ICSE 2025 EXAMINATION

Sample Question Paper - 15

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):** Centrosome is the point of attachment of two chromatids of a chromosome.

Reason (R): Centrosome initiates and regulates the process of cell division as it helps in the formation of spindle fibres.

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) Pulse wave is mainly caused by the

1. Systole of the left atrium
2. Systole of the right atrium
3. Systole of the left ventricle
4. Systole of the right ventricle

(iii) Mrs. Sharma is suffering from gout. Which of the following constituents is likely to be found in greater concentration in her blood?

1. Urea
2. Glucose
3. Uric acid
4. Bile pigments

(iv) A gland which secretes both, a hormone and an enzyme is the

1. Pituitary
2. Pancreas
3. Thyroid
4. Adrenal

(v) The ventral root ganglion of the spinal cord contains axons of the

1. Motor neuron
2. Sensory neuron
3. Relay neuron
4. Association neuron

(vi) **Assertion (A):** Amniotic fluid fills the space between the amnion and the embryo.
Reason (R): The fluid maintains an even pressure all around the embryo.

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

(vii) Mrs. Khan and her husband decided to plan their pregnancy. Which of the following methods of contraception should be used if they want to prevent the release of the egg from the ovary?

1. Condoms
2. Diaphragms
3. Contraceptive pills
4. Spermicidals

(viii) **Assertion (A):** Ethylene is the only hormone which is a gas at ordinary temperature.
Reason (R): It helps in the ripening of fruits and is produced in the roots.

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) Raj inserted a hairpin into his right ear to remove ear wax. He felt a sudden sharp pain with loss of hearing. This was due to the rupture of

1. Eardrum
2. Vestibule
3. Cornea
4. Pinna

(x) A pressure developed in a solution when it is separated from pure water by a semipermeable membrane is called

1. Root pressure
2. Transpiration pull
3. Osmotic pressure
4. Hydrostatic pressure

(xi) F.W. Went coined a term which means to grow. This term is

1. Auxin
2. Regenerate
3. Apical dominance
4. Cytokinin

(xii) **Assertion (A):** Photosynthesis occurs in all parts of a green plant.

Reason (R): Chlorophyll is the green pigment which traps solar energy during daytime.

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

(xiii) Given below are a few adaptations in plants to reduce the rate of transpiration.

I. Sunken stomata covered with hairs
II. Narrow leaves
III. Leaves modified into spines
IV. Leaves covered with a thick cuticle

Which of the above adaptations are found in *Nerium* to reduce water loss?

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

(xiv) Industrial melanism was highlighted by

1. Polar bear
2. Butterfly
3. Peppered moth
4. Bear

(xv) If a round, green seeded plant (RRyy) is crossed with a wrinkled, yellow seeded plant (rrYY), the seeds produced in F_1 generation are:

1. Round and green
2. Round and yellow
3. Wrinkled and green
4. Wrinkled and yellow

Question 2

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

(a) An accessory gland in human males whose secretion activates the human sperm.
(b) The process by which water enters the root hair.
(c) A chemical which caused Minamata disease in Japan.
(d) An instrument used to find the rate of transpiration in plants.
(e) A substance which is found in excess in the urine of a diabetic person.

(ii) Given below is a set of terms arranged in a logical sequence, representing a process or a function. Of these, one term is incorrect. Identify the incorrect term and replace it with the correct term. One has been done for you as an example.[5]

E.g., Pollen grain → Exine → Staminal tube → Male gametes → Micropyle
Incorrect term - Staminal tube, Correct term - Pollen tube

(a) Seminiferous tubule → Sperm → Sperm duct → Accessory glands → Semen → Ureter.
(b) Soil water → Root hair → Cells of cortex → Epidermis → Xylem.
(c) Oxygen → Stoma → Respiratory cavity → Mesophyll cells → Oxidation of glucose → 2 ATP.
(d) Pupil → Eye lens → Vitreous humour → Fovea → Auditory nerve.
(e) Sensory nerve → Dorsal root ganglion → Sensory neuron → Motor neuron → Receptor.

(iii) In the box given below is a list of biological terms that can be used to complete the statements that follow. Select the appropriate term from the box and re-write the completed statement. You can use a term only once: **[5]**

Concave, Neuron, Seminiferous tubule, Epididymis, Animal waste, Gestation, Nerve, Ethyl alcohol, Nephron, Myopia, DDT, Pregnancy, Convex

(a) The type of lens used to correct myopia is _____.
(b) The basic unit of the nervous system is the _____.
(c) Sperms are produced in the _____.
(d) A non-degradable pollutant is _____.
(e) The period of complete development of the foetus till birth is termed as _____.

(iv) Write the chief functional activity of each of the following: **[5]**

(a) Bone marrow: _____.

(b) Meninges: _____.

(c) Thick cuticle: _____.

(d) Cerebellum: _____.

(e) Collecting duct: _____.

(v) Match the terms in Column I with their explanations in Column II. **[5]**

Column I	Column II
1. Testosterone	a) Help in balancing while the body is in motion
2. Renal artery	b) Corpus luteum
3. Semicircular canals	c) Leydig cells
4. Progesterone	d) Defective haemoglobin in RBCs
5. Sickle-cell anaemia	e) Contains more urea
	f) Help in balancing while the body is at rest
	g) Contains less urea

SECTION B

(Attempt any four questions from this section.)

Question 3

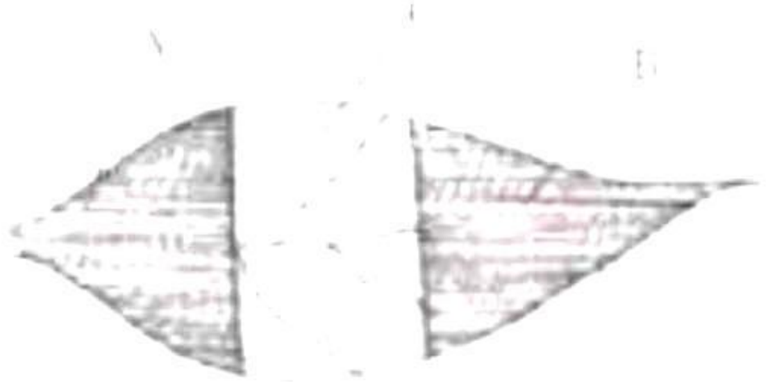
(i) What is the role of the ciliary muscles? **[1]**

(ii) Why does the blood in the arteries flow in spurts? **[2]**

(iii) Draw a neat and labelled diagram of a chloroplast. **[2]**

(iv) Mention two reasons for the rapid increase in the population of India. **[2]**

(v) The figure shows a leaf after an experiment. **[3]**



(a) What is the aim of the experiment?

(b) What colour do parts A and B show after the experiment?

(c) What will be the colour of part C?

Question 4

(i) Define: Photophosphorylation. **[1]**

(ii) Why is it harmful to use a sharp object to remove wax from our ears? **[2]**

(iii) Draw a neat and labelled diagram of an open stomata. **[2]**

(iv) Give reason: We urinate fewer times in summer than in winter and the urine passed is generally thicker. **[2]**

(v) The figure shows an endocrine gland. **[3]**

(a) Name the gland.

(b) Label the parts 1 and 2.

(c) Write the location of the gland.

Question 5

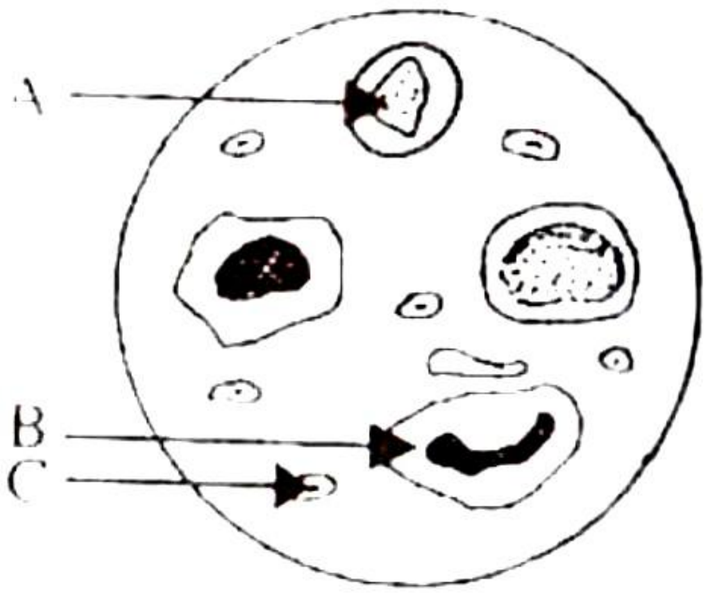
(i) Name two surgical methods to control population in humans. **[1]**

(ii) Give reason: Marine fish burst when placed under tap water. **[2]**

(iii) What is dialysis? Under what conditions is it performed? **[2]**

(iv) Explain with the help of a chart what will be the colour of a child's hair, if the father has a dominant gene for black hair and the mother has a recessive gene for brown hair? **[2]**

(v) The diagram given below represents a blood smear. **[3]**



(a) Identify A, B and C by giving their scientific names.

(b) State one important function of each.

(c) State two characteristics of B which enable it to carry out its function.

Question 6

(i) What would happen if fertilisers were sprinkled near the root hair in the soil? **[1]**

(ii) **[2]**

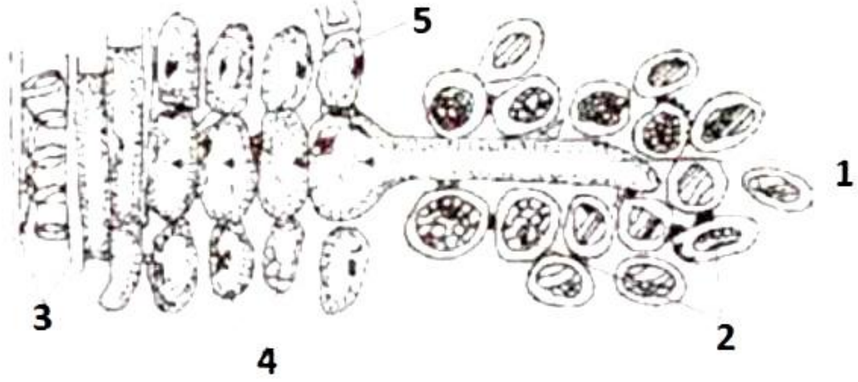
(a) What are the two sources that form the placenta?

(b) List any two substances which pass from the foetus to the mother through the placenta.

(iii) State two disadvantages of transpiration. **[2]**

(iv) Mention two effects of radioactive pollution on human health. **[2]**

(v) The figure given below is a diagrammatic representation of the cross-section of the root in the root hair zone. Study the same and then answer the questions which follow: **[3]**



(a) Name the parts labelled 1–5.

(b) What pressure is responsible for the movement of water in the direction indicated by the arrows?

(c) How is this pressure set up?

Question 7

(i) Why are roots said to be negatively phototropic? **[1]**

(ii) Write the full form of: **[2]**

(a) DDT

(b) PAN

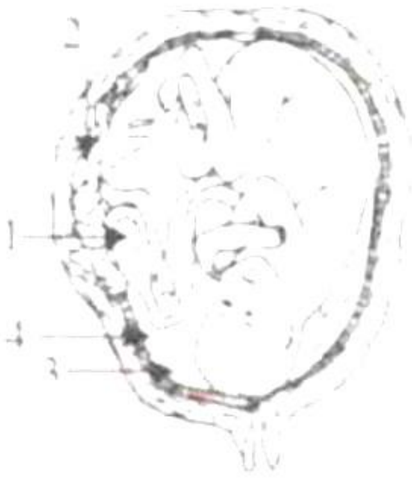
(iii) Distinguish between presbyopia and astigmatism. **[2]**

(iv) Give the functions of the following hormones: **[2]**

(a) Oxytocin

(b) Thyroxine

(v) The figure shows a human foetus in the uterus. **[3]**



(a) Label the parts 1–4.

(b) State the functions of parts 2 and 3.

(c) Briefly explain the respiration of the embryo.

Question 8

(i) Injury to the medulla oblongata results in death. **[1]**

(ii) Why is there an increasing dependency today on natural sources of energy such as sunlight and wind? **[2]**

(iii) Why do gametes have a haploid number of chromosomes? **[2]**

(iv) List two measures to control soil pollution. **[2]**

(v) Given alongside are two figures (A and B) showing a phenomenon that was first observed in Manchester before and after the year 1850. **[3]**

(a) What name has been given to this phenomenon?

(b) Give the common name and the scientific name of the insect involved in this phenomenon.

(c) The following phenomenon provides a classical explanation of a scientific theory given by a certain scientist. Give the name of the scientist who gave this theory.

Solution

SECTION A

Solution 1

(i) A is False and R is True

(ii) Systole of the left ventricle

(iii) Uric acid

(iv) Pancreas

(v) Motor neuron

(vi) Both A and R are True

(vii) Contraceptive pills

(viii) A is True and R is False

(ix) Eardrum

(x) Osmotic pressure

(xi) Auxin

(xii) A is False and R is True

(xiii) I and II

(xiv) Peppered moth

(xv) Round and yellow

Solution 2

(i)

(a) Seminal vesicles

(b) Osmosis

(c) Mercury

(d) Ganong's potometer

(e) Glucose

(ii)

(a) Incorrect term - Ureter, Correct term - Urethra
Seminiferous tubule → Sperm → Sperm duct → Accessory glands → Semen → Urethra.

(b) Incorrect term - Epidermis, Correct term - Endodermis
Soil water → Root hair → Cells of cortex → Endodermis → Xylem.

(c) Incorrect term - 2 ATP, Correct term - 38 ATP
Oxygen → Stoma → Respiratory cavity → Mesophyll cells → Oxidation of glucose → 38 ATP.

(d) Incorrect term - Auditory nerve, Correct term - Optic nerve
Pupil → Eye lens → Vitreous humour → Fovea → Optic nerve.

(e) Incorrect term - Receptor, Correct term - Effector
Sensory nerve → Dorsal root ganglion → Sensory neuron → Motor neuron → Effector.

(iii)

(a) The type of lens used to correct myopia is concave.
(b) The basic unit of the nervous system is the neuron.
(c) Sperms are produced in the seminiferous tubule.
(d) A non-degradable pollutant is DDT.
(e) The period of complete development of the foetus till birth is termed as gestation.

(iv)

(a) Bone marrow: Site for the formation of blood corpuscles.
(b) Meninges: Protects the brain from mechanical injuries and jerks.
(c) Thick cuticle: Avoids excessive transpiration.
(d) Cerebellum: Coordinates muscular activity and body balance.
(e) Collecting duct: Pours urine in the pelvis of the kidney.

(v)

Column I	Column II (Answers)
1. Testosterone	c) Leydig cells
2. Renal artery	e) Contains more urea
3. Semicircular canals	a) Help in balancing while the body is in motion
4. Progesterone	b) Corpus luteum
5. Sickle-cell anaemia	d) Defective haemoglobin in RBCs

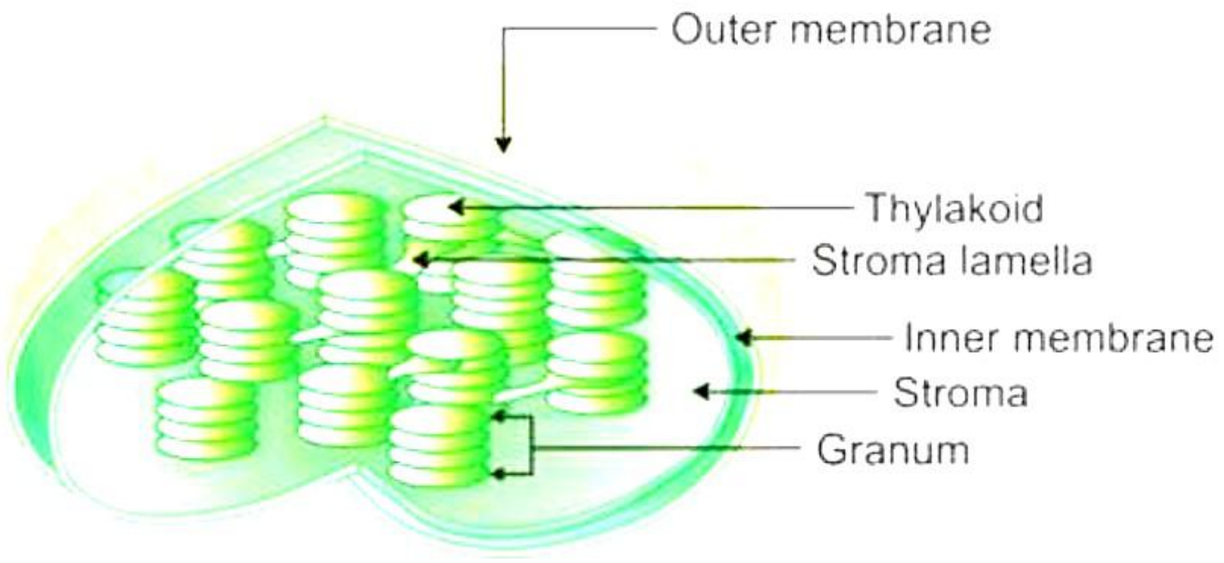
SECTION B

Solution 3

(i) Ciliary muscles present in the choroid, change, or regulate the shape of the eye lens.

(ii) The heart pushes the blood directly into the arteries with great force and pressure, and then relaxes for a while during joint diastole and then again pushes the blood into the arterial system. Therefore, the blood in the arteries flows in spurts.

(iii) <u>Chloroplast</u>



(iv) <u>Reasons for the rapid increase in the population of India:</u>

1. <u>Illiteracy</u>: Most of the rural population, which forms the bulk of our society, is still illiterate, ignorant, and superstitious. They also do not know the functioning of the human reproductive system.
2. <u>Traditional Beliefs</u>: Among the people from the lower strata of the society, children are regarded as a gift of God and a sign of prosperity. Therefore, they make no effort to avoid pregnancy.

(v)

(a) The aim of the experiment is to show that light is necessary for photosynthesis.

(b) After the experiment, part A and part B show blue-black colour. This is because parts A and B are exposed to sunlight and thus, starch is produced in these parts. As a result, these parts show positive starch test.

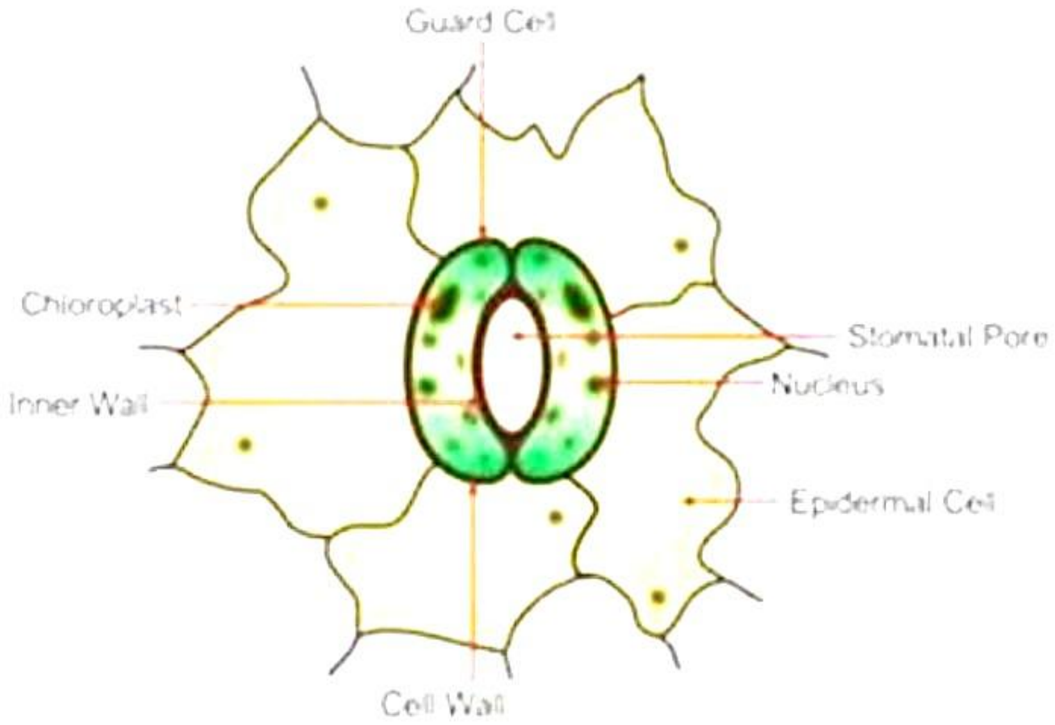
(c) Part C shows brown colour because it is covered with black paper before the experiment. This part of the leaf does not undergo photosynthesis, and due to the absence of starch, it gives a negative starch test.

Solution 4

(i) The process of formation of ATP from ADP by the addition of one phosphate group using electrons in the presence of light is called photophosphorylation.

(ii) When the sound waves strike the ear drum, it vibrates to produce sound and transmits these vibrations to the ear ossicles and the inner ear. Using a sharp object may rupture the ear drum. Therefore, it is harmful to use a sharp object to remove wax from the ear.

(iii) <u>Open stomata</u>



(iv) In summer, we lose a considerable part of the water through perspiration. As a result, the kidneys have to reabsorb more water from the glomerular filtrate making the urine concentrated. Thus, we urinate fewer times in summer than in winter and the urine passed is generally thicker.

(v)

(a) Adrenal gland.

(b) 1 - Adrenal cortex
2 - Adrenal medulla

(c) Adrenal gland is situated on the top of both the kidneys like a cap.

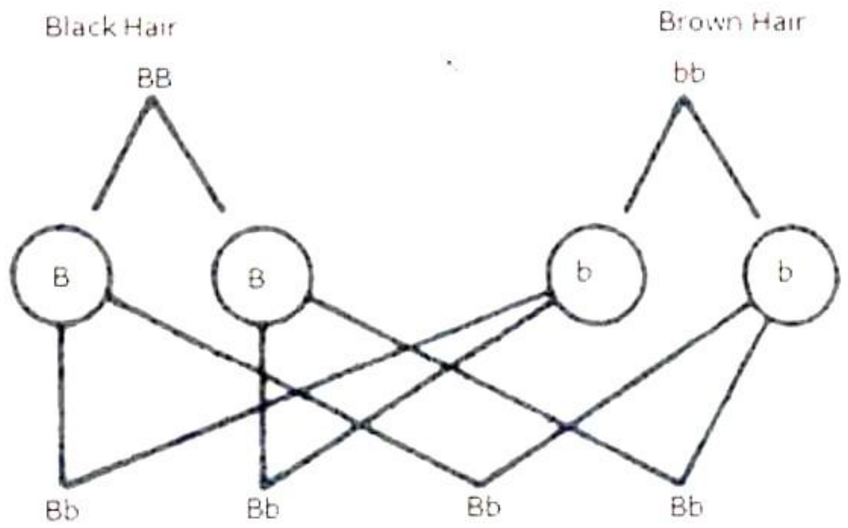
Solution 5

(i) Tubectomy in females and vasectomy in males.

(ii) The salt concentration in the body of marine fish is greater than that in tap water. If marine fish are placed under tap water, water enters the fish body due to the concentration gradient between the fish and tap water. The fish become more turgid and finally burst, leading to their death.

(iii) 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.

(iv) Father – Black Hair – BB
Mother – Brown hair - bb



In the F_1 generation, all the offspring will be heterozygous for black hair.

(v)

(a) A – Erythrocytes
B – Leucocytes
C - Thrombocytes

(b) <u>Erythrocytes (A)</u>: Supply oxygen to the cells of the body.
<u>Leucocytes (B)</u>: Play an important role in the immunity of the body by producing antibodies or by performing phagocytosis.
<u>Thrombocytes (C)</u>: Help in the coagulation of blood.

(c) <u>Characteristics of Leucocytes (B):</u>
1. They have pseudopodia to catch and engulf microorganisms.
2. They show amoeboid movement so that they can squeeze out of the blood capillaries and reach the site of infection in a short period of time.

Solution 6

(i) If fertilisers were sprinkled near the root hair in the soil, exosmosis would take place and the water will move out of the root hair. Thus, the root hair would become flaccid.

(ii)

(a) Placenta is formed by two sets of minute finger-like processes called the villi. One set of villi is from the uterine wall and the other set is from the allantois.

(b) Oxygen and amino acids.

(iii) <u>Disadvantages of transpiration:</u>
1. It causes stunted growth in plants.
2. Plants wilt on a hot and bright sunny day, which may sometimes result in death.

(iv) <u>Effects of radioactive pollution on human health:</u>

- It may cause cancers such as leukaemia.
- It affects the functioning of the cell membrane and cell enzymes.

(v)

(a) 1 - Root hair
2 - Soil particles
3 – Xylem
4 – Cortex
5 - Nucleus

(b) Root pressure and osmotic pressure.

(c) The pressure is set up by the alternate turgidity and flaccidity of the cells which help to move the cell sap upwards due to osmotic pressure. This creates root pressure which ultimately helps to absorb water.

Solution 7

(i) The movement of a plant part away from the direction of sunlight is called negative phototropism. Roots when exposed to sunlight tend to grow away from it in the downward direction. As a result, roots are said to be negatively phototropic.

(ii)

(a) DDT: Dichlorodiphenyltrichloroethane
(b) PAN: Peroxyacetyl nitrate

(iii) <u>Presbyopia</u> occurs in old people where the lens loses its flexibility resulting in far-sightedness.
<u>Astigmatism</u> is an eye defect in which some parts of the object are seen in focus while others are blurred. It arises due to the uneven curvature of the cornea.

(iv)

(a) <u>Oxytocin</u>: It stimulates vigorous contractions of the uterine muscles during childbirth. It also stimulates milk ejection.
(b) <u>Thyroxine</u>: It regulates the basal metabolism rate, i.e., the rate of cellular oxidation resulting in heat production at rest. In children, it is also responsible for growth.

(v)

(a) 1 - Umbilical cord
2 – Placenta
3 - Amniotic fluid
4 - Amnion

(b) <u>Placenta (Part 2):</u> Protects the foetus and provides nourishment and oxygen and removes urea through the umbilical cord.
<u>Amniotic fluid (Part 3):</u> Acts as a shock absorber and protects the foetus from mechanical jerks.

(c) The blood of the foetus is in close contact with the mother's blood. Oxygen and nutrients diffuse from the mother's blood to the foetus' blood and CO_2 diffuses from the foetus' blood to the mother's blood.

Solution 8

(i) The medulla oblongata regulates the involuntary activities of the body such as heartbeat, breathing rate, saliva secretion, and gut peristalsis. Injury to the medulla oblongata can disturb or halt these activities resulting in death.

(ii) Increasing population has already out pressured the limited resources of fossil fuels. It takes millions of years for the formation of fossil fuels. To conserve the limited resources of fossil fuels, there is an increasing dependency today on natural sources of energy such as sunlight and wind.

(iii) Gametes are formed by the process of meiosis. Meiosis is responsible for maintaining a constant number of chromosomes in a species. During fertilisation, if the gametes with half the number of chromosomes are fused, then the chromosome number is restored in the zygote. Therefore, gametes have a haploid number of chromosomes.

(iv) <u>Measures to control soil pollution:</u>

- Domestic and commercial wastes should be disposed in sanitary landfills, on vacant lands, where wastes are collected in layers, and then covered with soil.
- Use of incinerators must be mandatory for biomedical use.
- Use vermicompost or green manure in place of chemical fertilisers.

(v)

(a) Industrial melanism

(b) <u>Common name</u>: Peppered moth
<u>Scientific name</u>: *Biston betularia*

(c) Charles Darwin