

BIOLOGY

Answer Keys to Sample Paper - 1

SECTION I

Answer 1

(A)

1. (c) pancreas
2. (b) DNA and Histones
3. (d) ensure that the leaves are free from starch
4. (b) phagocytosis
5. (c) Removal of nitrogenous wastes

(B)

1. Renal artery
(Renal vein has urea but renal artery has higher concentration of urea as compared to renal vein).
2. Eustachian tube
3. Diffusion
4. Guttation
5. Cerebrum

(C)

1. Hearing
2. Guttation
3. Transmission of heredity characters
4. To keep the cuspid valves in position.
5. It helps in the transmission of the nerve impulse from one neuron to other neuron under enzymatic reactions.

(D)

1. Odd Term – Central canal
Aqueous humour, vitreous humour and iris are parts of the human eye.
2. Odd Term – Lime
Formalin, iodine and DDT are chemical substances

3. Odd Term – ADH
TSH, ACTH and FSH are secreted by the anterior pituitary gland.
4. Odd Term – RNA
Phosphate, sugar, and nitrogenous base form a molecule of nucleotide
5. Odd Term – Bile
Urea, uric acid and ammonia are nitrogenous waste substances

(E)

1. It is a part of the peripheral nervous system. It consists of a pair of chains of nerves and ganglia on either side of the backbone. It controls the involuntary actions of the internal organs.
2. Chromatin is a complex combination of DNA and proteins. They condense to form chromosomes and are present in the nuclei of eukaryotic cells.
3. The various processes resulting in the circulation of carbon in different forms constitute the carbon cycle.
4. Phagocytosis is a process by which certain cells like WBCs engulf the damaged tissues, bacteria and germs and digests them.
5. It is a part of the nephron consisting of the Glomerulus and the Bowman's capsule.

(F)

1. Chlorophyll is the green pigment present in cell organelles called chloroplasts. Chloroplasts are cell organelles, situated in the cytoplasm of plant cells. They are present mainly in the mesophyll cells and in the guard cells of stomata.
2. Dynamic balance is when the body is in motion whereas static balance is positional balance with respect to gravity.
3. Sensory nerve brings impulses from the receptors i.e., sense organs to the brain or spinal cord.
Motor nerve carries impulse from the brain or spinal cord to effector organs such as muscles or glands.
4. Heart sound produced at the beginning of the ventricular systole is called Lubb and at the other end of ventricular systole is called Dubb.
5. Transpiration occurs from the aerial part of the plant.
Guttation occurs at the tips of leaves.

(G)

1. False. Ciliary muscles regulate the size of the lens.

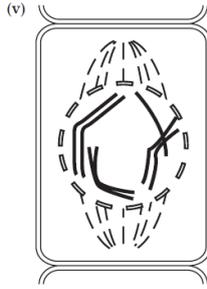
2. True.
3. True
4. False. The two different kinds of diabetes are diabetes insipidus caused due to insufficient secretion of vasopressin and the other is 'diabetes mellitus' caused due to hyposecretion of insulin but they cannot be described as mild and severe.
5. False. Respiration results in loss of dry weight of the plants

(H)

1. There are more stomatal openings on the lower surface of a dorsiventral leaf. More the number of stomata, higher is the rate of transpiration. Hence more transpiration occurs from the lower surface.
2. Potato cubes contain excess of salts and sugars as compared to the water in which the cubes are placed. Hence, due to endosmosis, water from the surrounding enters the potato cubes making them firm and increasing their size.
3. Oxygen is released during photosynthesis. Some of this oxygen may be used in respiration in the leaf cells, but the major portion of it is not required and it diffuses out into the atmosphere through the stomata. However, in a sense, even this oxygen is not a waste because all organisms require it for their existence including the plants.
4. A chemical “heparin” which is a naturally occurring anticoagulant secreted by basophil cells. Heparin released in blood vessels prevents blood from clotting.
5. Metabolic activities of all living things produce waste materials. These substances, if accumulate in the body, become poisonous and destroy the vital organs. So, excretion is must.

SECTION B**Answer 2**

- (a)
- (i) It is a plant cell because cell wall is present, and centrioles are absent.
 - (ii) Metaphase. Chromosomes are thick and short and are present at equatorial plate.
 - (iii) 1. Mitosis
2. Meiosis
 - (iv) Prophase
 - (v)



(b) (i) (a) shrink (b) opposite

(ii)

Sr.No.	Camera	Eye
1.	Box	Sclera
2.	Black inner paint	Choroid
3.	Shutter	Eyelids
4.	Diaphragm	Iris
5.	Light hole	Pupil
6.	Light-sensitive plate or film	Retina

Answer 3

- (a) (i) Osmosis is the process being studied through the given experiment.
 (ii) Osmosis is the movement of water molecule from its region of lower concentration to its region of higher concentration through a semi-permeable membrane.
 (iii) After about 10 minutes, the sugar solution in the thistle funnel will rise.
 (iv) Sugar solution is hypertonic in nature as it is more concentrated than water.
 (v) Cell sap of the root hair.

(b)

Column I	Column II
1. Beta cells of islets of Langerhans	(g) Insulin
2. Thyroid	(c) Exophthalmic goitre
3. Cretinism	(h) Under secretion of thyroxine in a child
4. Addison's disease	(b) Undersecretion of glucocorticoids
5. Hypothyroidism	(e) Thyroxine
6. Myxoedema	(a) condition due to under secretion of thyroxine in adults
7. Adrenaline	(d) Increases heartbeat
8. Cortisone	(f) Adrenal cortex
9. Gigantism	(j) Over secretion of growth hormone

10. Enlargement of breasts in adult males	(i) Over secretion of cortical hormones
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Answer 4

- (a) (i) Stomata surrounded by epidermal cells.
- (ii) 1. Chloroplast,
2. Inner wall of guard cells,
3. Nucleus,
4. Guard cells,
5. Stoma.
- (iii) The stoma is open in A and is almost closed in B.
- (iv) The opening and closing mechanism of stomata is regulated by the amount of water and solutes present in the guard cells.
- (b) (i) (a) Effectors
(b) Medulla oblongata
(c) Motor nerve: Effector
- (ii) (a) Afferent arteriole, glomerulus, efferent arteriole, capillary network, renal vein
(b) Renal artery, kidney, ureter, urinary bladder, urethra

Answer 5

- (a) (i) 3. Bowman's capsule Glomerulus.
- (ii) 6. Renal vein.
- (iii) 8. Distal convoluted tubule with blood capillaries.
- (iv) 7. Collecting tubule.
- (v) 2. Proximal convoluted tubule with blood capillaries.
- (b) (i) Labelled parts from A to C are
A – Cerebrum
B – Cerebellum
C – Medulla oblongata
- (ii) Cerebrum is the site of controlling memory, reasoning, thinking, perception, emotions, and speech.
Cerebellum maintains posture, equilibrium, and muscular coordination.
Medulla oblongata contains the centre for cardiac, respiratory, and vasomotor activities. It also coordinates reflexes for swallowing, coughing, sneezing, and vomiting.
- (iii) Three protective membranes covering the brain are dura mater, pia mater and arachnoid.
- (iv) The basic unit of brain is called neuron.

Answer 6

- (a)
- (i) Biological term for malleus, incus and stapes is ear ossicles.
 - (ii) Parts labelled from A to C are:
 - A – Cochlea,
 - B – Semicircular canals,
 - C – Vestibular apparatus
 - (iii) Functions of different parts are:
 - A – Concerned with sense of hearing.
 - B – Sense of dynamic balance.
 - (iv) Organ of Corti or spiral organ are the audio receptor region present in the part A.
- (b)
- (i)
 - 1. Larynx
 - 2. Left lobe of thyroid gland
 - 3. Trachea (windpipe)
 - 4. Oesophagus
 - 5. Parathyroid glands.
 - (ii) Structure 2 secretes thyroxine hormone and structure 5 secretes parathormone.
 - (iii) Enzymes, which constitute the enzyme system of the body.
 - (iv) Chemically, hormones may be proteins, amino acids or steroids.
 - (v) Iodine is related with the functioning of gland 2. While calcium and phosphorus are related with the functioning of gland 5.

Answer 7

- (a)
- (i) (d) 3.5
 - (ii) (b) Oxygen
 - (iii) (c) Water
 - (iv) (c) Decreases because the temperature drops.
 - (v) (b) Increases because more photosynthesis occurs
- (b)
- 1. Anterior or superior vena cava
 - 2. Pulmonary vein
 - 3. Mitral or bicuspid valve
 - 4. Dorsal aorta
 - 5. Aortic semilunar valve
 - 6. Left ventricle
 - 7. Right ventricle
 - 8. Pulmonary semilunar valve
 - 9. Pulmonary artery
 - 10. Tricuspid valve
 - 11. Right atrium.

BIOLOGY

Detailed Answers to Sample Paper - 2

SECTION I

Answer 1

(A)

1. (b) thyroid
2. (c) both ovary and testis
3. (c) activate chlorophyll
4. (d) Heart itself
5. (b) The pressure of blood exerted on the walls of arteries and

(B)

1. Liver
2. Hammer
3. Bleeding
4. Lenticels
5. Hypothalamus

(C)

1. smell
2. protection and reduced transpiration
3. Helps to divide the chromosome equally in the daughter cells from the parent cell.
4. It protects the heart.
5. Equalizes air pressure on the ear drum from inside.

(D)

1. Odd term: Pepsin
Category: Nitrogenous bases of DNA
2. Odd term: Iris
Category: Parts of human ear (middle ear)
3. Odd term: Cortisone
Category: Hormones of the pituitary gland

4. Odd term: Typhoid
Category: Genetic disorders

5. Odd: Lymphocyte
Category: Granulocytes.

(E)

1. It develops during lifetime due to experience or learning. It is brought about by the condition which is totally different from initial stimulus. Example: Salivation just by the smell of food.
2. Structure that forms in animal cells when the cytoplasm divides during cytokinesis.
3. Photosynthetic membrane, which is also known as the thylakoid membrane, is a bilayer of lipid molecules in which proteins are embedded. It is a site of light reaction of photosynthesis during which light energy is converted into chemical energy.
4. Formation of blood corpuscles like WBC and RBC by the bone marrow and lymph nodes is called Haematopoiesis.
5. The process by which proximal and distal tubules reabsorb all the useful products present in the glomerular filtrate.

(F)

1. Green grass being a producer can produce its own food by photosynthesis. Grasshopper is a primary consumer (herbivore) and directly feeds on producers like grass.
2. Rod cells contain rhodopsin whereas the cone cells contain iodopsin.
3. Medulla oblongata controls the activities of internal organs and many other involuntary actions
The cerebellum on the other hand maintains balance of the body and coordinates muscular activity.
4. Mitral valve is found between the left auricle and left ventricle.
Aortic semilunar valve is located at the point of origin of aorta from left ventricle.

5. Photolysis: It is a process of splitting of water molecule into
 $2\text{H}^+ + 4\text{e}^- + \frac{1}{2}\text{O}_2$ in the presence of sunlight by activated photo-synthetic pigments.

Photophosphorylation: It is a process of formation of ATP from ADP and inorganic phosphate by the utilization of energy released by electrons emitted during Photolysis of water.

(G)

1. False. The auditory nerve responsible for sound as well as for the body balance.

2. False.
Guttation is the process by which drops of water appear along leaf margins due to excessive root pressure whereas bleeding is the loss of cell sap through a cut stem.
3. True
4. True
5. False. Starch produced in a leaf is stored temporarily in the leaf until the process of photosynthesis. At night it is converted back into soluble sugar and translocated to different part of the body either for the utilization or for the storage.

(H)

1. In both perspiration and transpiration, water is lost by evaporation from the body of the organism as water vapour. This evaporation reduces the temperature of the body surface and brings about cooling in the body of the organism.
2. In a hypertonic solution, the solution outside the cell has higher solute concentration than the fluids inside the cell. Therefore, water flows out from the plant cell due to exosmosis. The cytoplasm shrinks and the plasma membrane withdraws away from the cell wall and this the cell becomes flaccid. Hence a plant cell when kept in a hypertonic salt solution for about 30 minutes turns flaccid.
3. The presence of starch is regarded as evidence of photosynthesis. Hence before starting an experiment on photosynthesis, the plant should be placed in the dark for 24-48 hours to destarch the leaves. During this period, all the starch from the leaves will be sent to the storage organs and the leaves will not show the presence of starch. So the various experiments on photosynthesis can be carried out effectively.
4. In blood transfusion, it is necessary that the type of blood to be transfused should be matched with the type of blood of the receiving person. Otherwise, the RBCs of the donor blood will stick to each other and block the passage of blood vessels of the receiver, leading to death. Hence, it is necessary to know the blood groups before giving transfusion of blood.
5. Excretion is necessary to remove the harmful and toxic substances from the body.

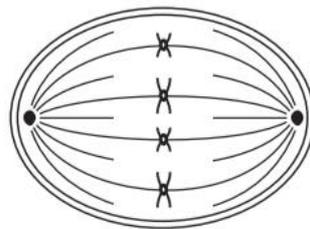
SECTION B**Answer 2**

- (a)
 - (i) The technical term for the condition of cell (a) is turgid cell and for the condition of cell (b) is plasmolysed cell or flaccid cell.
 - (ii) Cell (a) was placed in water solution whereas, cell (b) was placed in strong sugar solution before being viewed under the microscope.
 - (iii) The root hair cell wall resemble:
cell (a) in the condition when the field is over flooded.

- cell (b) increases of excessive application of fertilizers in the field.
- (iv) Root pressure is responsible for the movement of water from the root hair cell to the xylem of the root.
This pressure is built up due to cell-to-cell osmosis in the root tissues. As one turgid cell presses the next cell, the force of the flow of water increases inward. When the water reaches the xylem vessels; it enters the pores of their thick walls with considerable force.
- (v) Cell to cell difference of osmotic pressure and turgor pressure helps in the movement of water up the xylem of the root.
- (b) (i) (a) Stimulus → receptor → sensory neuron → central nervous system → motor neuron → effector → response
(b) Resting → depolarization → repolarization
(c) Dendrites → Dendron → perikaryon → nucleus → axon → axon endings
(d) Cerebrum → diencephalon → mid-brain → cerebellum → pons → medulla oblongata
- (ii) On a bright sunny day, the rate of transpiration is much higher than any other days. The leaves of certain plants roll up on a bright sunny day to reduce the exposed surface and thus reduce the rate of transpiration.

Answer 3

- (a) (i) Prophase. Chromosomes have duplicated, nuclear membrane is disappearing, nucleolus has disappeared.
- (ii) Stage: Metaphase.



(iii)

	Animal cell	Plant cell
(i)	Asters are formed.	Asters are not formed.
(ii)	Cytokinesis by formation of furrows in the cytoplasm.	Cytokinesis by cell plate formation.
(iii)	Occurs in most tissues of the whole body.	Occurs mainly at the growing tips and sides.

- (iv) A. Mitosis
B. Meiosis
- (b) (i) Thyroid
(ii) Regulates basal metabolism

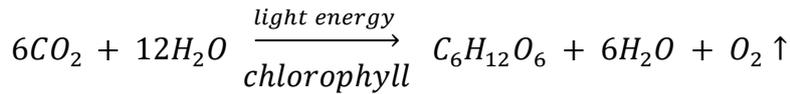
- (iii) Exophthalmic goiter
- (iv) Simple goiter, cretinism in children and myxoedema in adults
- (v) Insulin
- (vi) Hypoglycemia
- (vii) Diabetes mellitus
- (viii) Anterior pituitary
- (ix) Promotes growth of the whole body
- (x) Gigantism

Answer 4

- (a)
 - (i)
 1. Cuticle,
 2. Upper epidermis,
 3. Palisade tissue,
 4. Spongy parenchyma,
 5. Guard cell of stoma.
 - (ii) In the daytime, dotted arrow shows the path of CO_2 while solid arrow shows the path of oxygen (O_2). At night, dotted arrow shows the path of oxygen while solid arrow shows the path of CO_2 .
 - (iii) Yes, we can add one more arrow in the figure to show the loss of water during transpiration.
 - (iv) Only one leaf vein has been shown in this section.
- (b)
 - (i) In a nephron, the blood flows through the glomerulus under great pressure. The reason for this great pressure is that the efferent (outgoing) arteriole is narrower than the afferent arteriole (incoming). This high pressure causes the liquid part of the blood to filter out from the glomerulus into the renal capsule.
 - (ii)
 - (a) rhodopsin
 - (b) semi-circular canals

Answer 5

- (a)
 - (i) Photosynthesis
 - (ii) It is a process by which plant cells containing chlorophyll prepare food / glucose from CO_2 and water using sunlight.
 - (iii) O_2 was used up by the burning candle. Mouse dies due to lack of oxygen / asphyxiation.
 - (iv)
 - provides food for all organisms.
 - provides O_2 for respiration.
 - (v) Chemical equation:

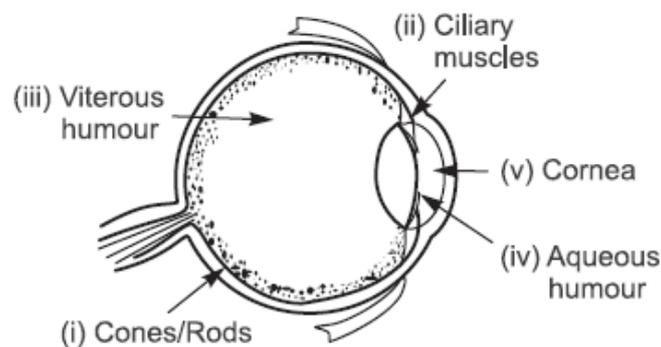


- (b) (i) (A) Red blood cells
 (B) White blood cells
 (C) Basophil
 (D) Neutrophil
 (E) Lymphocyte
 (F) Monocyte
 (G) Eosinophil
 (H) Platelets.
- (ii) (A) Aorta → renal artery → kidney → renal vein → posterior vena cava.
 (B) Aorta → Stomach → Hepatic portal vein → Liver → Hepatic vein

Answer 6

- (a) (i) Different parts in the diagram can be labelled as:
 A – Afferent arteriole.
 B – Glomerulus.
 C – Bowman’s capsule.
- (ii) The collective term used for part B and C is Malpighian capsule.
 (iii) Right kidney is placed slightly lower level than the left because the liver takes the much space of the right side.
 (iv) Homeostasis is the constancy of the internal environment of the body fluids. By the process of osmoregulation, kidney helps in maintaining the osmotic concentration of the body and helps in removing extra water or salts from the body.

(b)



Answer 7

- (a) (i) Goitre
 (ii) The thyroid gland enlarges due to the deficiency of iodine in the diet.
 (iii) (1) Cretinism in children
 (2) Myxoedema in adults

- (iv) Thyroxine
 - (v) It is in a mid-ventral position in the posterior part of the pharynx.
 - (vi) Thyroid stimulating hormone (TSH).
- (b)
- (i) Biological term for malleus, incus and stapes is ear ossicles.
 - (ii) Parts labelled from A to C are
 - A – Cochlea,
 - B – Semicircular canals,
 - C – Vestibular apparatus
 - (iii) Functions of different parts are
 - A – Concerned with sense of hearing.
 - B – Sense of dynamic balance.
 - (iv) Organ of Corti or spiral organ are the audio receptor region present in the part A.

BIOLOGY

Detailed Answers to Sample Paper - 3

SECTION 1

Answer 1

(A)

1. (b) diabetes insipidus
2. (c) DNA
3. (a) continue to live, but will not be able to store food
4. (c) artery
5. (c) Sweating

(B)

1. Cortex
2. Rods and cones
3. Turgidity
4. Ganong's photometer
5. Acetylcholine

(C)

1. vision
2. transpiration
3. Light reaction of photosynthesis.
4. Helps in bloods clotting.
5. Offers protection to the brain and spinal cord by acting as a cushion to absorb shocks. It also supplies nourishment to the brain tissue.

(D)

	Set	Odd one	Category
Eg.:	Cell wall, large vacuole, plastids, Centrosome	Centrosome	Parts of an animal cell
(i)	Cerebrum, cerebellum, thalamus, hypothalamus	Cerebellum	Parts of the forebrain
(ii)	Ovary, ureter, fallopian tube, uterus	Ureter	Parts of the human female reproductive system

(iii)	Adrenal gland, liver, thyroid gland, pituitary gland	Liver	Endocrine glands
(iv)	Malleus, pinna, incus, stapes	Pinna	Ear ossicles
(v)	Haemophilia, colour blindness, albinism, night blindness	Night blindness	Sex-linked inherited traits.

(E)

1. It is in the brain and the spinal cord. It acts as a connecting neuron and interconnects the sensory and motor neurons.
2. It is a process by which a cell divides into two or more daughter cells.
3. The phosphorylation of ADP to form ATP in the chloroplast during the light dependent reaction of photosynthesis is called photophosphorylation.
4. In mammals, the heart produces two separate circulations, the pulmonary to the lungs and systemic to the rest of the body. These two separate circulations are jointly called double circulation.
5. It is a hair-pin shaped structure, and it is not convoluted. It runs in medulla to turn back and to re-enter the cortex to continue into the next convoluted region of the tubule.

(F)

1. Producers show autotrophic mode of nutrition i.e. they are able to produce their own food from basic raw materials.
For example: green plants
Consumers show heterotrophic mode of nutrition i.e. they depend directly or indirectly on the producers for their food.
For example: Animals
2. Cochlea is responsible for hearing; it can perceive the senses of hearing.
Semi-circular canals are responsible for perceiving the senses to maintain the body balance.
3. The grey matter containing cytons lies in the cortex (outer region) while the white matter containing axons lies in the medullary region (inner region).
The grey matter containing cytons lies in the medullary region i.e. inner side while the white matter containing axons lies in the cortex i.e. the outer region.
4. Ureter carries urine from kidney to the urinary bladder.
Urethra is a passage through which urine is excreted out of the body.
5. Stoma is the opening of the stomata through which transpired water and respiratory gases pass through.
Stroma (matrix) is the part / region in the chloroplast where dark reactions of the photo- synthesis takes place.

(G)

1. False. short-sightedness is myopia and hyperopia is long-sightedness.
2. False. There is only one seed coat in a seed.
3. False. Potometer is an instrument used for measuring the rate of transpiration in green plants.
4. True
5. True

(H)

1. Transpiration increases with the velocity of wind. If the wind blows faster, the water vapours released during transpiration are removed faster and the area surrounding the transpiring leaf does not get saturated with water vapour.
2. Transplantation causes stress to the seedlings. If the seedlings are transplanted in the morning, they would have to immediately bear the additional stress of excessive transpiration occurring during the hot afternoon. Transplantation in the evening helps the seedlings to adjust for a longer time during the night (cooler temperatures) because the quantity of water absorbed exceeds the loss of water through transpiration. Therefore, it is better to transplant seedling in a flower bed in the evening and not in the morning.
3. If a green plant is kept in bright light, it tends to use up all the CO₂ produced during respiration, for photosynthesis. Thus, the release of CO₂ cannot be demonstrated. Hence, it is difficult to demonstrate respiration as these two processes occur simultaneously.
4. The SA node is called the pacemaker of the heart because the wave of contraction which conducts heartbeat originates in it.
5. The urine is acidic in nature due to the secretion of acidic chemicals into the glomerular filtrate while blood is alkaline due to reabsorption of alkaline substances from it.

SECTION B

Answer 2

- (a)
1. The level of mercury in the glass tube has risen.
 2. Transpiration pull.
 3. The flow of water from the soil through the vascular tissues of the plant to the evaporating surfaces is called transpiration pull.

4. (a) Cooling effect - It is helpful to plants on hot sunny days.
- (b) Distribution of water and mineral salts throughout the plant body.
- (c) Helps in ascent of sap by producing a suction force acting from the top of a plant.
5. Xylem.

(b) (i)

Example	Type of Reflex
(i) Sneezing	Simple
(ii) Blushing	Simple
(iii) Contraction of eye pupil	Simple
(iv) Lifting up a book	Conditioned
(v) Knitting without looking	Conditioned
(vi) Sudden application of brakes of the cycle on sighting an obstacle in front	Conditioned

- (ii) (a) grana
 (b) iodine solution
 (c) chloroplast
 (d) Calvin cycle

Answer 3

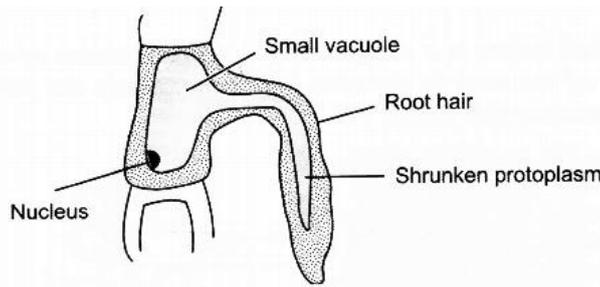
- (a) (i) The stage of cell division shown is anaphase.
 (ii) Different labelled parts are as follows:
 A – Spindle fibres
 B – Cell wall
 C – Chromatid
 D – Centromere
 (iii) Unique features of this stage is that chromosome get divided into sister chromatids that move towards the opposite poles.
 (iv) Two daughter cells are formed in kind of cell division.
- (b) (i) (1) Ovary
 (2) Development of secondary sexual
 (3) Glucagon
 (4) Raises blood sugar level
 (5) Thyroid
 (6) Hypersecretion of thyroxine
 (7) Anterior pituitary
 (8) Hypersecretion of Growth hormone

- (ii) (a) Auditory canal, tympanum, ear ossicles, oval window, cochlea
 (b) Conjunctiva, cornea, lens, retina, optic nerve

Answer 4

(a)

- (i) 1. Root hair cell
 2. Soil particle / Soil Water
 3. Xylem vessel
 4. Cortex cortical cells
- (ii) Endosmosis
- (iii) Osmotic pressure / Root pressure.
 – It is the minimum pressure to be exerted to prevent the passage of pure solvent into the solution when the two are separated by a semipermeable membrane.
 – It is the pressure caused due to cell osmosis.
- (iv) Guttation / exudation.
- (v)



- (b) (i) Cell labeled A in the diagram is red blood cell.
- (ii) The phenomenon in part (a) is diapedesis.
- (iii) Structural difference between A (RBCs) and B (WBCs) are :

Part A (RBCs)	Part B (WBCs)
Biconcave in shape.	Amoeboid in shape.
Nucleus is absent.	Nucleus is present.

- (iv) Phagocytosis is the process occurring in (b) and (c).
 During this phenomenon, the WBC engulfs the disease causing germs that enter the body and thus, defend our body from these organisms.

Answer 5

- (a) (i) The organelle shown in the diagram is chloroplast.
 (ii) Photosynthesis is the process which occurs in the chloroplast.
 (iii) Photosynthesis is giving the food and lifesaving gas i.e. oxygen
 (iv) Phases of process occurs in part labelled are:
 Part A – dark reaction
 Part B – Light reaction

- (v)
$$6CO_2 + 12H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} C_6H_{12}O_6 + 6O_2 + 6H_2O$$
- (b) (i) Excretion is the process of removal of all harmful and unwanted products especially nitrogenous products from the body of living beings.
- (ii) The units of the kidney are nephrons.
- (iii) Malpighian capsule lies in the cortex region of kidney and are present in large numbers which gives the cortex of kidney a dotted appearance.
- (iv) Two functions of kidney are:
- (1) It expels out all the nitrogenous products produced in the body.
 - (2) It helps in osmoregulation.
- (v) Two differences in the composition of blood flowing through blood vessels A and B are:
- (1) B contains blood having large amount of water, while blood in A is thicker.
 - (2) B carries more oxygen and nitrogenous waste products as it is renal artery.
A carries carbon dioxide and no nitrogenous products.

Answer 6

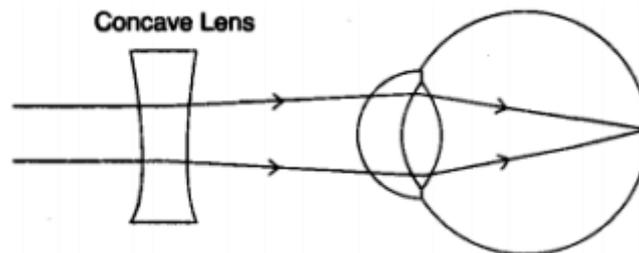
- (a) (i) (1) The part numbered 3 is named as occipital lobe of cerebrum, which is the area of vision. If this part is damaged, the person will be unable to see and will lose his sight/vision.
- (2) The part numbered 4 is named as cerebellum, which is responsible for co-ordinating the muscular activity for body balancing. If this part is damaged, the body balancing during walking and running would be affected.
- (ii) Function of part 1: It governs all mental activities (reasoning, will, memory, intelligence, higher feelings and emotions).
- Function of part 2: It controls all voluntary actions and is responsible for taste and smell. It is responsible for hearing
- Function of part 5 : It controls several involuntary activities, such as heart beat, breathing, peristaltic motion of the alimentary canal, dilation and concentration of blood vessels, etc.
- (b) (i) (1) Alpha cells of islet of Langerhans.
- (2) Beta cells of islet of Langerhans.
- (ii) (1) It increases blood sugar level.
- (2) It decreases blood sugar level.
- (iii) Pancreas produces pancreatic juice which is carried by pancreatic duct into the duodenum. It also produces hormones which are

poured into blood. Because of this dual activity, it is called an exo-endocrine gland.

- (iv) If insulin is given orally, it will be digested by the protein digesting enzymes in the stomach. Hence it has to be injected into the body of highly diabetic patient so that it is able to travel into the blood stream, to bring about the required specific effect.
- (v) Islets of Langerhans.

Answer 7

- (a) (i) The defect is myopia.
- (ii) Different parts labelled from A to C:
A – Vitreous humour
B – Yellow spot
C – Optic nerve
- (iii) Two possible reasons for the defects are:
(a) The eyeball becomes long from front to back.
(b) The lens becomes too curved/convex.
- (iv) This defect can be rectified by concave lens as given below in the diagram :



- (b) 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).

BIOLOGY

Detailed Answers to Sample Paper - 4

SECTION I

Answer 1

(A)

1. (b) Thyroid
2. (b) 46
3. (c) trapping light energy
4. (d) destroy pathogens
5. (b) Liver

(B)

1. Glomerulus
2. Rhodopsin
3. Guttation
4. Hydathodes
5. Cerebrospinal fluid

(C)

1. Transmission of the nerve impulse from one neuron to other neuron under enzymatic reactions.
2. Conduction of water and mineral salts
3. Dark reaction of photosynthesis.
4. It carries blood to the muscles of heart.
5. Amplify the vibrations of the ear drum and transmit them to the delicate membrane stretched along the oval window.

(D) (1) - (f), (2) - (g), (3) - (b), (4) - (i), (5) - (a)

(E)

1. The cerebral cortex contains cell bodies of the neuron and is greyish in colour. It is called grey matter. The grey matter has many folds (i.e. gyri) and grooves (i.e. sulci). They increase

the surface area to accommodate more nerve cells. A higher number of convolutions leads to greater intelligence.

2. It is a part of chromosome through which chromatids are linked.
3. The phosphorylation is a bio-chemical process which involves covalent attachment of a phosphate group to an organic molecule.
4. The passage of White Blood Corpuscles through the unruptured walls of blood vessels is known as diapedesis. It helps in engulfing the germs and also protects the body from getting infected.
5. It is a thin walled cup like hollow ball pressed deep on one side. Its hollow internal space continues into the tubule.

(F)

1. The gas released during respiration is carbon dioxide.

The gas released during photosynthesis is oxygen.

2. Rods are sensitive to dim light but do not respond to colour.

Cones are sensitive to bright light and are responsible for colour vision.

3. The cerebrum controls all voluntary actions. It enables us to think, reason, plan and memorize.

The cerebellum on the other hand maintains balance of the body and coordinates muscular activity.

4. Renal cortex : Malpighian capsule, proximal and distal convoluted tubules.

Renal medulla : Loop Henle, Collecting ducts.

5. Turgid cell surrounded by hypotonic solution

Plasmolysed cell surrounded by hypertonic solution.

(G)

1. True

2. False. The leaves of the twig remain turgid since its xylem is intact and xylem is responsible for water conduction in plants.

3. False, moist cobalt chloride paper is pink in colour.

4. Hydathodes

5. True

(H)

1. When the rate of transpiration far exceeds the rate of absorption of water by roots, the cells lose their turgidity. Hence, excessive transpiration results in wilting of the leaves.

2. If a plant is uprooted, the leaves continue losing water by transpiration, but there is no more water absorbed by the roots. This does not allow the compensation for the loss of water by transpiration; hence the leaves of the uprooted plant wilt soon.
3. The chloroplasts are concentrated in the upper layers of the leaf which helps cells to trap the sunlight quickly. Also the epidermis is covered by a waxy, waterproof layer of cuticle. This layer is thicker on the upper surface than the lower one. Hence most leaves have the upper surface greener and shinier than the lower one.
4. Loss of nucleus gives RBCs a biconcave shape thus increasing their surface area volume ratio for absorbing more oxygen. RBCs do not have mitochondria so that they cannot use oxygen for themselves. All oxygen can be efficiently transported without any consumption by RBCs and delivered to the tissues. Thus for their efficient function matured mammalian RBCs lack nucleus and mitochondria.
5. The glucose is absent in the urine of a healthy person because it is completely reabsorbed from the glomerular filtrate.

SECTION B

Answer 2

- (a)
- (i) The phloem has been removed from a part of the ring. The food prepared by leaves comes down through phloem, but since the phloem is cut off, the food gets collected in the upper part of the ring and hence the swelling appears.
 - (ii) The food prepared by leaves is not able to pass on downward as the phloem has been removed, resulted in the shrinking of the bark.
 - (iii) Phloem.
 - (iv) Xylem.
 - (v) Bark protects from the attack of fungi and insects, against loss of water by evaporation and against variation of external temperature.
- (b)
- (i) (a) Afferent arteriole, glomerulus, efferent arteriole, capillary network, renal vein
(b) Renal artery, kidney, ureter, urinary bladder, urethra
 - (ii) (a) rhodopsin
(b) semi-circular canals
 - (iii) Organ of Corti is located in the inner ear. It contains sensory cells which process hearing.

Answer 3

- (a)
1. 1. Cuticle.
2. Upper epidermis.
3. Palisade Mesophyll cells.
4. Spongy Mesophyll cells.
5. Guard cell of stoma.

2.
 1. In the daytime dotted arrow shows the path of carbon dioxide while solid arrow shows the path of oxygen.
 2. At night dotted arrow shows the path of oxygen while solid arrow shows the path of carbon dioxide.
 3. Yes, we can add one more arrow pointing outward to show the loss of water in form of water vapour during transpiration.

4. Only one.

(b)

- (i)
 - (i) Bacteria, Antigen, Active immunity, Lymphocytes, Antibody
 - (ii) Auditory canal, Tympanum, Ear ossicles, Oval window, Cochlea
 - (iii) Renal artery, Afferent arteriole, Glomerulus, Efferent arteriole, Renal vein
 - (iv) Photons, grana, water molecules, hydrogen and hydroxyl ions, oxygen
 - (v) G_1 phase, S phase, G_2 phase, Karyokinesis, Cytokinesis.

Answer 4

- (a)
 - (i) It is a plant cell because cell wall is present, and centrioles are absent.
 - (ii) The stage shown is prophase.
 - (iii) The stage that follows the one shown here (prophase) is metaphase. It is identified by the position of chromosomes that are arranged at the equator attached to the spindle fibre.
 - (iv) In mitosis, the chromosome number in daughter cell is same as that of the mother cell, i.e., diploid parent cell gives rise to two diploid ($2n$) daughter cells.
In meiosis the chromosome number is halved in the daughter cell, i.e. the diploid mother cell gives rise to four haploid (n) daughter cells.

(b)

(i) The parts A, B, C and D indicated in the diagram are

- A – Erythrocytes
- B – Leucocytes
- C – Thrombocytes
- D – Plasma

(ii)

Part A (RBCs)	Part B (WBCs)
Biconcave in shape.	Amoeboid in shape.
Nucleus is absent.	Nucleus is present.

(iii) The main function of part A, B and C are

- A – Transport oxygen as oxyhaemoglobin (erythrocytes) to the body tissues.
- B – Defend the body against disease causing germs (leucocytes).
- C – Initiate clotting of blood (thrombocytes).

(iv) Life span of the part labelled 'A', i.e. RBCs is 120 days.

(v) Soluble protein found in D, i.e. plasma which helps in the clotting of blood is fibrinogen.

Answer 5

(a)

(i) Different parts in the diagram are labelled as :

- A – Collecting duct.
- B – Distal convoluted tubule.
- C – Loop of Henle.
- D – Bowman's capsule.

(ii) As the afferent arteriole splits into many fine branches to which the volume of capillaries reduced, thereby raising the hydrostatic pressure in the glomerulus.

(iii) Blood vessel that contains the least amount of urea in this diagram is efferent arteriole that connects to renal vein.

(iv) Loop of Henle is the part of renal tubule that lies in medulla region of kidney.

- (i) A – Semicircular canals
- B – Utriculus
- C – Sacculus
- D – Cochlea

(ii) Auditory nerve is the part of ear responsible for transmitting impulses to the brain.

- (iii) (a) For static balance – Utriculus and sacculus
- (b) For dynamic balance – semicircular canals
- (c) For hearing - Cochlea

(iv) Organ of corti are the audio receptor cells which pick up vibration.

(v) Endolymph is the fluid present in the inner ear.

Answer 6

(a)

- (i) A—Cerebrum;
B—Medulla oblongata;
C—Cerebellum.
- (ii) A—Controls memory, learning, speech and co-ordinates sensory input and motor output,
B—Controls vital processes such as heart rate and breathing,
C—Responsible for muscle co-ordination and balance.
- (iii) D—Contains cerebrospinal fluid.

(b)

(i) The endocrine gland shown in the diagram is thyroid gland.

(ii) The secretion of this gland is thyroxine which regulates basal metabolism.

(iii) The mineral element required for synthesis of thyroxine is iodine.

(iv) Cretinism is caused due to undersecretion of thyroxine in children.

(v) Exophthalmic goitre is caused due to hypersecretion of thyroxine.

Answer 7

(a)

- (i) Tube B (b) will show the greatest increase in dry weight of the pond weed.
- (ii) Least amount of starch will be found in Tube E (e).

- (iii) Most oxygen will be found in test tube A (a)
- (iv) Least carbon dioxide will be found in test tube A (a).
- (v) The plant will survive for the shortest length of time in tube C (c).

(b)

1. Chloroplasts
2. Water
3. Hydrogen
4. Photolysis of water
5. Hydrogen
6. NADPH
7. ATP
8. Photophosphorylation
9. Glucose
10. Polymerisation

BIOLOGY

Detailed Answers to Sample Paper - 5

SECTION I

Answer 1

(A)

1. (b) The α cells of Islets of Langerhans
2. (c) Coloured bodies
3. (b) humidity
4. (d) entry of blood into auricles
5. (a) Proximal convoluted tubule

(B)

1. Collecting duct
2. Auditory nerves
3. Xylem
4. Guttation
5. Synapse

(C)

1. Maintaining equilibrium and posture of the body.
2. Reduces water loss
3. Conduct photosynthesis by trapping solar energy.
4. Clotting of blood.
5. Choroid layer with many capillaries forms the nutritive layer of the retina and absorbs light rays to avoid reflection.

(D)

1. Odd Term – Pericardium
Rest are components of blood vessels

2. Odd Term – Spinal cord
Rest are components of neuron

3. Odd Term – Centrosome

Rest are parts of a plant cells

4. Odd Term – Seminiferous tubules

Rest belongs to accessory glands

5. Odd: Lymphocyte

Rest are granulocytes (white blood cells that have no granules in their cytoplasm).

(E)

1. It contains motor fibres which carry impulses generated by the association neuron (brain or spinal cord) to the effector organs. Example: A nerve which arises from the brain and ends in the eye muscles is a motor nerve. It helps in rotating the eye.

2. Two identical parts of a chromosome are called sister chromatids.

3. It is a coenzyme which acts as a reducing agent in certain anabolic reactions. During electron transfer, NADP gains electron from hydrogen and get reduced to NADPH₂.

4. System of veins carrying blood capillaries of intestine to the liver in mammals is called hepatic portal system.

5. A single afferent arteriole of the renal artery breaks up into a number of capillary branches to form the glomerulus. The blood in the glomerulus is subjected to higher pressure since the diameter of the afferent arteriole is wider than that of the efferent arteriole that leaves the glomerulus, so ultrafiltration takes place.

(F)

1. Light reactions: Hydrogen and oxygen are produced here, along with release of electrons, which converts ADP into ATP.

Dark reactions: Glucose is the main product formed during dark reaction.

2. Myopia results when the eyeball is lengthened from front to back or the lens is too curved. Hyperopia results from either too shortening of the eyeball from front to back or when the lens is too flat.

3. Sympathetic nervous system prepares the body for violent action against the abnormal condition.

Parasympathetic nervous system is concerned with re-establishing normal conditions after the violent act is over.

4. Diabetes mellitus occurs due to under secretion of insulin which in turn increases the level of glucose in blood.

Diabetes insipidus is caused due to the deficiency of antidiuretic hormone (ADH).

5. Turgor Pressure in a turgid plant cell is the pressure exerted by the cell contents on the cell wall.

Wall Pressure in a turgid plant cell is the pressure exerted by the cell wall on cell contents.

(G)

1. True
2. False. Dry seeds when submerged in water swell up due to imbibitions. On contact with water dry seeds imbibe water and swell up.
3. False. Most transpiration occurs at mid-day.
4. True
5. False. Dark reaction of photosynthesis is independent of light and occurs simultaneously with light reaction.

(H)

1. Plants absorb water continuously through their roots, which is then conducted upwards to all the aerial parts of the plant, including the leaves. Only a small quantity of this water i.e. about 0.02% is used for the photosynthesis and other activities. The rest of the water is transpired as water vapour. Hence water transpired is the water absorbed.
2. Common salt when sprinkled on the grass causes the Plasmolysis of grass cell ultimately leading them to death. Hence, if we sprinkle some common salt on grass growing on a lawn, it is killed at the spot.
3. Oxygen is released during photosynthesis. Some of this oxygen may be used in respiration in the leaf cells, but the major portion of it is not required and it diffuses out into the atmosphere through the stomata. However, in a sense, even this oxygen is not a waste because all organisms require it for their existence including the plants.
4. The number of leucocytes increases during infection to fulfil the defence demand of the body.
5. During summer, the water is also lost in the form of sweat from the body hence more water is reabsorbed from the glomerular filtrate to keep the fluid balance in the body. That is why, the urine is slightly thicker in summer than in winter.

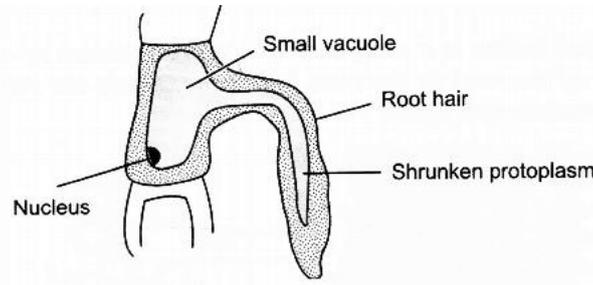
SECTION B

Answer 2

(a)

- (i) Different parts can be labelled as
A – Cell membrane of root hair
B – Cell wall of root hair
C – Cytoplasm
D – Nucleus
- (ii) The soil medium is hypotonic; thus, endosmosis occurs and leads to turgid condition of the root hair cell.

- (iii) A (cell membrane): It is semipermeable.
B (cell wall): It is freely permeable.
- (iv) Representation of root hair cell when a concentrated solution of fertilizer is added is given below:



(b)

(i)

(a) Auditory canal, tympanum, ear ossicles, oval window, cochlea

(b) Conjunctiva, cornea, lens, retina, optic nerve

(ii)

(a) Effectors

(b) Medulla oblongata

(c) Effector

Answer 3

(a)

1. To show that plants expel out water in form of water vapour from leaves during transpiration.

2. To check the evaporation of water from the soil.

3. Dry Blue cobalt chloride paper.

4. The colour of 'X' changes from blue to pink.

The water vapour given off from the leaves saturates the atmosphere inside the jar and moistens the paper as a result the blue colour of the paper turns pink.

(b)

(i)

Tonsils: Tonsils are lymph glands located on the sides of the neck. They tend to localize the infection and prevent it from spreading it in the body as a whole.

Spleen: The spleen is a large lymphatic organ. The spleen acts as a blood reservoir in case of emergency such as haemorrhage, stress or poisoning. It produces lymphocytes and destroys worn out RBCs.

(ii) (i) Bacteria, Antigen, Active immunity, Lymphocytes, Antibody

(ii) Auditory canal, Tympanum, Ear ossicles, Oval window, Cochlea

(iii) Renal artery, Afferent arteriole, Glomerulus, Efferent arteriole, Renal vein

Answer 4

(a)

- (i) A – Artery,
B – Vein,
C – Capillary
- (ii) 1 – Connective tissue/ Tunica externa
2 – Lumen
3 – Muscular tissue/ Tunica Media.....
- (iii) A – Oxygenated.
- (iv) (Any one)

Artery	Vein
Narrow lumen	Wide lumen.
Thick muscular layer	Thin muscular layer
Valves are absent	Valves present
Elastic	Non Elastic

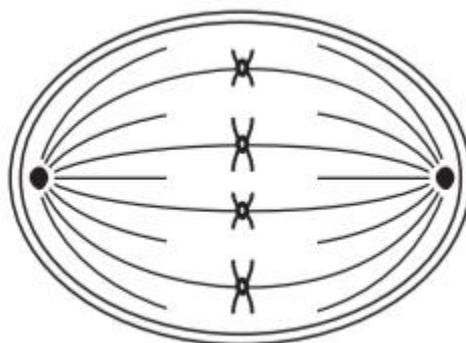
(b)

- (i) To remove starch from the leaves.
- (ii) Sodium hydroxide absorbs CO_2 present in the air inside the flask.
- (iii) 1. C
2. E
- (iv) Carbon dioxide/light/chlorophyll.

Answer 5

(a)

- (i) Different parts can be labelled as :
A – Aster rays
B – Spindle fibres
C – Chromatid
- (ii) The above stage is anaphase because the sister chromatids are at the poles.
- (iii) This type of cell division occurs in the somatic cells.
- (iv) The stage prior to anaphase is metaphase.



(b)

- (i) Renal tubule or Nephron
- (ii) Glomerular filtrate
Urea, glucose
- (iii) Urine
Urea
- (iv) Ultrafiltration, Selective reabsorption, Tubular secretion
- (v) Glucose

Answer 6

(a)

- (i) A – Cerebrum
B – Cerebellum
C – Spinal cord
- (ii) A – seat of memory, intelligence, consciousness, will power, control voluntary actions, helps us to think, reason, invent, plan (Any one)
B – maintain body balance, posture, equilibrium, co-ordinates muscular activities (Any one)
- (iii) Neurons / Nerve cells
A – Outer grey matter has cytons and inner white matter has axons.
C – Outer white matter has axons and inner grey matter has cytons.
- (iv) Meanings
- (v) Protect the brain / spinal cords from injuries and shocks.

(b) 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).

Answer 7

(a)

- (a) 1- Pituitary gland, 2 - thyroid gland, 3 - pancreas, 4 - adrenal glands
- (b) All the glands shown in the above diagram are endocrine glands. They secrete essential hormones and pour their secretions directly into the blood.
- (c) Iodine is essential for the normal working of thyroxine.
- (d) Pituitary gland is the master gland it controls the working of the other glands.

(b)

- (i) The eardrum is vibrated by sound waves and passes them to internal ear.
- (ii) Ear ossicles.
- (iii) One big ossicle would not be able to produce effective amplification because it would require a greater force of vibration than supplied by the eardrum normally. Moreover, three smaller ossicles with proper distance between them produces multiple amplification and effective transmission.
- (iv) C is semicircular canals and D is cochlea.
- (v) Endolymph.