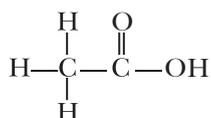


QUESTIONS FOR PRACTICE SOLUTIONS

Chapter-1:

Carbon and its Compounds

1. A student studies that acetic acid is a saturated compound. The structure of the compound is shown.



Why is acetic acid classified as a saturated compound?

Ans. In the structure of acetic acid, there is only single bonds between the carbon atoms so it is a saturated compound.

2. Carbon forms four covalent bonds by sharing its four valence electrons with four univalent atoms, e.g. hydrogen. After the formation of four bonds, carbon attains the electronic configuration of which element? Write any two properties of such type of compounds.

Ans. The atomic number of carbon is 6. Its electronic configuration is 2,4. When it shares four electrons with other univalent atoms, its electronic configuration becomes 2,8 which is same as that of neon. Such compounds are called covalent compounds. The properties of these compounds are:

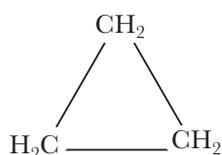
- (i) They are bad conductors of electricity.
(ii) They have low melting and boiling points.

3. Write the heteroatom(s) present in $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2\text{Cl}$.

Ans. Heteroatoms are the ones which are not carbon or hydrogen. So, in this compound, oxygen and chlorine are heteroatoms.

4. What are cyclic hydrocarbons? Draw the structures of any two of them. Also specify their names.

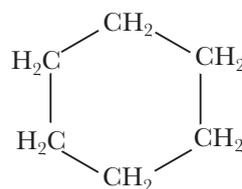
Ans. Cyclic hydrocarbons are the compounds in which the carbon atoms are arranged in the form of a ring.



or



Cyclopropane



or



Cyclohexane

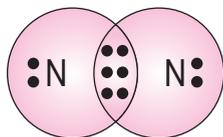
5. A student studies that the carbon compounds CH_3OH , $\text{C}_2\text{H}_5\text{OH}$, $\text{C}_3\text{H}_7\text{OH}$, and $\text{C}_4\text{H}_9\text{OH}$ can be grouped as homologous series. Why are these compounds grouped as homologous series?

Ans. These compounds are grouped as homologous series because of the following two reasons:

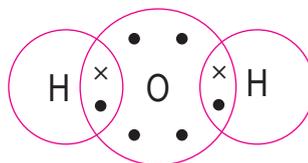
- (a) They have same functional group.
(b) Each successive member differs from the previous member by $-\text{CH}_2$ unit.

6. Draw the electron dot structure of (i) nitrogen and (ii) water molecule.

Ans. (i)



(ii)



7. An element of group 14 has two common allotropes, A and B. A is very hard and is bad conductor of electricity while B is soft to touch and good conductor of electricity. Identify the element and its allotropes. Explain reasons for their different properties.

Ans. The element is carbon. Its two allotropes are diamond (A) and graphite (B). Diamond has a three dimensional structure so it is hard. In diamond, each carbon atom is bonded to four other carbon atoms so no electron is free to conduct the current hence it is a bad conductor of electricity. On the other hand, in graphite the atoms are bonded in layers and each carbon atom is bonded to three other carbon atoms giving a hexagonal array. So, graphite is soft and good conductor of electricity.

8. Name the functional groups present in the following compounds



[NCERT Exemplar]

Ans. (i) Ketone

(ii) Carboxylic acid

(iii) Aldehyde

(iv) Alcohol

9. The formulae of four organic compounds are given below:



(i) Which one of these compounds A, B, C or D is a saturated hydrocarbon?

(ii) Name the functional group present in compound B.

(iii) Write the chemical formula of next two members of homologous series of compound A.

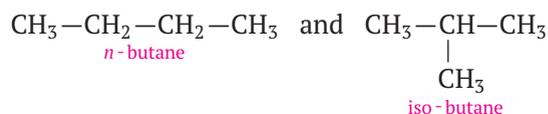
Ans. (i) 'D' is a saturated hydrocarbon.

(ii) Carboxylic acid

(iii) C_3H_6 , C_4H_8

10. What is meant by "structural isomers"? Give reason why propane (C_3H_8) cannot exhibit this characteristic. Draw the structures of possible isomers of butane (C_4H_{10}).

Ans. The pair of compounds having same molecular formula but different structural formula are called structural isomers. Propane does not have enough carbon atoms to arrange them as branching so it does not show structural isomerism. The isomers of butane are:



Chapter-2:

Periodic Classification of Elements

1. The image shows three set of elements.

W	
Symbol	Atomic Mass
N	14.0
P	31.0
As	74.9

X	
Symbol	Atomic Mass
Ca	40.1
Sr	87.6
Ba	137.3

Y	
Symbol	Atomic Mass
C	12
N	14
O	16

Z	
Symbol	Atomic Mass
Cl	35.5
Br	79.9
I	126.9

Which set of element follows the rule of Döbereiner's Triads and why?

Ans. X and Z form Dobereiner's triad.

The atomic mass of strontium = 87.6

Average atomic mass of calcium and barium = $(40.1 + 137.3)/2 = 88.7$

As, the atomic mass of strontium is roughly equal to the average masses of calcium and barium so Ca, Sr, Ba form Dobereiner's triad.

The atomic mass of bromine = 79.9

Average atomic mass of chlorine and iodine = $(35.5 + 126.9)/2 = 80.2$

As, the atomic mass of bromine is roughly equal to the average masses of chlorine and iodine so Cl, Br, I form Dobereiner's triad.

2. How chlorine, bromine, fluorine, cobalt and hydrogen be arranged in order to satisfy the concept of Newlands' Octaves?

Ans. Hydrogen, fluorine, chlorine, cobalt, bromine

3. The image shows the arrangement of the elements in the Mendelèev's Periodic Table done by a student. What is the error done by the student while arranging the elements? [HOTS]

Group	I	II	III	IV	V	VI	VII
Oxide	R ₂ O	RO	R ₂ O ₃	RO ₂	R ₂ O ₅	RO ₃	R ₂ O ₇
hydride	RH	RH ₂	RH ₃	RH ₄	RH ₃	RH ₂	RH
Periods	A B	A B	A B	A B	A B	A B	A B
↓							
1	H 1.008						
2	Na 22.99	Mg 24.31	Al 29.98	Si 28.09	P 30.974	S 32.06	Cl 35.453
3	Li 6.939	Be 9.012	B 10.81	C 12.011	N 14.007	O 15.999	F 18.998

Ans. The student exchanged the elements of the third period and second period.

4. How does the tendency of the elements to lose electrons change in the Modern Periodic Table in (i) a group, (ii) a period and why?

Ans. (i) In a group, the tendency to lose electrons increases because of increase in number of shells and less effective nuclear charge, the atomic size increases.

(ii) Along a period, the tendency to lose electrons decreases, due to increase in effective nuclear charge as atomic size decreases.

5. A student learns that the atomic size depends on the atomic radius of the elements. How does the atomic radius of elements in the third period change as one goes from sodium to argon? Give reason.

Ans. The atomic size decreases along the period from sodium to argon. In moving from left to right across the period, the charge on the nucleus increases by one unit (due to increase in atomic number), but the additional electron goes to the same shell. As a result, outer electrons are pulled in closer to the nucleus. This causes the decrease of atomic size.

6. The elements A, B, C, D and E have atomic number 9, 11, 17, 12 and 13 respectively. Which pair of elements belong to the same group?

Ans. The electronic configuration of A(9) : 2, 7

The electronic configuration of B(11) : 2, 8, 1

The electronic configuration of C(17) : 2, 8, 7

The electronic configuration of D(12) : 2, 8, 2

The electronic configuration of E(13) : 2, 8, 3

As the valence electrons in A and C are same, they belong to the same group number 17.

7. The element with atomic number 14 is hard and forms acidic oxide and a covalent halide. Is it a metal, non-metal or metalloid? Justify your answer.

Ans. Element with atomic no. 14 is silicon and is a metalloid. It forms acidic oxide, thus behaving as a non-metal and also forms covalent halide, thus acting as a metal.

8. "Atomic number of an element is considered to be a more appropriate parameter than its atomic mass for a chemist." Take the example of the element X (atomic number 13) to justify this statement.

Ans. The properties of an element depends on its valence electrons which can be calculated with the help of atomic number not atomic mass. Also, it tells about the group and period to which the element belongs. The number of shells tells the period number and the group number depends on the number of valence electrons. The atomic number of given element is 13. Electronic configuration is 2,8,3. Its valence electrons is 3. So, its group number is (10+3=13) and period number is equal to number of shells *i.e.*, 3.

9. An element 'X' (Atomic number = 20) burns in the presence of oxygen to form a basic oxide.

(i) Identify the element and write its electronic configuration.

(ii) State its group number and period number in the Modern Periodic Table.

(iii) Write a balanced chemical equation for the reaction when this oxide is dissolved in water.

[CBSE (F) 2016]

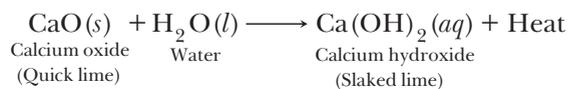
Ans. (i) Element X is Calcium (Ca)

Electronic configuration - 2, 8, 8, 2

(ii) Group number = 2nd

Period number = 4th

(iii) When quicklime or calcium oxide (CaO) reacts with water, slaked lime [Ca(OH)₂] is formed. During this reaction a large amount of heat is released. So, this reaction is an exothermic reaction.



10. Answer the following questions based on the elements with atomic number 3 to 9:

[CBSE 2019 (31/5/3)]

- (i) Name the element with smallest atomic radius.
- (ii) Name the element which shows maximum valency.
- (iii) Name the element which is a metalloid.
- (iv) Name the element which is most electropositive.
- (v) Write the chemical formula of the compound formed when the elements of atomic number 6 and 8 react together.

- Ans.**
- (i) Fluorine
 - (ii) Carbon
 - (iii) Boron
 - (iv) Lithium
 - (v) CO_2



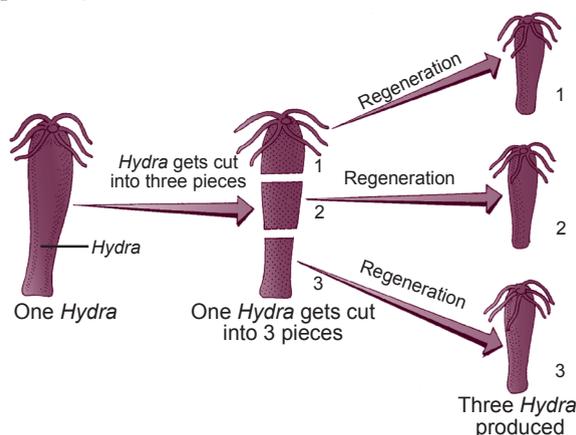
1. What is puberty? What do you understand by secondary sexual characters?

Ans. As the rate of general body growth begins to slow down, reproductive tissues begin to mature. This period during adolescence is called puberty.

The sex hormones cause the reproductive organs to develop fully and result in the development of secondary sexual characteristics. For example, growth of hair in armpits and pubic region are secondary sexual characteristics in both boys and girls.

2. Explain the phenomenon of regeneration with the help of a diagram. How is regeneration different from reproduction?

Ans. Regeneration is the ability of an organism to replace its damaged or lost body parts. It can be seen in *Hydra*, *Planaria*, earthworms, starfish, etc. If *Hydra* is cut into two or more pieces each body piece reconstitutes into a new and complete individuals of smaller size. Regeneration in *Hydra* is due to totipotency of interstitial cells.



	Regeneration		Reproduction
1.	No new individual organism is produced.	1.	New individual organisms are produced.
2.	It is mostly seen in organisms with complex body designs.	2.	It is seen in all living organisms.

3. What is menstrual cycle? Describe in brief the changes occurring in a woman during menstrual cycle.

Ans. Female sexual cycle is called menstrual cycle which occurs regularly and periodically after every 28 days or a month.

From day 5 to 14 of menstrual cycle the Graffian follicle in ovary grows and matures. It starts releasing the hormone estrogen. The endometrium (inner lining of uterus) starts thickening and there is increased blood supply to it. Luteinising hormone (LH) is released from the pituitary gland. This initiates release of ovum from the ovary (ovulation). By now the endometrium is thick, moist and rich in blood capillaries. If ovum is not fertilized, the entire endometrial lining sloughs down, capillaries break down causing bleeding.

4. What is contraception? List three advantages of adopting contraceptive measures.

Ans. The prevention of pregnancy in women (by preventing fertilization) is called contraception. Advantages of adopting contraceptive devices:

- (i) Prevents spread of sexually transmitted diseases.
- (ii) Maintains population and prevent population explosion.

(iii) Unwanted and teen pregnancies can be avoided.

(iv) Family can be planned by individuals

(any three)

5. What is the site of fertilisation in plants? What are the products of fertilisation?

Ans. In plants fertilization takes place in the embryo sac in pistil. Fertilisation results in formation of diploid zygote and triploid primary endosperm nucleus.

6. Differentiate between the fission of *Leishmania* and *Plasmodium*.

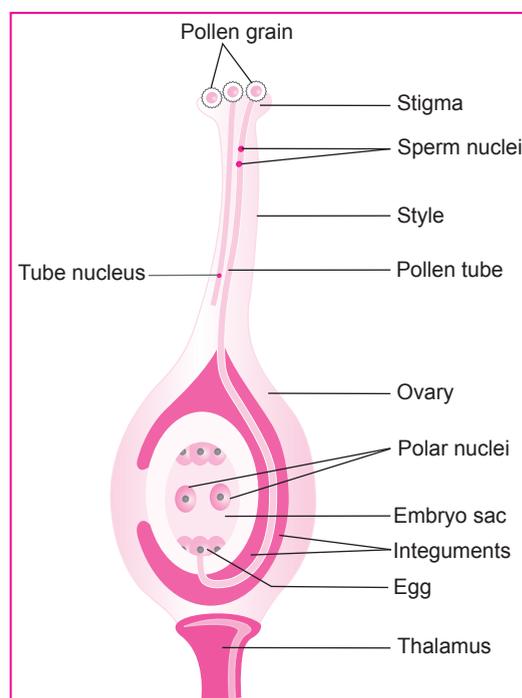
Ans. In *Leishmania*, reproduction is through binary fission which results in formation of two daughter cells. *Plasmodium* reproduces by multiple fission, in which the parent body divides into many daughter cells.

7. How are general growth and sexual maturation different from each other? [NCERT Exemplar]

Ans. General growth refers to different types of developmental processes in the body like increase in height, weight gain, changes in shape and size of the body. But sexual maturation is specific to changes reflected at puberty like cracking of voice, new hair patterns in males and development of breasts in females, etc.

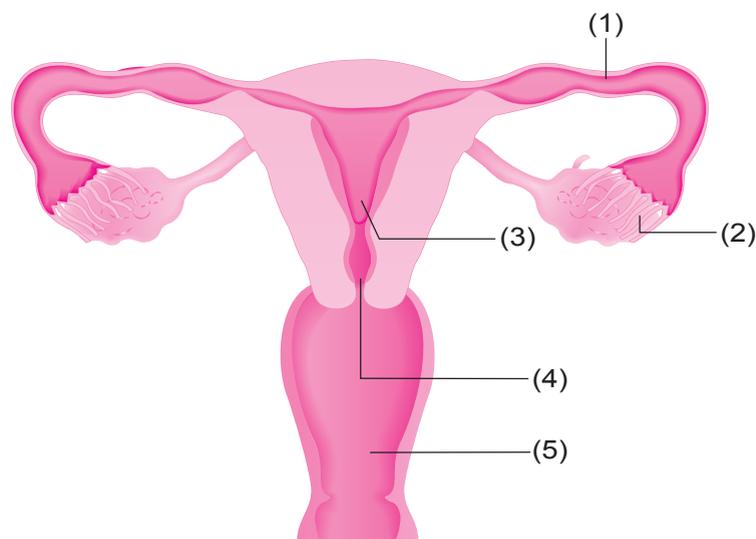
8. Distinguish between pollination and fertilisation. Mention the site and product of fertilisation in a flower. Draw a neat, labelled diagram of a pistil showing pollen tube growth and its entry into the ovule. [NCERT Exemplar]

Ans. The process or mechanism of transfer of pollen grains from the anther to the stigma is termed as pollination. The fusion of male and female gametes giving rise to zygote is termed fertilisation. The site of fertilisation is ovule. The product of fertilisation is zygote.



Fertilisation showing pollen tube growth

9. (i) Identify the given diagram. Name the parts 1 to 5.



- (ii) What is contraception? List three advantages of adopting contraceptive measures.

[CBSE 2019 (31/1/1)]

Ans. (i) 1- fallopian tube, 2-ovary, 3-uterus, 4-cervix, 5-vagina.

(ii) Same as Ans. 4 above

10. What is menstrual cycle? Describe different changes during the menstrual cycle occurring in a woman.

Ans. Same as **Ans. 3** above



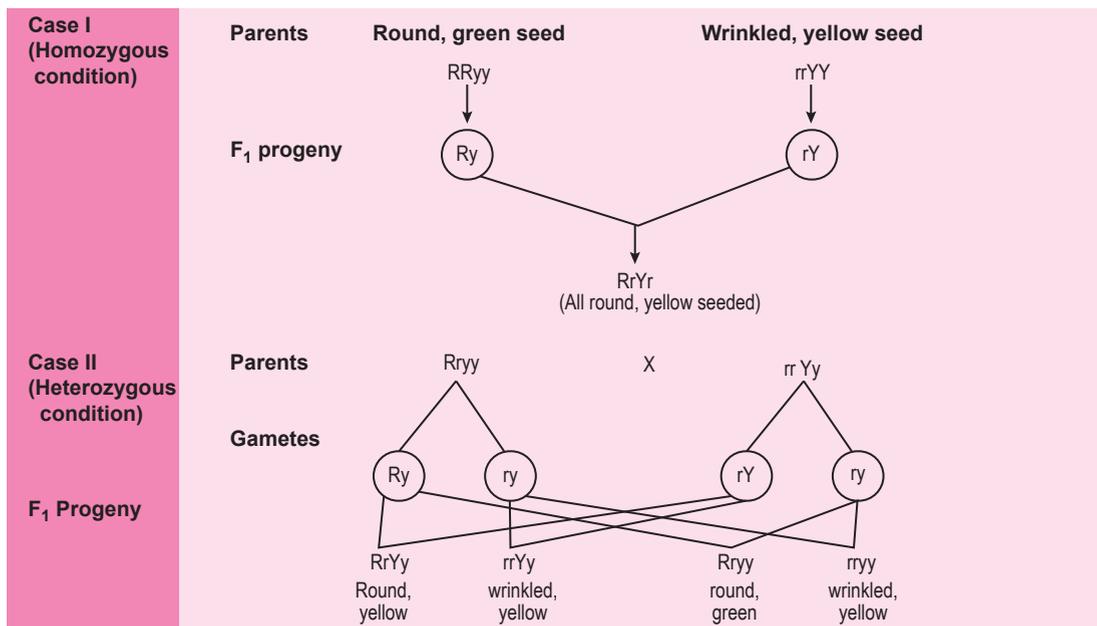
1. Which characters of the pea plant did Mendel consider for his experiments?

Ans. Mendel considered the following characters of the pea plant:

- (i) Seed shape
- (ii) Cotyledon colour
- (iii) Flower colour
- (iv) Pod shape
- (v) Pod colour
- (vi) Position of flower
- (vii) Stem length

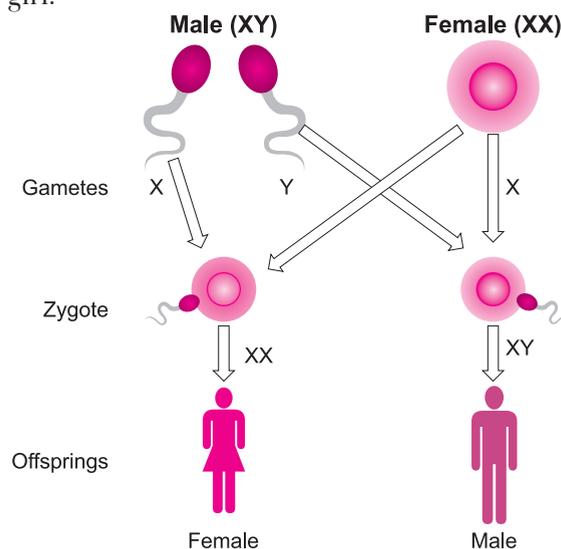
2. If a round, green seeded pea plant is crossed with wrinkled, yellow seeded pea plant, what will be the F₁ progeny? Depict with a cross.

Ans.



3. How can the sex of human offspring be determined?

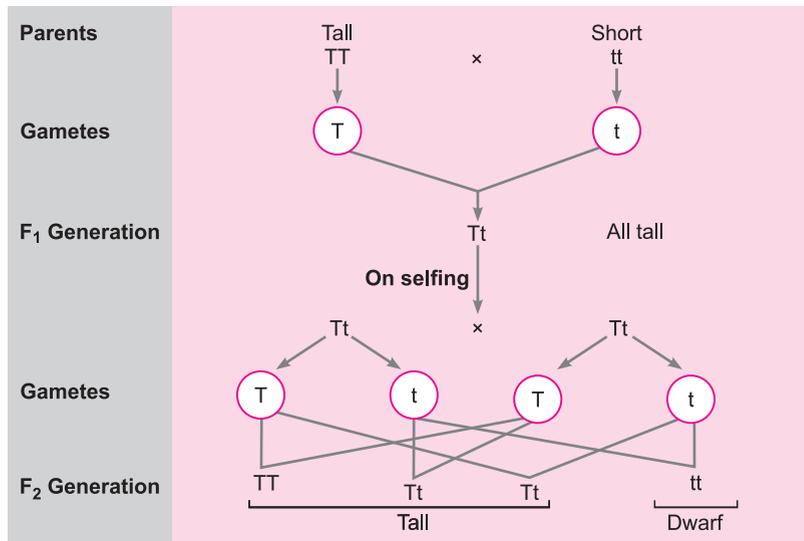
Ans. In human beings, sex of the child depends upon which kind of male gamete fertilises the female gamete. If sperm carrying X chromosome fertilises the ovum carrying X chromosome, then the child born will be a girl.



If a sperm carrying Y chromosome fertilises the ovum which carries X chromosome, then the child born will be a boy.

4. If we cross pure-bred tall (dominant) pea plant with pure-bred dwarf (recessive) pea plant we will get pea plants of F_1 generation. If we now self-cross the pea plant of F_2 generation, then we obtain pea plants of F_2 generation.
- What do the plants of F_2 generation look like?
 - State the ratio of tall plants to dwarf plants in F_2 generation.
 - State the type of plants not found in F_1 generation but appeared in F_2 generation, mentioning the reason for the same.

Ans.



- All plants are tall
- 3:1
- Dwarf plants reappeared in F_2 generation. This is because in F_1 generation two different alleles had come together, so only the dominant allele expressed itself. But in F_2 generation the different alleles segregated and assorted to express the recessive trait too.

5. What do you understand by dominant and recessive traits?

Ans. Dominant traits are those which express themselves in the F_1 generation.

Recessive traits are those traits which remain hidden or do not express themselves in the F_1 generation.

6. How do Mendel's experiments show that the

- traits may be dominant or recessive
- traits are inherited independently?

Ans. (i) When Mendel cross-pollinated pure tall pea plants with pure dwarf pea plants, only tall plants were obtained in F_1 generation. On self-pollinating the F_1 progeny, both tall and dwarf plants appeared in F_2 generation in the ratio 3 : 1.

Appearance of tall character in both the F_1 and F_2 shows that it is a dominant character. The absence of dwarf character in F_1 generation and its reappearance in F_2 shows dwarfness is the recessive character.

- When Mendel first crossed pure-bred pea plants having round-yellow seeds with pure-bred pea plants having wrinkled-green seeds, he found that only round-yellow seeds were produced in the first-generation. No wrinkled-green seeds were obtained in the F_1

generation. From this, it was concluded that round shape and yellow colour of the seeds were dominant traits over the wrinkled shape and green colour of the seeds.

When the F_1 generation pea plants having round-yellow seeds were cross-bred by self-pollination, then four types of seeds having different combinations of shape and colour were obtained in second generation (F_2). These were round-yellow, round-green, wrinkled-yellow and wrinkled-green seeds. Such a cross is known as dihybrid cross as two sets of corresponding characters are considered.

Mendel observed that along with round-yellow and wrinkled-green, two new combinations of characteristics, round-green and wrinkled-yellow, had appeared in the F_2 generation. On the basis of this observation, Mendel concluded that though the two pairs of original characteristics (seed colour and shape) combine in the F_1 generation, they get separated and behave independently in the subsequent generation.

7. What is meant by expression TT and Tt in Mendelian terms?

Ans. In Mendelian terms TT represents homozygous dominant pure breed variety and Tt represents heterozygous variety.

8. What is the contribution of Mendel to genetics?

Ans. Mendel is known as the 'Father of Genetics'. He formulated the basic rules of inheritance of traits. He worked on garden pea and gave the following laws of inheritance which are followed till date:

(i) Law of dominance

(ii) Law of segregation

(iii) Law of independent assortment

9. Bacteria have a simpler body plan when compared with human beings. Does it mean that human beings are more evolved than bacteria? Provide a suitable explanation. *[NCERT Exemplar]*

Ans. This is a debatable issue. If appearance of complexity is concurrent with evolution then, human beings are certainly more evolved than bacteria. But if we take the totality of life characteristics into account, then it is hard to label either organism as evolved.

[**Note:** This question is only given for knowledge. It will not be evaluated in the CBSE Board Exam]

10. (i) Define a gene.

(ii) Define alleles.

Ans. (i) Gene is the basic physical and functional unit of heredity which determines the characteristics of offspring.

(ii) Allele refers to the alternate forms of a gene. Different alleles of a gene give rise to different expressions of a character.



1. How is the direction of electric current related to the direction of flow of electrons in a wire?

Ans. The direction of electric current in a wire is just opposite to the direction of flow of electrons in the wire.

2. List any two differences between a voltmeter and an ammeter.

Ans.

S.No.	Ammeter	Voltmeter
1.	Ammeter measures electric current in the circuit.	Voltmeter measures the potential difference between two points of a conductor.
2.	It is connected in series in an electric circuit.	Voltmeter is connected in parallel across the ends of a conductor or resistor.

3. How does the resistance of a wire vary with its cross-sectional area?

Ans. Resistance of a wire is inversely proportional to its cross-sectional area. More is the cross-sectional area of a conductor, less is the resistance of the conductor.

4. You have a metal, an insulator and an alloy. Write these substances in the ascending order of their electrical resistivity.

Ans. Resistivity of metal < resistivity of alloy < resistivity of insulator

5. What is heating effect of electric current?

Ans. The production of heat in a conductor due to the flow of electric current through it is called heating effect of electric current.

6. Name the physical quantity expressed as the product of potential difference and electric current.

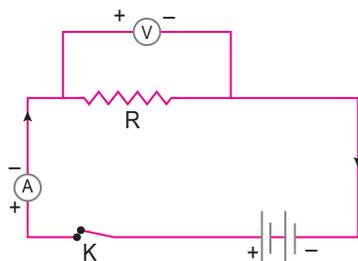
Ans. Electric power, *i.e.*, $P = VI$

7. Mention the condition under which charge can move in a conductor. Name the device which is used to maintain this condition in an electric circuit. [CBSE 2012, 2013]

Ans. The ends of the conductor must be maintained at different voltages. This condition is maintained in a conductor by a cell or a battery.

8. How is an ammeter and a voltmeter connected in a circuit and why?

Ans.



An ammeter is always connected in series with a circuit as shown in figure. It is so because all the current which we want to measure must pass through the ammeter. A voltmeter is connected in parallel to the component across which we want to measure the potential difference. It is so because the terminals of the voltmeter should be connected to the points between which we want to measure the potential difference.

9. Why is parallel arrangement used in domestic wiring?

Ans. Parallel arrangement is used in domestic wiring because:

- (i) In parallel circuit, if one electrical appliance stops working due to some defect, then all other appliances keep working normally. In series circuit, if one electrical appliance stops working due to some defect, then all other appliances also stop working.

- (ii) In parallel circuits, each electrical appliance gets the same voltage as that of the power supply line. In series circuit, appliances do not get the same voltage as that of the power supply line.
- (iii) In the parallel connection of electrical appliances, the overall resistance of the household circuit is reduced due to which the current from the power supply is high. In the series connection, the overall resistance of the circuit increases too much due to which the current from the power supply is low.

10. What is electrical resistivity of a material? What is its unit? Describe an experiment to study the factors on which the resistance of conducting wire depends.

Ans. The resistivity of a material is numerically equal to the resistance offered by the opposite faces of a cube of that material of side 1 m.

$$R = \rho l/A$$

$$\rho = RA/l$$

The unit of resistivity = $\frac{\text{metre}^2 \times \text{ohm}}{\text{metre}} = \text{ohm metre } (\Omega \text{ m})$

The factors on which the resistance of conducting wire depends are:

- Length of the wire
- Cross sectional area of the wire
- Nature of material of the conductor
- Temperature

11. What is likely to happen and how it would affect the value of resistance if we pass the current for a longer time? [CBSE 2014]

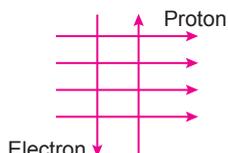
Ans. When current is passed through a conductor for a longer time, the conductor is heated due to Joule's heating effect. Resistance of conductor increases with increase in temperature due to heating effect.



1. The strength of magnetic field inside a long current carrying straight solenoids is same at all the points. Justify this statement.

Ans. Inside the solenoid the magnetic field lines are parallel to each other forming a uniform field strength which indicates that the magnetic field is the same at all points inside the solenoid.

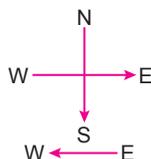
2. A uniform magnetic field exists in the plane of paper pointing from left to right as shown in figure. In the field, an electron and proton are shown. What will be the direction of force experienced by electron and proton?



Ans. The proton and electron are moving in opposite directions to each other and is perpendicular to the direction of magnetic field. Now, we know that the direction of current is taken opposite to the motion of electron.

So, both electron and proton have current in same direction. Therefore, they experience forces pointing into the plane of paper.

3. A constant current flows in a horizontal wire in the plane of the paper from East to West as shown in figure alongside. At which point, the direction of magnetic field will be North to South and explain the rule used to determine it.



Ans. The magnetic field is directed from North to South for any point below the wire. The direction of magnetic field in straight current carrying wire is determined by right hand thumb rule.

4. Name an instrument in which the directive property of a magnet is used and give its one use.

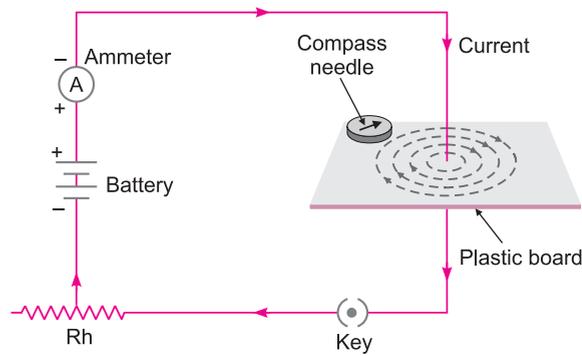
Ans. Compass is an instrument in which the directive property of magnet is used. It is mainly used in ships for navigation and orientation.

5. What is a solenoid and how is it different from a coil?

Ans. A coil is a normal bundle of wire wrapped circularly, whereas a solenoid is the circular coil of insulated wire which acts as a magnet when electric current flows through it.

6. (i) Draw magnetic field lines produced around a current carrying straight conductor passing through a cardboard. Name state and apply the rule to mark the direction of these field lines.
(ii) How will the strength of the magnetic field change when the point where magnetic field is to be determined is moved away from the straight wire carrying constant current? Justify your answer.

Ans. (i) Right hand thumb rule gives the direction of magnetic field lines which states that if thumb points along the direction of current, then the direction of wrapped fingers will give the direction of magnetic field lines.



(ii) Using compass needle.

When we move away from wire, the deflection of the needle decreases which implies the strength of magnetic field decreases.

7. Two fuse wires of same length are rated 5 A and 20 A. Which of the two fuse wires is thicker and why?

Ans. The fuse wire rating 20 A is thicker because current is inversely proportional to resistance. Lesser the resistance more current will be allowed through the fuse wire. Since the resistance of thicker wire is less. Hence, it will allow more current.

8. A student fixes a sheet of white paper on a drawing board. He places a bar magnet in the centre of it. He sprinkles some iron filings uniformly around the bar magnet. Then he taps the board gently and observes that the iron filings arrange themselves in a particular pattern.

(i) Why do the iron filings arrange in a pattern?

(ii) What does the crowding of iron filings at the end of the magnet indicate?

(iii) What does the lines along which the iron filings align represent?

(iv) Draw a neat diagram to show the magnetic field lines around a bar magnet.

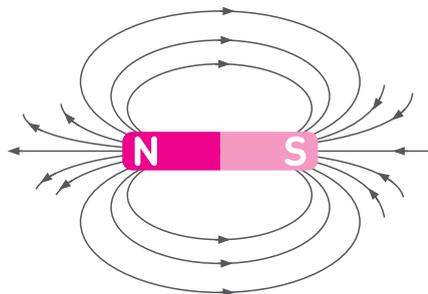
(v) Write any two properties of magnetic field lines.

Ans. (i) Iron filings arrange themselves in a pattern due to the presence of magnetic field around the magnet which exerts a force on the filing in a particular direction.

(ii) It indicates that magnetic field is stronger near the ends of magnet.

(iii) Magnetic field lines

(iv)



(v) (a) Magnetic field lines always form closed and continuous curves.

(b) Magnetic field lines never intersect each other.

9. Answer the following questions:

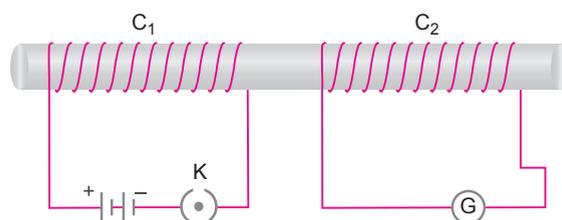
(i) A stationary charge is placed in a magnetic field. Will it experience a force? Give reason to justify your answer.

- (ii) On what factors does the direction of force experienced by a conductor when placed in a magnetic field depend?
- (iii) Under what conditions is the force experienced by a current carrying conductor placed in a uniform magnetic field maximum?
- (iv) Name and state the rule which gives the direction of force experienced by a current carrying conductor placed in a magnetic field.

- Ans.**
- (i) No it will not experience any force because stationary charge do not constitute any current.
 - (ii) The direction of force depends on the direction of current in the conductor and the direction of Magnetic field.
 - (iii) The force is maximum when the length of the conductor is perpendicular to magnetic field.
 - (iv) Fleming's left-hand rule.

Stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular to one another. If the forefinger points in the direction of magnetic field and the middle finger in the direction of current, then the thumb will point in the direction of motion or the force acting on the conductor.

- 10.** Two coils C_1 and C_2 are wrapped around a non conducting cylinder. Coil C_1 is connected to a battery and key and C_2 with galvanometer G . On pressing the key (K), current starts flowing in the coil C_1 . State your observation in the galvanometer.



- (i) When key K is pressed on.
- (ii) When current in the coil C_1 is switched off.
- (iii) When the current is passed continuously through coil C_1 .
- (iv) Name and state the phenomenon responsible for the above observations. Write the name of the rule that is used to determine the direction of current produced in the phenomena.

- Ans.**
- (i) Galvanometer shows a momentary deflection.
 - (ii) Galvanometer shows a momentary deflection in opposite direction.
 - (iii) No deflection in galvanometer.
 - (iv) The phenomenon responsible is Faraday's law of electromagnetic induction. According to this law, whenever the magnetic field lines linked with a coil change due to relative motion of a magnet and the coil, an induced current is produced in the coil. The magnitude of induced current is directly proportional to the rate of change of number of magnetic field lines linked to the coil.
- Fleming's right hand rule is the rule that is used to determine the direction of current produced in the phenomena.



1. Classify the following into abiotic and biotic components:

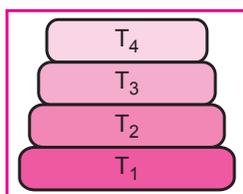
Rain, water, butterfly, air, grass, bacteria, fungi, sunlight

Ans. Abiotic components: Rain, water, air, sunlight ; Biotic components: butterfly, grass, bacteria, fungi

2. How do free oxygen atoms form at higher levels of atmosphere?

Ans. An oxygen molecule (O_2) is ionized into two free oxygen atoms by high energy UV radiations. The high energy UV radiations split apart molecular oxygen into free oxygen (O) atoms.

3. In the given figure the various trophic levels are shown in a pyramid. At which trophic level is maximum energy available and why?



Ans. Highest energy is available at the first trophic level, T_1 . According to the ten per cent law the energy available at each successive trophic level is 10% of the previous level. Thus, there is a gradual decline in the amount of energy available from the first trophic level to the last.

4. Select the mis-matched pair in the following and correct it.

(i) Biomagnification — Accumulation of chemicals at the successive trophic levels of a food chain

(ii) Ecosystem — Biotic components of environment

(iii) Aquarium — A man-made ecosystem

(iv) Parasites — Organisms which obtain food from other living organisms

Ans. The mismatched pair is: (ii) Ecosystem — Biotic components of environment.

Correction: Ecosystem – Both biotic and abiotic components of environment.

5. (i) Why should National Parks be allowed to remain in their pristine form?

(ii) Why is reuse of material better than recycling?

[CBSE 2019 (31/5/1)]

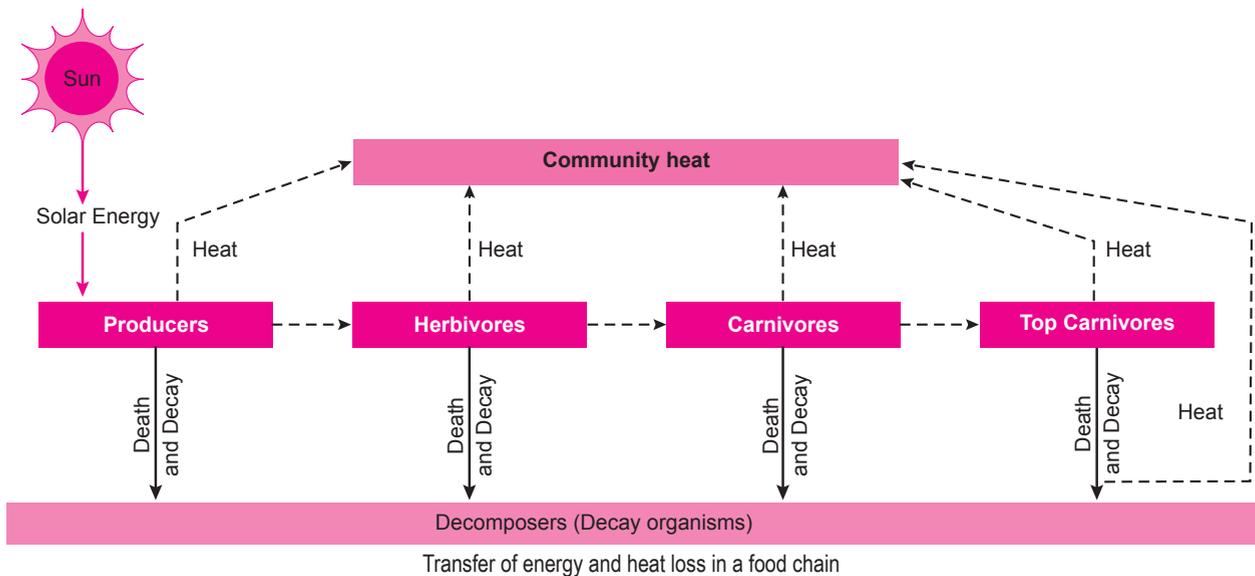
Ans. (i) [Question belongs to chapter 8] National parks should be allowed to remain in their pristine form because they preserve the habitat of animals and birds in their natural habitat, without human interference, as they are self-sustainable. This in turn maintains the ecological balance.

(ii) Reuse is better than recycling as it does not consume energy.

6. Define an ecosystem. Draw a block diagram to show the flow of energy in an ecosystem.

[CBSE 2019 (31/1/1)]

Ans. A unit of biosphere in which biotic and abiotic components interact with each other is an ecosystem.



7. What is meant by trophic level in a food chain? Construct a terrestrial food chain with four trophic levels. The energy flow in a food chain is always unidirectional. Why?

[CBSE 2019 (31/5/1)]

Ans. Each step or level of a food chain where transfer of energy occurs are called trophic levels.

Grass → Insect → Frog → Snake

Energy flow in a food chain is always unidirectional because:

- (i) An average of 10% of the food eaten is turned into its own body and made available for the next level of consumers.
 - (ii) The energy that is captured by the autotrophs does not revert back to the solar input.
 - (iii) The energy which is passed to the herbivores does not come back to the autotrophs.
 - (iv) As it moves progressively through the various trophic levels it is no longer available to the previous level.
8. In a village of South India people started cultivating crops all around a lake. They added fertiliser of their field in order to enhance the yield. Soon after it was discovered that the water body was completely covered with green floating plants and the aquatic animals started dying in large number.

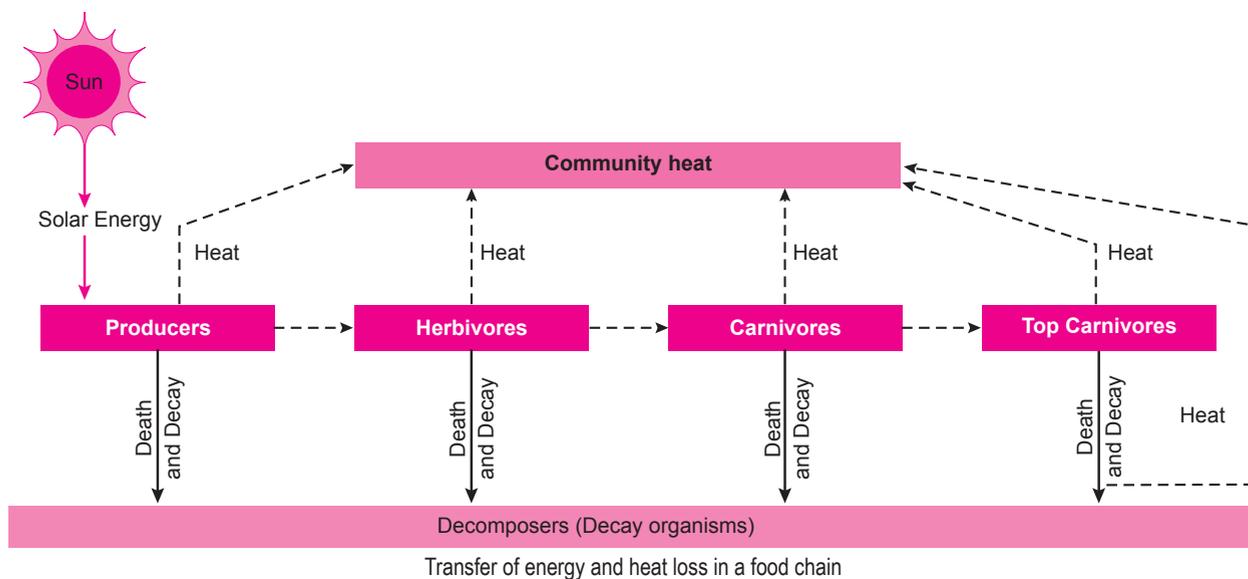
Analyse the situation and state reasons for the excessive growth of plants and death of aquatic animals in the lake.

[CBSE 2019 (31/3/2)]

Ans. [Question belongs to chapter 8] Since people used excessive fertilisers in the fields, they were carried down to the lake during rains. As many fertilisers contain phosphates and nitrates, the water body became enriched with these chemicals. These chemicals promote excessive growth of aquatic plants and the surface of water was completely covered with plants (eutrophication). Depletion of light in the water body and insufficient availability of dissolved oxygen and nutrients resulted in the death of fish.

9. (i) Draw a line diagram to show flow of solar energy in ecosystem.
 (ii) Why is the government stressing upon the use of jute/cloth carry bags?
 (iii) List any two artificial ecosystems.

Ans. (i)



(ii) The government is stressing upon use of jute/cloth bags because:

1. They are biodegradable in nature
2. They can be reused, thus producing less waste

(iii) Aquarium and garden are artificial ecosystems.

10. (i) Which gas shields the surface of the Earth from the harmful UV-radiations from the Sun?

(ii) Mention one example each of biotic and abiotic components of ecosystem.

(iii) Identify which one of the following would have hazardous impact if it persists in the environment for a longtime.

Plastic, vegetable waste, steel utensils.

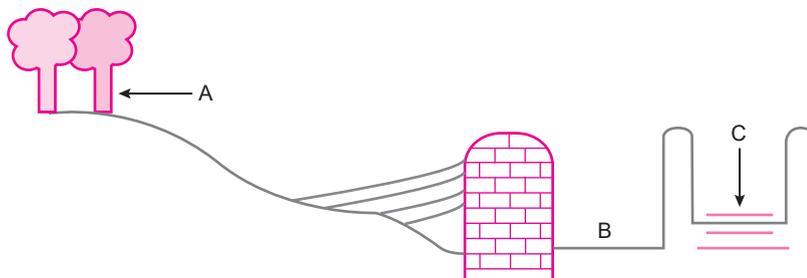
Ans. (i) Ozone

(ii) Biotic – grass; Abiotic: water

(iv) Plastic.



1. A diagram of traditional water harvesting system is given below:



Identify the system and the labelled parts A, B and C.

Ans. The system is Khadin. A: Catchment area, B- Saline area, C- Shallow dugwell.

2. Why is it important to make small check dams across the flooded gullies?

Ans. It is important to make small check dams across the flooded gullies because they recharge ground water and hold the water permanently.

3. Switching off unnecessary lights and fans and repairing leaking taps correctly defines which term of 5R's?

Ans. These define 'Reduce'. This means reducing the waste of resources to save them.

4. Give two examples of sustainable development in order to conserve natural resources for the future generation.

Ans. (i) Saving electricity by turning off electrical appliances and lights when not in use.
(ii) Segregating wastes and recycling them.

5. Why are the Arabari forests of Bengal known to be a good example of conserved forest?

Ans. The forest department developed a strategy in which the villagers were involved in the protection of the forest. In return for the labour, the villagers were paid and also had some benefit in harvesting operations. They were allowed to collect wood and fodder on payment of nominal fee. In this way, by the active and willing participation of the local people, the Sal forests of Arabari were conserved.

6. List four advantages of properly managed watershed management.

[CBSE Delhi 2016]

Ans. Advantages of watershed management:

- (i) It strictly maintains the water quality.
- (ii) It helps in equal and sustainable distribution of water.
- (iii) It provides protection from floods by controlling the flow of rainwater.
- (iv) It helps in enhancing the level of groundwater

7. What is a dam? Why do we seek to build large dams? While building large dams, which three main problems should particularly be addressed to maintain peace among local people? Mention them.

[CBSE 2018]

Ans. Dams are large constructions over a big river which can ensure the storage of adequate water, not just for irrigation but also for generating electricity.

Advantages of dams:

- (i) control of flood
- (ii) water available for irrigation
- (iii) production of electricity
- (iv) alleviation of water scarcity

(v) availability of water over long distances

Following problems should be addressed:

- (i) Unequal distribution of water should be checked
- (ii) People should not be displaced
- (iii) Water logging problems should be checked.

8. What is the importance of forest as a resource?

[NCERT Exemplar]

Ans. Forests are renewable resources which

- (i) provide habitat, food and protection to wildlife,
- (ii) help in balancing CO₂ and O₂ of atmosphere,
- (iii) improve water holding capacity of soil,
- (iv) regulate water cycle,
- (v) are the source for all essential commodities like fuel wood, timber, pulp and paper, etc., for human beings,
- (vi) provide useful products like fruits, resins, gums, essential oils, etc.

9. Explain the five R's for conserving the environment.

Ans. By pursuing the five 5R's, *i.e.*, Refuse, Reduce, Recycle, Repurpose and Reuse we can be environment friendly.

- (i) **Refuse:** It means to say 'No' to waste or to things that cause harm to environment. For example, saying no to the use of any plastic kitchenware at home, not using fluorescent bulbs and lights, etc.
- (ii) **Reduce:** It means to use less. I would save electricity by switching off unnecessary lights and fans, prefer walking on cycling than using an automobile, turn off the engine of car at red light, repair leaky taps, and would not waste food etc.
- (iii) **Recycle:** Means to collect used things like plastic, paper, glass and metal items and recycle these materials to make required things instead of synthesising or extracting fresh plastic, paper, glass or metal.
- (iv) **Reuse:** Refers to use things again and again. For example, instead of throwing away used envelopes, they can be used by reversing.
- (v) **Repurpose:** It means to upcycle *i.e.*, altering something you already have. So to use it for something different. Like turning old clothes into cleaning rags, using cartons, containers for storing, etc.

10. (i) Is water conservation necessary? Give reasons.

(ii) List two advantages associated with water harvesting at the community level.

Ans. (i) The total amount of fresh water is more than enough to meet the needs of human beings. But its uneven distribution, wide seasonal as well as yearly fluctuation in rainfalls and water shortage are chronic problems in most parts of the world. To overcome these issues, water conservation is a necessity.

(ii) Advantages of water harvesting at community level:

- (a) Recharges ground water
- (b) Mitigates floods and droughts
- (c) Brings rivers and wells back to life and makes more water available.

(Any two)

