Science (086)
Class- X, Session: 2021-22
TERM II

Time: 2 Hours **Max. 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. (a) Why are most carbon compounds poor conductors of electricity?
(b) Write the name and structure of a saturated compound in which the carbon atoms are arranged in a ring. Give the number of single bonds present in this compound.

2. (a) State Modern Periodic Law.
(b) Elements A, B, C and D have atomic numbers 1, 8, 11 and 19 respectively. Choose the odd element and give reason for your answer.

3. (a) List two reproductive parts of a flower.
(b) How is a unisexual flower different from a bisexual flower? State in brief.

4. (a) Why is vegetative propagation practised for growing some types of plants ?
(b) Name the different parts of a flower that has germ cells.

5. Define reproduction. How does it help in providing stability to the population of species?

or

What are the advantages and disadvantages of asexual reproduction?

6. How will the magnetic field produced in a current carrying a circular coil change if we
(i) increase the value of current ?
(ii) increase the distance from the coil ?

or

(a) Swati draws magnetic field lines of field close to the axis of a current carrying circular loop. As she moves away from the centre of the circular loop she observes that the lines keep on diverging. How will you explain her observation ?
(b) Write two properties of magnetic field lines.

7. What is biodiversity ? What will happen if biodiversity of an area is not preserved ? Mention one effect of it.

or

What will happen if all the carnivore our are removed from the earth ?

Section B

8. Three elements A, B and C have atomic numbers 7, 8 and 9 respectively.

(a) What would be their positions in the Modern Periodic Table (Mention group and period both).

(b) Arrange A, B and C in the decreasing order of their size.

(c) Which one of the three elements is most reactive and why ?

9. Draw the structural formulae of all the possible isomers of the compound with the molecular formula C_3H_6O and also give their electron dot structures.

10. An angiosperm plant having red coloured flowers when crossed with the other having the same colour produced 40 progenies out of which 30 plants were with red coloured flowers 10 plants were with white colour flowers.

Finds out :

(a) What is the possible genotype of parent plants ?

(b) Which trait is dominated and recessive?

(c) What is this cross called as and what is its phenotyping ratio ?

11. State Joules law of heating. List two special characteristics of a heating element wire.

An electric iron consumes energy at the rate of 880 W when heating is at the maximum rate and 440 W when the heating is at the minimum rate. The applied voltage is 220 V. Calculate the current and resistance in each case.

12. An electric heater connected to a 220 V line has two resistance coils of 22 Ohms each.

Calculate the current if these coils are used

(a) Separately

(b) In series

(c) In parallel.

or

By applying right hand thumb rule, show that magnetic lines of force at the center of the circular current-carrying wire are straight lines in the inward direction when current is clockwise.

What happens when the current is reversed?

13. (a) What is full form of (i) UNEP (ii) CFCs.

(b) On what basis are organisms grouped as producers, consumers and decomposer ?

(c) Write two problems that would arise if there were no decomposer in are ecosystem.

Section C

This section has 02 case-based questions (14 and 15). Each case is followed by 03 sub-questions (a, b and c). Parts a and b are compulsory. However, an internal choice has been provided in part c.

14. Answer given questions on the basis of your understanding of the following paragraph and the related studies concepts.
The sexual act always has the potential to lead to pregnancy will make major demands on the body and the mind of the woman and if she is not ready for it, her health will be adversely affected. Therefore, many ways have been devised to avoid pregnancy.

(i) Name any two bacterial diseases that are caused due to unprotected sex.
(ii) In what a pill helps in preventing pregnancy?
(iii) What is vasectomy?

or

What are the common side-effects of using contraceptive pills?

15. Read the following case based passage and answer the questions given after passage.
Resistance of a conductor depends on the length, area of cross-section and nature of the material of the conductor. When a conductor is stretched (increased in its length), then its area of cross-section decreases accordingly but the volume (i.e. area x length) of the conductor remains same.
Resistivity of conductor,

$$\rho = \frac{RA}{l}$$

Where, A = area of cross-section of conductor

l = length of conductor

(i) What do you mean by resistivity ?
(ii) What is the SI unit of resistivity of conductor ?
(iii) Write one difference between resistance and resistivity.

or

The resistance (R) of a wire of length is halved and area of cross-section (A) is doubled, what is the new resistance (R') ?

SCIENCE - 086

Class 10 - Science

Time: 2 Hours **Max. 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

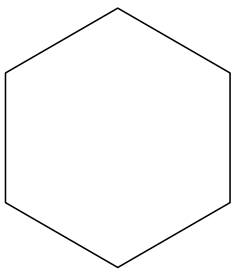
1. (a) Why are most carbon compounds poor conductors of electricity?

(b) Write the name and structure of a saturated compound in which the carbon atoms are arranged in a ring. Give the number of single bonds present in this compound.

Ans :

(a) Electricity is conducted by moving electrons. But carbon forms covalent bonds by sharing of electrons. It does not have free electrons.

(b) Cyclohexane is a saturated compound in which carbon atoms are arranged in a ring.



Cyclohexane

There are 6 single bonds present in this compound.

2. (a) State Modern Periodic Law.

(b) Elements A, B, C and D have atomic numbers 1, 8, 11 and 19 respectively. Choose the odd element and give reason for your answer.

Ans :

(a) Modern periodic law states that the physical and chemical properties of an element are the periodic function of the atomic number of that element.

(b) Odd element : B having atomic number 8.

Reason : B has six electrons in valence shell but A, C and D have one electron in their valence shells.

3. (a) List two reproductive parts of a flower.

(b) How is a unisexual flower different from a bisexual flower? State in brief.

Ans :

(a) The two reproductive parts of a flower :
(i) Stamen (male part).
(ii) Pistil/Carpel (female part).

(b) Unisexual flower has either stamen or carpel in it i.e., it has only male or female part, whereas bisexual flower has both stamen and carpel i.e., it has both male and female parts.

4. (a) Why is vegetative propagation practised for growing some types of plants ?

(b) Name the different parts of a flower that has germ cells.

Ans :

(a) Vegetative propagation is performed in the plants which do not have viable seeds or seeds which are dormant. Plants which have desirable superior traits are also vegetatively propagated because it results in producing identical plants. Plants which needs intensive care during the early stages of their development also are vegetatively propagated.

(b) Anther of stamen and ovule in ovary of pistil have germ cells.

5. Define reproduction. How does it help in providing stability to the population of species?

Ans :

The production of new organisms from the existing organisms of the same species is known as

reproduction.

The rate of birth and death in a given population determine its stability. The rate of birth should be approximately equal to the rate of death. So, by checking birth rate, which is increasing at an alarming rate, stability to population of species can be provided.

or

What are the advantages and disadvantages of asexual reproduction?

Ans :

The only advantage of asexual reproduction is that it is fast and simple and progeny is clone of parent.
Disadvantages of asexual reproduction :

(a) No variations are produced. Hence no evolutionary change takes place.
(b) In case of any defect in the parent organism, it is passed on to the offspring.

6. How will the magnetic field produced in a current carrying a circular coil change if we

(i) increase the value of current ?
(ii) increase the distance from the coil ?

Ans :

(i) Magnetic field will increase on increasing the value of the current.
(ii) Magnetic field will decrease on increasing the distance from the coil.

or

(a) Swati draws magnetic field lines of field close to the axis of a current carrying circular loop. As she moves away from the centre of the circular loop she observes that the lines keep on diverging. How will you explain her observation ?
(b) Write two properties of magnetic field lines.

Ans :

(a) Strength of the magnetic field decreases as distance increases. This is indicated by the decrease in degree of closeness of the lines of field.
(b) Properties :
  (i) The magnetic field lines originate from the north pole and merge at the south pole outside the magnet and south to north inside the magnet.
  (ii) No two magnetic field lines intersect each other.

7. What is biodiversity ? What will happen if biodiversity of an area is not preserved ? Mention one effect of it.

Ans :

Biodiversity is the existence of a wide variety of species of plants, animals and micro-organisms in a natural habitat within a particular environment or existence of genetic variation within a species. Biodiversity of an area is the number of species range of different life forms found there. Forests are biodiversity hotspots.
In ecosystem every living being is dependent on another living being. If biodiversity is not maintained, the various links of the food chains go missing and if one organism goes missing, this will effect all the living beings who are dependent on it and environmental balance will get disturbed.

or

What will happen if all the carnivore our are removed from the earth ?

Ans :

If all the carnivores are removed from the earth, the population of herbivores will increase. Large population of herbivores will overgraze. As a result, all plants will disappear from the earth surface and ultimately the earth may become a desert and eventually all herbivorous will die to lack of food. Biosphere will get disturbed which will lead to end of life on earth.

Section B

8. Three elements A, B and C have atomic numbers 7, 8 and 9 respectively.

(a) What would be their positions in the Modern Periodic Table (Mention group and period both).
(b) Arrange A, B and C in the decreasing order of their size.
(c) Which one of the three elements is most reactive and why ?

Ans :

(a) Position of A = 15th group, 2nd period.
Position of B = 16th group, 2nd period.
Position of C = 17th group, 2nd period.
(b) $A > B > C$
(c) C is the most reactive as it has smallest size. So, it can easily gain electrons.

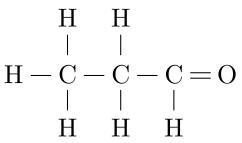
9. Draw the structural formulae of all the possible isomers of the compound with the molecular formula C_3H_6O and also give their electron dot structures.

Ans :

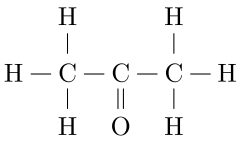
There are two possible isomers of C_3H_6O.
These are :

(i) Propanal C_2H_5CHO and

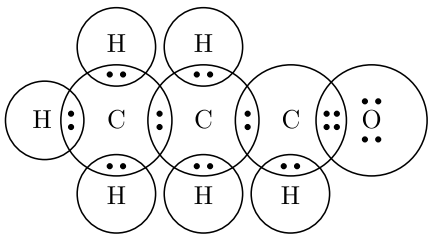
(ii) Propanone CH_3COCH_3



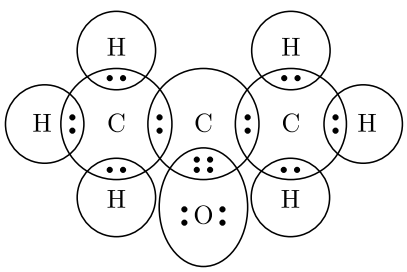
Structure of Propanal



Structure of Propanone



Electron dot structures of Propanal



Electron dot structures of Propanone

10. An angiosperm plant having red coloured flowers when crossed with the other having the same colour produced 40 progenies out of which 30 plants were with red coloured flowers 10 plants were with white colour flowers.
Finds out :

(a) What is the possible genotype of parent plants ?

(b) Which trait is dominated and recessive?

(c) What is this cross called as and what is its phenotyping ratio ?

Ans :

(a) Rr and Rr

(b) Red colour of flower is the dominant trait while white colour is the recessive trait.

(c) Monohybrid cross, phenotypic ratio of red and white flower is 3:1.

11. State Joules law of heating. List two special characteristics of a heating element wire.
An electric iron consumes energy at the rate of 880 W when heating is at the maximum rate and 440 W when the heating is at the minimum rate. The applied voltage is $220\ \text{V}$. Calculate the current and resistance in each case.

Ans :

Joules law : In accordance with Joules law of heating, if a current I flows through a resistor of resistance R for a time t, then the heat produced across the resistor is

$$H = I^2Rt \text{ Joules}$$

Two characteristics are :

(i) It must not melt at high temperature.

(ii) It has high resistivity.

Maximum power, $P_{max} = 880\ \text{W}$

Minimum power, $P_{min} = 440\ \text{W}$

Voltage, $V = 220\ \text{V}$

Current, $I = ?$

Resistance, $R = ?$

$$\text{Net Power} = P_{max} - P_{min} = VI$$
$$880 - 440 = 220 \times I$$
$$440 = 220 \times I$$
$$I = 2\text{A}$$
$$V = IR$$
$$220 = 2 \times R$$
$$R = 110\,\Omega$$

12. An electric heater connected to a 220 V line has two resistance coils of 22 Ohms each.
Calculate the current if these coils are used

(a) Separately

(b) In series

(c) In parallel.

Ans :

(a) Separately :

Current, $I = \frac{V}{R} = \frac{220}{22} = 10\ \text{A}$

(b) In series :

$$R = R_1 + R_2$$
$$= 22\,\Omega + 22\,\Omega = 44\,\Omega$$

$$I = \frac{V}{R} = \frac{220}{44} = 5\ \text{A}$$

(c) In parallel :

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$= \frac{1}{22}\,\Omega + \frac{1}{22}\,\Omega = \frac{1}{11}\,\Omega$$

$$R = 11\,\Omega$$

$$I = \frac{V}{R} = \frac{220}{11} = 20\ \text{A}$$

or

By applying right hand thumb rule, show that magnetic lines of force at the center of the circular current-carrying wire are straight lines in the inward direction when current is clockwise.
What happens when the current is reversed?

Ans :

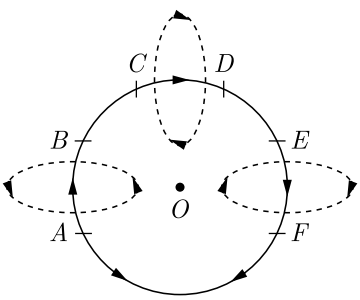


Fig : Magnetic lines of force at the centre of the circular current-carrying wire are straight lines in the inward direction when current is clockwise.

Consider a current-carrying straight wire. Magnetic field around it is in the form of concentric circles.
Now bend this wire in the form of a circular loop and allow current to pass through it.
Consider three small parts AB, CD and EF at the circular current-carrying wire. These small parts are nearly straight, hence right hand thumb rule can be applied. Let the current move in the clockwise direction.
Direction of Magnetic Field at O → Apply right hand thumb rule at each part to find the direction of magnetic field at O. For each part AB, CD and EF, Magnetic lines of force at O are straight and inwards as shown in Figure. If we reverse the direction of current, the magnetic lines of force will remain straight but their direction will be outward. It shows that magnetic lines of force at the center of a circular current-carrying wire are straight.

13. (a) What is full form of (i) UNEP (ii) CFCs.
(b) On what basis are organisms grouped as producers, consumers and decomposer ?
(c) Write two problems that would arise if there were no decomposer in are ecosystem.

Ans :

(a) (i) UNEP : United Nations Environment Programmes
(ii) CFCs : Chlorofluorocarbon.
(b) Organisms can be grouped as producers, consumers and decomposers according to the manner in which they obtain their nutrition from the environment.
(c) Two problems that would arise in absence of decomposer in an ecosystem are :
(i) Decomposition of garbage as well as dead plants and animals will not take place.
(ii) Recycling of nutrients and natural replenishment of soil will not take place.

Section C

This section has 02 case-based questions (14 and 15). Each case is followed by 03 sub-questions (a, b and c). Parts a and b are compulsory. However, an internal choice has been provided in part c.

14. Answer given questions on the basis of your understanding of the following paragraph and the related studies concepts.
The sexual act always has the potential to lead to pregnancy will make major demands on the body and the mind of the woman and if she is not ready for it, her health will be adversely affected. Therefore, many ways have been devised to avoid pregnancy.

(i) Name any two bacterial diseases that are caused due to unprotected sex.
(ii) In what a pill helps in preventing pregnancy?
(iii) What is vasectomy?

or

What are the common side-effects of using contraceptive pills?

Ans :

(i) The two bacterial diseases that are caused due to unprotected sex are gonorrhea and syphilis.

(ii) The pill helps in preventing pregnancy as prevent the release of the ovum, by changing the hormonal balance.

(iii) Vasectomy is the surgical process by which the vas defers in cut. This prevents the sperms from reaching the ejaculatory duct.

or

The common side-effects of using contraceptive pills are irritation, nausea and mood swings.

15. Read the following case based passage and answer the questions given after passage.

Resistance of a conductor depends on the length, area of cross-section and nature of the material of the conductor. When a conductor is stretched (increased in its length), then its area of cross-section decreases accordingly but the volume (i.e. area x length) of the conductor remains same.

Resistivity of conductor,

$$\rho = \frac{RA}{l}$$

Where, A = area of cross-section of conductor

l = length of conductor

(i) What do you mean by resistivity ?

(ii) What is the SI unit of resistivity of conductor ?

Resistivity, $\rho = \frac{RA}{l}$

$$= \frac{\text{ohm} - \text{m}^2}{m} = \text{ohm} - \text{meter}$$

(iii) Write one difference between resistance and resistivity.

or

The resistance (R) of a wire of length is halved and area of cross-section (A) is doubled, what is the new resistance (R') ?

Ans :

(i) Resistivity is defined as the resistance of a conductor of unit length and unit area of cross-section.

(ii) (b) SI unit of resistivity is ohm-metre.

(iii) Resistance is that property of a conductor by virtue of which it opposes or resists the flow of charges through it. Its SI unit Ω. Resistivity is the characteristic property of the material of the conductor and varies only if its temperature changes. Its SI unit Ω-metre.

or

Initially, $R = \frac{\rho l}{A}$ ...(1)

(ρ = resistivity)

According to the question,

New length of the wire,

$$l' = \frac{l}{2}$$

and new area of cross-section,

$$A' = 2A \qquad \text{(Given)}$$

New resistance, $R' = \rho\frac{l/2}{2A} = \frac{\rho l}{4A} = \frac{R}{4}$