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. Give the IUPAC names of
(a) $CH_3 - CH_2 - Br$
(b) $CH_3 - CH_2 - CH_2 - CH_2 - C \equiv CH$

2. Account for the following :
(a)   Elements of group 17 are monovalent.
(b)   Elements of group 18 are called zero valent.

3. (a)   Write full form of DNA.
(b)   Why are variations essential for the species?

4. (a)   List three distinguishing features between sexual and asexual types of reproduction.
(b)   Explain why variations are observed in the offsprings of sexually reproducing organisms ?

5. What are the functions of testis in the human male reproductive system? Why are these located outside the abdominal cavity?

or

In a bisexual flower inspite of the young stamens being removed artificially, the flower produces fruit.
Give reasons.

6. State what would happen to the direction of rotation of a motor, if
(i)   the current were reversed ?
(ii)   both current and magnetic field were reversed simultaneously.

or

The given magnet is divided into three part A, B and C.

A	B	C

Name the parts where the strength of the magnetic field is :
(i)   maximum,
(ii) minimum.
How will the density of magnetic field lines differ at these parts ?

7. In the following food chain, 5 J of energy is available to man. How much energy was available at producer level ?
Plant → Sheep → Man.

or

Aquarium need to be cleaned once in a while whereas ponds or lakes do not require any cleaning : Explain
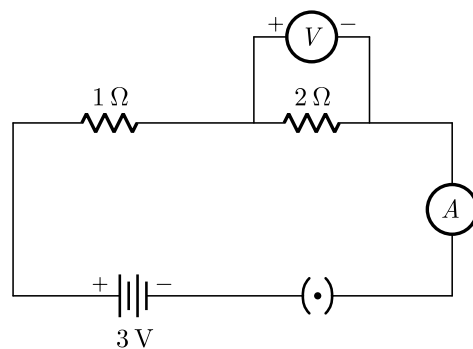
Section B

8. Three elements X, Y and Z have atomic numbers 7, 8 and 9 respectively.
(a)   Arrange them in the decreasing order of their atomic radii.
(b)   Which of the three is most electronegative? Why?
(c)   Write the formula of compound formed between
(i) X and Y
(ii) X and Z

9. Na, Mg, Al, Si, P, S, Cl and Ar are the elements of third period :
(i)   Which one of them is an inert gas ? Why?
(ii)   Which one of them has the valency 4 ? What kind of bond does it form ionic or covalent ?

or

Give reasons for the following :
(a)   Lithium atom is smaller than sodium atom.
(b)   Chlorine (atomic number 17) is more electronegative than sulphur (atomic number 16).

10. Distinguish between the acquired traits and the inherited traits in tabular form, giving one example for each.

11. (a)   List the factors on which the resistance of a conductor in the shape of wire depends.
(b)   Why are metals good conductors of electricity whereas glass is a bad conductor of electricity? Give reason.
(c)   Why are alloys commonly used in electrical heating devices? Give reason.

12. What would be the reading of ammeter and voltmeter in the given circuit?

or

Answer the following questions :
(i)   What is the direction of magnetic field lines outside a bar-magnet ?
(ii) The magnetic field lines in a given region are getting crowded. What does it indicate ?
(iii) State one advantage of AC over DC.

13. You have been selected to talk on "ozone layer and its protection in the school assembly" on "Environment Day".
(i)   Why should ozone layer be protected to save the environment ?
(ii) List any two ways that you would stress in your talk to bring in awareness amongst your fellow friends that would also help in protection of ozone layer as well as the environment.

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. Study the follwoing table and answer the following questions.

Table-A

	Characters	Males	Females
1.	Total no. of chromosomes	23 pairs	23 pairs
2.	No. of autosome	22 pairs	22 pairs
3.	No. of sex chromosome	1 pair	1 pair

(i)   What is sex determination?
(ii) What are the sex chromosomes in the males?
(iii) What are the sex chromosomes in the females?
(iv) Is the father responsible for the sex of the child?

15. Read the following case based passage and answer the questions given after passage.
A room has two tube lights, a fan and a TV. Each tube light draws 40 W, the fan draws 80 W

and the TV draws 60 W on the average, the tube lights are kept on for five hours, the fan for twelve hours and the TV for eight hours every day. The rate for electrical energy is ₹ 3.10 per kWh.

(i)   Calculate the energy consumed by each tube light in a day.
(ii) What is the total energy consumed in a day?
(iii) Find the cost of electricity used in this room in a 30-day month.

or

What quantities determines the rate at which energy is delivered by current?

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.
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Section A

1. Give the IUPAC names of

(a) $CH_3 - CH_2 - Br$

(b) $CH_3 - CH_2 - CH_2 - CH_2 - C \equiv CH$

Ans :

(a) The IUPAC name of $CH_3 - CH_2 - Br$ is Bromo ethane.

(b) The IUPAC name of $CH_3 - CH_2 - CH_2 - CH_2 - C \equiv CH$ is Hexa-1-yne.

2. Account for the following :

(a) Elements of group 17 are monovalent.

(b) Elements of group 18 are called zero valent.

Ans :

(a) For group 17 elements :
Electronic configuration : 2, 8, 7
Valence shell electron : 7
Valency : $8 - 7 = 1$

(b) For group 18 elements :
Electronic configuration : 2, 8, 8
(Mono valent) valence shell electron : 8
Valency : $8 - 8 = 0$
(Zero valent)

3. (a) Write full form of DNA.

(b) Why are variations essential for the species?

Ans :

(a) Deoxyribonucleic Acid.

(b) It important for the survival of species through evolution.

4. (a) List three distinguishing features between sexual and asexual types of reproduction.

(b) Explain why variations are observed in the offsprings of sexually reproducing organisms ?

Ans :

(a)

	Asexual Reproduction	Sexual Reproduction
1.	Offspring arises from a single individual parent	It involves two individuals of different sexes-male and female.
2.	Fusion of gametes is not involved.	Fusion of gamete takes place
3.	Meiosis does not occur at any time during reproduction.	Meiosis occurs at the time of gamete formation.

(b) During sexual reproduction, the DNA copying mechanism is not accurate due to meiosis during haploid sex cells formation and the resultant errors as well as genetic recombination of chromosome of two different individuals i.e., father and mother are a source of variations in populations of organisms.

5. What are the functions of testis in the human male reproductive system? Why are these located outside the abdominal cavity?

Ans :

The functions of testes are (i) to produce male sex cells called sperms and (ii) to produce the male sex hormone called testosterone. The testosterone hormone brings about sexual secondary sex changes seen in the appearance of boys at the time of puberty.

The testis are outside the abdominal cavity of the body because the sperm formation requires a lower temperature than the normal body temperature. Being outside the abdominal cavity, the temperature of scrotum is about 3°C lower than the temperature inside the body. In this way, testis provide an optimum temperature for the formation of sperms.

or

In a bisexual flower inspite of the young stamens being removed artificially, the flower produces fruit. Give reasons.

Ans :

Even if the young stamens are removed, the pistil remains intact. So, when cross-pollination occurs, it leads to fertilization and hence formation of fruits takes place.

6. State what would happen to the direction of rotation of a motor, if
(i) the current were reversed ?
(ii) both current and magnetic field were reversed simultaneously.

Ans :

(i) Direction of rotation would be reversed.
(ii) Direction of rotation would remain unchanged.

or

The given magnet is divided into three part A, B and C.

| A | B | C |

Name the parts where the strength of the magnetic field is :
(i) maximum, (ii) minimum.
How will the density of magnetic field lines differ at these parts ?

Ans :

(i) Maximum magnetic field is in the region A and C.
(ii) Minimum magnetic field is in the region B.
This is because A and C are magnetic poles and have maximum number of magnetic field lines which determine the intensity of magnetic field while B is centre of the magnet that has no magnetic field lines. So, intensity of magnetic field near B is almost zero.

7. In the following food chain, 5 J of energy is available to man. How much energy was available at producer level ?
Plant $\rightarrow$ Sheep $\rightarrow$ Man.

Ans :

Plant $\rightarrow$ Sheep $\rightarrow$ Man.
Energy available to man in the above food chain is 5 J.
According to 10% law, energy available to sheep is 50 J.
Again according to 10% law, energy available to plants, i.e., at produce level is 500 J.

or

Aquarium need to be cleaned once in a while whereas ponds or lakes do not require any cleaning : Explain

Ans :

Aquarium need to be cleaned because it is not a self–sustained natural ecosystem. It is man-made or artificial ecosystem
Ponds and lakes are self-sustained naturals ecosystem in which nutrient cycle and energy flow occur naturally.

Section B

8. Three elements X, Y and Z have atomic numbers 7, 8 and 9 respectively.
(a) Arrange them in the decreasing order of their atomic radii.
(b) Which of the three is most electronegative? Why?
(c) Write the formula of compound formed between
(i) X and Y
(ii) X and Z

Ans :

(a) The elements can be arranged according to the decreasing order of atomic radii as follows :
$X > Y > Z$
Size of the atom decreases when moving from left to right in a period. This is due to an increase in nuclear charge which tends to pull the electrons closer to the nucleus and reduces the size of the atom.
(b) Z is most electronegative since electro-negativity increases from left to right in periodic table. As the effective nuclear charge acting on the valence shell electrons increases across a period, the tendency to lose electrons will decrease.
(c) (i) When X combines with Y :
Valency of $X = 3$
Valency of $Y = 2$
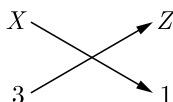Cross-multiplying the valences

$X \diagdown \diagup Y$

$3 \diagup \diagdown 2$
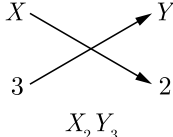
$X_2 Y_3$

The compound formed is $X_2 Y_2$.

(ii) When X combines with Z
Valency of $X = 3$
Valency of $Z = 2$
Cross-multiplying the valences

$X \diagdown \diagup Z$

$3 \diagup \diagdown 1$

The compound formed is XZ_3.

9. Na, Mg, Al, Si, P, S, Cl and Ar are the elements of third period :
(i) Which one of them is an inert gas ? Why?
(ii) Which one of them has the valency 4 ? What kind of bond does it form ionic or covalent ?

Ans :

(i) Argon (A_{18}) is an inert gas. Its electronic configuration is $\begin{pmatrix} K & L & M \\ 2 & 8 & 8 \end{pmatrix}$ which is completely filled and stable.

(ii) Silicon Si_{14} $\begin{pmatrix} K & L & M \\ 2 & 8 & 4 \end{pmatrix}$ has the valency 4. The element completes its octet to attain noble gas configuration by sharing of electrons and forming covalent bond.

or

Give reasons for the following :
(a) Lithium atom is smaller than sodium atom.
(b) Chlorine (atomic number 17) is more electronegative than sulphur (atomic number 16).

Ans :

(a) Electronic configuration of Li is 2, 1 and that of Na is 2, 8, 1. Since sodium has more number of shells, it has a larger size.
(b) Electronic configuration of Cl = 2, 8, 7
Electronic configuration of S = 2, 8, 6
As sulphur is placed before chlorine in the Periodic Table, it has a bigger size and its tendency to gain electrons is less than chlorine.

10. Distinguish between the acquired traits and the inherited traits in tabular form, giving one example for each.

Ans :

	Acquired traits	Inherited traits
1.	These are somatic variations and do not bring any change in DNA	These are genetic variations and bring about changes in the DNA.
2.	These traits develop throughout the life time of an individual and are not inherited. **Example :** learning of dance and music.	These traits are transferred by or inherited from the parents to the offspring. **Example:** Eye colour, Hair colour.

11. (a) List the factors on which the resistance of a conductor in the shape of wire depends.
(b) Why are metals good conductors of electricity whereas glass is a bad conductor of electricity? Give reason.
(c) Why are alloys commonly used in electrical heating devices? Give reason.

Ans :

(a) Resistance of a conductor depends directly on its length, inversely proportional to the area of cross-section, directly proportional to the temperature and it depends on the nature of the conductor.
(b) Metals have free electrons which can move and conduct electricity, whereas glass does not have free electrons which can flow freely to conduct electricity.
(c) The resistivity of an alloy is generally higher than that of pure metal. Alloys do not oxidise (burn) readily at higher temperatures. Therefore, conductors of electric heating devices, such as toasters and electric irons, are made of an alloy rather than pure metal.

12. Answer the following questions :
(i) What is the direction of magnetic field lines outside a bar-magnet ?
(ii) The magnetic field lines in a given region are getting crowded. What does it indicate ?
(iii) State one advantage of AC over DC.
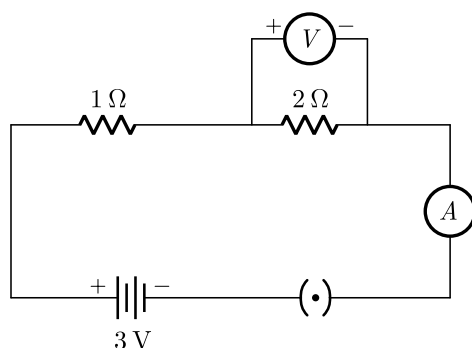
Ans :

(i) North pole to south pole.
(ii) The strength of magnetic field is higher in this

region.

(iii) AC voltage can be stopped up and transmitted over long distances without much loss of energy.

or

What would be the reading of ammeter and voltmeter in the given circuit?

Ans :

Here, $R_1 = 1\,\Omega,\ R_2 = 2\,\Omega$

The resistance are connected in the series combination hence the equivalent resistance is given by

$$R = R_1 + R_2$$
$$= 1 + 2 = 3\,\Omega$$
$$I = \frac{V}{R} = \frac{3}{3} = 1\,\text{A}$$

Ammeter reading $= 1\,\text{A}$

Voltmeter Reading $= IR = 1 \times 2 = 2\,\text{V}$

Voltmeter reading $= 2\,\text{V}$

13. You have been selected to talk on "ozone layer and its protection in the school assembly" on "Environment Day".
(i) Why should ozone layer be protected to save the environment ?
(ii) List any two ways that you would stress in your talk to bring in awareness amongst your fellow friends that would also help in protection of ozone layer as well as the environment.

Ans :

(i) Ozone layer helps in shielding the Earth from the harmful UV radiations coming from sun. If ozone layer gets depleted UV radiations an directly reach the Earth's surface and drastically affect the life on Earth.
(ii) **Ozone layer can be protected by :**
(a) Stop the release of Chlorofluorocarbon.
(b) Reduce the usage of air conditioner.

(c) Removing the pollutant nitrogen monoxide.

Section C

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14. Study the follwoing table and answer the following questions.

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	Characters	Males	Females
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(i) What is sex determination?
(ii) What are the sex chromosomes in the males?
(iii) What are the sex chromosomes in the females?
(iv) Is the father responsible for the sex of the child?

Ans :

(i) The process by which the sex of a newborn organism is detected is called sex determination.
(ii) The males have two sex chromosomes which are X and Y.
(iii) The sex chromosomes in the females are X and X.
(iv) Yes, the mother is solely responsible for the sex of the child because the mother gives only the X chromosome to the child. It is the father that gives either the X or Y chromosome to the child.

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

A room has two tube lights, a fan and a TV. Each tube light draws 40 W, the fan draws 80 W and the TV draws 60 W on the average, the tube lights are kept on for five hours, the fan for twelve hours and the TV for eight hours every day. The rate for electrical energy is ₹ 3.10 per kWh.
(i) Calculate the energy consumed by each tube light in a day.
(ii) What is the total energy consumed in a day?
(iii) Find the cost of electricity used in this room in a 30-day month.

or

What quantities determines the rate at which

energy is delivered by current?

Ans :

(i) For each tube light,

Power, $P = 40 \text{ W} = \dfrac{40}{1000} \text{ kW}$

Energy consumed by each tube light in a day is,

$$= P \times t$$

$$= \left(\dfrac{40}{1000} \text{kW}\right) \times 5 \text{ h}$$

$$= 0.2 \text{ kW h}$$

(ii) Energy consumed by tube light in a day is,

$$= 0.2 \text{ kWh}$$

Energy consumed by the fan in a day is,

$$= \dfrac{80}{1000} \text{kW} \times 12 \text{ h}$$

$$= 0.96 \text{ kWh}$$

Energy consumed by the TV in a day is,

$$= \dfrac{60}{1000} \text{ kW} \times 8 \text{ h}$$

$$= 0.48 \text{ kWh}$$

Total energy consumed in a day is,

$$= 2 \times 0.2 \text{ kWh} + 0.96 \text{ kWh}$$

$$+ 0.48 \text{ kWh}$$

$$= 1.84 \text{ kWh}$$

(iii) Energy consumed in a day

$$= 1.84 \text{ kWh}$$

Energy consumed in a day

$$= 30 \times 1.84 \text{ kWh}$$

$$= 55.2 \text{ kWh}$$

The cost of electricity

$$= ₹ \, 3.1 \times 55.2 = ₹ \, 171.12$$

or

The rate at which energy is delivered is determined by :

(a) the potential difference across the conductor.

(b) the current flowing in the circuit.