Sample Question Paper - 21
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. Two carbon compounds A and B have the molecular formulae C_3H_8 and C_3H_6 respectively.
(a) Which one of the two is most likely to show addition reaction ?
(b) Explain with the help of chemical equation, how an addition reaction is useful in vegetable ghee industry.

2. (a) State the modern periodic law.
(b) How many periods and groups are present in the modern periodic table ?

3. (a) Name two animals which reproduce asexually.
(b) What are the male and female gonads in human beings known as?

4. (a) Explain the process of regeneration is planaria.
(b) How is regeneration different from reproduction?

5. What is placenta? State its any two roles during pregnancy.

or

In what respect is the human male gamete different from the female gamete?

6. What happens to the deflection of the compass needle placed at a point near current carrying straight conductor :
(a) if the current is increased ?
(b) if the direction of current in the conductor is changed ?

or

How does the strength of the magnetic field at the center of a circular coil of a wire depend on

(a) radius of the coil (b) number of turns of wire in the coil ?

7. In a certain study conducted on occurrence of DDT along food chains in an ecosystem, the concentration of DDT in grass was found to be 0.5 ppm (parts per million), in sheep it was 2 ppm and in man it was 10 ppm. Why was the concentration of DDT maximum in case of man ?

or

In a food chain comprising frogs, insects, birds and grass, which one of the organisms is likely to have maximum concentration of harmful non-biodegradable chemicals in its body ?

Section B

8. Given below are four elements with their atomic numbers :

Element	Atomic Number
A	16
B	11
C	3
D	14

(a) Identify the elements which belong to the same group of the Modern Periodic Table.
(b) Arrange the given elements in decreasing order of atomic size.
(c) Write the formula of the oxide of B.

9. (a) Draw the structure of ethyne (C_2H_2).
(b) List any two differences between soaps and detergents.

or

Arrange giving reason for the following elements in increasing order of their atomic size :
(a) Be, O, F (given that they belong to 2nd, 16th and 17th groups and 2nd period respectively.)
(b) I, Cl, F (Given that they belong to 5th, 3rd and 2nd period respectively in the 17th group).

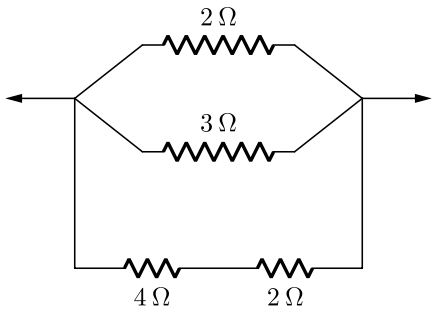
10. Explain Mendel's experiment with peas on inheritance of characters considering only one visible contrasting character.

11. The values of current I flowing in a given resistor for the corresponding values of potential difference V across the resistor are given below:

I (ampere)	0.5	1.0	2.0	3.0	4.0
V (volt)	1.6	3.4	6.7	10.2	13.2

Plot a graph between V and I and calculate the resistance of the resistor.

12. Calculate the equivalent resistance from the following combination of resistors.



or

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

(i) Pushed into the coil ?
(ii) Withdrawn from inside the coil ?
(iii) Held stationary inside the coil ?

13. Give reason to justify the following:

(i) The existence of decomposer is essential in a biosphere.
(ii) Flow of energy in a food chain is unidirectional.

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 growing size of the human population is a cause of concern for all people. The rate of birth and death in a given population will determine its size. Reproduction is the process by which organisms increase their population. The process of sexual maturation for reproduction is gradual and takes place while general body growth is still going on. Some degree of sexual maturation does not necessarily mean that the mind or body is ready for sexual acts or for having and bringing up children. Various contraceptive devices are being used by human beings to control the size of population.

(i) List two common signs of sexual maturation in boys and girls.
(ii) What is the result of reckless female foeticide?
(iii) Which contraceptive method changes the hormonal balance of the body?

or

Write two factors that determine the size of a population.

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

Electrical resistivities of some substances at 20°C are given below :

Table-A

S. No.	Metal	Resistivity (in Ω-m)
1.	Silver	1.60×10^{-8}
2.	Copper	1.62×10^{-8}
3.	Tungsten	5.20×10^{-8}
4.	Iron	10.0×10^{-8}
5.	Mercury	94.0×10^{-8}
6.	Nichrome	10.0×10^{-8}

(i) Among silver and copper, which one is a better conductor?
(ii) Which material world you advise to be used in electrical heating devices?
(iii) What do you mean by resistivity ?

or

What is the effect of temperature on resistivity of a substance?

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. Two carbon compounds A and B have the molecular formulae C_3H_8 and C_3H_6 respectively.

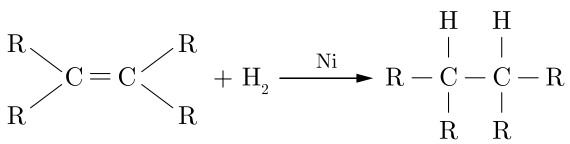
(a) Which one of the two is most likely to show addition reaction ?

(b) Explain with the help of chemical equation, how an addition reaction is useful in vegetable ghee industry.

Ans :

(a) C_3H_6 (B) will show addition reaction as it is an unsaturated hydrocarbon.

(b) Vegetable oil reacts with hydrogen in presence of Ni as a catalyst to form vegetable ghee, which is a saturated compound.



Vegetable oil (Unsaturated) + H_2

$\xrightarrow{Ni}$ Vegetable ghee (Saturated)

2. (a) State the modern periodic law.

(b) How many periods and groups are present in the modern periodic table ?

Ans :

(a) Modern periodic law states, that properties of elements are a periodic function of their atomic numbers.

(b) There are 7 periods and 18 groups in modern periodic table.

3. (a) Name two animals which reproduce asexually.

(b) What are the male and female gonads in human beings known as?

Ans :

(a) (i) Hydra,
(ii) Spirogyra

(b) Male gonad : Testis
Female gonad : Ovary

4. (a) Explain the process of regeneration is planaria.

(b) How is regeneration different from reproduction?

Ans :

(a) If the body of planaria some how gets cut into a number of pieces, then each body piece can regenerate into a complete planaria by growing all the mussing parts. (see Fig.)

(b) The process of getting back a full organism from the body parts is called regeneration.

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

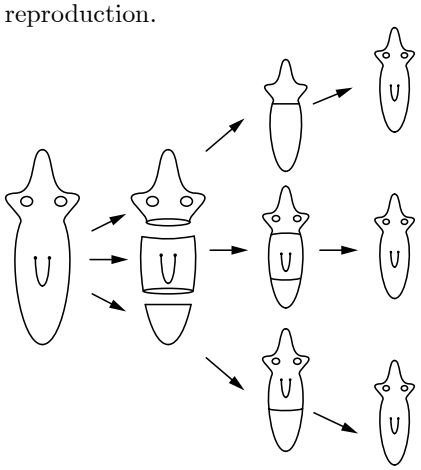


Fig : Regeneration in planaria.

5. What is placenta? State its any two roles during pregnancy.

Ans :

Placenta is a specialised vascular tissue attached to uterus that provides all requirements of the foetus during pregnancy.

Role :

(i) It provides nutrition to the foetus.

(ii) The waste substances generated by the foetus are excreted out through the placenta.

or

In what respect is the human male gamete different from the female gamete?

Ans :

	Male gamete	**Female -gamete**
(i)	These are smaller.	These are larger because they contain food reserve.
(ii)	They are motile.	They are non-motile.

6. What happens to the deflection of the compass needle placed at a point near current carrying straight conductor :

(a) if the current is increased ?

(b) if the direction of current in the conductor is changed ?

Ans :

(a) Deflection of the compass needle increases.

(b) Direction of deflection in the compass needle changes.

or

How does the strength of the magnetic field at the center of a circular coil of a wire depend on (a) radius of the coil (b) number of turns of wire in the coil ?

Ans :

(a) Strength of magnetic field (B) is inversely proportional to radius of the coil (r), i.e., $B \propto 1/r$.

(b) Strength of magnetic field (B) is directly proportional to the number of turns in the coil (N) i.e., $B \propto N$.

7. In a certain study conducted on occurrence of DDT along food chains in an ecosystem, the concentration of DDT in grass was found to be 0.5 ppm (parts per million), in sheep it was 2 ppm and in man it was 10 ppm. Why was the concentration of DDT maximum in case of man ?

Ans :

DDT is non-biodegradable chemical which gradually accumulates in fatty tissue at each trophic level. Since man is at the highest trophic level, there is maximum accumulation of DDT in him. It happens due to biological magnification.

or

In a food chain comprising frogs, insects, birds and grass, which one of the organisms is likely to have maximum concentration of harmful non-biodegradable chemicals in its body ?

Ans :

Birds would have maximum concentration of harmful non-biodegradable chemicals in their body as they occupy the top most trophic level in the given food chain. It happens due to biological magnification.

Section B

8. Given below are four elements with their atomic numbers :

Element	**Atomic Number**
A	16
B	11
C	3
D	14

(a) Identify the elements which belong to the same group of the Modern Periodic Table.

(b) Arrange the given elements in decreasing order of atomic size.

(c) Write the formula of the oxide of B.

Ans :

(a) B and C

(b) B > D > A > C

(c) B_2O

9. (a) Draw the structure of ethyne (C_2H_2).

(b) List any two differences between soaps and detergents.

Ans :

(a) $H - C \equiv C - H$

(b) (i) Soaps are sodium salts of long chain fatty acids, whereas detergents are sodium or potassium salts of sulphonic acids of hydrocarbons.

(ii) Soaps cannot be used with hard water but detergents work well with both hard and soft water.

or

Arrange giving reason for the following elements in

increasing order of their atomic size :

(a) Be, O, F (given that they belong to 2nd, 16th and 17th groups and 2nd period respectively.)

(b) I, Cl, F (Given that they belong to 5th, 3rd and 2nd period respectively in the 17th group).

Ans :

(a) F < O < Be. This is because atomic size decreases across a period.

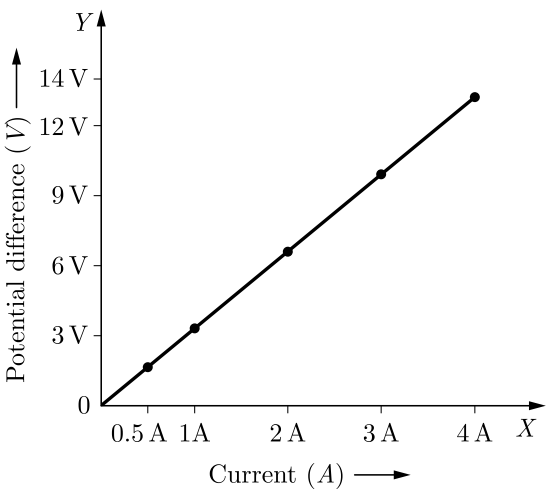
(b) F < Cl < I. This is because atomic size increases down the group.

10. The values of current I flowing in a given resistor for the corresponding values of potential difference V across the resistor are given below:

I (ampere)	0.5	1.0	2.0	3.0	4.0
V (volt)	1.6	3.4	6.7	10.2	13.2

Plot a graph between V and I and calculate the resistance of the resistor.

Ans :



From the graph, we can take values of V and I.

$$V = (6.7 - 3.4) = 3.3 \text{ Volt}$$

$$I = (2.0 - 1.0) = 1.0 \text{ A}$$

$$R = \frac{V}{I} = \frac{3.3}{1.0} = 3.3\,\Omega$$

So, Resistance = 3.3 Ω (ohm)

11. Explain Mendel's experiment with peas on inheritance of characters considering only one visible contrasting character.

Ans :

Mendel concluded his breeding experiments of inheritance of characters considering only one visible contrasting character i.e., monohybrid cross with garden peas.

(i) He studied homozygous (pure) plants of a tall (TT) short (tt) varieties.

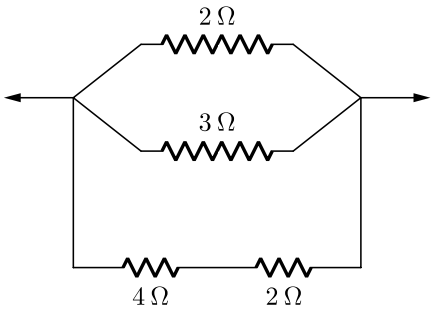
(ii) He crossed them and obtained F_1 progeny.

(iii) He found that in F_1 progeny all plants were tall.

(iv) He selfed the plants of F_1 progeny which were hybrid (Tt).

(v) He found that in F_2 progeny there were tall as well as short plants of which the three quarter plants were tall and one quarter was short.

12. Calculate the equivalent resistance from the following combination of resistors.



Ans :

In the given circuit 4 Ω and 2 Ω are connected series. Hence the equivalent resistance is given by

$$R_s = R_1 + R_2$$

$$= 4\,\Omega + 2\,\Omega = 6\,\Omega$$

Also, equivalent resistance in parallel is :

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

or $$R_p = \frac{1}{2} + \frac{1}{3} + \frac{1}{6} = \frac{6}{6} = 1\,\Omega$$

or

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

(i) Pushed into the coil ?

(ii) Withdrawn from inside the coil ?

(iii) Held stationary inside the coil ?

Ans :

(i) Due to change in magnitude flux linked with coil, the galvanometer shows deflection (say towards right).

(ii) Due to change in magnetic flux linked with coil, the galvanometer shows deflection [say towards left opposite to that in case (i)].

(iii) As it is stationary, no change in magnetic flux linked with coil, so galvanometer shows no deflection.

13. Give reason to justify the following:

(i) The existence of decomposer is essential in a biosphere.

(ii) Flow of energy in a food chain is unidirectional.

Ans :

(i) Decomposer decompose the complex organic molecules present in the dead plants and animals to the simple molecular level. Thus, decomposer help the return of various nutrients to the soil/water so that these are available to the producers once again. So, if decomposer are removed from the earth, the soil/water will become deficient in nutrients and the operation of various mineral cycles will get affected.

(ii) In a food chain the energy moves progressively through the various trophic levels. It is no longer available to the previous level (autotrophs) and the energy captured by the autotrophs does not go back to the solar input and also quantity of total available energy decreases gradually on each trophic level due to 10% law. Hence, the flow of energy is unidirectional.

Section C

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(i) List two common signs of sexual maturation in boys and girls.

(ii) What is the result of reckless female foeticide?

(iii) Which contraceptive method changes the hormonal balance of the body?

or

Write two factors that determine the size of a population.

Ans :

(i) Common signs of sexual maturation in boys and girls are :

(a) Thick hair growing in new parts of the body such as armpits and the genital area between the thighs. Thinner hair can also appear on legs and arms, as well as on the face.

(b) The skin frequently becomes oily and might begin to develop pimples.

(ii) Due to reckless female foeticides, child sex ratio is declining at an alarming rate in some sections of the society.

(iii) Contraceptive pills changes the hormonal balance of the body.

or

Birth rate and Death rates are the factors which determines the size of the population.

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

Electrical resistivities of some substances at 20°C are given below :

Table-A

S. No.	Metal	Resistivity (in Ω-m)
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4.	Iron	10.0×10^{-8}
5.	Mercury	94.0×10^{-8}
6.	Nichrome	10.0×10^{-8}

(i) Among silver and copper, which one is a better conductor?

(ii) Which material world you advise to be used in electrical heating devices?

(iii) What do you mean by resistivity ?

or

What is the effect of temperature on resistivity of a substance?

Ans :

(i) Silver

(ii) Nichrome

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

or

Resistivity of a material changes if its temperature changes. The general rule in resistivity increases with increasing temperature in conductors and decreases with increasing temperature in insulators.