

**ICSE Board  
Class X Biology  
Board Paper 2011 - Solution**

---

**SECTION I**

**Answer 1**

**(a)**

- (i) Calcium
- (ii) Interstitial cells/Leydig cells
- (iii) Choroid layer
- (iv) Nephron/Urinerous tubule
- (v) Thylakoids

**(b)**

- (i) Yellow spot: It is the region of sharpest and brightest vision in the eye.
- (ii) Coronary artery: It supplies oxygenated blood to the heart muscles.
- (iii) Medulla oblongata: It controls the activity of the internal organs.
- (iv) Thrombocytes: They help in blood coagulation.
- (v) Vitreous humour: It helps in keeping the shape of the eye ball.

**(c)**

To test the leaf for starch, it is boiled in water to kill the cells (1). It is next boiled in methylated spirit to remove chlorophyll (2). The leaf is placed in warm water to soften it. It is then placed in a dish and iodine (3) solution is added. The region which contains starch turns blue-black (4), and the region which does not contain starch turns brown (5).

**(d)**

- (i) Amnion: uterus, around the embryo
- (ii) Pituitary gland: base of the mid-brain, below the hypothalamus
- (iii) Mitral valve: heart, between the left auricle and the left ventricle
- (iv) Organ of Corti: inner ear, in the middle canal
- (v) Hydathodes: margins of the leaves

(e)

(i) False.

**Correct Statement:** Penicillin obtained from *Penicillium notatum* is an antibiotic.

(ii) False.

**Correct Statement:** Implantation is the process of fixing of the zygote to the uterine wall.

(iii) True.

(iv) False.

**Correct Statement:** The ureter carries urine from the kidney to the urinary bladder.

(v) False.

**Correct Statement:** The nucleus is a part of the cell in which chromosomes are present.

(f)

(i) Plasmolysis is the phenomenon of contraction of the cytoplasm from the cell wall.

(ii) The blood vessel which begins and ends in capillaries is the hepatic portal vein.

(iii) Wooden doors swell up in the rainy season due to imbibition.

(iv) Phenotype is the observable characteristic which is genetically controlled.

(v) Salk's vaccine is given to build up immunity against polio.

(g)

(i) Cell 1 is a white blood cell (neutrophil).

(ii) Diapedesis

(iii) 1 – Erythrocyte (red blood cell)

2 – Leucocyte (white blood cell)

<b>Erythrocytes</b>	<b>Leucocytes</b>
1. Erythrocytes are biconcave and disc shaped.	1. Leucocytes are irregular in shape, usually amoeboid.
2. They are enucleated, i.e. the nucleus is absent.	2. Different shapes of nucleus are found in different kinds of leucocytes.

(iv) The process occurring in B and C is phagocytosis. During phagocytosis, WBCs, especially neutrophils, engulf the bacteria and destroy them. Any pathogens invading the body are killed by WBCs in this process. Thus, it protects the human body from infections and diseases.

**(h)**

<b>Column I</b>	<b>Column II</b>
1) Pacemaker	(e) SA Node
2) Stroma	(g) Site of dark reaction
3) Afferent nerve	(h) Transmits impulses from the receptor organ to the spinal cord
4) Prolactin	(f) Stimulates production of milk by the mammary gland
5) Sacculus	(a) Associated with static body balance

## SECTION II

### Answer 2

#### (a)

(i) The above structure is present in the renal cortex of the kidney.

(ii) 1. Afferent arteriole

2. Glomerulus

3. Bowman's capsule

4. Efferent arteriole

(iii) Stages in urine formation are

1. Ultrafiltration

2. Reabsorption: Selective reabsorption and tubular secretion

(iv) The technical term given to the process in 2 and 3 is ultrafiltration.

The blood flows through the glomerulus under great pressure, which is much greater than in the capillaries elsewhere. The reason for this greater pressure is that the efferent arteriole is narrower than the afferent arteriole. This high pressure causes the smaller molecules of the blood to filter out through the glomerulus into the renal tubule. This filtration under extraordinary force is called ultrafiltration. The fluid entering the Bowman's capsule is called 'glomerular filtrate'.

#### (b)

(i) In hilly regions, the soil is deficient in iodine; thus, the food grown in such soil is also iodine deficient. Iodine is necessary for the synthesis of thyroid hormone. Simple goitre is caused by hyposecretion of thyroxine. Therefore, people living in hilly regions usually suffer from simple goitre.

(ii) During summer, more water is lost by perspiration, so there is more reabsorption of water from the kidney tubules into the blood. Thus, the urine is more concentrated and thicker. In winter, perspiration is highly reduced, so smaller amounts of water are reabsorbed by the kidney tubules, making the urine more dilute. Therefore, urine is slightly thicker in summer than in winter.

(iii) Potato cubes absorb water by the process of endosmosis and the cell membrane acts as a semi-permeable membrane. Due to endosmosis, the potato cubes increase in size. At this time due to turgor pressure and wall pressure, the potato becomes firm.

(iv) A lack of nucleus increases the surface area volume ratio. More erythrocytes can be accommodated in the same space. At the same time, the oxygen-carrying capacity of erythrocytes increases. Lack of mitochondria ensures that all the oxygen absorbed by RBCs is transported and delivered to the tissues. Therefore, a mature mammalian erythrocyte lacks a nucleus and mitochondria.

(v) Plants prepare their food by the process of photosynthesis. Herbivores are dependent on plants for their food. Carnivores depend on herbivores. All animals directly or indirectly are dependent on plants to obtain food for energy. Therefore, photosynthesis is considered to be a process supporting all life on Earth.

**Answer 3**

**(a)**

- (i) (1) Glucagon: alpha cells.  
(2) Insulin: beta cells.
- (ii) (1) 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) Insulin controls the high blood sugar level in the body. It promotes the glucose utilisation by the body and the conversion of glucose into glycogen in the liver to maintain the normal sugar level.
- (iii) The pancreas contains exocrine glands, which are duct glands, secreting pancreatic juice in the small intestine which helps in digestion. On the other hand, it also contains islets of Langerhans which are endocrine glands secreting insulin, glucagon and somatostatin. Therefore, the pancreas is referred to as an exo-endocrine gland.
- (iv) Insulin is a hormone and proteinaceous in nature. If taken orally, it may be broken down due to the digestion process in the stomach by digestive juices, so it is not taken orally.
- (v) Islets of Langerhans is the technical term for the cells of the pancreas which produce endocrine hormones.
- (vi) Pancreas is located in the abdomen, between the stomach and the small intestine.

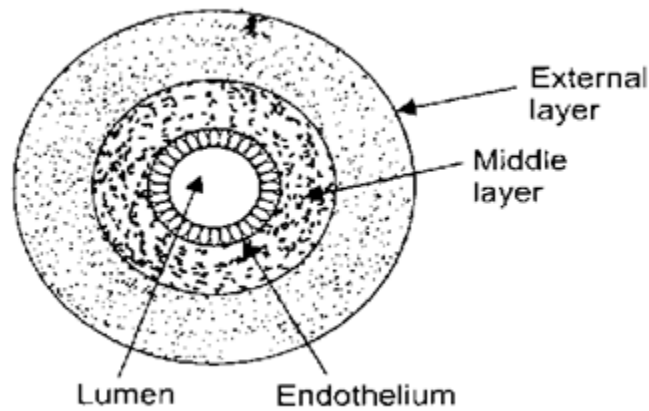
**(b)**

- (i) The process of focusing the eye 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 which are responsible for bringing about the change in the shape of the lens are the ciliary muscles and the suspensory ligaments.
- (iv) (1) In the dark, the rod cells and their pigment rhodopsin get activated.  
(2) In the light, the cone cells and their pigment iodopsin get activated.

**Answer 4**

**(a)**

- (i) 1 – Pulmonary vein  
3 – Hepatic portal vein  
6 – Hepatic vein  
7 – Inferior vena cava
- (ii) Coronary arteries supply blood to the heart with oxygen.
- (iii) 2. Aorta.



(iv)

<b>Renal Artery</b>	<b>Renal Vein</b>
1. The renal artery has thick muscular walls.	1. The renal vein has thin muscular walls.
2. It has a narrow lumen.	2. It has a wider lumen.
3. Valves are absent in the renal artery.	3. Valves are present in the renal vein.

**(b)**

- (i) Membranous labyrinth
- (ii) Malleus (hammer), incus (anvil) and stapes (stirrup). The biological term is **ear ossicles**.
- (iii) (1) Static balance: sacculus and utriculus  
(2) Hearing: cochlea/organ of Corti  
(3) Dynamic balance: semicircular canal
- (iv) Auditory nerve

**Answer 5**

**(a)**

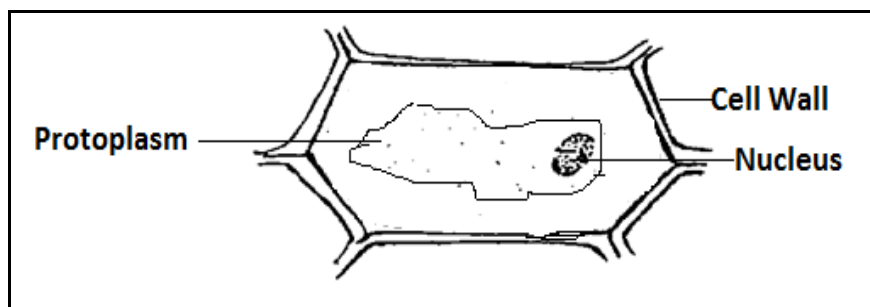
- (i) A – Ovum; B – Sperm
- (ii) The ovum is produced in the ovary, and sperms are produced in the testes by the seminiferous tubules.
- (iii) Oviduct or fallopian tube
- (iv) Hormone secreted by
  - (1) Ovary: oestrogen
  - (2) Testes: testosterone
- (v) An accessory gland found in the male reproductive system is the prostate gland. The secretions of the prostate gland contribute to sperm motility and viability.

**(b)**

- (i) A – Cell wall  
B – Cell membrane  
C – Epidermal cell  
D – Nucleus
- (ii) The process is osmosis which causes the cell to become turgid. Osmosis is the movement of water molecules from a region of their high concentration to a region of their low concentration through a semi-permeable membrane.
- (iii) Part A: Cell wall; Part B: Cell membrane

Cell Wall	Cell Membrane
The cell wall is a freely permeable membrane.	The cell membrane is a semi-permeable membrane.

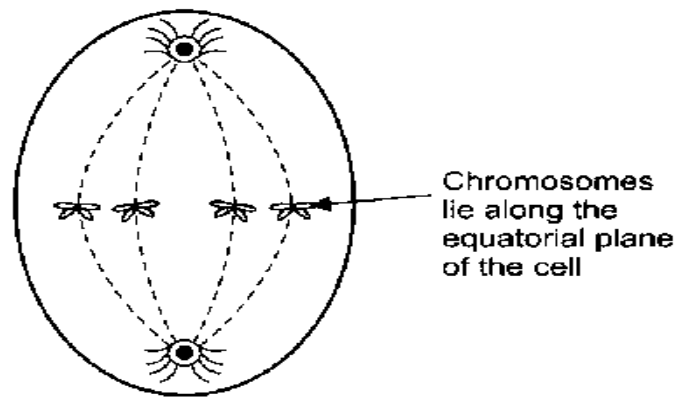
(iv)



**Answer 6**

**(a)**

- (i) 1 – Aster  
2 – Spindle fibres  
3 – Chromatids
- (ii) The two chromatids of each chromosome separate and move apart towards opposite poles. So, this is the anaphase stage.
- (iii) This type of cell division takes place in body cells or somatic cells.
- (iv) The stage prior to anaphase is metaphase.



**(b)**

- (i) The process studied is transpiration.
- (ii) Transpiration is the process by which plants lose water in the form of water vapour through their aerial parts. Transpiration helps plants to maintain their body temperature. It also cools the regions around the plant.
- (iii) Oil is placed over water to prevent any water loss by evaporation from the surface of water.
- (iv) The level of water will
  - (1) Reduce in bright sunlight
  - (2) Remain the same in humid conditions
  - (3) Reduce on a windy day
- (v) Three adaptations in plants to overcome transpiration are
  - 1. Sunken stomata, e.g. *Nerium*
  - 2. Fewer stomata
  - 3. Narrow leaves



**Answer 7**

**(a)**

(i)

<b>Organ</b>	<b>Sympathetic system</b>	<b>Parasympathetic system</b>
(1) Heart	Accelerates heartbeat	Retards heartbeat
(2) Pupil of the eye	Dilates the pupil	Constricts the pupil
(3) Salivary gland	Inhibits secretion of saliva	Stimulates secretion of saliva

(ii) Four activities of the Red Cross:

1. To extend relief and help to the victims of any calamity such as floods, fires, famines, earthquakes etc.
2. To produce and supply blood for the needy victims of war or other calamities.
3. To extend all possible first aid at the site of an accident.
4. To look after maternal and child welfare centres.

(b)

<b>(i) Antiseptic</b>	<b>Disinfectant</b>
Carbolic acid, Dettol	Phenol, Formalin

<b>(ii) Erythrocytes</b>	<b>Leucocytes</b>
Erythrocytes contain the haemoglobin pigment which is an oxygen carrier. Thus, they supply oxygen at the cell level.	Leucocytes help in the defence mechanism of the body. They destroy invading pathogens by phagocytosis.

<b>(iii) Guttation</b>	<b>Bleeding</b>
Guttation is caused when a humid environment hampers transpiration but the roots continue to absorb water which builds up a hydrostatic pressure within the plant.	Bleeding occurs due to an injury to the plant. The plant sap escapes from the ruptured part of the plant.

<b>(iv) NADP</b>	<b>AIDS</b>
Nicotinamide adenine dinucleotide phosphate	Acquired immunodeficiency syndrome

<b>(v) Monohybrid ratio</b>	<b>Dihybrid ratio</b>
3:1	9:3:3:1