ICSE 2025 EXAMINATION

Sample Question Paper - 14

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) **Assertion (A):** Mitosis is referred to as 'reductional division'.

Reason (R): In mitosis, the number of chromosomes in the sex cells in reduced to half.

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

(ii) The genotypes for the trait of tongue-rolling are RR, Rr, rr. Of these genotypes, Rr is said to be

1. Homozygous dominant
2. Heterozygous dominant
3. Homozygous recessive
4. Heterozygous recessive

(iii) **Assertion (A):** The stomata open at night and close during the daytime.

Reason (R): The opening and closing of stomata depends on the turgidity of the guard cells.

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

(iv) The Pacific Ocean generates the greatest number of tropical storms and cyclones. In such areas, the rate of transpiration is found to be very low during storms. This happens due to the

1. Presence of moisture in the wind
2. Low temperature during the storms
3. High velocity of the wind
4. None of these

(v) NADP is expanded as

1. Nicotinamide Adenine Dinucleotide Phosphate
2. Nicotinamide Adenosine Dinucleotide Phosphate
3. Nicotinamide Adenine Dinucleotide Phosphatase
4. Nicotinamide Adenosine Dinucleotide Phosphatase

(vi) Agranulocytes are

1. Lymphocytes, Monocytes
2. Lymphocytes, Basophils
3. Eosinophils, Basophils
4. Eosinophils, Monocytes

(vii) Ultrafiltration occurs in the

1. Bowman's capsule
2. Proximal convoluted tubule
3. Henle's loop
4. Distal convoluted tubule

(viii) **Assertion (A):** *Homo erectus* represented the first man-like ancestor in human evolution.
Reason (R): They had a cranial capacity ranging from 680-735 cm^3 and showed bent kneed posture.

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

(ix) Anita was suffering from water diabetes. She experienced frequent and copious urination resulting in loss of water from the body. This condition may be due to

1. Hyposecretion of insulin
2. Hyposecretion of vasopressin
3. Hypersecretion of insulin
4. Hypersecretion of vasopressin

(x) The site of maturation of human sperms is the

1. Interstitial cells
2. Seminiferous tubule
3. Epididymis
4. Prostate gland

(xi) **Assertion (A):** Vasectomy in females and tubectomy in males are the surgical techniques that can be used to prevent pregnancy.
Reason (R): It is recommended that between the couple, it is better if the husband gets operated for the surgical technique.

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

(xii) A reflex arc is best described as the movement of stimuli from the

1. Receptor cell, sensory neuron, relay neuron, motor neuron, effector muscles
2. Receptor cell, motor neuron, relay neuron, sensory neuron, effector muscles
3. Receptor cell, relay neuron, motor neuron, sensory neuron, effector muscles
4. Receptor cell, sensory neuron, motor neuron, relay neuron, effector muscles

(xiii) Which poisonous gas is contained in the exhaust of a petrol-driven vehicle?

1. Ammonia
2. Carbon monoxide
3. Chlorine
4. Carbon dioxide

(xiv) Which of the following is not a natural reflex action?

1. Knee-jerk
2. Blinking of eyes due to strong light
3. Salivation at the sight of food
4. Sneezing when any irritant enters the nose

(xv) A, B and C are different methods of contraception.
A – These are fitted inside the uterus to prevent the implantation of the blastocyst.
B – These are chemicals placed in the vagina to kill the sperms.
C – These are caps fitted in the vagina to prevent the entry of sperms into the uterus.
Based on the above descriptions, what are A, B and C likely to be?

	A	**B**	**C**
1.	Spermicidals	IUDs	Diaphragms
2.	Diaphragms	Spermicidals	IUDs
3.	IUDs	Diaphragms	Spermicidals
4.	IUDs	Spermicidals	Diaphragms

Question 2

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

(a) The famous book published by Darwin in which he proposed the idea of natural selection.

(b) Twins born from a single egg fertilised by a single sperm.

(c) A phenomenon which occurs when gases in the Earth's atmosphere trap the Sun's heat.

(d) The structure formed after the release of the ovum from the Graafian follicle.

(e) The chemicals leading to the formation of ozone hole.

(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) Grass, Snake, Peacock, Insects, Frog

(b) Renal artery, Urethra, Ureter, Kidney, Urinary bladder

(c) Dendrites, Axon endings, Nucleus, Axon, Perikaryon

(d) Conjunctiva, Retina, Cornea, Optic nerve, Lens

(e) Xylem vessels, Mesophyll cells, Stoma, Intercellular spaces, Substomatal space

(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) Cochlea	1. Uterus
(b) Lenticels	2. Dynamic equilibrium
(c) Industrial melanism	3. Respiration
(d) Semicircular canals	4. Oviduct
(e) Implantation	5. Static equilibrium
	6. Audio receptors
	7. *Biston betularia*

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

(a) Oestrogen, Progesterone, Testosterone, Prolactin

(b) Prophase, Anaphase, Telophase, Pachytene

(c) Haemophilia, Colour blindness, Night blindness, Albinism

(d) Adrenal gland, liver, thyroid gland, pituitary gland

(e) Systolic pressure, Diastolic pressure, Stethoscope, Sphygmomanometer

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

(a) Spleen

(b) Bartholin's gland

(c) Yellow spot

(d) Stomata

(e) Prostate gland

SECTION B

(Attempt any four questions from this section.)

Question 3

(i) Why gametes have a haploid number of chromosomes? [1]

(ii) Root hairs become flaccid when fertilisers are added to the moist soil around it. Explain. [2]

(iii) Differentiate between the following pairs based on what is mentioned in the brackets: [2]

a) *Australopithecus* and Modern man (Body hair)

b) *Homo habilis* and *Homo sapiens* (Posture)

(iv) State the difference in the arrangement of neurons in the brain and the spinal cord. [2]

(v) What is dialysis? Under what conditions is it carried out? [3]

Question 4

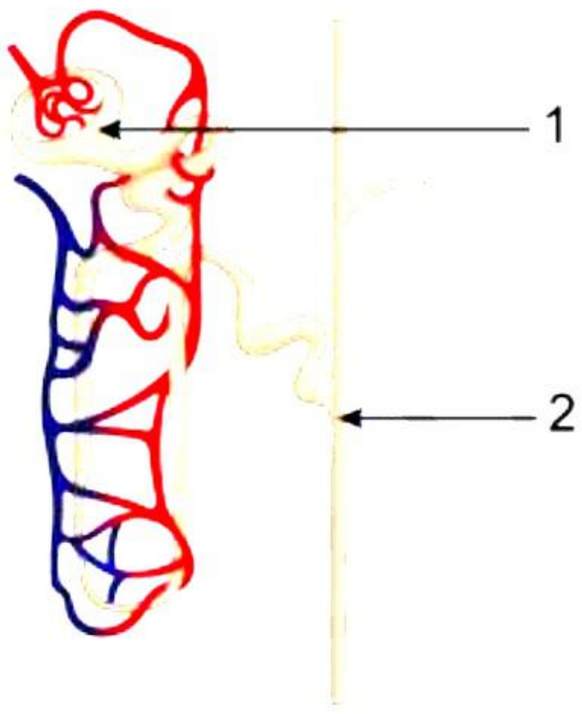
(i) Name the blood vessel which [1]

(1) begins and ends in capillaries.

(2) supplies blood to the walls of the heart.

(ii) When are the sounds 'LUBB' and 'DUP' produced during a heartbeat? [2]

(iii) The diagram below is that of a structure present in the human kidneys. [2]

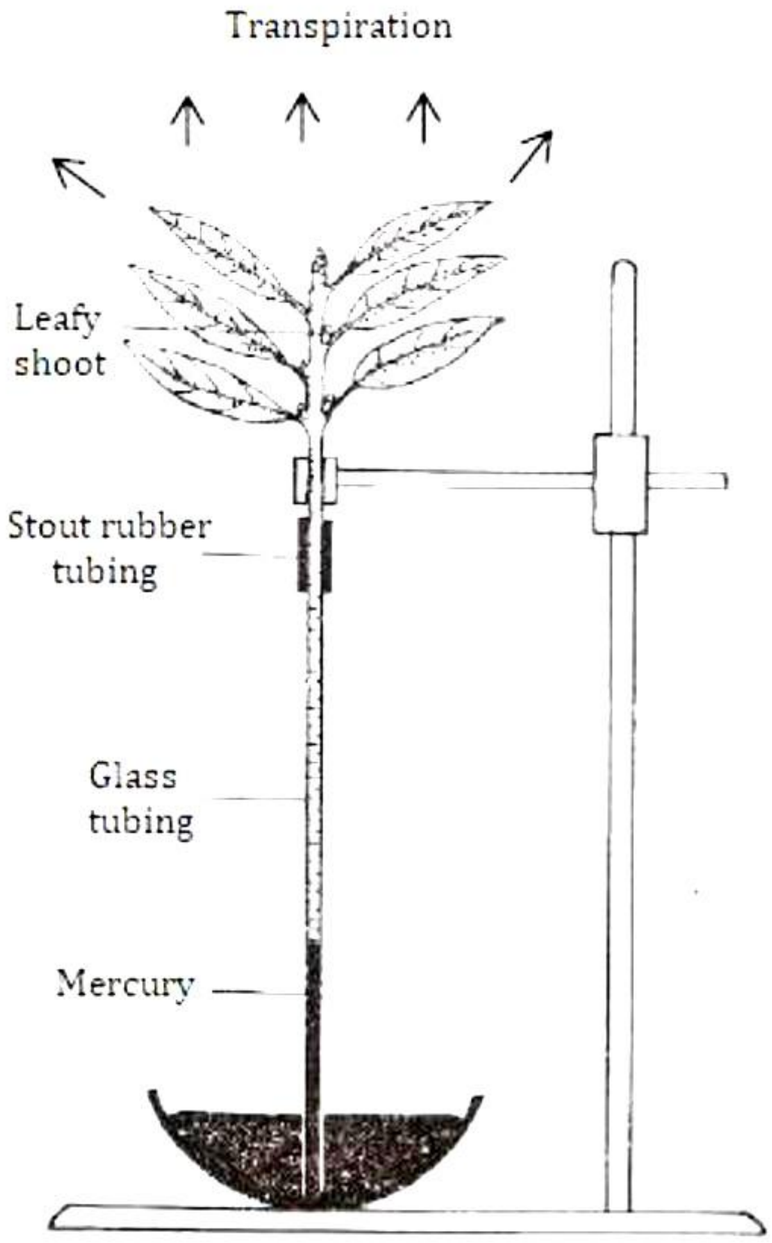


a) Name the structure represented in the diagram.

b) What is the liquid entering part '1' and part '2'called?

(iv) Give the functions of the spinal cord. [2]

(v) The diagram below represents an experiment to demonstrate a certain phenomenon in a green plant. [3]



a) Will the level of mercury in the glass tubing rise or fall? Which conducting tissue of the plant does the glass-tubing represent?
b) How will the rate of the above process differ if the environment of the plant has:
   (i) Less humidity
   (ii) High temperature
c) State any two advantages of transpiration to the plant.

Question 5

(i) Name two involuntary actions controlled by the medulla in the hind brain. [1]
(ii) Abnormally a large number of WBCs in the blood is usually an indication of some infection in our body. Give reason [2]
(iii) Why is photosynthesis important in nature? [2]
(iv) What is fertilisation? Name the site of fertilisation in the body of a human female. [2]
(v) A homozygous dominant tall pea plant bearing red flowers (TTRR) is crossed with a homozygous recessive dwarf pea plant bearing white flowers (ttrr). [3]
   a) What is the phenotype and genotype of the F_1 individuals?
   b) Write the possible combinations of gametes that are obtained when two F_1 hybrid plants are crossed.
   c) Mention the phenotypic ratio of the F_2 generation.

Question 6

(i) Define the following term - Diapedesis. [1]

(ii) In a mitotic cell division, enumerate the changes that occur in the nucleus of a cell during - [2]

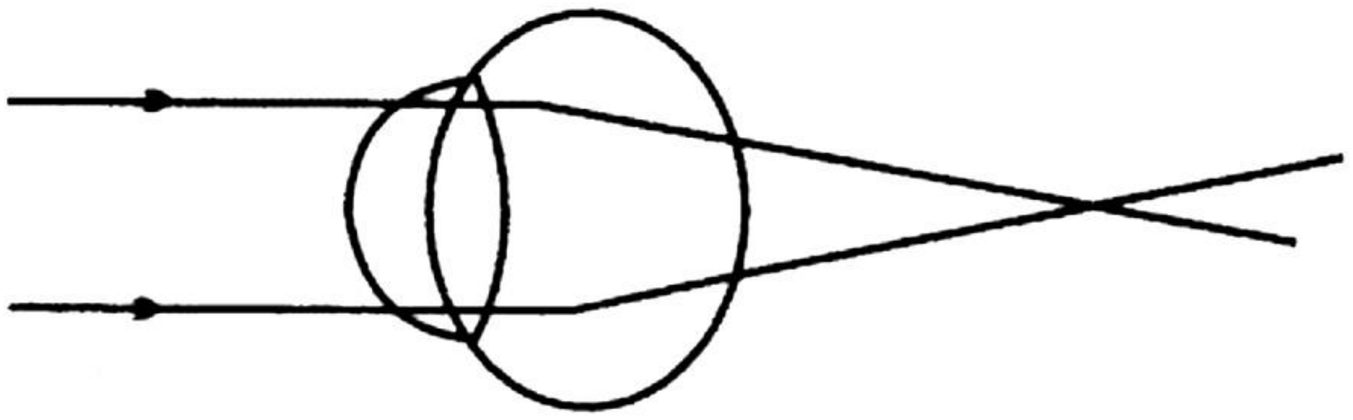
a) Prophase

b) Anaphase

(iii) Mention the two principles through which Lamarck explained his ideas. [2]

(iv) Explain why the grass in the lawn becomes greener if you add a little fertiliser to it but dies if you add a lot of it. [2]

(v) Given below is a diagrammatic representation of a defect in the human eye. [3]



a) Identify the defect.

b) Mention two reasons for the above defect.

c) State how the defect can be rectified.

Question 7

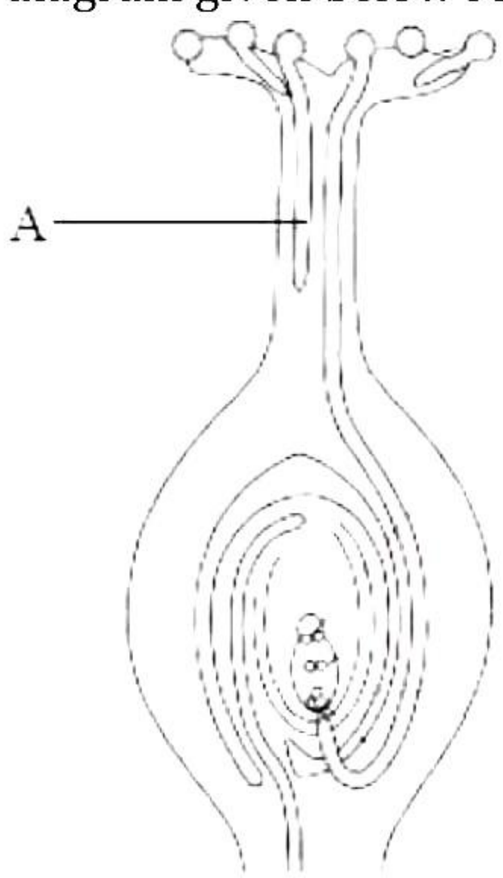
(i) List two sensory functions of the internal ear. [1]

(ii) Define growth rate of population. In what situation can this rate be negative? [2]

(iii) Draw a neat, labelled diagram of a human ovum. [2]

(iv) What is a monohybrid cross? How did Mendel perform this cross? [2]

(v) The diagram given below represents a plant movement. [3]



a) Name and explain the tropic movement shown in the diagram.

b) Label the part marked 'A'.

c) What is part A attracted to?

Question 8

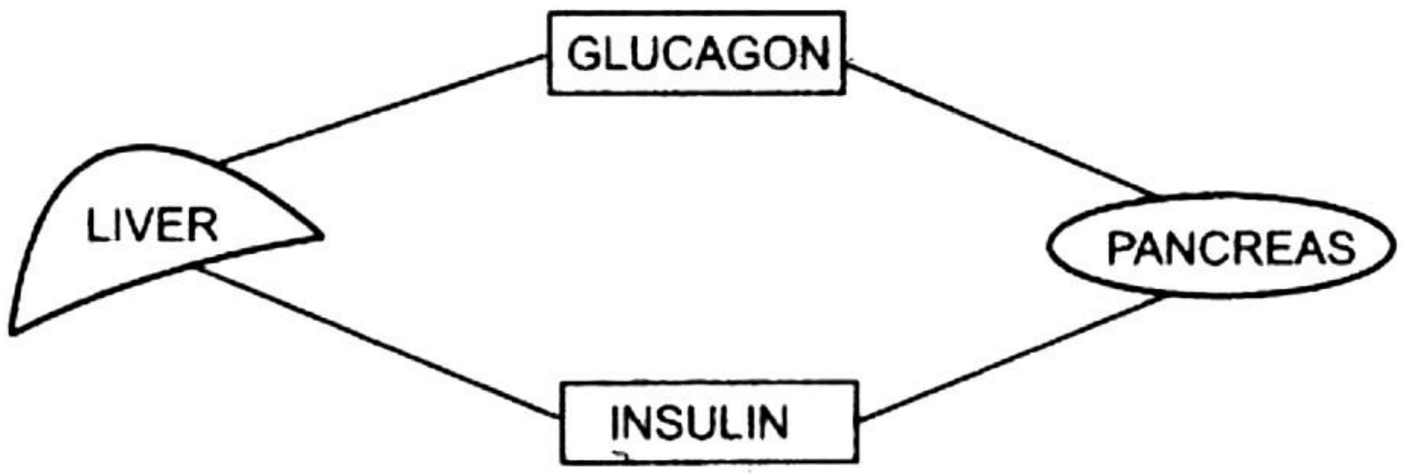
(i) How is soil pollution caused? [1]

(ii) What are the disadvantages of transpiration? [2]

(iii) The full-grown human embryo respires but does not breathe. [2]

(iv) What is the greenhouse effect and how is it caused? [2]

(v) Study the diagram given below and answer the questions that follow: [3]



a) Name the cells of the pancreas that produce (1) glucagon, (2) insulin.

b) State the main function of glucagon and insulin.

c) Why is insulin not given orally but is injected into the body?

Solution

SECTION A

Solution 1

(i) Both A and R are false
(ii) Heterozygous dominant
(iii) A is false and R is true
(iv) High velocity of the wind
(v) Nicotinamide Adenine Dinucleotide Phosphate
(vi) Lymphocytes, Monocytes
(vii) Bowman's capsule
(viii) Both A and R are false
(ix) Hyposecretion of vasopressin
(x) Epididymis
(xi) A is false and R is true
(xii) Receptor cell, sensory neuron, relay neuron, motor neuron, effector muscles
(xiii) Ammonia
(xiv) Salivation at the sight of food
(xv) A – IUDs, B – Spermicidals, C - Diaphragms

Solution 2

(i)

(a) The Origin of Species
(b) Identical or monozygotic twins
(c) Greenhouse effect
(d) Corpus luteum
(e) Chlorofluorocarbons (CFCs)

(ii)

(a) Grass, Insects, Frog, Snake, Peacock
(b) Renal artery, Kidney, Ureter, Urinary bladder, Urethra
(c) Dendrites, Perikaryon, Nucleus, Axon, Axon endings
(d) Conjunctiva, Cornea, Lens, Retina, Optic nerve
(e) Xylem vessels, Mesophyll cells, Intercellular spaces, Substomatal space, Stoma

(iii)

Column I	Column II
(a) Cochlea	6. Audio receptors
(b) Lenticels	3. Respiration
(c) Industrial melanism	7. *Biston betularia*
(d) Semicircular canals	2. Dynamic equilibrium
(e) Implantation	1. Uterus

(iv)

(a) Testosterone (Rest are female hormones)
(b) Pachytene (Rest are phases of mitosis)
(c) Night blindness (Rest are sex-linked disorders)
(d) Liver (Rest are endocrine glands)
(e) Stethoscope (Rest are related to blood pressure)

(v)

(a) Spleen: In the abdomen behind the stomach and above the left kidney
(b) Bartholin's gland: Sides of vaginal orifice in females
(c) Yellow spot: On the horizontal median axis of the eyeball in the retina
(d) Stomata: Lower surface of the leaf
(e) Prostate gland**:** At the base of the urinary bladder

SECTION B

Answer 3

(i) Gametes are produced because of meiosis or reduction division; hence they have a haploid number of chromosomes.

(ii) When fertilisers are added to the moist soil around root hairs, it forms a hypertonic solution. As a result, the protoplasm shrinks, and the plasma membrane withdraws itself from the cell wall. Hence, the root hairs become limp or flaccid.

(iii)

a) Differences between *Australopithecus* and Modern man (Body hair)

Australopithecus	**Modern man**
Body covered with hair	Highly reduced body hair

b) Differences between *Homo habilis* and *Homo sapiens* (Posture)

Homo habilis	***Homo sapiens***
Bent kneed posture	Fully erect posture

(iv) In the brain, the cytons of the neurons are outside (white matter) and the axons are inside (grey matter). In the spinal cord, the cytons are inside (grey matter) and the axons are outside (white matter).

(v) Dialysis involves the use of artificial kidney or a dialysis machine. The patient's blood from the radial artery is led through the machine where excess salts and urea are removed. The purified blood is then returned to a vein in the same arm.
Dialysis is carried out in case of failure of both the kidneys. In case there is a permanent damage in the kidneys, then dialysis must be repeated for about 12 hours twice a week.

Answer 4

(i)
(1) Portal vein
(2) Coronary artery

(ii) The 'LUBB' sound is produced when the tricuspid and the bicuspid valves close with a jerk. The 'DUP' sound is produced when the semilunar valves at the roots of the aorta and the pulmonary artery get closed.

(iii)
a) Nephron
b) 1 - Glomerular filtrate
2 – Urine

(iv) <u>Functions of the spinal cord:</u>
1. It controls all the reflex actions occurring below the neck.
2. It conducts sensory impulses from the skin to the brain and motor impulses from the brain to the muscles of the trunk and the limbs.

(v)
a) The level of mercury in the glass tubing will rise. The glass-tubing represents xylem.
b)
(i) Less humidity increases the rate of transpiration.
(ii) High temperature increases the rate of transpiration.
c) <u>Advantages of transpiration to the plants:</u>
1. It brings about a cooling effect to the plant body since evaporation of water reduces the temperature of the leaf surface.
2. It helps in ascent of sap by producing a suction force acting from top of the plant.

Answer 5

(i) <u>Involuntary actions controlled by the medulla in the hind brain:</u>

1. Blood pressure
2. Vomiting

(ii) WBCs in our blood engulf and destroy the disease-causing germs entering our body. In this way, they defend the body against infection. Their population grows if there is an infection. Therefore, a rise in the number of WBCs suggests infection.

(iii) The bodies of all living organisms, both plants and animals, are dependent on the food that has been synthesised in a green cell by photosynthesis. Purification of the atmosphere whereby the volume of CO_2 remains constant is due to the photosynthetic activity of the green plants. Oxygen is given out by the green plants during photosynthesis. In this way, photosynthesis supports all life on the Earth.

(iv) The union of male and female gametes to form a zygote is called fertilisation. Fertilisation takes place in the oviduct or fallopian tube of a human female.

(v)

a) F_1 generation phenotype – All plants are tall and bear red flowers.
   F_1 generation genotype – Heterozygous (TtRr)
b) Possible combinations of gametes that are obtained when two F_1 hybrid plants are crossed are TR, Tr, tR, tr.
c) Phenotypic ratio of the F_2 generation is 9:3:3:1.

Answer 6

(i) The process in which the leucocytes or white blood cells squeeze out through the walls of the blood capillaries at the site of injury to fight against pathogens is called diapedesis.

(ii)

a) <u>Changes during Prophase of Mitosis:</u>
   - The nuclear membrane and the nucleolus disappear.
   - The duplicated chromosomes begin to move towards the equator of the cell.
b) <u>Changes during Anaphase of Mitosis:</u>
   - The two sister chromatids of each chromosome separate and are drawn apart towards the opposite poles.

(iii) Lamarck explained his ideas through the below two principles:

1. Use and disuse: Parts of the body which are used extensively become larger and stronger, while those which are not used deteriorate.
2. Inheritance of acquired characters: An organism could pass its modifications to its offspring.

(iv) By adding some fertiliser, the leaves will produce more chlorophyll and appear greener since the fertiliser supplies minerals and other nutrients. If too much fertiliser is added, it creates a hypertonic solution which causes plasmolysis. As a result, there is wilting of certain plant portions and ultimately, the plant perishes.

(v)

a) Hyperopia (far-sightedness). In this defect, as seen in the diagram, the image is formed behind the retina.
b) Reasons for hyperopia:
   - Shortening of the eyeball from front to back.
   - Lens becomes too flat.
c) Hyperopia can be rectified by using a convex (converging) lens of appropriate power (focal length).

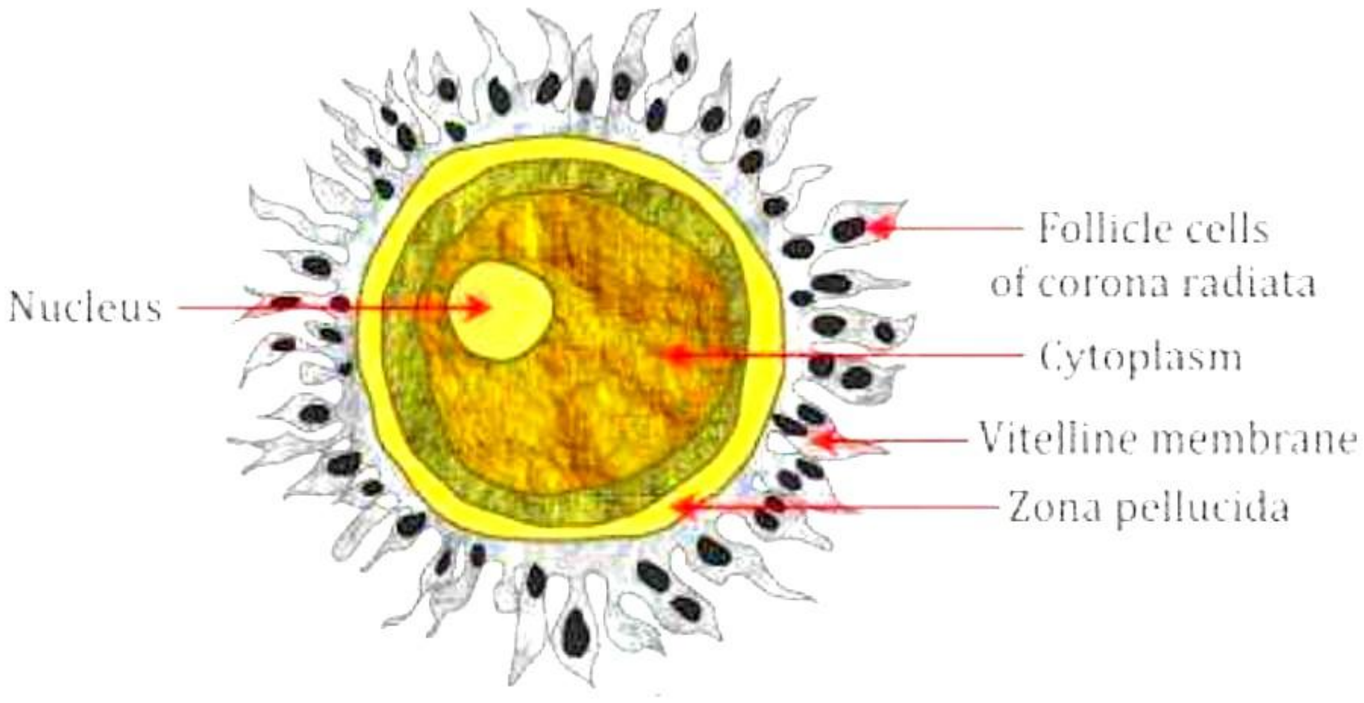
Answer 7

(i) Sensory functions of the internal ear:

1. Hearing
2. Body balance

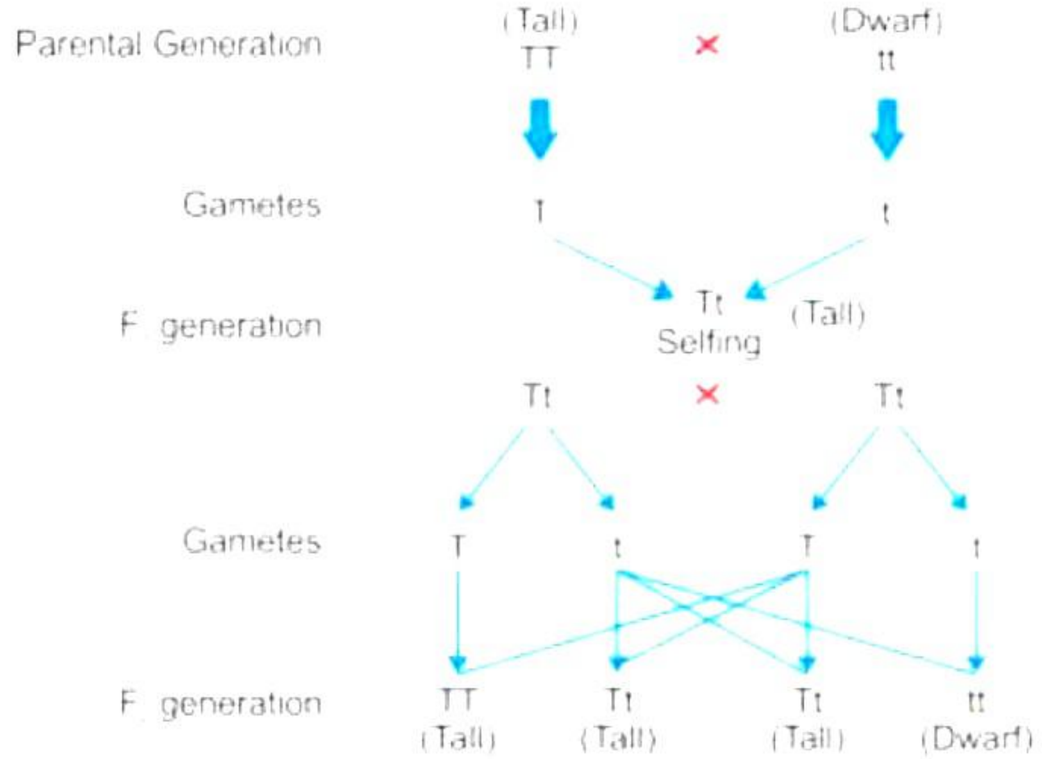
(ii) The growth rate of population is the difference between the birth rate and the death rate. The growth rate of population can be negative when the death rate is higher than the birth rate of the population.

(iii) Human ovum:



(iv) Monohybrid cross is a cross where two forms of a single trait are crossed or hybridised.

Mendel performed this experimental cross on pea plants. He crossed the true breeding forms of tall (TT) and dwarf (tt) plants and obtained the hybrid tall (Tt) progeny. This was called the first filial generation (F_1). He then self-pollinated the F_1 tall hybrids and produced the second filial generation (F_2) with both tall (TT, Tt) and dwarf (tt) plants in the ratio of 3:1.



(v)

a) Chemotropism. It is the phenomenon of growth or movement of a plant part towards the source of nutrients or chemicals.
b) A → Pollen tube
c) 'A' (pollen tube) is attracted to the peptones secreted by the neck canal cells.

Answer 8

(i) Soil pollution usually results from the disposal of solid and semi-solid wastes produced during agricultural practices, industrial processes, and insanitary habits.

(ii) <u>Disadvantages of transpiration:</u>

- Some plants die due to excessive water loss by transpiration.
- Due to high rate of transpiration, plants suffer from loss of turgidity.

(iii) The dissolved oxygen in the mother's blood diffuses into the fully developed human embryo and is used in the oxidation of glucose in the cells, which releases energy, through respiration. However, there are no breathing movements since the embryo's lungs lie collapsed and do not function until the foetus is removed from the mother's body. Therefore, no breathing movements can be seen in the embryo as it receives oxygen by the diffusion of gases.

(iv) Carbon dioxide gas is widely emitted into the atmosphere. Excess carbon-dioxide emissions cause the greenhouse effect, which raises the global average temperature. Global warming is another name for it. Carbon dioxide levels have risen by 28% in the previous century, owing to the use of fossil fuels such as coal, gas, and oil.

(v)

a) (1) Glucagon - Alpha cells of islets of Langerhans
(2) Insulin - Beta cells of islets of Langerhans.

b) Glucagon - Increases blood sugar level
Insulin - Decreases blood sugar level

c) If insulin is given orally, it will be digested by the protein digesting enzymes in the stomach. Hence it must be injected into the body.