

ICSE Board
Class X Biology
Board Paper 2013
(One hour and a half)

General Instructions:

Total Marks: 80

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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 allotted 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 [].
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SECTION I (40 Marks)

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

Question 1

(a) Name the following:

- (i) The cell body of a nerve cell.
- (ii) The waxy layer on the epidermis of the leaf meant to reduce transpiration.
- (iii) A non-biodegradable pesticide.
- (iv) The physical expression of genes in an individual.
- (v) Knot-like mass of blood capillaries inside the Bowman's capsule.

[5]

(b) State the exact location of the following:

- (i) Chloroplast
- (ii) Incus
- (iii) Corpus callosum
- (iv) Guard cells
- (v) Pulmonary semilunar valve

[5]

- (c)** Given below are six sets with four terms each. In each set, a term is an odd one 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: Fructose, Sucrose, Glucose, Calcium

Odd term: Calcium

Category: Carbohydrates

- (i) Carbonic acid, acetic acid, benzoic acid, boric acid
- (ii) Saliva, bile, sweat, tears
- (iii) Cretinism, myxoedema, simple goitre, acromegaly
- (iv) Sneezing, coughing, blinking, typing
- (v) Semicircular canals, cochlea, tympanum, utricle

[5]

- (d)** Match the items in Column A with that which is most appropriate in Column B. Rewrite the matching pair. [5]

Column A	Column B
(1) Testis	(a) Kidney
(2) Poliomyelitis	(b) Water vapour
(3) Transpiration	(e) Prostate gland
(4) Clotting of blood	(d) Iron
(5) Uriniferous tubule	(e) Uterus
	(f) Gonad
	(g) Salk's vaccine
	(h) Water droplet
	(i) Calcium
	(j) TAB vaccine

(e) Choose the correct answer from the four options given below:

- (i) The cell component visible only during cell division is
 - A. Mitochondria
 - B. Chloroplast
 - C. Chromosome
 - D. Chromatin
- (ii) Pulse wave is mainly caused by the
 - A. Systole of atria
 - B. Diastole of atria
 - C. Systole of the left ventricle
 - D. Systole of the right ventricle
- (iii) The recessive gene is one which expresses itself in
 - A. Heterozygous condition
 - B. Homozygous condition
 - C. F₂ generation
 - D. Y-linked inheritance
- (iv) A gland which secretes both hormone and enzyme is the
 - A. Pituitary
 - B. Pancreas
 - C. Thyroid
 - D. Adrenal
- (v) The ventral root ganglion of the spinal cord contains cell bodies of the
 - A. Motor neuron
 - B. Sensory neuron
 - C. Intermediate neuron
 - D. Association neuron

[5]

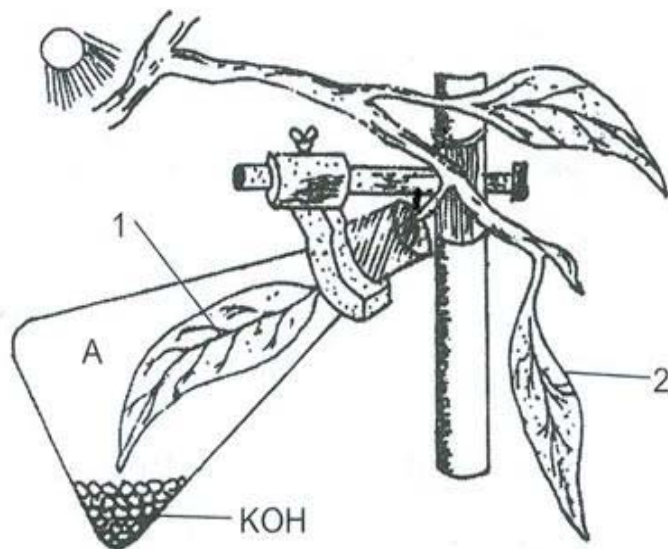
(f) Given below is an example of certain structures and their special functional activities.

For example: Eye and vision. On a similar pattern, complete the following:

- (i) Neutrophils
- (ii) Ureter
- (iii) Neurotransmitters
- (iv) Iris of the eye
- (v) Placenta

[5]

- (g)** The figure given below represents an experiment to demonstrate a particular aspect of photosynthesis. The letter 'A' represents a certain condition inside the flask.



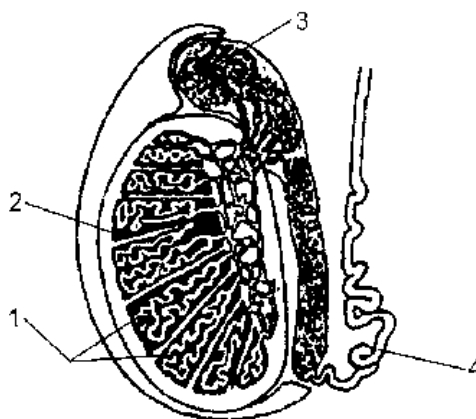
- (i) What is the aim of the experiment?
(ii) Identify the special condition inside the flask.
(iii) Name an alternative chemical which can be used instead of KOH.
(iv) In what manner do the leaves 1 and 2 differ at the end of the starch test? [5]
- (h)** Given below are five groups of terms. In each group, arrange and rewrite the terms in the correct order so as to be in a logical sequence. For example, Question: Implantation, Parturition, Ovulation, Gestation, Fertilisation. Answer: Ovulation, Fertilisation, Implantation, Gestation, Parturition.
- (i) Spongy cells, Upper epidermis, Stoma, Palisade tissue, Sub-stomatal space
(ii) Spinal cord, Motor neuron, Receptor, Effector, Sensory neuron
(iii) Endodermis, Cortex, Soil water, Xylem, Root hair
(iv) Metaphase, Telophase, Prophase, Anaphase, Cytokinesis
(v) Intestine, Liver, Intestinal artery, Hepatic vein, Hepatic portal vein [5]

SECTION II [40 Marks]

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

Question 2

- (a) Given below is a diagram of the lateral section of the testis of a man. Study the same and answer the questions which follow:



- (i) Label the parts numbered 1 to 4 in the diagram.
- (ii) State the functions of the parts labelled 1 and 3.
- (iii) What is the significance of the testes being located in the scrotal sac outside the abdomen?
- (iv) What is the role played by the inguinal canal?
- (v) What is semen?

[5]

- (b) Give the biological/technical terms for the following:

- (i) Chemicals found in the blood which act against antigens.
- (ii) A constituent which causes pollution.
- (iii) The onset of menstruation in a young girl.
- (iv) Structure which connects the placenta with the foetus.
- (v) The fluid present between the layers of meninges.
- (vi) Permanently open structures seen on the bark of an old woody stem.
- (vii) The biological process which is the starting point of the food chain.
- (viii) The change in an organism resulting due to stimulus.
- (ix) An antiseptic substance present in tears.
- (x) A solution in which the relative concentration of water molecules and the solute on either side of the cell membrane is the same.

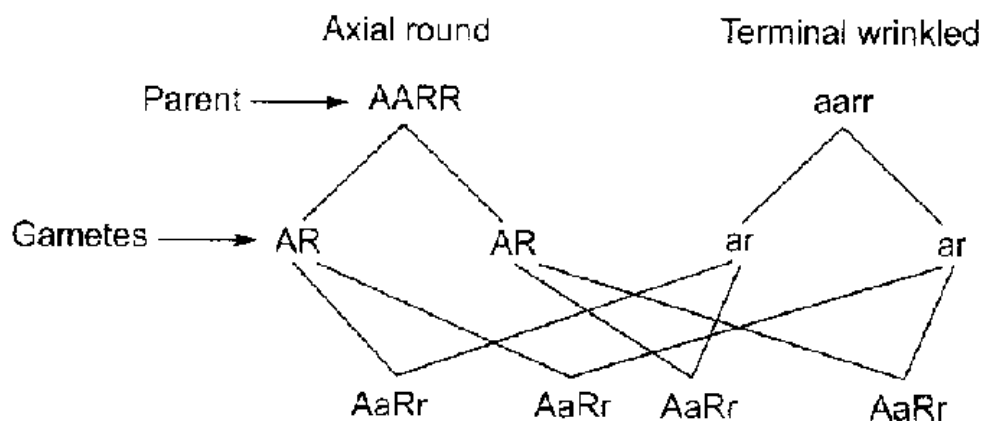
[5]

Question 3

- (a)** Draw a diagram of the human eye as seen in a vertical section and label the parts which suit the following descriptions relating to the
- (i) Photosensitive layer of the eye.
 - (ii) Structure which is responsible for holding the eye lens in its position.
 - (iii) Structure which maintains the shape of the eye ball and the area of no vision.
 - (iv) Anterior chamber seen in front of the eye lens.
 - (v) Outer most transparent layer seen in front of the eye ball.
- [5]
- (b)** Differentiate between the following pairs on the basis of what is mentioned within brackets:
- (i) Photolysis and Photophosphorylation (definition)
 - (ii) Bicuspid valve and Tricuspid valve (function)
 - (iii) Vasectomy and Tubectomy (explain)
 - (iv) Cerebrum and Spinal cord (arrangement of nerve cells)
 - (v) Bowman's capsule and Malpighian capsule (parts included)
- [5]

Question 4

- (a) Given below is a schematic diagram showing Mendel's experiment on sweet pea plants having axial flowers with round seeds (AARR) and terminal flowers with wrinkled seeds (aarr). Study the same and answer the questions which follow:



- Give the phenotype of F₁ progeny.
- Give the phenotypes of F₂ progeny produced upon by the self-pollination of F₁ progeny.
- Give the phenotypic ratio of F₂ progeny.
- Name and explain the law induced by Mendel on the basis of the above observation.

[5]

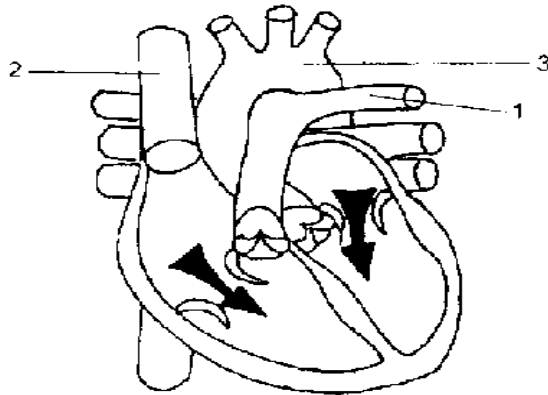
- (b) Complete the following table by filling in the blanks from 1 to 10 with appropriate terms:

[5]

Sr. No.	Gland	Secretion	Function/Effect on body
1.	Thyroid	<u>1</u>	<u>2</u>
2.	<u>3</u>	Vasopressin	<u>4</u>
3.	<u>5</u>	<u>6</u>	Promotes glucose utilisation by the body cells
4.	Lacrimal gland	<u>7</u>	<u>8</u>
5.	Adrenal medulla	<u>9</u>	<u>10</u>

Question 5

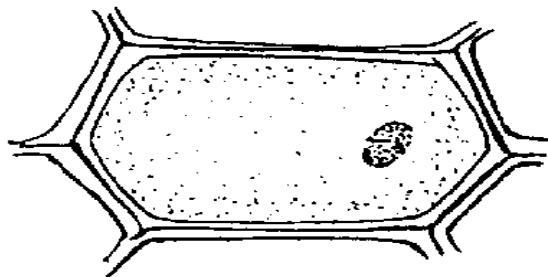
- (a) The diagram given below represents the human heart in one phase of its functional activities. Study the same and answer the questions which follow:



- (i) Name the phase.
 - (ii) Label the parts 1, 2 and 3.
 - (iii) Which part of the heart is contracting in this phase? Give a reason to support your answer.
 - (iv) Draw a well-labeled diagram of part 1 and 2 to show the structural differences between them. [5]
- (b) Give biological reasons for the following:
- (i) The wall of the ventricle is thicker than the auricle.
 - (ii) The renal cortex has a dotted appearance.
 - (iii) Wooden frames of doors get jammed during the monsoon season.
 - (iv) Throat infections can lead to ear infections.
 - (v) The hand automatically shows the direction to turn a cycle without thinking. [5]

Question 6

- (a)** The figure given below shows the epidermal cells of an onion bulb. This cell was then transferred to a drop of sugar solution.



- (i) Draw a well-labelled diagram of the epidermal cell as it would appear after immersion in a strong sugar solution.
 - (ii) What scientific term is used for the changes as shown in (i)?
 - (iii) What should be done to restore the cell back to its original condition?
 - (iv) Give the scientific term for the recovery of the cell as a result of the step taken in (iii) above.
 - (v) Define the term osmosis. [5]
- (b)** Briefly explain the following terms.
- (i) Genes
 - (ii) Cytokinesis in plant cells
 - (iii) Guttation
 - (iv) Diabetes insipidus
 - (v) Disinfectants [5]

Question 7

- (a)**
- (i) Draw a well-labeled diagram to show the anaphase stage of mitosis in a plant cell having four chromosomes.
 - (ii) State any two harmful effects of acid rain.
 - (iii) Expand the following biological abbreviations:
(1) NADP (2) ACT [5]
- (b)**
- (i) List any two major activities of the Red Cross.
 - (ii) Write any two major reasons for the population explosion in the world.
 - (iii) Write the names of four nitrogenous bases in a DNA molecule. [5]

ICSE Board
Class X Biology
Board Paper 2013 - Solution

SECTION I

Answer 1

(a)

- (i) Cyton
- (ii) Cuticle
- (iii) DDT
- (iv) Phenotype
- (v) Glomerulus

(b)

- (i) Chloroplast: Inside the plant cells, mainly contained in the mesophyll cells, located between the upper and the lower epidermis of the leaves.
- (ii) Incus: Present between the malleus and stapes bones in the middle ear.
- (iii) Corpus callosum: It is located between the two cerebral hemispheres.
- (iv) Guard cells: They are present on the lower epidermis of a dorsiventral leaf surrounding or on either side of the stoma.
- (v) Pulmonary semilunar valve: Located at the opening of the right ventricle into the pulmonary artery.

(c)

Odd terms	Category of the other three items
(i) Acetic acid	Antiseptics
(ii) Bile	Germ-killing secretions
(iii) Acromegaly	Disease related to the thyroid gland
(iv) Typing	Natural (inborn) reflexes
(v) Tympanum	Parts of the inner ear

(d)

Column A	Column B
1) Testis	(f) Gonad
2) Poliomyelitis	(g) Salk's vaccine
3) Transpiration	(b) Water vapour
4) Clotting of blood	(i) Calcium
5) Uriniferous tubule	(a) Kidney

(e)

- (i) C. Chromosome
- (ii) C. Systole of the left ventricle
- (iii) B. Homozygous condition
- (iv) B. Pancreas
- (v) A. Motor neuron

(f)

- (i) Neutrophils: Phagocytosis
- (ii) Ureter: Transports urine from the kidneys to the urinary bladder.
- (iii) Neurotransmitters: Transmits impulses in a synaptic cleft from a presynaptic neuron to a postsynaptic neuron.
- (iv) Iris of the eye: Controls the size of the pupil and regulates the amount of light entering the eye.
- (v) Placenta: Provides nourishment and oxygen to the developing foetus.

(g)

- (i) The aim of the experiment is to prove that carbon dioxide is necessary for photosynthesis.
- (ii) The special condition inside the flask is that the air inside the flask contains no carbon dioxide.
- (iii) An alternate chemical which can be used instead of KOH is soda lime.
- (iv) The leaf 1 when tested for the presence of starch turned brown, indicating the absence of starch, while leaf 2, which is outside the flask, turned blue-black, indicating the presence of starch.

(h)

- (i) Upper epidermis, palisade tissue, spongy cells, sub-stomatal space, stoma
- (ii) Receptor, sensory neuron, spinal cord, motor neuron, effector
- (iii) Soil water, root hair, cortex, endodermis, xylem
- (iv) Prophase, metaphase, anaphase, telophase, cytokinesis
- (v) Intestinal artery, intestine, hepatic portal vein, liver, hepatic vein

SECTION II

Answer 2

(a)

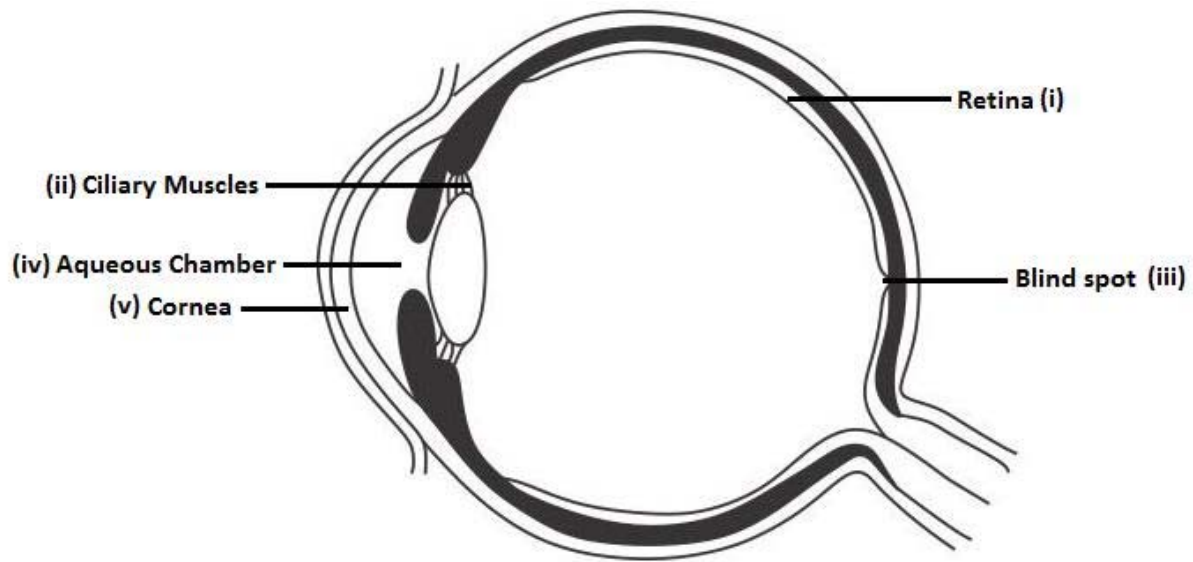
- (i) 1 – Seminiferous tubules
2 – Lobule
3 – Epididymis
4 – Vas deferens
- (ii) 1. Seminiferous tubules: Produce sperms by the process of spermatogenesis.
3. Epididymis: Stores the sperms for some days during which they mature and become motile.
- (iii) The production and survival of sperms requires a temperature which is lower than the normal body temperature, so the testes are located in the scrotal sac which is outside the abdomen, which 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 the mixture of sperms and secretions from the seminal vesicle, prostate gland and Cowper's gland.

(b)

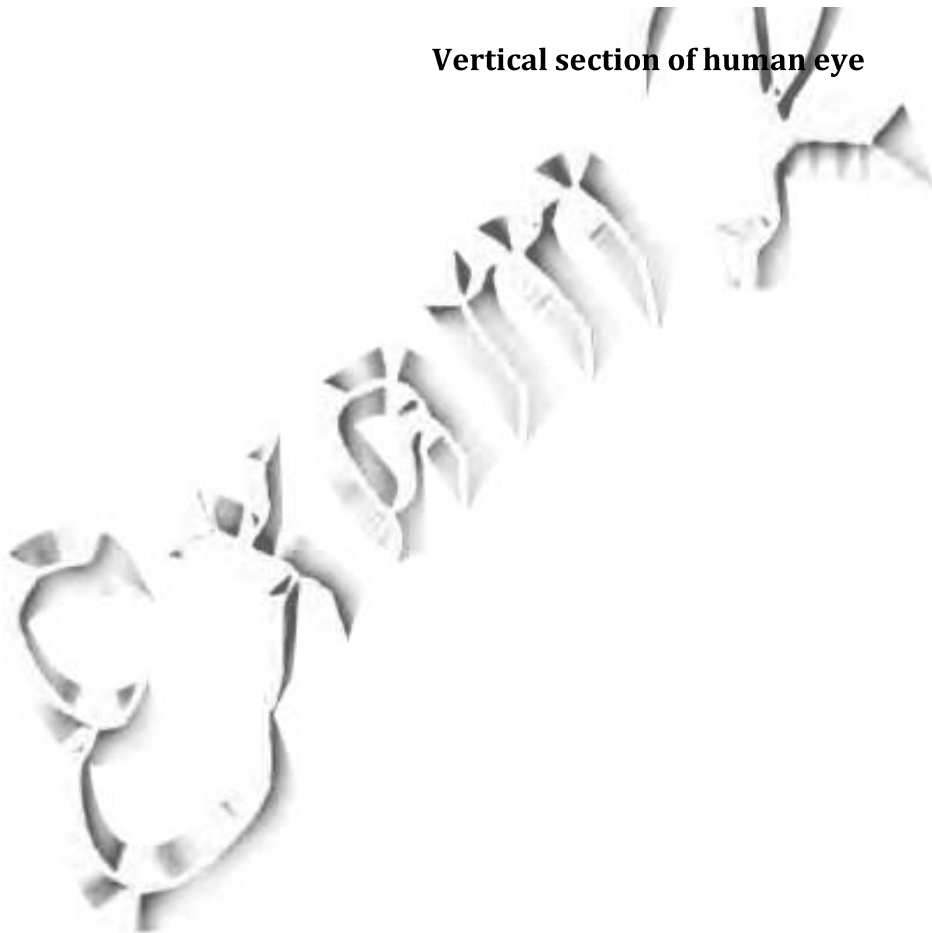
- (i) Antibodies
- (ii) Pollutant
- (iii) Menarche
- (iv) Umbilical cord
- (v) Cerebrospinal fluid
- (vi) Lenticels
- (vii) Photosynthesis
- (viii) Response
- (ix) Lysozymes
- (x) Isotonic solution

Answer 3

(a)



Vertical section of human eye



(b)

(i)

Photolysis	Photophosphorylation
The splitting up of a water molecule into its two components—hydrogen and oxygen—by photons is called photolysis.	The process in which electrons are used to convert ADP (adenosine diphosphate) into an energy-rich compound ATP (adenosine triphosphate) by adding one phosphate group with the help of light energy is called photophosphorylation.

(ii)

Tricuspid valve	Bicuspid valve
The tricuspid valve prevents the backflow of the blood from the right ventricle to the right atrium.	The bicuspid or mitral valve prevents the backflow of the blood from the left ventricle to the left atrium.

(iii)

Vasectomy	Tubectomy
Vasectomy is the surgery performed in males in which the vas deferens is ligated/cut and tied to block the path of sperms from the testes.	Tubectomy is the surgery performed in females where the fallopian tubes or oviducts are ligated and are tied to close the passage of the egg.

(iv)

Cerebrum	Spinal cord
The outer region of the cerebrum contains cell bodies and is grey in colour, while the inner region contains axons of neurons.	The outer region of the spinal cord contains axons, while the inner region contains cell bodies of neurons and appears grey in colour.

(v)

Bowman's capsule	Malpighian capsule
Bowman's capsule is a cup-shaped body which continues as a body of tubules. A glomerulus is enclosed in its cup-shaped cavity.	Bowman's capsule and glomerulus together are called Malpighian capsule.

Answer 4

(a)

(i) All F_1 progenies will have axial flowers and round seeds.

(ii) F_2 phenotypes will be

- Axial flowers, round seeds
- Axial flowers, wrinkled seeds
- Terminal flowers, round seeds
- Terminal flowers, wrinkled seeds

(iii) Phenotypic ratio of the F_1 progeny:

- Axial flowers, round seeds - 9
- Axial flowers, wrinkled seeds - 3
- Terminal flowers, round seeds - 3
- Terminal flowers, wrinkled seeds - 1

(iv) **Law of Segregation:** When the two members of a pair of factors separate during the formation of gametes, they do not blend but segregate or separate into different gametes.

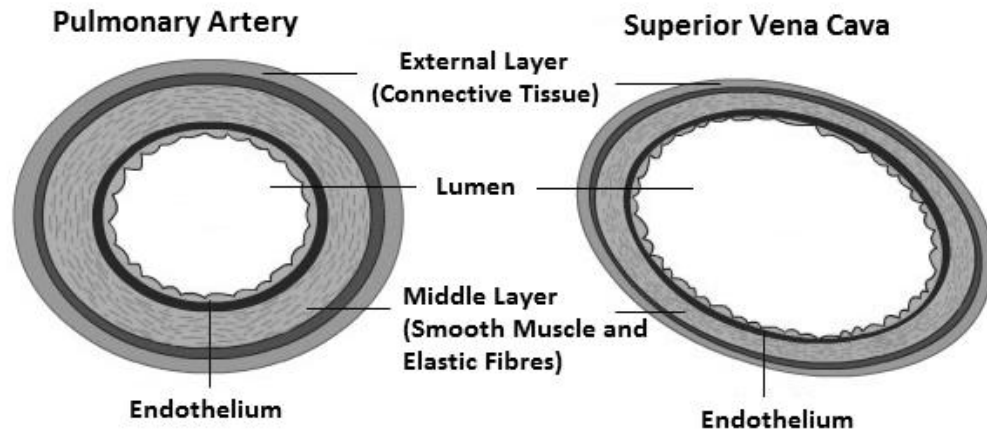
(b)

Sr. No.	Gland	Secretion	Function/Effect on Body
1.	Thyroid	<u>Thyroxine (1)</u>	<u>Regulates basal metabolism (2)</u>
2.	<u>Posterior lobe of pituitary gland (3)</u>	Vasopressin	<u>Increases reabsorption of water by kidney tubules (4)</u>
3.	<u>Thyroid gland (5)</u>	<u>Insulin (6)</u>	Promotes glucose utilisation by the body cells
4.	Lacrimal gland	<u>Tears (7)</u>	<u>Washes away dust particles and germs (8)</u>
5.	Adrenal medulla	<u>Adrenaline (9)</u>	<u>Increases the heartbeat (10)</u>

Answer 5

(a)

- (i) Atrial systole
- (ii) 1 – Pulmonary artery
2 – Superior vena cava
3 – Aorta
- (iii) Atria are contracting in this phase. In the diagram, arrows indicating the flow of blood are shown from atria to ventricles. During the atrial systole, the atria contract and the blood moves from the atria to the respective ventricles.
- (iv) Diagram of an artery and vein:



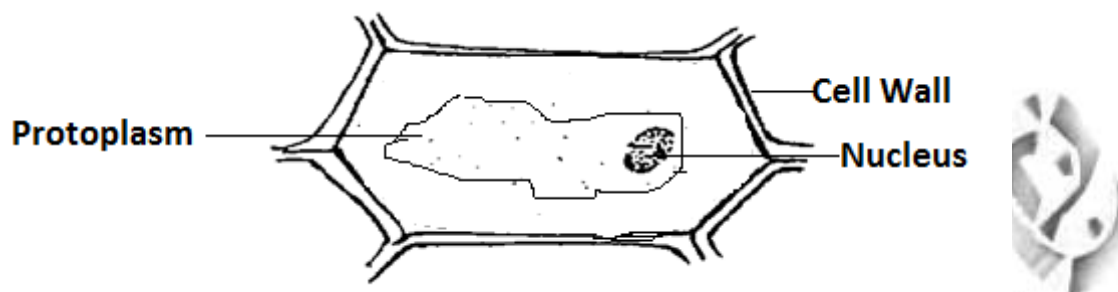
(b)

- (i) The left ventricle pumps blood to all the body parts, and the right ventricle pumps blood to the lungs. Both ventricles pump the blood against the force of gravity which requires a great force. In order to provide strength to apply this force and ensure there is no damage to the walls, the walls of the ventricle are thicker than the auricles.
- (ii) The Malpighian capsules lie in the cortex of the kidneys. These Malpighian capsules appear in large numbers and appear like dots when observed. Therefore, the renal cortex has a dotted appearance.
- (iii) During the monsoon, doors absorb moisture from the atmosphere due to imbibition and swell up, which results in them getting jammed.
- (iv) The Eustachian tube connects the cavity of the middle ear with the throat. Therefore, throat infections can lead to ear infections.
- (v) Due to previous learning about directions, the brain actually remembers its reflex. This is called conditioned reflex. Therefore, the hand automatically shows the direction to turn a cycle without thinking.

Answer 6

(a)

(i)



(ii) The cell is plasmolysed.

(iii) The cell has to be placed in water so that water will enter the cell by endosmosis, and the cell will regain its original shape.

(iv) Deplasmolysis of the cell.

(v) Osmosis is the process by which water molecules move from the region of their high concentration to the region of their low concentration through a semi-permeable membrane.

(b)

(i) **Genes:** Genes are the specific sequences of nucleotides on a chromosome which encode a particular protein, which is expressed in the form of some visible character of the body.

(ii) **Cytokinesis in plant cell:** During cytokinesis in a plant cell, the cell plate grows from the centre to the periphery of the cell resulting in division of the cytoplasm which forms two daughter cells.

(iii) **Guttation:** Guttation is the loss of water by plants, from the margins of their leaves, through special pores called hydathodes.

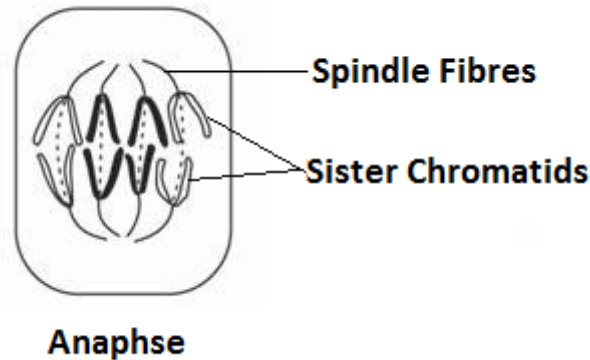
(iv) **Diabetes insipidus:** Deficiency of antidiuretic hormone makes the urine very dilute. Large amount of urine is excreted out of the body leading to dehydration and thirst. This condition is called 'diabetes insipidus'.

(v) **Disinfectants:** Disinfectants are strong chemical substances which are applied on spots and places where germs thrive and multiply.

Answer 7

(a)

(i) Anaphase in plant cell:



(ii) Harmful effects of acid rain:

- (1) Causes damage to vegetation by polluting the soil.
- (2) Causes decaying or corrosion of historical monuments made of marble.

(iii) (1) NADP – Nicotinamide adenine dinucleotide phosphate

(2) ACT – Adrenocorticotrophic hormone

(b)

(i) Two major activities of the Red Cross:

- (1) To extend relief and help to the victims of any calamities such as floods, fires, famines, earthquakes etc.
- (2) To procure and supply blood for the needy victims of war or other calamities.

(ii) Two reasons for population explosion in the world:

- (1) Improved medical facilities and public health measures.
- (2) Improved nutrition and increased food production.

(iii) The four nitrogenous bases are Adenine, Guanine, Thymine and Cytosine.