ICSE 2025 EXAMINATION

Sample Question Paper - 12

BIOLOGY

Time: 2 hrs. **Total Marks: 80**

General Instructions:

1. *Answers to this paper must be written on the paper provided separately.*
2. *You will be not allowed to write during first 15 minutes.*
3. *This time is to be spent in reading the question paper.*
4. *The time given at the head of this paper is the time allowed for writing the answers.*

Section A** is compulsory. Attempt any **four questions** from **Section B.

The intended marks for questions or parts of questions are given in brackets [ ]

SECTION A

(Attempt all questions from this Section.)

Question 1

Choose the correct answers to the questions from the given options.

(Do not copy the question, write the correct answer only.) **[15]**

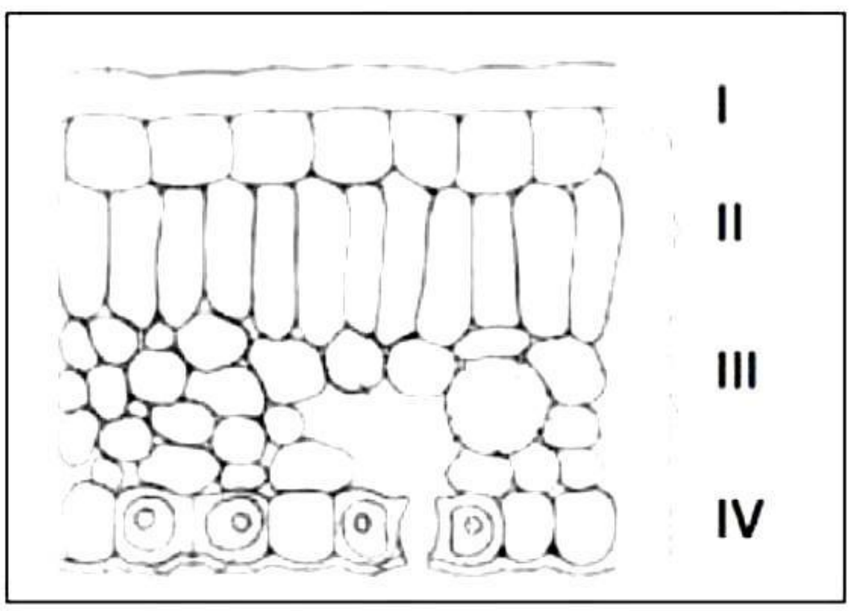
(i) After a wound or a cut in the body, the blood coagulates through the

1. WBCs
2. RBCs
3. Platelets
4. Plasma

(ii) **Assertion (A):** The testes are located in the scrotal sacs outside the abdomen.
Reason (R): It allows the production and maturation of sperms.

1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

(iii) Sahil was asked to draw the transverse section of the leaf during his practical exams. He sketched the below diagram.



Identify the layer of cells where maximum photosynthesis occurs.

1. I, II
2. II, III
3. III, IV
4. I, IV

(iv) The cell component visible only during cell division is the

1. Centrosome
2. Chromosome
3. DNA
4. Nucleosome

(v) The β-cells of the pancreas secrete the hormone insulin. Mr. Sharma is suffering from malfunctioning of the pancreas. Which of the following will be adversely affected in Mr. Sharma's body?

1. Regulation of calcium level
2. Digestion of fats
3. Metabolism of carbohydrates and proteins
4. Control of blood sugar level

(vi) The rate of photosynthesis is not affected by

1. Light intensity
2. Humidity
3. Temperature
4. CO_2 concentration

(vii) An example of bio-degradable waste is

1. Peels of vegetables
2. Grass
3. Paper
4. All of these

(viii) The normal gestation period in humans is

1. 270 days
2. 290 days
3. 280 days
4. 295 days

(ix) **Assertion (A):** The inner ear contains three tiny bones - malleus, incus, and stapes.
Reason (R): Three small bones of ear ossicles are advantageous as compared to one single bone for hearing.

1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

(x) When pregnancy does not occur, the life of the corpus luteum is about
1. 4 days
2. 10 days
3. 14 days
4. 28 days

(xi) The amount of light entering the eye can be controlled by the
1. Iris
2. Pupil
3. Cornea
4. Ciliary muscles

(xii) The cerebellum in the brain controls voluntary actions of the body.
Given below are few actions.
I. Beating of the heart
II. Walking
III. Blinking of the eyes
IV. Jumping from a height
Which of the above actions are controlled by the cerebellum?
1. I, II
2. II, III
3. III, IV
4. II, IV

(xiii) **Assertion (A):** DNA contains four types of nitrogenous bases – Adenine, Guanine, Cytosine and Uracil.
Reason (R): Adenine pairs with Thymine with two hydrogen bonds while Guanine pairs with Cytosine with three hydrogen bonds.
1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

(xiv) The state of a cell in which the cell wall is rigid and stretched by an increase in volume due to the absorption can be explained as
1. Flaccidity
2. Turgidity
3. Capillarity
4. Tonicity

(xv) **Assertion (A):** The cortex of a kidney tubule shows a 'dotted' appearance.
Reason (R): Henle's loop and collecting ducts lie in the cortex.
1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

Question 2

(i) Name the following: **[5]**

(a) Pair of chromosomes carrying dissimilar alleles for a particular character.

(b) The term used for Bowman's capsule and glomerulus together.

(c) Hormone which controls the basal metabolic rate.

(d) Chemicals leading to the formation of ozone hole.

(e) Number of persons per square kilometre at any given time.

(ii) Arrange and rewrite the terms in each group in the correct order so as to be in a logical sequence beginning with the term that is underlined. **[5]**

(a) <u>Upper epidermis</u>, Spongy cell, Stoma, Palisade tissue

(b) <u>Prophase</u>, Telophase, Anaphase, Metaphase

(c) <u>Vena cava</u>, Right ventricle, Pulmonary veins, Right auricle

(d) <u>Ovulation</u>, Implantation, Fertilisation, Parturition

(e) <u>Receptor</u>, Effector, Motor neuron, Sensory neuron

(iii) Match the items given in Column I with the most appropriate ones in Column II and rewrite the correct matching pairs. **[5]**

Column I	Column II
(a) Vasectomy	1. Methane
(b) Radioactive element	2. Female sterilisation
(c) Dark reaction	3. Uranium
(d) Tubectomy	4. Grana
(e) Greenhouse gas	5. Mercury
	6. Male sterilisation
	7. Stroma

(iv) Choose the odd one out from the following terms and name the category to which the others belong: **[5]**

(a) Cretinism, Myxoedema, Goitre, Scurvy

(b) Sulphur dioxide, Carbon dioxide, Methane, Water vapour

(c) Olfactory lobes, Cerebrum, Cerebellum, Diencephalon

(d) Tympanum, Macula, Cochlea, Utriculus

(e) Seismonasty, Hydrotropism, Geotropism, Phototropism

(v) State the exact location of the following structures. **[5]**

(a) Lenticels

(b) Thyroid gland

(c) Proximal convoluted tubule

(d) Bicuspid valve

(e) Pancreas

SECTION B

(Attempt any four questions from this section.)

Question 3

(i) Write the full form of the following abbreviations: [1]

(a) DNA (b) RNA

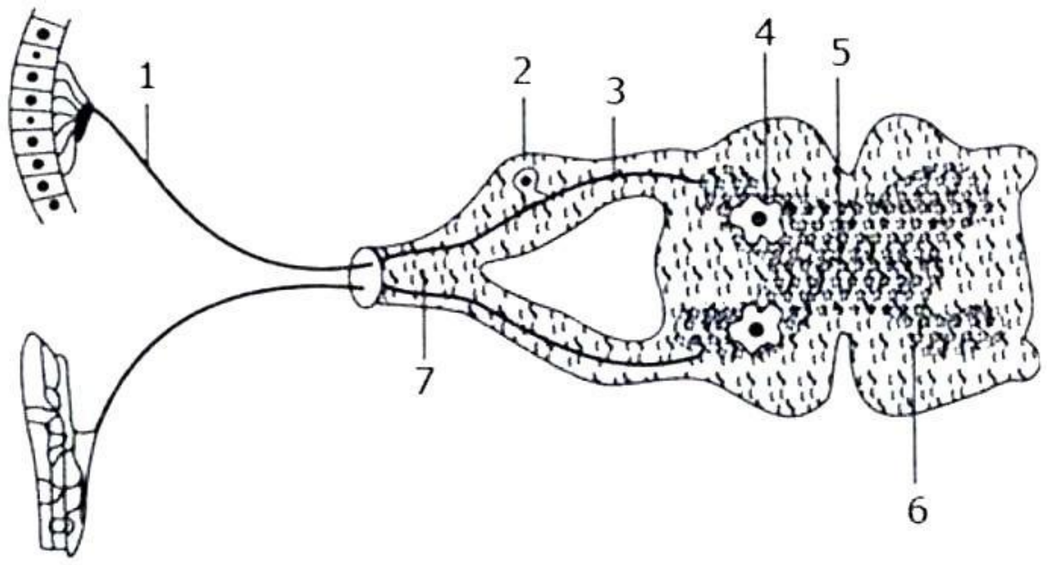
(ii) Root hair contains cell sap of a higher concentration than the surrounding soil water. How does it help in water absorption? [2]

(iii) Briefly explain how the rate of transpiration is affected by [2]

1. Intensity of light
2. Humidity of the atmosphere

(iv) List two features of garden pea with their dominant and recessive traits. [2]

(v) The diagram below depicts the cross-section of the spinal cord. Study the same and answer the questions which follow: [3]



1. Name the parts labelled 2, 5 and 6.
2. What is the technical term given to the pathway represented by 3, 4 and 7?
3. How does the arrangement of cells in the spinal cord differ from that in the brain?

Question 4

(i) Why is meiosis referred to as 'reductional division'? [1]

(ii) Draw a diagram of the different blood cells as seen in a smear of human blood. [2]

(iii) Study the diagram below and answer the following questions: [2]

a) Name the parts labelled 1, 2, 3 and 4.

b) What is the technical term given to the process occurring in 2 and 3?

(iv) Which apparatus is used to measure the phenomenon of transpiration in plants? What is the limitation of this apparatus? [2]

(v) Complete the following table by filling in the blanks from 1 to 6 with appropriate terms: [3]

Sr. No.	Gland	Secretion	Function/Effect on body
1.	1	Vasopressin	2
2.	Lacrimal gland	3	4
3.	Adrenal medulla	5	6

Question 5

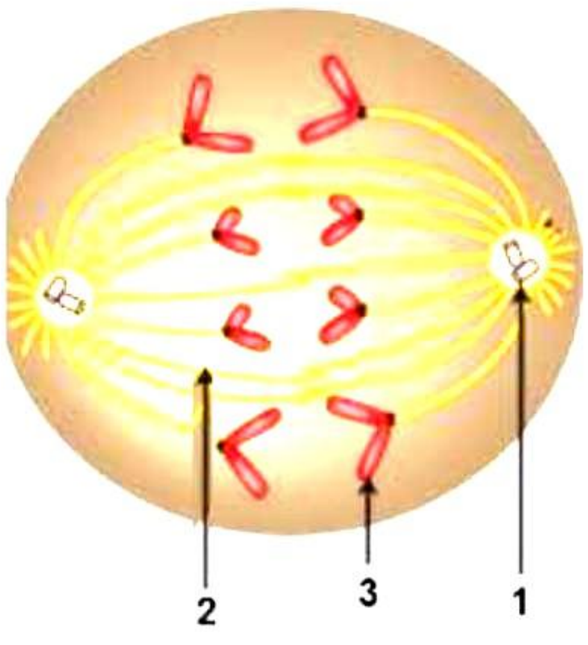
(i) The brain is ordinarily free from shock. Give reason. [1]

(ii) Erythrocytes are biconcave discs and lack mitochondria. Give one reason. [2]

(iii) What is photosynthesis? Write a well-balanced chemical equation for it. [2]

(iv) Explain the terms 'natural selection' and 'speciation.' [2]

(v) The diagram below represents a stage during mitotic cell division in an animal cell. [3]



(a) Identify the stage. Give a reason to support your answer.

(b) Name the parts labelled 1, 2 and 3.

(c) What is the chromosome number of the cell?

Question 6

(i) Name the pressure which helps in the movement of water up the xylem of the root.[1]

(ii) Mention two reasons for a sharp rise in 'human population' in the world. [2]

(iii) If one adrenal gland is removed, then the other one gets enlarged to some extent. Explain. [2]

(iv) Draw a neat and labelled diagram of the part of a plant showing leaf tendril. Name the plant. [2]

(v) With reference to the human ear, answer the following questions: [3]

(a) Give the technical term for the structure found in the inner ear.

(b) Name the three small bones present in the middle ear. What is the biological term for them collectively?

(c) Name the nerve which transmits messages from the ear to the brain.

Question 7

(i) What are the effects of water pollution caused by the metal mercury? [1]

(ii) Why does a person suffering from low blood pressure pass no urine or less urine?[2]

(iii) State two functions of the placenta. [2]

(iv) Give the dihybrid ratio. Name and state the law which explains the dihybrid ratio. [2]

(v) Mention three structural differences between the renal artery and the renal vein. [3]

Question 8

(i) What is an oil spill? [1]

(ii) Mention two reasons for a high birth rate in India. [2]

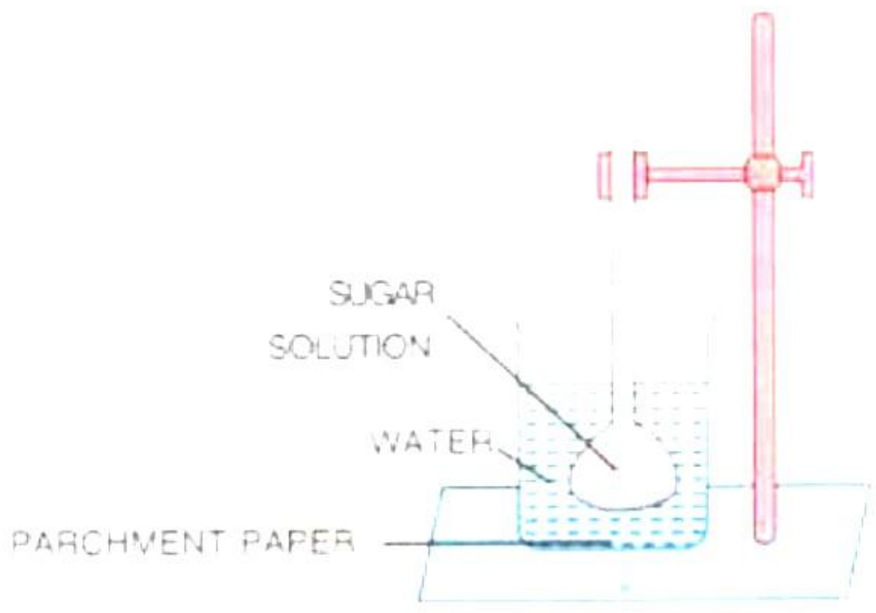
(iii) [2]

(a) Where is the foetus contained in the body?

(b) How does it differ from the embryo?

(iv) State any two harmful effects of acid rain. [2]

(v) The diagram given below represents an experimental set-up to demonstrate a certain process. Study the same and answer the questions that follow: [3]



(a) Name the process.

(b) What would you observe in the experimental set-up after an hour or so?

(c) What control experiment can be set up for comparison?

Solution

SECTION A

Answer 1

(i) Platelets
(ii) Both A and R are true
(iii) II, III
(iv) Chromosome
(v) Control of blood sugar level
(vi) Humidity
(vii) All of these
(viii) 280 days
(ix) A is false and R is true
(x) 14 days
(xi) Pupil
(xii) II, IV
(xiii) A is false and R is true
(xiv) Turgidity
(xv) A is true and R is false

Answer 2

(i)

(a) Heterozygous chromosomes
(b) Malpighian capsule
(c) Thyroxine
(d) Chlorofluorocarbons
(e) Population density

(ii)

(a) Upper epidermis, Palisade, Spongy cell, Stomata
(b) Prophase, Metaphase, Anaphase, Telophase
(c) Vena cava, Right auricle, Right ventricle, Pulmonary veins
(d) Ovulation, Fertilisation, Implantation, Parturition
(e) Receptor, Sensory neuron, Motor neuron, Effector

(iii)

Column I	Column II
(a) Vasectomy	6. Male sterilisation
(b) Radioactive element	3. Uranium
(c) Dark reaction	7. Stroma
(d) Tubectomy	2. Female sterilisation
(e) Greenhouse gas	1. Methane

(iv)

(a) Scurvy (rest are diseases caused by deficiency in hormones)
(b) Sulphur dioxide (rest are greenhouse gases)
(c) Cerebellum (rest are parts of the forebrain)
(d) Macula (rest are structures present in the ear)
(e) Seismonasty (rest are tropic movements)

(v)

(a) Lenticels: Older stem of plants
(b) Thyroid gland: In front of the neck/lower part of the neck below the larynx
(c) Proximal convoluted tubule: In the cortex of the kidney
(d) Bicuspid valve: Between left atrium and left ventricle
(e) Pancreas**:** Abdomen, between the stomach and the small intestine.

SECTION B

Solution 3

(i) DNA: Deoxyribonucleic acid
RNA: Ribonucleic acid

(ii) Root hair contains cell sap of a higher concentration than the surrounding soil water. This implies that there is a lesser water potential inside the root hair cell and higher water potential in the soil. This difference sets off osmosis, and the outside water diffuses into the root hair. From the root hair, the water continues to enter the cells and finally reaches the xylem vessels.

(iii)

1. The higher the intensity of light, the greater is the rate of transpiration.
2. Humidity decreases the rate of transpiration.

(iv) Features of garden pea with their dominant and recessive traits: *(Any two)*

Sr.No	Character	Dominant trait	Recessive trait
1.	Flower Colour	Purple	White
2.	Seed Colour	Yellow	Green
3.	Seed Shape	Round	Wrinkled
4.	Pod Shape	Inflated	Constricted
5.	Flower Position	Axial	Terminal

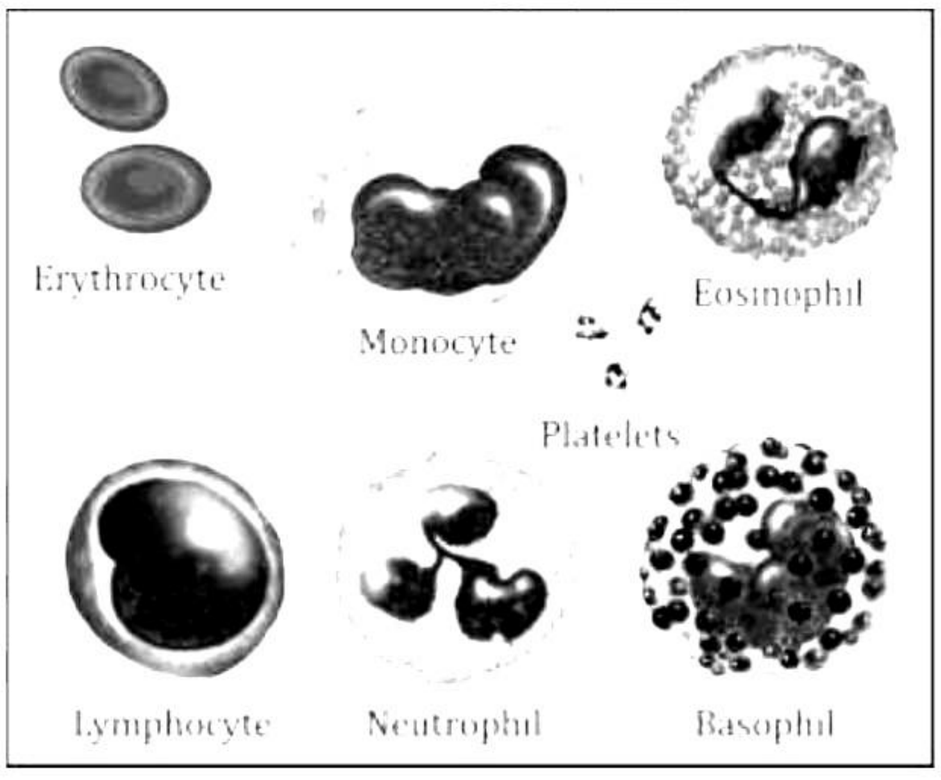
(v)

1. 2 - Cell body of the sensory neuron
   5 - Central canal
   6 - Grey matter
2. Reflex arc
3. In the spinal cord, the cell bodies of neurons, i.e., grey matter, lie on the inner side and the axons of neurons, i.e., white matter, lie in the outer region.
   In the brain, the arrangement is exactly the opposite. The grey matter lies on the outer side and the white matter lies on the inner side.

Solution 4

(i) Meiosis is referred to as 'reductional division' because the number of chromosomes is reduced to half i.e., out of the 23 pairs of chromosomes in humans, only a single set of chromosomes is passed on to the sex cells.

(ii) Different blood cells seen in a smear of human blood:



(iii)

a) 1 - Afferent arteriole
   2 - Glomerulus
   3 - Bowman's capsule
   4 - Efferent arteriole
b) Ultrafiltration

(iv) Ganong's Potometer is used to measure the phenomenon of transpiration in plants.
Limitation: A potometer does not measure the water loss by transpiration. Instead, it measures the water uptake by the plant. Water absorbed by the plant is not completely lost by transpiration; some of it is used for the cell activities.

(v)

Sr.No	Gland	Secretion	Function/Effect on body
1.	Posterior lobe of pituitary gland (1)	Vasopressin	Increases reabsorption of water by kidney tubules (2)
2.	Lacrimal gland	Tears (3)	Washes away dust particles and germs (4)
3.	Adrenal medulla	Adrenaline (5)	Increases the heartbeat (6)

Solution 5

(i) The brain is protected by a bony structure called the cranium. Cerebrospinal fluid is present between the meninges which acts as a shock absorber.

(ii) Erythrocytes are biconcave discs, as this increases the surface area for the diffusion of gas molecules across the plasma membrane. Lack of mitochondria makes them transport all the oxygen absorbed to the tissues.

(iii) Photosynthesis is the process by which living plant cells containing chlorophyll, produce food substances (glucose and starch), from carbon dioxide and water, by using light energy and release oxygen as a by-product.
Balanced chemical equation for photosynthesis:

$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6H_2O + 6O_2 \uparrow$$

(iv) During the struggle for existence, only those individuals which have advantageous variations survive while the ones which lack these variations are wiped out. Nature selects only those variations which are suitable for existence. This process is called natural selection.
The origin of new species by gradual modification is called speciation.

(v)

(a) Anaphase of mitosis because the chromatids are moving towards the opposite poles.
(b) 1 – Centriole
2 - Spindle fibres
3 - Chromatid
(c) 4

Solution 6

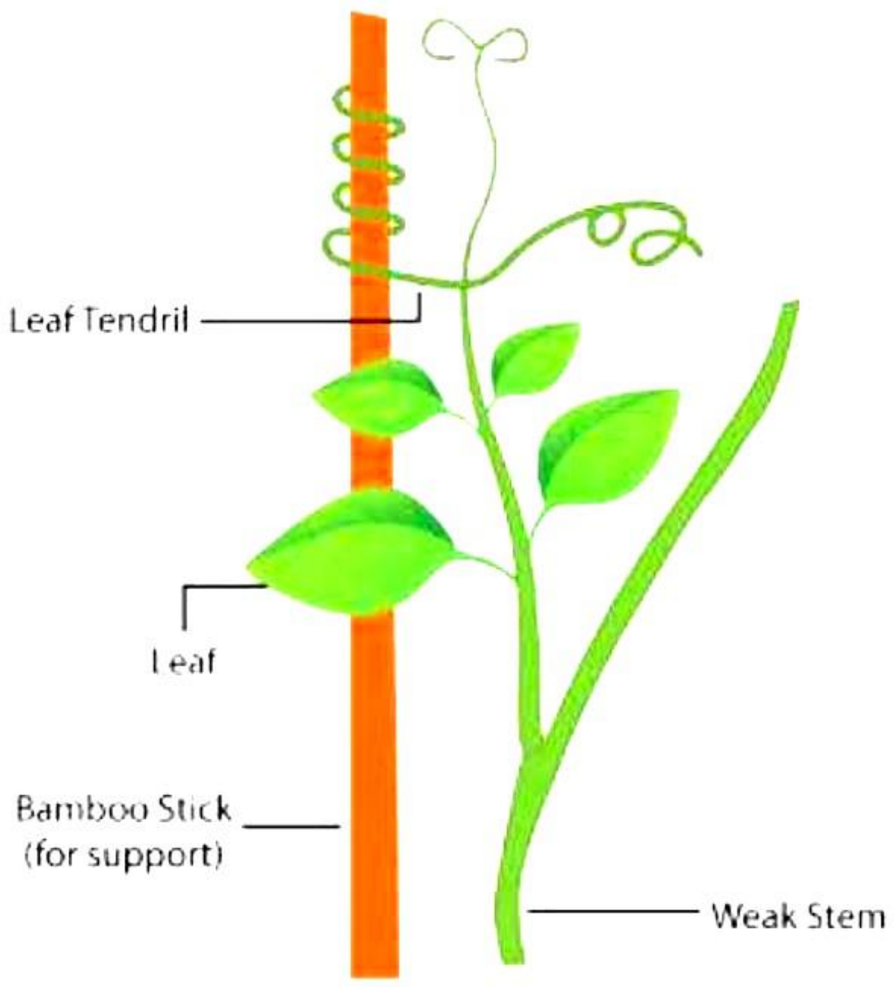
(i) Transpiration pull

(ii) <u>Reasons for a sharp rise in human population in the world:</u>

- Better healthcare is available for all age groups. There are advanced facilities, specialist doctors, and medicines available for medical treatment.
- Food shortage has been overcome because of Green Revolution. Better quality food is produced and available to all.

(iii) The adrenal gland performs several functions to send more glucose and oxygen to the muscle cells to secrete the emergency hormone. If one adrenal gland has been removed, it puts additional pressure on the functional gland to meet the added requirement of secretion of hormones that are required by our body for well-functioning. As a result, the other gland enlarges to some extent.

(iv) <u>Leaf tendril of sweet pea plant:</u>



(v)

(a) Membranous labyrinth

(b) Malleus (*hammer*), incus (*anvil*) and stapes (*stirrup*). The biological term is ear ossicles.

(c) Auditory nerve

Solution 7

(i) Water contaminated with mercury if drunk causes numbness of the limbs, lips, and tongue. It can also lead to mental disorders.

(ii) A person suffering from low blood pressure (BP) passes no urine or less urine to retain more salts in the body. Due to low BP, the amount of salt decreases in the body, and to overcome it, more retention of salts is required. So, less urine is produced.

(iii) Functions of the placenta:

1. It allows the diffusion of oxygen, nutrients, and immune products from the mother to the foetus.
2. It allows the diffusion of waste material generated by the foetus to the mother to for excretion.

(iv) Dihybrid ratio: 9:3:3:1.
The law of independent assortment explains the dihybrid ratio.
Law of independent assortment: When there are two pairs of characters (dihybrid cross), the distribution of the alleles of one character into the gametes is independent of the distribution of the alleles of the other character.

(v) Structural differences between the renal artery and the renal vein:

Renal Artery	Renal Vein
1. Thick muscular walls	1. Thin muscular walls
2. Narrow lumen	2. Wider lumen
3. Valves absent	3. Valves present

Solution 8

(i) Oil spill is the accidental discharge of oil or petroleum on the surface of sea water due to overturned oil tankers, offshore oil mining and oil refineries.

(ii) Reasons for a high birth rate in India:

1. Illiteracy: Illiteracy, especially among rural people, results in poor knowledge about reproduction, childbirth, and a lack of proper awareness about birth control procedures.
2. Religious and traditional beliefs and customs: Many people consider children as a blessing of God and as a prosperity sign. Hence, they do not take measures to prevent pregnancy.

(iii)

(a) Foetus is contained in the mother's uterus.

(b) In foetus, limbs have appeared and resembles the humans unlike the embryo which is a growing or a dividing zygote.

(iv) <u>Harmful effects of acid rain:</u>

- Acidic water affects aquatic life. If river water is acidic, then most aquatic animals cannot survive.
- Buildings, monuments, statues, and sculptures are corroded because of acid rain.

(v)

(a) Osmosis

(b) After an hour or so, the level of sugar solution in the thistle funnel will rise and the level of water in the beaker will drop slightly.

(c) For the control experiment, the beaker will contain water. At the same time, instead of the sugar solution; the thistle funnel with the cellophane paper tied on its mouth and inverted in the beaker will also contain water.