      ii. There is no space for isotopes of elements.
      iii. Atomic mass does not increase in a regular manner.
   b. i. From left to right metallic character decreases. The reason is effective nuclear charge increases when we go left to right in period.
      ii. From top to bottom metallic character increases. The reason is size of atom increase therefore tendency to loose electron increases.
3. i. Seminal vesicles and prostate gland provide fluid to the semen.
   ii. Advantages of semen in relation to sperms are:
      a. It helps in sperm movement.
      b. It helps in nourishment and activation of sperms.
      c. Seman is alkali which helps to neutralize the acidic medium of urethra.
4. i. Sperms are produced in seminiferous tubules present in testers of male reproductive system by process known as spermatogenesis.
   ii. Sperm consists of 2 main parts head and tail, both of which are connected by neck. The long tail also known as flagellum of sperms helps in quick movement or motility of sperms through the female reproductive tract through wave like motion.
   iii. Sperms are delivered from the site of their production by vas deferens, also known as sperm duct to the urethra in order to allow the passage of semen outside the body. Movement of sperm is facilitated by prostatic fluid.
5. i) Fore limbs of frogs and wings of bird.
   ii) Analogous organs.

   OR

   No, since two copies of traits are inherited from parents, one from mother and the other form father. Unless we know the nature of these two variants of traits we cannot tell which is dominant and which is recessive. Recessive traits appear when both the parents contribute recessive allele. From this statement we can only presume are that both parents are contributing recessive allele.
6. As we know, force acting on current carrying conductor is given by the relation:
   F = BIL.
   Here B is strength of the magnetic field, I is the current flowing in conductor and L is the length of the conductor.
   i. When I increase, F also increases hence displacement of the rod increases.
   ii. When a stronger horse shoe magnet is inserted, magnetic field B increases. So force F increase. Hence displacement increases.
7. Decomposers break down the complex organic substances of garbage, dead animals and plants into simpler inorganic substances that enter into the soil and are used up again by the plants. In the absence of decomposers, recycling of material in the biosphere will not take place which will ultimately lead to end of all life forms.

Section B

8. i. Valency =+3
   ii. P, Q are metals R is metalloid and S is non-metal.
   iii. P is the most basic element
9. i. The carbon compounds are being increasingly used as a source of energy, as medicines, colours, textiles, plastics, food preservatives etc. Wood contains carbon in the form of cellulose. Plastic contains carbon in

long chains called polymers. Steel contains carbon sandwiched between Iron molecules. Graphite is pure carbon. Diamonds are pure carbon (in a different crystalline structure than graphite).

ii. :O:: C : : O: [CO_2]

The carbon and oxygen atoms are linked by two covalent bonds.

OR

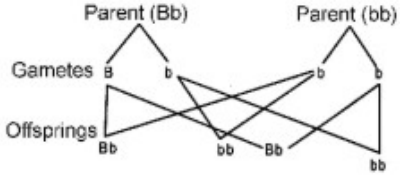
i. The -CHO group is a terminal functional group. Terminal groups are the one that only occur at end of a carbon chain. Three valencies of the C-atom in -CHO group are already satisfied, so this group cannot be present in the middle of the chain.

ii. Two carbon atoms cannot be linked to each other by more than three covalent bonds. If two carbon atoms were to be linked by four covalent bonds, their nuclei would come so close to each other that the force of repulsion between them will push the two atoms apart. As a result, a stable molecule would not be formed.

10. a. Genotype of man: Bb (Heterozygous)
Genotype of mother: bb
(homozygous recessive)

b. Possible genotype of his father: Bb (Heterozygous) or BB (homozygous dominant)

c. Cross between heterozygous man and homozygous recessive blue-eyed woman Bb x bb 50% Blue-eyed 50% Brown eyed.
The ratio obtained is 1 : 1 it is an example of test cross also.



11. (i) Since $R \propto l$ (length of the conductor)
Length of wire C is more than A and B. Therefore wire C has higher resistance.
(ii) Resistivity of all wires is same as material of all the wires is same.Electrical Resistivity of a wire depends on the nature of the material and not on the dimensions of a wire.

12. i. since resistances are in parallel
$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$
$\frac{1}{R} = \frac{1}{2} + \frac{1}{5} + \frac{1}{10} = \frac{8}{10}$
R = $\frac{10}{8}\Omega$

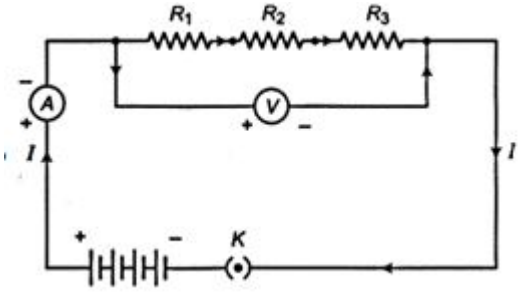
ii. Total current I = $\frac{V}{R} = \frac{6V}{10/8\Omega}$
= 4.8 A

iii. If I_1, I_2 and I_3 be the current through $2\Omega, 5\Omega and 10\Omega$ respectively.
Therefore, I_1 = $\frac{V}{R_1} = \frac{6}{2}$
= 3 A
I_2 = $\frac{V}{R_2} = \frac{6}{5}$
= 1.2 A
I_3 = $\frac{V}{R_3} = \frac{6}{10}$
= 0.6 A

OR

a. (i) Join the three resistors R_1, R_2 and R_3 of different values in series connected to a battery of V volt.
(ii) Connect them with battery, an ammeter (A) and plug key (K).
(iii) Plug the key and note the ammeter reading
(iv) Change the position of the ammeter to anywhere in between the resistors and note the ammeter reading each time.
(v) The ammeter reading will remain the same every time.

Therefore when resistors are connected in series same current flows through all resistors.



b. Given: $R_1 = 5\Omega$, $R_2 = 10\Omega$, $R_3 = 15\Omega$ and V = 30V

Total resistance of the circuit, $R = R_1 + R_2 + R_3$

$R = 5 + 10 + 15$

$R = 30\ \Omega$

Potential difference across the circuit, by ohm's law,

V = IR

or $I = \frac{V}{R} = \frac{30}{30} = 1A$

Potential difference across 15 ohm Resistor = 1 × 15 = 15 volt

13. i. Biodegradable substances are paper cups, napkins and paper bags.
Non-biodegradable substances are Aluminium foils, polythene, plastic bottles, cans.

ii. a. By segregating the waste into biodegradable and non-biodegradable, they can be treated easily and accordingly thus reducing environmental pollution.
b. Biodegradable waste can be converted into compost, biogas for agricultural purposes and other uses.
c. Non-biodegradable waste can be sent to factories for recycling and also be used as landfills.

iii. Rama is good observer, takes initiative and a sensible person, who applies and understands the value of nature.

Section C

14. i. Cc × cc

ii. CC × Cc

iii. 25% of the total number of eggs will not hatch (genotype cc). 50% of the offspring will be curlywinged (Cc) and 25% of the offspring are straightwinged (CC).

OR

0%

15. i. No two magnetic field lines are found to cross each other. If two field lines crossed each other, it would mean that at the point of intersection, the compass needle would point in two directions at the same time, which is not possible.

ii. The magnetic field and hence the magnetic line of force exist in all the planes all around the magnet.

iii. The relative strength of the magnetic field is shown by the degree of closeness of the field lines and the direction of the magnetic field is obtained by tangent to the field lines at the point of intersect.

OR