

**ICSE Board
Class X Biology
Sample Paper – 12 Solution**

Time: 2 hrs

Total Marks: 80

SECTION-I

Answer 1

(a)

- (i) Incorrect term - Ureter, Correct term - Urethra
Seminiferous tubule → Sperm → Sperm duct → Accessory glands → Semen
→ Urethra.
- (ii) Incorrect term - Epidermis, Correct term - Endodermis
Soil water → Root hair → Cells of cortex → Endodermis → Xylem.
- (iii) Incorrect term - 2 ATP, Correct term - 38 ATP
Oxygen → Stoma → Respiratory cavity → Mesophyll cells → Oxidation of glucose →
38 ATP.
- (iv) Incorrect term - Auditory nerve, Correct term - Optic nerve
Pupil → Eye lens → Vitreous humour → Fovea → Optic nerve.
- (v) Incorrect term - Receptor, Correct term - Effector
Sensory nerve → Dorsal root ganglion → Sensory neuron → Motor neuron →
Effector.

(b)

- (i) Seminal vesicles
- (ii) Oral rehydration solution (ORS)
- (iii) Mercury
- (iv) Ganong's potometer
- (v) Golgi apparatus

(c)

- (i) The type of lens used to correct myopia is concave.
- (ii) The basic unit of the human brain is the neuron.
- (iii) The end-product of fermentation is ethyl alcohol/lactic acid.
- (iv) A non-degradable pollutant is DDT.
- (v) The period of complete development of the foetus till birth is termed as gestation.

(d)

- (i) C. Chromosome. Chromosomes are visible during the metaphase stage of mitotic cell division.
- (ii) C. Pulse wave is mainly caused by the systole of the left ventricle.
- (iii) B. Recessive gene is the one that expresses itself in the homozygous condition, i.e., it needs another identical allele for its expression.
- (iv) B. Pancreas. Pancreas can secrete a hormone, e.g., insulin as well as an enzyme, e.g., pancreatic lipase.
- (v) A. Motor neuron. The ventral root ganglion of the spinal cord contains motor neuron axons only and conducts impulses from the spinal cord to the periphery.

(e)

- (i) **Genes:** Genes are the specific sequences of nucleotides on a chromosome that encode a particular protein which is expressed in the form of some visible character of the body.
- (ii) **Cytokinesis in plant cells:** Cytokinesis is a process where the cell plate grows from the centre to the periphery of the plant cell, resulting in the division of the cytoplasm, which results in the formation of two daughter cells.
- (iii) **Guttation:** Guttation is the loss of water from the margins of the plant leaves through special pores called hydathodes.
- (iv) **Diabetes insipidus:** Deficiency of antidiuretic hormone makes the urine much more dilute. This condition is called diabetes insipidus.
- (v) **Struggle for existence:** Struggle for existence occurs when there is an intense competition between the organisms for favorable shelter, climate, food supply and breeding places.

(f)

Column I	Column II (Answers)
1. Vestigial organs	c) Vermiform appendix
2. Renal artery	e) Contains more urea
3. Semicircular canals	a) Help in balancing while the body is in motion.
4. Phloem	b) Downward flow of the sap
5. Sickle-cell anaemia	d) Defective haemoglobin in RBCs

(g)

- (i) Bone marrow: site for the formation of blood corpuscles.
- (ii) Nucleus: controls the functions of the other cell organelles.
- (iii) Thick cuticle: avoids excessive transpiration.
- (iv) Cerebellum: coordinates muscular activity.
- (v) Taste bud: helps to sense the taste of substances.

(h)

- (i) False. The alpha cells of the pancreas secrete glucagon.
- (ii) False. Duplicated chromosomes remain attached at a point termed centromere.
- (iii) True.
- (iv) True.
- (v) False. Plants that manufacture their own food are termed autotrophs.

SECTION-II

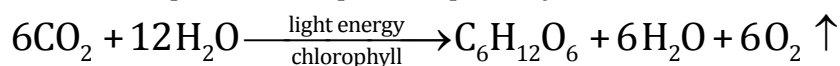
Answer 2

(a)

- (i) Part A are ear ossicles (malleus, incus and stapes). Ear ossicles receive vibrations from the ear drum and magnify them. The vibrations of the stapes are transmitted to the membrane of the oval window.
- (ii) Part B is the eustachian tube. It equalises the air pressure on either side of the eardrum and allows it to vibrate freely.
- (iii) Part C is the auditory nerve. It transmits nerve impulses from the cochlea in case of sound and from the semicircular canals in case of balancing, to the brain.
- (iv) Functions of ear wax:
 - 1) The ear wax has insect repellent properties which prevents the entry of insects into the auditory canal. It also prevents the entry of dust particles.
 - 2) It lubricates and protects the eardrum.

(b)

- (i) Photosynthesis.
- (ii) Photosynthesis is the process by which green plants manufacture their food in the form of carbohydrates using carbon dioxide and water in the presence of sunlight. Plants contain a green plastid, chloroplast which contains a green pigment, chlorophyll. It traps light energy during the process of photosynthesis.
- (iii) The aim of the experiment is to show that oxygen is produced and released by plants during the process of photosynthesis.
- (iv) Chemical equation to represent photosynthesis:



Answer 3

(a)

- (i) 1. Seminiferous tubules
2. Lobule
3. Epididymis
4. Vas deferens
- (ii) Part 1 (Seminiferous tubules): They produce sperms by the process of spermatogenesis.
Part 3 (Epididymis): It stores sperms for some days, during which they mature and become motile.
- (iii) The production and survival of sperms require a temperature that is lower than the normal body temperature. So, the testes are located in the scrotal sac which is situated outside the abdomen. It maintains the temperature at 3°C below the normal body temperature.
- (iv) The inguinal canal allows the descent of testes along with their ducts, blood vessels and nerves.
- (v) Semen is a mixture of sperms and secretions from the seminal vesicle, prostate gland and Cowper's gland.

(b)

- (i) The process of focusing the eye for clear vision at different distances is called power of accommodation of the eye.
- (ii) (1) During near vision, the shape of the lens is round or convex.
(2) During distant vision, the shape of the lens is flattened or thinner.
- (iii) The two structures that are responsible for bringing about a change in the shape of the lens are ciliary muscles and suspensory ligaments.
- (iv) (1) In the dark, the rod cells and their pigment, visual purple or rhodopsin gets activated.
(2) In the light, the cone cells and their pigment, iodopsin gets activated.

Answer 4

(a)

- (i) 1-X
2-Y
3-XX
4-XY
5-XX
6-XY
- (ii) 3-Female
4-Male
5-Female
6-Male
- (iii) Males are responsible for the sex of the offspring because males carry the Y chromosome. If a sperm carrying X chromosome fertilises an ovum which always carries an X chromosome, then the combination of sex chromosomes will be XX and the child born will be a female (girl). If a sperm carrying the Y chromosome fertilises an ovum, then the combination of sex chromosomes will be XY and the child born will be a male (boy). Thus, the male (father) is responsible for the sex of the offspring.
- (iv) Allosomes
- (v) Autosomes, 22 pairs.

(b)

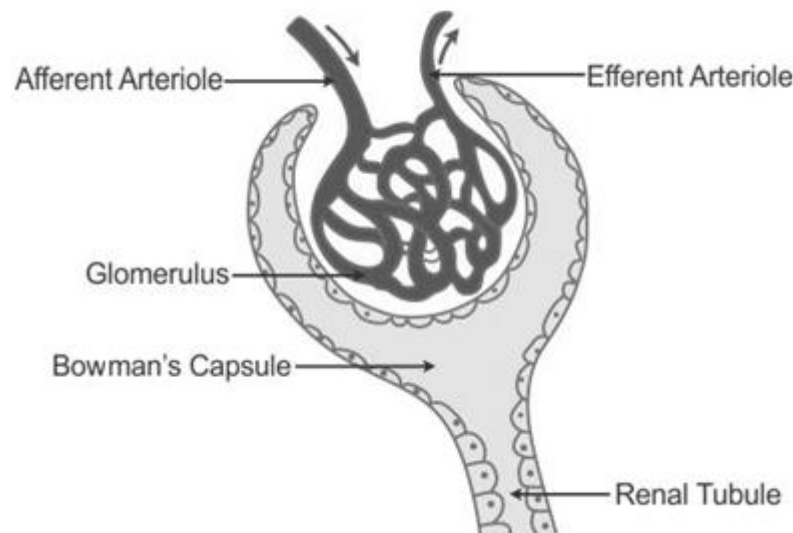
- (i) (1) Glucagon: alpha cells.
(2) Insulin: beta cells.
- (ii) (1) Function of glucagon: In case of low blood sugar levels, glucagon stimulates the breakdown of glycogen into glucose in the liver and raises the blood sugar level.
(2) Function of insulin: Insulin controls high blood sugar levels in the body. It promotes glucose utilisation in the body and the conversion of glucose to glycogen in the liver to maintain the normal sugar level.
- (iii) Pancreas contains exocrine glands which are duct glands secreting pancreatic juice into the small intestine, that helps in the digestion of food. On the other hand, pancreas contains islets of Langerhans which are endocrine glands that secrete insulin, glucagon and somatostatin. Therefore, pancreas is referred to as an exo-endocrine gland.
- (iv) Insulin is a proteinaceous hormone. If administered orally, it may be broken down inside the stomach by the digestive juices during the process of digestion. Therefore, insulin is injected into the body and not administered orally.
- (v) Islets of Langerhans is the technical term for the cells of the pancreas that produce endocrine hormones.

Answer 5**(a)**

- (i) The aim of the experiment is to prove that carbon dioxide is necessary for the process of photosynthesis.
- (ii) The special condition inside the flask is that the air inside the flask does not contain carbon dioxide gas.
- (iii) The chemical that can be used instead of KOH is soda lime.
- (iv) The leaf 1 when tested for the presence of starch turns brown in colour indicating the absence of starch, while leaf 2 which is outside the flask turns blue black indicating the presence of starch.

(b)

- (i) Malpighian corpuscle:

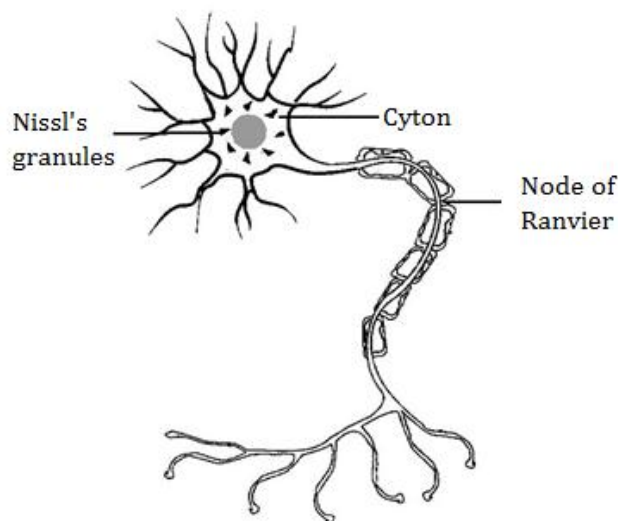


- (ii) Ultrafiltration takes place in the glomerulus. The blood flows through the glomerulus under high pressure as the afferent arteriole is wider than the efferent arteriole. This creates a high hydrostatic pressure which causes the liquid part of the blood to filter out from the glomerulus into the renal tubule. This filtration is called ultrafiltration. During ultrafiltration, plasma along with organic and inorganic substances enter the Bowman's capsule. The fluid entering the renal tubule is called the glomerular filtrate.

Answer 6

(a)

(i) Structure of the neuron:



- (ii) (1) Seat of memory: cerebrum.
(2) Coordinates muscular activity: cerebellum.
- (iii) Major functions of abscisic acid:
(1) Induce dormancy of buds and seeds.
(2) Inhibits seed germination and development.
(3) Stimulates closing of stomata.

(b)

- (i) The two mistakes made by the candidate are:
(1) The tube carrying air in flask A is not dipped into the solution of limewater.
(2) The limb of the air pump in flask B is not dipped into the solution of limewater.
- (ii) Soda lime absorbs CO_2 present in the incoming air.
- (iii) The purpose of using limewater in flask A:
The incoming air is passed through soda lime which absorbs CO_2 from it. Therefore, the limewater in flask A does not turn milky which gives an indication of CO_2 being completely absorbed by soda lime. Thus, CO_2 free air is supplied to the plant.
- The purpose of using limewater in flask B:
As the air passes into flask B, the reaction of limewater with CO_2 turns it milky which indicates that CO_2 is produced by the plant during the experiment.
- (iv) The chemical equation to represent the process of respiration:
$$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + 38 \text{ ATP}$$

Answer 7

(a)

- (i) On a bright sunny day, due to high temperatures, the rate of transpiration exceeds the rate of absorption of water by the leaves. This causes deficiency of water in the plants. Hence, on a bright sunny day, the leaves of certain plants roll up to minimize the loss of water.
- (ii) The salt concentration is more in the body of a marine fish than in tap water. If the marine fish is thrown under tap water, water enters the body of the fish due to a concentration gradient between the fish and tap water. The fish become more turgid and thus, finally bursts leading to its death.
- (iii) The heart pushes the blood directly into the arteries with great force and pressure, then relaxes for a while during the joint diastole and then, again pushes the blood into the arterial system. Therefore, the blood in arteries flows in spurts.
- (iv) In the nose, hair present in the nasal passage and the mucous membrane trap the dust particles and germs which enter while breathing air. However, on breathing through the mouth, there is no first line defense system and the substances may get direct entry into the body. Therefore, it is advisable to breathe through the nose and not through the mouth.
- (v) When the cell is old or damaged, lysosomes secrete the lytic enzyme lysozyme which digests or destroys the entire cell. Therefore, lysosomes are termed as suicidal bags of the cell.

(b)

- (i) Difference between myopia and hypermetropia on the basis of the condition of the eyeball.

Myopia	Hypermetropia
In myopia the eyeball is lengthened from front to back.	In hypermetropia the eyeball is shortened from front to back.

- (ii) Difference between rods and cones on the basis of the pigment present.

Rods	Cones
Rhodopsin is present in rods.	Iodopsin is present in cones.

- (iii) Difference between tonoplast and plasma membrane on the basis of its location.

Tonoplast	Plasma membrane
Tonoplast is the membrane around the vacuole present in the cell.	Plasma membrane is the membrane around the cytoplasm and it covers the entire cell.

(iv) Difference between wall pressure and turgor pressure on the basis of explanation.

Wall pressure	Turgor pressure
Wall pressure is the pressure exerted by the cell wall on the cell contents.	Turgor pressure is the pressure exerted by the cell contents on the cell wall.

(v) Difference between thigmotropism and geotropism on the basis of the stimulus.

Thigmotropism	Geotropism
Stimulus is in the form of touch or physical contact.	Stimulus is in the form of gravity.