

ICSE Board
Class X Biology
Board Paper 2014
(Two hours)

General Instructions:

Total Marks: 80

1. Answers to this paper must be written on the paper provided separately.
2. You will **not** be allowed to write during the first **15** minutes.
This time is to be spent in reading the question paper.
3. The time given at the head of the paper is the time allowed for writing the answers.
4. Attempt **all** questions from **Section I** and **any four** questions from **Section II**.
5. The intended marks of questions or parts of questions are given in brackets [].

SECTION I (40 Marks)

*Attempt **all** questions from this section.*

Question 1

(a) Name the following:

- (i) The part of the brain associated with memory.
- (ii) The ear ossicle which is attached to the tympanum.
- (iii) The type of gene which is not expressed in the presence of a contrasting allele.
- (iv) The hormone secreted by islets of langerhans.
- (v) The process of conversion of ADP into ATP during photosynthesis. [5]

(b) State the main function of the following:

- (i) Cerebrospinal fluid
- (ii) Eustachian tube
- (iii) Suspensory ligament of the eye
- (iv) Sperm duct
- (v) Lenticels [5]

(c) Copy and complete the following by filling in the blanks 1 to 5 with appropriate words:

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

(d) Given below are six sets with four terms each. In each set one term is odd and cannot be grouped in the same category to which the other three belong. Identify the odd one in each set and name the category to which the remaining three belong. The first one has been done as an example.

Example: Calyx, Corolla, Stamens, Midrib

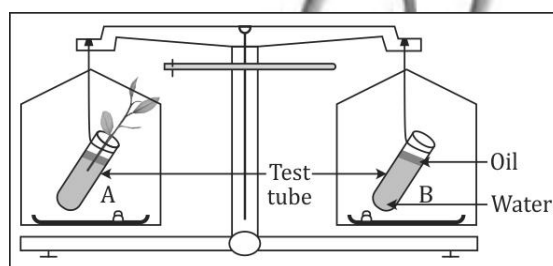
Odd term: midrib

Category: Parts of a flower

- (i) Haemoglobin, Glucagon, Iodopsin, Rhodopsin
- (ii) Urethra, Uterus, Urinary bladder, Ureter
- (iii) Transpiration, Photosynthesis, Phagocytosis, Guttation
- (iv) Cyton, Photon, Axon, Dendron
- (v) Oxytocin, Insulin, Prolactin, Progesterone

[5]

(e) The figure given below represents an experimental setup with a weighing machine to demonstrate a particular process in plants. The experimental setup was placed in bright sunlight. Study the diagram and answer the following questions:



- (i) Name the process intended for study.
- (ii) Define the above mentioned process.
- (iii) When the weight of the test tube (A & B) is taken before and after the experiment, what is observed? Give reasons to justify your observation in A & B.
- (iv) What is the purpose of keeping the test tube B in the experimental setup? [5]

(f) Match the items given in Column A with the most appropriate ones in Column B and rewrite the correct matching pairs from Column A and Column B: [5]

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

(g) Choose the correct answer from the options given below:

- (i) Cretinism and Myxoedema are due to
 - A. Hypersecretion of thyroxin
 - B. Hypersecretion of growth hormone
 - C. Hyposecretion of thyroxin
 - D. Hyposecretion of growth hormone
- (ii) Which of the following is not a natural reflex action?
 - A. Knee-jerk
 - B. Blinking of eyes due to strong light
 - C. Salivation at the sight of food
 - D. Sneezing when any irritant enters the nose
- (iii) After mitotic cell division, a female human cell will have
 - A. 44 + XX chromosomes
 - B. 44 + XY chromosomes
 - C. 22 + X chromosomes
 - D. 22 + Y chromosomes
- (iv) The antibiotic penicillin is obtained from
 - A. Protozoan
 - B. Bacteria
 - C. Virus
 - D. Fungus
- (v) The site of maturation of human sperms is the
 - A. Seminiferous tubule
 - B. Interstitial cells
 - C. Epididymis
 - D. Prostate gland

[5]

(h) State the exact location of the following:

- (i) Tricuspid valve
- (ii) Amnion
- (iii) Yellow spot
- (iv) Seminal vesicle
- (v) Adrenal gland

[5]

SECTION II [40 Marks]

Attempt any **four** questions from this section.

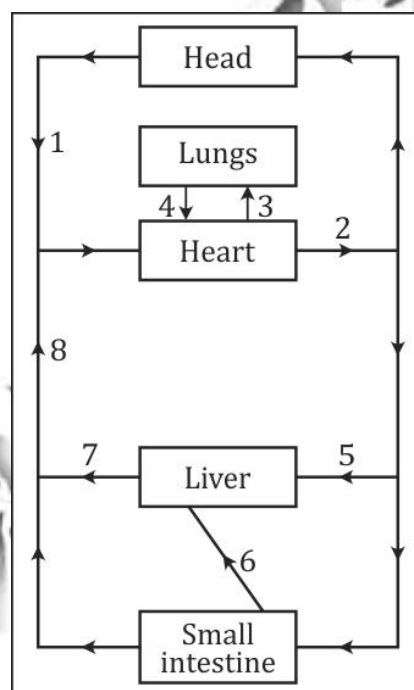
Question 2

(a) Differentiate between the following pairs on the basis of what is mentioned within brackets:

- (i) Spinal nerves and Cranial nerves (number of nerves)
- (ii) Near vision and Distant vision (shape of the eye lens)
- (iii) Corpus callosum and Corpus luteum (function)
- (iv) Turgor pressure and Wall pressure (explain)
- (v) Disinfectant and Antiseptic (definition)

[5]

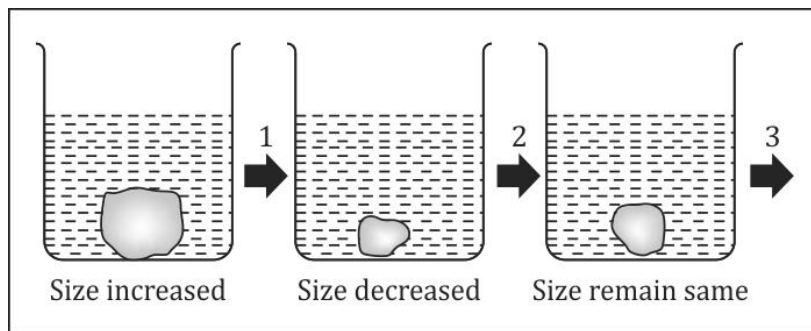
(b) The diagram below represents the simplified pathway of the circulation of blood. Study the same and answer the questions which follow:



- (i) Name the blood vessels labelled 1 and 2.
- (ii) State the function of blood vessels labelled 5 and 8.
- (iii) What is the importance of the blood vessel labelled 6?
- (iv) Which blood vessel will contain a high amount of glucose and amino acids after a meal?
- (v) Draw a diagram of the different blood cells as seen in a smear of human blood. [5]

Question 3

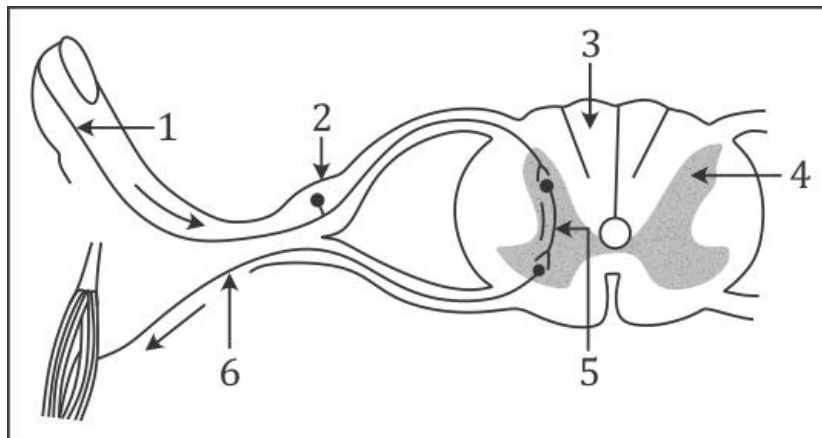
- (a) A candidate in order to study the process of osmosis has taken 3 potato cubes and put them in 3 different beakers containing 3 different solutions. After 24 hours, in the first beaker the potato cube increased in size, in the second beaker the potato cube decreased in size and in the third beaker there was no change in the size of the potato cube. The following diagram shows the result of the same experiment:



- (i) Give the technical terms of the solutions used in beakers, 1, 2 and 3.
 - (ii) In beaker 3, the size of the potato cube remains the same. Explain the reason in brief.
 - (iii) Write the specific feature of the cell sap of root hairs which helps in absorption of water.
 - (iv) What is osmosis?
 - (v) How does a cell wall and a cell membrane differ in their permeability? [5]
- (b) A potted plant was taken in order to prove a factor necessary for photosynthesis. The potted plant was kept in the dark for 24 hours. One of the leaves was covered with black paper in the centre. The potted plant was then placed in sunlight for a few hours.
- (i) What aspect of photosynthesis was being tested?
 - (ii) Why was the plant placed in the dark before beginning the experiment?
 - (iii) During the starch test, why was the leaf
 - (1) boiled in water
 - (2) boiled in methylated spirit
 - (iv) Write a balanced chemical equation to represent the process of photosynthesis.
 - (v) Draw a neat diagram of a chloroplast and label its parts. [5]

Question 4

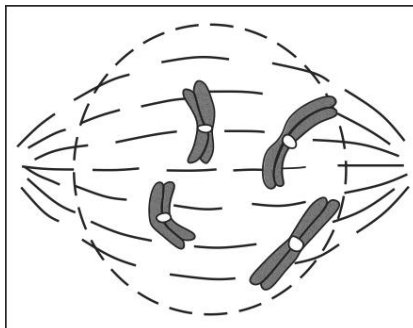
- (a)** The diagram given below is a representation of a certain phenomenon pertaining to the nervous system. Study the diagram and answer the following questions:



- (i) Name the phenomenon which is being depicted.
 - (ii) Give the technical term for the point of contact between the two nerve cells.
 - (iii) Name the parts 1, 2, 3 and 4.
 - (iv) Write the functions of parts 5 and 6
 - (v) How does the arrangement of neurons in the spinal cord differ from that of the brain? [5]
- (b)** Give scientific reasons for the following statements:
- (i) Use of CFC is banned in many countries.
 - (ii) We cannot distinguish colours in moonlight.
 - (iii) Balsam plants wilt during mid-day even if the soil is well watered.
 - (iv) Carbon monoxide is highly dangerous when inhaled.
 - (v) A person walks clumsily after consuming alcohol. [5]

Question 5

- (a) Given below is a diagram representing a stage during mitotic cell division. Study it carefully and answer the questions which follow:



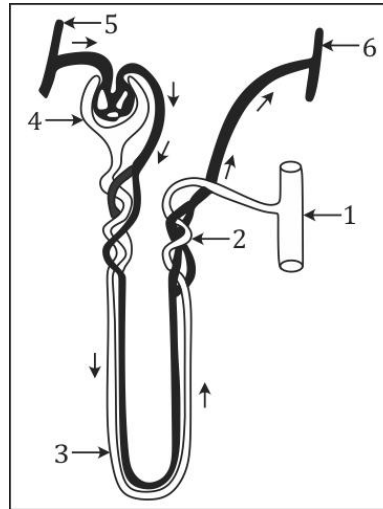
- (i) Is it a plant cell or an animal cell? Give a reason to support your answer.
- (ii) Identify the stage shown.
- (iii) Name the stage which follows the one shown here. How is that stage identified?
- (iv) How will you differentiate between mitosis and meiosis on the basis of the chromosome number in the daughter cells?
- (v) Draw a duplicated chromosome and label its parts. [5]

(b)

- (i) Name the disease for which the following types of vaccines are given:
 - (1) Salk's vaccine
 - (2) BCG
- (ii) Give one example of each of the following:
 - (1) A water pollutant
 - (2) An aquatic plant used in the laboratory to demonstrate O_2 liberation during photosynthesis
 - (3) An antibiotic
 - (4) A nitrogenous base in DNA
- (iii) Expand the following biological abbreviations:
 - (1) ATP
 - (2) TSH
 - (3) DPT
 - (4) DNA [5]

Question 6

(a) The given diagram represents a nephron and its blood supply. Study the diagram and answer the following questions:



- (i) Label parts 1, 2, 3 and 4.
- (ii) State the reason for the high hydrostatic pressure in the glomerulus.
- (iii) Name the blood vessel which contains the least amount of urea in this diagram.
- (iv) Name the two main stages of urine formation.
- (v) Name the part of the nephron which lies in the renal medulla. [5]

(b) Briefly explain the following terms.

- (i) Monohybrid cross
- (ii) Biomedical waste
- (iii) Innate immunity
- (iv) Diapedesis
- (v) Hormones [5]

Question 7

(a)

- (i) State any two harmful effects of noise pollution on human health.
- (ii) Categorise the following activities according to the functions of the Red Cross Society and the WHO:
 - (1) To suggest quarantine measures to prevent spread of disease
 - (2) Humanitarian services to victims of war
 - (3) To educate people in accident prevention
 - (4) To promote projects for research on disease
- (iii) Write any two major reasons for the population explosion in India.
- (iv) State Mendel's Law of segregation. [5]

(b) Give technical terms for the following:

- (i) A method of contraception in which the sperm duct is cut and ligated
- (ii) Statistical study of human population
- (iii) The protective covering of the heart
- (iv) A sudden heritable change in the gene
- (v) Repeated units of DNA molecule
- (vi) The fluid portion of blood
- (vii) The nerve which transmits impulses from the ear to the brain
- (viii) Group of hormones which influence other endocrine glands to produce hormones
- (ix) Thin walled sac of skin which covers the testes
- (x) The permanent stoppage of the menstrual cycle in a woman aged 50 years [5]

ICSE Board
Class X Biology
Board Paper 2014 - Solution

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)

Spinal nerves	Cranial nerves
31 pairs of spinal nerves are present in humans.	12 pairs of cranial nerves are present in humans.

(ii)

Near vision	Distant vision
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)

Corpus callosum	Corpus luteum
Corpus callosum connects the two cerebral hemispheres internally.	Corpus luteum secretes oestrogen and progesterone.

(iv)

Turgor pressure	Wall pressure
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)

Disinfectant	Antiseptic
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

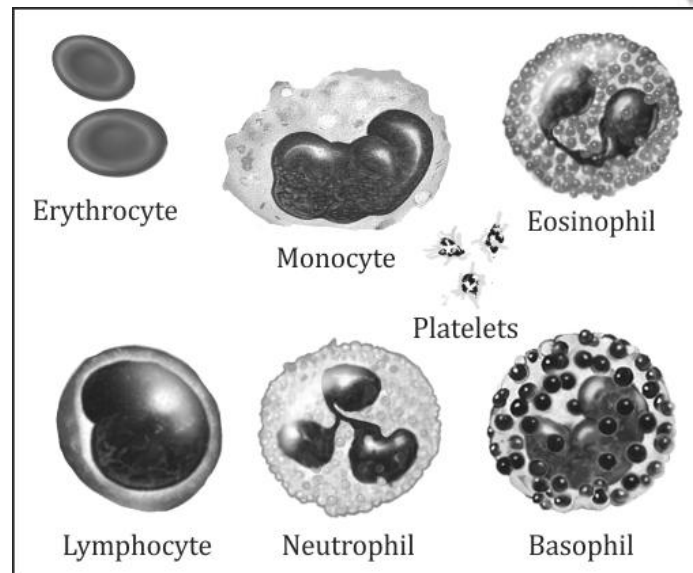
(ii) Function of blood vessel 5 (Hepatic artery) – It supplies oxygenated blood to the liver.

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:



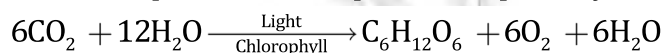
Answer 3

(a)

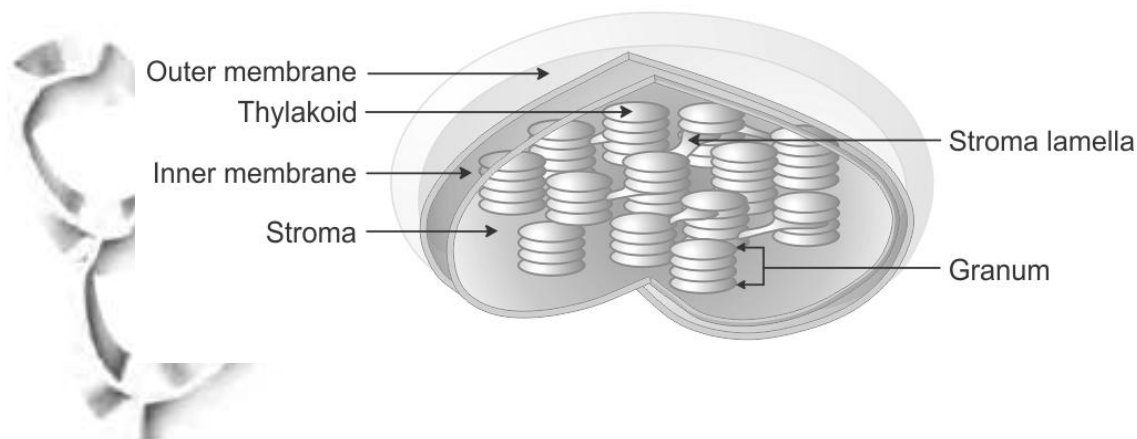
- (i) Solution 1 – Hypotonic solution
Solution 2 – Hypertonic solution
Solution 3 – Isotonic solution
- (ii) In beaker three, the solution present is an isotonic solution, i.e. the relative concentration of water molecules and solutes is same in the solution as well as inside the cell. There is no movement 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.

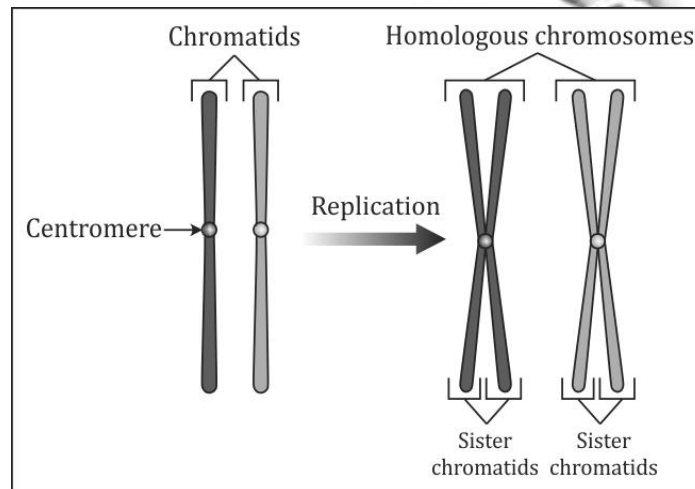
Answer 5

(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)

Functions of the Red Cross Society	Functions of WHO
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