

**ICSE Board  
Class X Biology  
Board Paper 2014 - Solution**

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**SECTION I**

**Answer 1**

**(a)**

- (i) Cerebrum
- (ii) Malleus
- (iii) Recessive
- (iv) Glucagon, Insulin
- (v) Photophosphorylation

**(b)**

- (i) Cerebrospinal fluid – It acts as a shock absorber and protects the brain from mechanical shocks.
- (ii) Eustachian tube – It equalises the pressure on either side of the ear drum.
- (iii) Suspensory ligament of the eye – It holds the lens in position.
- (iv) Sperm duct – It carries sperms from the epididymis to the urethra.
- (v) Lenticels – They help in the exchange of gases.

**(c)**

The human female gonads are ovaries. A maturing egg in the ovary is present in a sac of cells called **follicle (1)**. As the egg grows larger, the follicle enlarges and gets filled with a fluid and is now called the **graafian (2)** follicle. The process of releasing the egg from the ovary is called **ovulation (3)**. The ovum is picked up by the oviduct funnel and fertilisation takes place in the **oviduct (4)**. In about a week, the blastocyst gets fixed in the endometrium of the uterus and this process is called **implantation (5)**.

**(d)**

- (i) Odd term: Glucagon. Category: They are pigments. (Glucagon is a hormone)
- (ii) Odd term: Uterus. Category: Parts of the excretory system. (Uterus is a part of the female reproductive system)
- (iii) Odd term: Phagocytosis. Category: Processes which occur in plants. (Phagocytosis a process which occurs in animals)
- (iv) Odd term: Photon. Category: Parts of the neuron. (Photon is an energy particle)
- (v) Odd term: Insulin. Category: Hormones responsible for pregnancy and lactation. (Insulin maintains blood glucose levels)

***Please note that the information provided in brackets is to help you in your learning. It does not have to be included in your answer.***

**(e)**

- (i) Transpiration
- (ii) Transpiration is a process by which water is lost in the form of water vapour from the aerial parts of the plant.
- (iii) Weight of test tube A before the experiment was more than its weight after the experiment. This is because water from test tube A has evaporated due to transpiration.  
Weight of test tube B remains the same before and after the experiment, because no loss of water occurs in test tube B.
- (iv) Test tube B is used here as a control. This makes the observation of the change in test tube A easy.

**(f)**

Sr. No.	Column A	Column B
1.	Pituitary gland	c. Growth hormone
2.	Sulphur dioxide	d. Acid rain
3.	Seminiferous tubules	e. Sperms
4.	Clotting blood	b. Calcium
5.	Guttation	h. Hydathodes

**(g)**

- (i) C. Hyposecretion of thyroxine. Cretinism is caused in children, while myxoedema is caused in adults.
- (ii) C. Salivation at the sight of food
- (iii) A. 44 + XX chromosomes
- (iv) D. Fungus
- (v) C. Epididymis

**(h)**

- (i) Tricuspid valve – Located between the right auricle and right ventricle.
- (ii) Amnion – It surrounds the embryo and is located on the inner side of the chorion.
- (iii) Yellow spot – Located at the centre of the posterior portion of the retina.
- (iv) Seminal vesicle – Located posterior to and at the end of the urinary bladder in front of the rectum.
- (v) Adrenal gland – Located at the top of each kidney as a cap-like structure.

## SECTION II

### Answer 2

(a)

(i)

<b>Spinal nerves</b>	<b>Cranial nerves</b>
31 pairs of spinal nerves are present in humans.	12 pairs of cranial nerves are present in humans.

(ii)

<b>Near vision</b>	<b>Distant vision</b>
In near vision, the shape of the eye lens is convex.	In distant vision, the shape of the eye lens is thin and less convex.

(iii)

<b>Corpus callosum</b>	<b>Corpus luteum</b>
Corpus callosum connects the two cerebral hemispheres internally.	Corpus luteum secretes oestrogen and progesterone.

(iv)

<b>Turgor pressure</b>	<b>Wall pressure</b>
Turgor pressure is the outward pressure exerted on the cell wall by the fluid contents of the cell.	Wall pressure is the inward pressure exerted by the cell wall on the fluid content of the cell.

(v)

<b>Disinfectant</b>	<b>Antiseptic</b>
Chemical substances which destroy some bacteria and prevent the growth of others are called disinfectants.	Chemical substances which are used to destroy microbes in spots and places and for the sterilisation of instruments are called antiseptics.

**(b)**

(i) 1- Superior vena cava

2 - Aorta

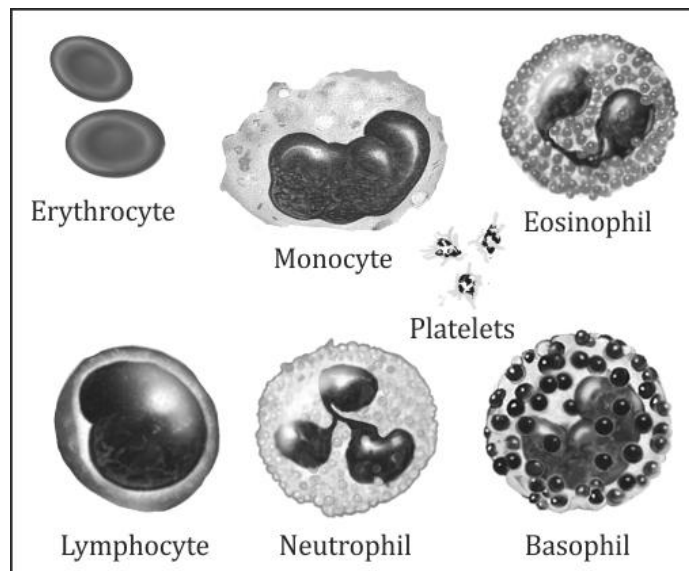
(ii) Function of blood vessel 5 (Hepatic artery) - It supplies oxygenated blood to the liver.

Function of blood vessel 8 (Inferior vena cava) - It carries deoxygenated blood from the posterior parts of the body to the heart.

(iii) Importance of blood vessel 6 (Hepatic portal vein) - It carries nutrient laden blood from the gastrointestinal tract to the liver.

(iv) Blood vessel 6, i.e. hepatic portal vein.

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

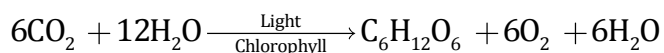


**Answer 3****(a)**

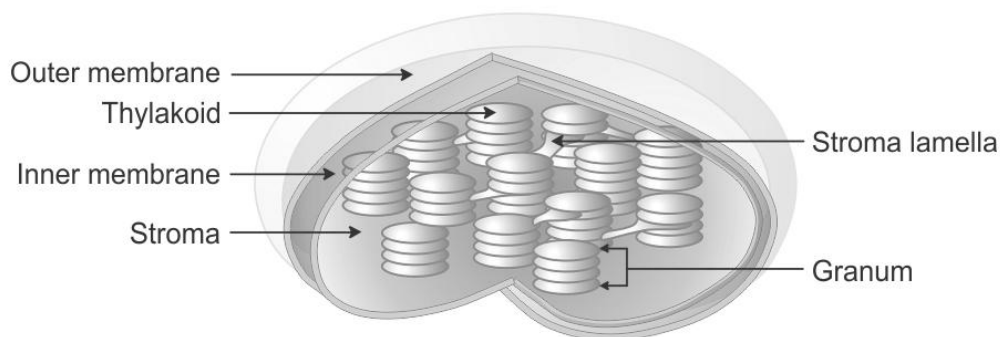
- (i) Solution 1 – Hypotonic solution  
Solution 2 – Hypertonic solution  
Solution 3 – Isotonic solution
- (ii) In beaker three, the solution present is an isotonic solution, i.e. the relative concentration of water molecules and solutes is same in the solution as well as inside the cell. There is no movement of water molecules across the cell membrane. Hence, the size of the potato cubes remains same.
- (iii) The cell sap of root hairs has higher concentration of solute than the surrounding water.
- (iv) Osmosis is the diffusion of water molecules across the semi-permeable membrane from the region of dilute solution (i.e. a lower solute concentration) to the region of concentrated solution (i.e. a higher solute concentration).
- (v) The cell wall is freely permeable to all the substances, while the cell membrane is selectively permeable and allows only certain substances to enter or exit the cell.

**(b)**

- (i) Light is required for photosynthesis.
- (ii) Before beginning the experiment, the plant was kept in dark in order to destarch it, i.e. to remove the pre-existing starch from the storage organs.
- (iii) (1) The leaf was boiled in water to destroy enzymes so that further chemical changes do not take place in the leaf.
- (iv) (2) The leaf was boiled in methylated spirit to dissolve chlorophyll.
- (v) Chemical equation for the process of photosynthesis:



- (vi) Chloroplast:



**Answer 4****(a)**

- (i) Path of reflex action or reflex arc
- (ii) Synapse
- (iii) 1 – Receptor  
2 – Dorsal root ganglion  
3 – White matter  
4 – Grey matter
- (iv) Function of part 5 (Association neuron) – Relays information from the sensory neuron to the motor neuron.  
Function of part 6 (Spinal nerve) – A response impulse is sent to the effector through the spinal nerve.
- (v) In the brain, the cell bodies of neurons lie in the cortex, i.e. the outer region (grey matter) and axons lie on in the inner region (white matter). In the spinal cord, the cell bodies lie in the medullary region (inner grey matter) and axons lie on the outer side, i.e. cortex (outer white matter).

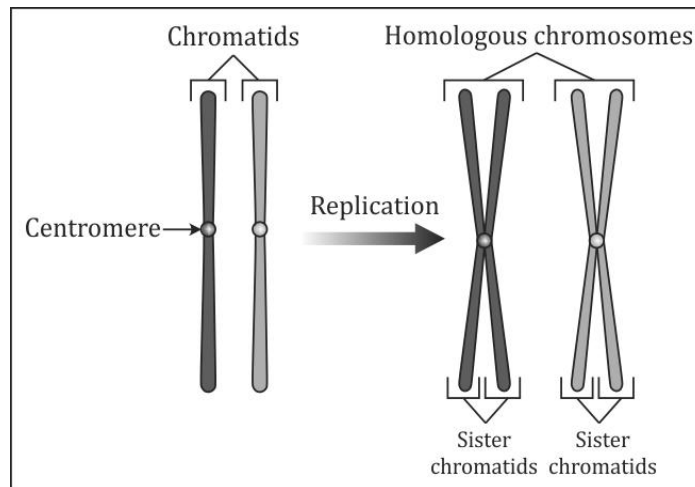
**(b)**

- (i) Chlorine from CFC breaks ozone molecules into oxygen and nascent oxygen, thereby depleting the ozone layer. This has made the ozone layer, which is important for the absorption of solar UV rays, thinner making it disastrous for life on Earth. Hence, the use of CFC is banned in many countries.
- (ii) Cone cells in the retina are responsible for colour vision. They are functional only in bright light. Moon light is unable to stimulate the cone cells; however, the rod cells respond to dim light. Hence, we can see in moon light but cannot distinguish colours.
- (iii) In case of balsam plants, the rate of transpiration during mid-day exceeds the rate of absorption of water by the roots. The cells therefore lose turgidity.  
In the evening or during the night, the stomata are constricted and the temperature is not very high; therefore, there is no loss of water through transpiration, and the turgidity of the leaves is re-acquired.
- (iv) Carbon monoxide when inhaled and absorbed into blood binds with haemoglobin and forms an irreversible complex called carboxyhaemoglobin. The formation of this complex reduces the oxygen-carrying capacity of blood. Hence, carbon monoxide is highly dangerous when inhaled.
- (v) The cerebellum is responsible for the coordination of muscular movements. In case of an alcoholic person, the cerebellum gets affected and is unable to coordinate muscular movements. Hence, after consuming alcohol, a person walks clumsily.

**Answer 5****(a)**

- (i) It is a plant cell because centrioles are not shown in the diagram.
- (ii) Prophase
- (iii) Metaphase. Chromosomes arrange themselves on the metaphase plate.
- (iv)

Mitosis	Meiosis
Chromosome number remains the same as that of the parent cells.	Daughter cells receive only half the number of chromosomes from the parent cells.

**(v) Duplicated Chromosome:****(b)**

(i)

- (1) Salk's vaccine – Poliomyelitis
- (2) BCG – Tuberculosis

(ii)

- (1) A water pollutant – Mercury
- (2) An aquatic plant used in the laboratory to demonstrate the liberation of oxygen during photosynthesis – Hydrilla
- (3) An antibiotic - Penicillin
- (4) A nitrogenous base in DNA – Adenine

(iii)

- (1) ATP – Adenosine triphosphate
- (2) TSH – Thyroid stimulating hormone
- (3) DPT – Diphtheria, Pertussis, Tetanus
- (4) DNA – Deoxyribose nucleic acid

**Answer 6****(a)**

- (i) 1 – Collecting duct  
2 – Distal convoluted tubule (DCT)  
3 – Descending limb of loop of Henle  
4 – Bowman's capsule
- (ii) The diameter of efferent arteriole is narrower than the diameter of the afferent arteriole which builds the high hydrostatic pressure in the glomerulus.
- (iii) Efferent arteriole
- (iv) The two main stages of urine formation are ultrafiltration and tubular reabsorption.
- (v) Henle's loop and collecting tubules

**(b)**

- (i) Monohybrid Cross – It is a cross in which only one pair of contrasting characters is taken into consideration.
- (ii) Biomedical Waste – Wastes such as cotton swabs, bandages, discarded surgical instruments generated by hospitals, clinics, diagnostic laboratories, research institutions are collectively called biomedical waste.
- (iii) Innate Immunity – Immunity which is by birth, i.e. acquired from parents, is called innate immunity.
- (iv) Diapedesis – Leucocytes, especially monocytes, migrate through the walls of the blood vessels. This process is called diapedesis. Leucocytes migrate to fight germs.
- (v) Hormones – A hormone is a secretion from the endocrine glands, which is poured into the blood and which acts on the target organs or cells of the same individual.



**Answer 7****(a)****(i) Harmful effects of noise pollution on human health:**

1. Prolonged exposure to high-decibel noise damages the ear drums and can bring about permanent hearing impairment.
2. Noise pollution can lead to high blood pressure (hypertension), constant headaches and lack of concentration.
3. It interrupts the thought process, resulting in low efficiency at work.
4. It disturbs sleep which causes irritability and nervous disorders.

**(ii)**

<b>Functions of the Red Cross Society</b>	<b>Functions of WHO</b>
Humanitarian services to victims of war.	To suggest quarantine measures to prevent spread of disease.
To educate people in accident prevention.	To promote projects for research on disease.

**(iii) Reasons for population explosion in India:**

1. Improved nutrition (especially for growing children) helps to stay healthy, and thus, people suffer less from diseases and live longer.
2. Fewer infant deaths because of better health care leads to a greater number of children reaching the reproductive age which further contributes to the population growth.

**(iv) Mendel's law of segregation – Two members of a pair of factors separate during the formation of gametes.****(b)**

- (i) Vasectomy
- (ii) Demography
- (iii) Pericardium
- (iv) Mutation
- (v) Nucleotide
- (vi) Plasma
- (vii) Auditory nerve
- (viii) Tropic hormones
- (ix) Scrotum
- (x) Menopause