Sample Question Paper - 23
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) What is denatured alcohol ?
(b) How many covalent bonds does a molecule of ethane (C_2H_6) have? Draw its structure to justify your answer.

2. An element has the electronic configuration 2, 8, 3. What is the atomic number of this element? To which
(i) group, and (ii) period does this element belong ?

3. In tobacco plant, the male gametes have 24 chromosomes. State the number of chromosomes in
(i) egg nucleus, (ii) zygote, (iii) endosperm and (iv) leaf cell.

4. State in brief the function of the following organs in the human female reproductive system :
(a) Ovary
(b) Fallopian tube

5. State the mode of reproduction in following organisms: Earthworm, Frog, Rhizopus, Plasmodium

or

Name the sex hormones secreted by male and female sex organs in human beings. State one function of each.

6. A current-carrying straight conductor is placed in east-west direction. What will be the direction of the force experienced by this conductor due to the earth's magnetic field ? How is this force affected on :
(a) reversing the direction of flow of the current ?
(b) doubling the magnitude of the current ?

or

A student while studying the force experienced by a current carrying conductor in a magnetic field records the following observations :

(i) The force experienced by the conductor increases as the current is increased.

(ii) The force experienced by the conductor decreases as the strength of the magnetic field is increased.

Which of the two observations is correct and why ?

7. Which one of the following food habits is better and why ?

(a) Plant → Man.

(b) Plant → Goat → Man

or

Name the sources from where the green plants obtain C, H and O.

Section B

8. The elements of the second period of the Periodic Table are given below :

Li, Be, B, C, N, O, F, Ne

(a) Give reason to explain why atomic radius decreases from Li to F.

(b) Identify the most metallic and non-metallic elements.

(c) How does valency change from Li to Ne.

9. Three elements X, Y and Z have atomic numbers 7, 8 and 9 respectively :

(a) State their positions (Group number and period number both) in the modern periodic table.

(b) Arrange these elements in the decreasing order of their atomic radii.

(c) Write the formula of the compound formed when X combines with Z.

or

An element X has atomic number 19.

(a) Write its electronic configuration.

(b) To which group of the Modern Periodic Table does it belong ?

(c) State the nature of the compound formed by element X with chlorine.

10. (a) What is the role of autosomes?

(b) Why is it that offspring receives traits from both the parents.

11. (a) Define the term volt.

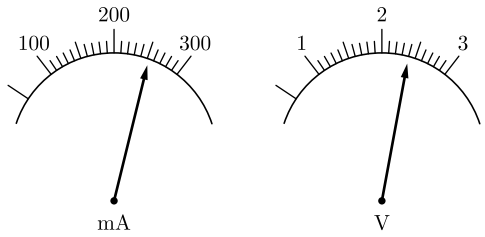
(b) State the relation between work, charge and potential difference for an electric circuit.

Calculate the potential difference been the terminals of a battery if 100 joules of work is required to transfer 20 coulombs of charge from one terminal of the battery of the other.

12. The current flowing through a resistor connected in a circuit and the potential difference developed across its ends are as shown in the diagram by milliammeter and voltmeter readings respectively :

(a) What are the least counts of these meters?

(b) What is the resistance of the resistor?



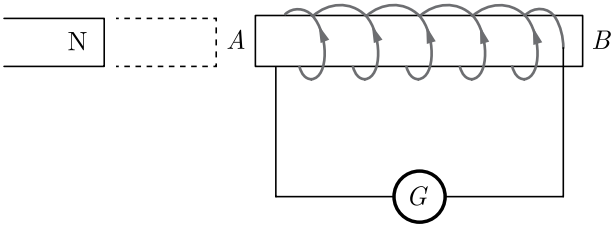
or

The diagram below shows a coil connected to a center zero galvanometer G. The galvanometer shows a deflection to the right when the N pole of a powerful magnet is moved to the right as shown.

(i) Explain why the deflection occurs in the galvanometer.

(ii) Does the direction of current in the coil appear clockwise or anti-clockwise when viewed from end A?

(iii) State the observation in G when the coil is moved away from N.



13. (i) What is the height of ozone from the equator ?

(ii) Name the rays against which ozone layer provides protection.

(iii) Name one effect of depletion of ozone.

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.

Reproduction in human beings is by sexual reproduction where both the male and female gametes fertilise to give rise to an embryo. The fertilization of the human embryo occurs inside the body of the female.

(i) Name the part of the male reproductive system where the formation of sperms takes place.
(ii) What is the other name of the oviduct?
(iii) What is the placenta ?

or

Define the term implantation.

15. Read the following case based passage and answer the questions given after passage.
An electrician is a tradesman specializing in electrical wiring of buildings, transmission lines, stationary machines and related equipment. Electrician may be employed in the installation of new electrical components or the maintenance and repair of existing electrical infrastructure.
An electrician has made electric circuit of a house in such a way that if a fan is closed, the lamps also stop glowing.
(i) What is the defect in this type of circuit wiring? Why ?
(ii) Two resistances R_1 and R_2 are connected turn by turn in parallel and in series. In which case, the resultant resistance will be less than either of the individual resistances ?
(iii) Which is the better way to connect lights and other appliances in domestic circuit series connection or parallel connection ?

or

In which type of combination different resistors will have equal value of electric current through them ?

Solution

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

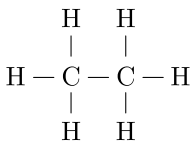
1. (a) What is denatured alcohol ?

(b) How many covalent bonds does a molecule of ethane (C_2H_6) have? Draw its structure to justify your answer.

Ans :

(a) When ethanol is mixed with methanol or some poisonous substances such as copper sulphate, pyridine etc. it becomes unfit for drinking. Such an alcohol is called denatured alcohol.

(b) Seven single covalent bonds;



2. An element has the electronic configuration 2, 8, 3. What is the atomic number of this element? To which

(i) group, and (ii) period does this element belong ?

Ans :

(i) Atomic number = 13

(ii)

(a) Group number = 13

(b) Period number = 3

3. In tobacco plant, the male gametes have 24 chromosomes. State the number of chromosomes in (i) egg nucleus, (ii) zygote, (iii) endosperm and (iv) leaf cell.

Ans :

(i) Chromosomes in egg Nucleus — 12
(ii) Zygote — 24
(iii) Endosperm — 36
(iv) Leaf cell — 24

4. State in brief the function of the following organs in the human female reproductive system :

(a) Ovary

(b) Fallopian tube

Ans :

(a) **Function of ovary :** It produces the female gamete (ovum) as well as secretes the female hormones (estrogen and progesterone).

(b) **Function of fallopian tube :** It is the site of fertilization. Here a female egg may get fused with the male gamete (sperm).

5. State the mode of reproduction in following organisms: Earthworm, Frog, Rhizopus, Plasmodium

Ans :

Earthworm — Sexual reproduction
Frog — Sexual reproduction
Rhizopus — Spore formation
Plasmodium — Multiple fission.

or

Name the sex hormones secreted by male and female sex organs in human beings. State one function of each.

Ans :

(i) **Hormones secreted by male sex organ :** Testosterone — It controls the production of sperms.

(ii) **Hormones secreted by female sex organ :** Estrogen — It controls the production of ova.

6. A current-carrying straight conductor is placed in east-west direction. What will be the direction of the force experienced by this conductor due to the earth's magnetic field ? How is this force affected on :

(a) reversing the direction of flow of the current ?

(b) doubling the magnitude of the current ?

Ans :

The direction of the force will be vertically downward due to the earth's horizontal magnetic field.

(a) The direction of the force will become vertically upward on reversing the direction of the flow of the current.

(b) If the magnitude of the current is doubled, the force is doubled but remains in the same direction.

or

A student while studying the force experienced by a current carrying conductor in a magnetic field records the following observations :

(i) The force experienced by the conductor increases as the current is increased.

(ii) The force experienced by the conductor decreases as the strength of the magnetic field is increased.

Which of the two observations is correct and why ?

Ans :

Observation (i) is correct.

It is so because force experienced by a current carrying conductor in a magnetic field is proportional to the strength of the current.

7. Which one of the following food habits is better and why ?

(a) Plant → Man.

(b) Plant → Goat → Man

Ans :

(a) is better.

Reason : According to the ten percent law of nature, in a shorter food chain maximum transfer of energy will take place.

or

Name the sources from where the green plants obtain C, H and O.

Ans :

(a) Green plants get C, i.e., Carbon from the CO_2 present in the atmosphere.

(b) H (Hydrogen) and O (Oxygen) are obtained from water absorbed from the soil.

(c) Oxygen is also obtained from air.

Section B

8. The elements of the second period of the Periodic Table are given below :

Li, Be, B, C, N, O, F, Ne

(a) Give reason to explain why atomic radius decreases from Li to F.

(b) Identify the most metallic and non-metallic elements.

(c) How does valency change from Li to Ne.

Ans :

(a) Atomic radii decrease in moving from left to right along a period due to increase in nuclear charge which pulls electrons closer to the nucleus and thus reduces the size of the atom.

(b) Li is the most metallic element. F is the most non-metallic element.

(c) Valency first increases from +1 to 4 and then decreases from 3 to 0.

9. Three elements X, Y and Z have atomic numbers 7, 8 and 9 respectively :

(a) State their positions (Group number and period number both) in the modern periodic table.

(b) Arrange these elements in the decreasing order of their atomic radii.

(c) Write the formula of the compound formed when X combines with Z.

Ans :

(a) Position of X (Atomic number = 7)

Group number = 15

Period number = 2

Position of Y (Atomic number 8)

Group number = 16

Period number = 2

Position of Z (Atomic number 9)

Group number = 17

Period number = 2

(b) Size of radii X > Y > Z.

(c) Formula of the compound when X combines with Z : XZ_3.

or

An element X has atomic number 19.

(a) Write its electronic configuration.

(b) To which group of the Modern Periodic Table does it belong ?

(c) State the nature of the compound formed by element X with chlorine.

Ans :

(a) Electronic configuration of X = 2, 8, 8, 1

(b) Group 1
(c) X will form ionic (electrovalent) compound with chlorine.

10. (a) What is the role of autosomes?
(b) Why is it that offspring receives traits from both the parents.

Ans :

(a) Autosomes are the chromosomes which contain genes for all somatic trait. They are identical in male and females and they do not have any role in the determination of sex.
(b) During sexual reproduction, two haploid gametes which came from father and mother having half the number of chromosomes and together to from diploid zygote. It is therefore the offspring has the chromosomes from both parents having different genes of different traits.

11. (a) Define the term volt.
(b) State the relation between work, charge and potential difference for an electric circuit.
Calculate the potential difference been the terminals of a battery if 100 joules of work is required to transfer 20 coulombs of charge from one terminal of the battery of the other.

Ans :

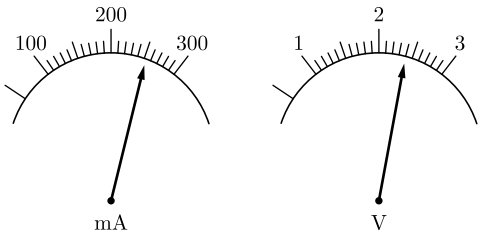
(a) The term volt is the S.I. unit of potential difference. Potential difference is said to be volt if one joule work is to be done to carry 1 coulomb positive charge from one point to another.
(b) The relation between work (W), charge (Q) and potential difference (V) for an electric circuit is

$$V = \frac{W}{Q}$$

Given: $W = 100\,\text{J}$, and $Q = 20\,\text{C}$
Potential difference,

$$V = \frac{W}{Q} = \frac{100\,\text{J}}{20\,\text{C}} = 5\,\text{V}$$

12. The current flowing through a resistor connected in a circuit and the potential difference developed across its ends are as shown in the diagram by milliammeter and voltmeter readings respectively :
(a) What are the least counts of these meters?
(b) What is the resistance of the resistor?



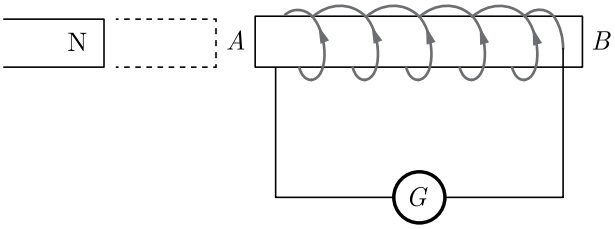
Ans :

(a) 10 mA and 0.1 V
(b) Given, $V = 2.4$ volt
$I = 250\,\text{mA} = 0.25\,\text{A}$
As we know that,

$$R = \frac{V}{I} = \frac{2.4}{0.25} = 9.6\,\Omega$$

or

The diagram below shows a coil connected to a center zero galvanometer G. The galvanometer shows a deflection to the right when the N pole of a powerful magnet is moved to the right as shown.
(i) Explain why the deflection occurs in the galvanometer.
(ii) Does the direction of current in the coil appear clockwise or anti-clockwise when viewed from end A?
(iii) State the observation in G when the coil is moved away from N.



Ans :

(i) This is due to the change in magnetic flux in the coil. Due to change in magnetic flux, an induced emf is produced in the coil. Hence a current flows through the galvanometer.
(ii) The current appears clockwise when viewed from end A.
(iii) The galvanometer now deflects towards left.

13. (i) What is the height of ozone from the equator ?
(ii) Name the rays against which ozone layer provides protection.
(iii) Name one effect of depletion of ozone.

Ans :

(i) 10 to 16 km.
(ii) UV rays of sun.
(iii) Skin cancer.

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.

Reproduction in human beings is by sexual reproduction where both the male and female gametes fertilise to give rise to an embryo. The fertilization of the human embryo occurs inside the body of the female.

(i) Name the part of the male reproductive system where the formation of sperms takes place.
(ii) What is the other name of the oviduct?
(iii) What is the placenta ?

or

Define the term implantation.

Ans :

(i) The scrotum is the part of the male reproductive system where the formation of sperms occurs.
(ii) The other name of the oviduct is the fallopian tube.
(iii) The embryo develops a special structure called the placenta. This structure helps in the transportation of components from the mother's body to the embryo. Placenta also prevents the mixing of the mother's blood with the baby's blood.

or

The process by which the blastocyst gets attached to the lining of the uterus wall is termed as implantation. It is an important post-fertilisation process. The successful fusion of male and female gamete results in implantation.

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

An electrician is a tradesman specializing in electrical wiring of buildings, transmission lines, stationary machines and related equipment. Electrician may be employed in the installation of new electrical components or the maintenance and repair of existing electrical infrastructure.

An electrician has made electric circuit of a house in such a way that if a fan is closed, the lamps also stop glowing.

(i) What is the defect in this type of circuit wiring? Why ?
(ii) Two resistances R_1 and R_2 are connected turn by turn in parallel and in series. In which case, the resultant resistance will be less than either of the individual resistances ?
(iii) Which is the better way to connect lights and other appliances in domestic circuit series connection or parallel connection ?

or

In which type of combination different resistors will have equal value of electric current through them ?

Ans :

(i) Electrician has made series connection of all the lamps in electric circuit of house because of which, if one lamp gets fused, all the other lamps would stop working. This is due to the fact that when devices are connected in series, then if one device fails, the circuit gets broken and all the devices in that circuit stop working.
(ii) In parallel, because the resultant resistance in parallel circuit is $\frac{R_1 R_2}{R_1 + R_2}$ whereas in series the equivalent resistance is $R_1 + R_2$. Hence, equivalent resistance is less in parallel circuit.
(iii) Parallel connection is a better way to connect lights and other appliances in domestic circuit. It is because when we connect a number of devices in parallel combination, each device gets the same potential hence keeps on working even, if other devices stop working.

or

In series combination, different resistors will have equal value of electric current.