



# **ICSE YEAR 2014 BIOLOGY**

## **(SCIENCE - PAPER 3)**

- **SOLUTION OF 2014**
- **COMMENTS OF COUNCIL EXAMINERS**
- **SUGGESTIONS FOR TEACHERS**

Dedicated to all my lovely students. May God help you always.

This small booklet contains solution of 2014 ICSE Biology (Science Paper 3). The comments from the council examiners under solution of every question makes this a very handy guide for students to understand what the council expects as answer from the students.

I hope that the students will find this to be useful.

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23rd February, 2015

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**BIOLOGY**  
**SCIENCE Paper - 3**

**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 in the presence of a contrasting allele is not expressed.
  - (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 fertilization 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.

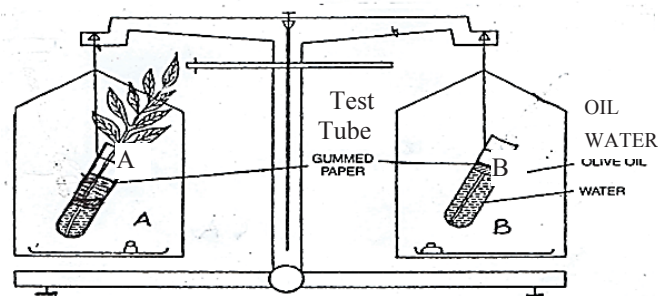
(iii) Transpiration, Photosynthesis, Phagocytosis, Guttation.

(iv) Cyton, Photon, Axon, Dendron.

(v) Oxytocin, Insulin, Prolactin, Progesterone.

[5]

(e) The figure given below represents an experimental set up with a weighing machine to demonstrate a particular process in plants. The experimental set up 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 set up?

[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:

Sl. 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

[5]

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

(i) Cretinism and Myxoedema are due to:

A. Hyper secretion of thyroxin

B. Hyper secretion of growth hormone.

- C. Hyposecretion of thyroxin.
  - D. Hypersecretion 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 chromosome.
  - B. 44 + xy chromosome.
  - C. 22 + x chromosome.
  - D. 22 + y chromosome.
- (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. Prostrate 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]

## Examiners' Comments

- (a) (i) Most candidates wrote the correct answer. Cerebellum was written as an occasional incorrect answer instead of cerebrum.
- (ii) Most candidates wrote the correct answer. Some, however, wrote the common term 'Hammer' and did not score.
- (iii) This question was answered correctly by most candidates.
- (iv) This question was answered correctly.
- (v) Only a few candidates were able to write the correct answer. Most of them wrote 'Phosphorylation' instead of 'Photophosphorylation'. A number of spelling errors were noticed.
- (b) (i) The concept of protecting brain and spinal cord from mechanical injuries was missing. Instead most candidates wrote 'Shock absorber' as the function.
- (ii) A few candidates wrote the correct answer as 'equalises air pressure on either side of the importance of the word 'air' and lost marks.
- (iii) Most candidates wrote the correct answer. A few wrote the function of ciliary muscles instead of suspensory ligament.
- (iv) Some candidates failed to answer correctly, as they did not write the idea of 'from' and 'to' for transport of sperms. They merely stated 'carries sperms'.  
Most candidates were casual in answering and did not mention the gases that diffuse through lenticels.
- (c) (i) Answered correctly by most candidates.
- (ii) Most candidates wrote the correct answer. A few were not sure of the technical term and wrote 'mature' instead of 'Graafian'.
- (iii) Most candidates wrote the answer correctly and no error was observed.
- (iv) Some candidates wrote 'Uterus' instead of 'oviduct/fallopian tube'.
- (v) Some candidates answered correctly, however a few wrote 'fertilization' instead of 'implantation'.
- (d) (i) Most candidates were able to write the this answer correctly, but a few failed to understand the meaning of 'odd term' and 'category'. Most candidates were able to identify the odd term but mentioned the category of the odd term instead of the remaining three.
- (ii) Most candidates failed to score as they were confused with the urinary and genital systems.

### Suggestions for teachers

- While teaching the lesson about 'brain' stress on the functions of cerebrum, cerebellum and Medulla Oblongata.
- Train students to use biological/technical terms rather than common names which otherwise have different meanings.
- Insist on correct spelling of biological terms.
- Importance of sunlight in the formation of ATP during photosynthesis needs to be stressed.
- Give a clear understanding regarding the structure and functions of parts of ear.
- Make use of charts, models and interactive smart boards to explain the parts of eye and ear.
- With the help of flow charts explain the transport of sperms and urine stressing on the words 'from' and 'to'.
- Location and function of stomata and lenticels must be taught clearly to avoid confusion. Emphasise on the gases that diffuse through them.
- Clearly differentiate between the parts of male and female reproductive system. Stress on the exact location and function.
- Train students on conceptual learning.
- Advise students to take practical work seriously to enable them to know the difference between Transpiration and Photosynthesis.
- Explain the difference between Mitosis and Meiosis on the basis of the number of chromosomes.
- Exact location of endocrine glands specially Adrenal glands and the hormones secreted by them must be given importance.

- (iii) Most candidates wrote the correct answer. However a few did not write the correct category and vaguely mentioned 'seen in plants'.
  - (iv) Correctly answered by most candidates.
  - (v) Only a few candidates were able to write the correct answer. Most were confused with female hormones and other hormones in general.
- (e)
- (i) Many candidates failed to comprehend the question and wrote 'absorption in plants' instead of 'transpiration'.
  - (ii) Candidates who wrote incorrect answers for the previous question did not write the correct definition.
  - (iii) Most candidates wrote the correct answer. A few could not justify the reason for difference in weights in Test tubes A and B.
  - (iv) Answered correctly by most candidates.
  - (v) Most candidates wrote the correct answer. A few could not justify the reason for difference in weights in Test tubes A and B.
  - (vi) Answered correctly by most candidates.
- (f)
- (i) Most candidates wrote the correct pair.
  - (ii) Correct pairing was done.
  - (iii) Most candidates wrote the correct answer but some paired seminiferous tubules with Testosterone, as they were confused with the function of 'Leydig cells'.
  - (iv) Candidates wrote the correct matching pair.
  - (v) Candidates wrote the correct answer.
- (g)
- (i) Most candidates answered correctly but some were confused with the terms 'Hyposecretion' and 'Hypersecretion'.
  - (ii) Answered correctly by most candidates.
  - (iii) Majority of candidates did not know the difference in number of chromosomes in Mitosis and Meiosis, and hence failed to score.
  - (iv) Most candidates answered correctly.
  - (v) Most candidates were unsure of the answer as they were confused with seminiferous tubules and interstitial cells.
- (h)
- (i) Confusion regarding the right and left side of the heart was evident in the answers. Most candidates did not specify the location as 'between right auricle and right ventricle' instead wrote 'on the right side of heart'.
  - (ii) The idea regarding 'surrounding/enclosing foetus' was not written. Instead many candidates wrote 'on the foetus' or 'between uterus and foetus'.
  - (iii) Most candidates were unable to specify the exact location. They merely stated 'on the retina'.
  - (iv) Most candidates wrote the correct answer. Some however wrote the location of Prostate gland instead of seminal vesicles.
  - (v) Majority of candidates answered correctly.

Suggestions for teachers

- Award marks to answers that are complete and relevant during school examinations.
- Stress on prepositions like 'in, on, between, around' while stating exact location of structures/organs.
- Students must be trained to identify odd terms and mention the category of the rest.

## MARKING SCHEME

### Question - 1

- a)
- Cerebrum
  - Malleus/Hammer = 0
  - Recessive gene
  - Insulin / Glucagon / Somatostatin
  - Photophosphorylation / Phosphorylation
- b) State the main function
- Protecting the brain from external mechanical injuries/distributes neuroendocrine hormones/nutrients.
  - Equalizing the air (operative) pressure on either side of tympanum / Eardrum (equalizing air pressure in middle ear = 0)
  - Holding the eye (operative) lens in position.
  - Transports sperms from (operative) testis epididymis to (operative) urethra / penis
  - Diffusion of O<sub>2</sub> and CO<sub>2</sub> / Exchange of photosynthetic and respiratory gases/Removal of water vapour during transpiration/helps in Transpiration.
- c) Copy and complete:  
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, follicle enlarges and gets filled with a fluid and is now called graafian(2) follicle. The process of releasing the egg from the ovary is called as Ovulation(3). The ovum is picked up by oviducal funnel and fertilization is takes place in the Fallopian tube/oviduct/uterine tube (4). In about a week the blastocyst gets fixed in the endometrium of uterus and this process is called implantation(5).
- d) Odd term and category
- Odd term – Glucagon  
Category – Pigments / pigments seen in human body.
  - Odd term – Uterus  
Cateogry – Parts of excretory system / urinary system
  - Odd term – Phagocytosis  
Category – processes taking place in plants /physiological actions of plants.
  - Odd term – Photon  
Category – parts of neuron /nerve cell
  - Odd term – Insulin  
Category – Hormones seen only female body/ female hormones.
- e) The figure given below represents an experimental setup with a weighing machine to demonstrate a particular process in plant. Study the diagram and answer the following questions:
- Transpiration
  - The process of removal of water as water vapour (operative) from the aerial parts/leaf/stomata (operative) of a plant body.
  - In A – The weight of test tube reduces, as the leafy shoot transpires and in turn it absorbs water from test tube.  
In B – No change in weight/weight does not reduce/. There is no leafy shoot. No transpiration and no absorption of water.
  - It acts as a control set up.
- f) Match the items given in Column A with those in Column B:
- Pituitary gland - Growth hormone or 1 - c
  - Sulphur dioxide - Acid rain 2 - d



	iii)	Seminiferous tubules – Sperms	3 - e
	iv)	Clotting of blood – Calcium	4 - b
	v)	Guttation – Hydathodes	5 – h
g)	i)	Hyposecretion of thyroxine	
	ii)	Salivation at the sight of food.	
	iii)	44 + xx chromosome	
	iv)	Fungus	
	v)	Epididymis	
h)	i)	Between (operative) right auricle and right ventricle./at right atrio ventricular aperture.	
	ii)	Surrounding /Enclosing /Around the foetus/embryo.	
	iii)	Centre of horizontal axis of eye ball (operative) on retina (operative)/centre of retina.	
	iv)	Between (operative) posterior surface of the urinary bladder and the rectum.	
	v)	Found attached on top of each kidney/ cap like structure on kidney/ Above kidney = 0	

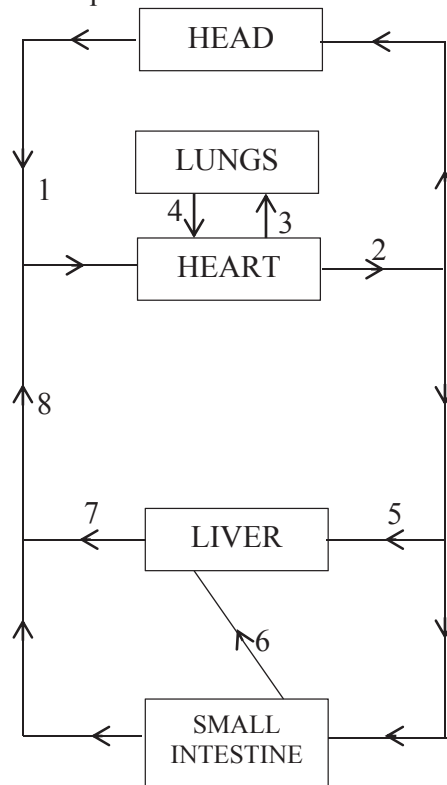
## Question 2

(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 that 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]

### Examiners' Comments

- (a) (i) Most candidates wrote the correct answer. However, some did not mention the number of nerves in pairs.
- (ii) The fact that there were many incorrect answers suggests that importance was not given to usage of proper adverbs to describe the shape of eye lens in near and distant vision.
- (iii) Most candidates were unaware of the specific functions of corpus callosum and wrote incorrect answers like 'joins cerebrum'.
- (iv) Majority of candidates answered correctly. A few however wrote incorrect answers like 'cell organelles instead of 'cell contents'.
- (v) Most candidates wrote the correct explanation, but a few failed to write where they are used.
- (b) (i) A large number of candidates failed to score as they were careless and did not mention 'Anterior/Superior Venacava'. However, most of them were able to identify 'Aorta'. A few candidates misspelt 'Aorta as 'Arota'.
- (ii) Most candidates did not know the importance of the terms oxygenated and deoxygenated blood while answering the function of Hepatic artery and Inferior Venacava.
- (iii) Only a few candidates were able to write the correct answer. Most of them appeared unaware of the importance of Hepatic Portal Vein.
- (iv) Most candidates wrote the correct answer. Some did not understand the question and wrote 'hepatic vein' instead.
- (v) Majority of candidates drew correct diagrams of blood cells. A few nucleus in RBCs as they were not sure that they are enucleated.

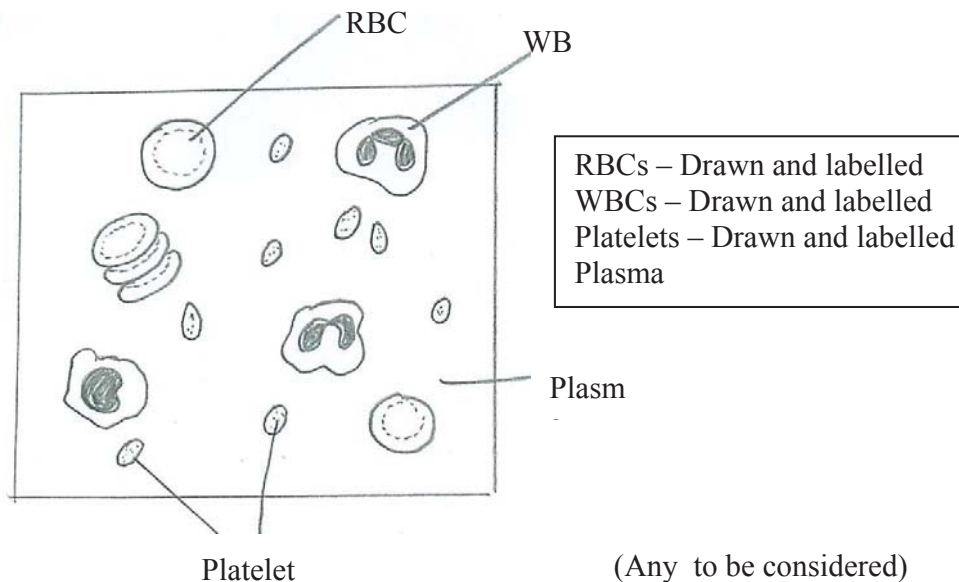
### Suggestions for teachers

- Guide students to differentiate clearly between corpus callosum and corpus luteum, disinfectant and antiseptic.
- Number of Cranial and Spinal nerves needs to be mentioned in pairs.
- Train students to differentiate between Myopia and Hyperopia with the help of diagrams and the lens used for correction.
- Explain 'Circulation of blood' with a simplified sketch to show blood vessels entering and leaving the heart.
- Importance of Hepatic Portal vein must be emphasised.
- Candidates must be made practise diagrams of blood cells. They must know the significance of RBCs being enucleated.
- The concept of endosmosis and exosmosis using hypotonic and hypertonic solution must be taught in lab with the help of practical experiments.
- Advise students to read the questions carefully before answering.

## MARKING SCHEME

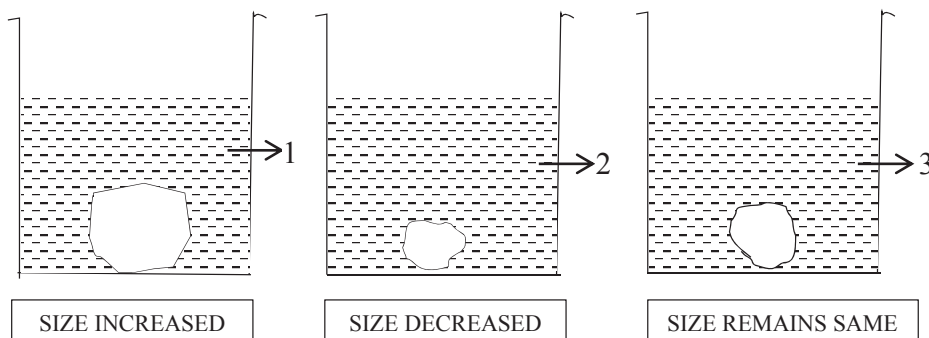
### Question - 2

- a) i) Spinal nerve – 31 pairs  
Cranial nerves – 12 pairs  
(31 and 12 only = 0)
- ii) Near vision – Too curved / Too round  
Distant vision – Too thin / Too flat (more = 0)
- iii) Corpus callosum – Transmitting impulses from one cerebral (operative) hemisphere to the other. (connecting two cerebral hemisphere=0)  
Corpus luteum – secretes Oestrogen/Progesterone/relaxin  
(Prepares uterus for reception of embryo = 0)
- iv) Turgor Pressure In a turgid plant cell (operative) the pressure exerted by cell contents on the cell wall.  
Wall Pressure In a turgid plant cell (operative) the pressure exerted by the cell wall on cell contents.
- v) Disinfectant: Strong chemical substances applied on spots and places in our surroundings to kill germs. They should not come in contact with skin. [ $\frac{1}{2}$ ]  
Antiseptic : Mild chemical substances applied on body surface (operative) to kill harmful microbes.
- (b) i) 1 – Anterior vena cava / superior vena cava / Precaval  
2 – Aorta
- ii) 5 – Brings oxygenated blood from Aorta/Heart to Liver.  
8 – Takes deoxygenated blood from the posterior / lower region of the body to the heart / right auricle
- iii) Takes blood containing absorbed food to liver, to regulate the amount of nutrients in blood toxins coming along with food are detoxified in liver,
- iv) Hepatic Portal vein
- v) Diagram



### 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?
- (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.

### Examiners' Comments

- (a) (i) Most candidates answered correctly. A few did not understand the meaning of technical terms and hence wrote 'high concentration / low concentration / same concentration of solution'.
- (ii) Most candidates were not clear about the reason for the size of potato cube being the same. They did not apply the concept of osmosis.
- (iii) This question was answered correctly by most candidates.
- (iv) Answered correctly by most candidates. Due to carelessness, some candidates did not mention the role of semipermeable membrane.
- (v) Most candidates wrote the correct answers. Some however lost marks for writing 'more permeable / less permeable instead of writing technical terms.
- (b) (i) Most candidates answered correctly. A few wrote 'chlorophyll' as the factor instead of 'sunlight'.
- (ii) Many candidates failed to score as they wrote about destarching the plant instead of leaves.
- (iii) Many candidates were unaware about the steps involved in starch test. Hence, they wrote 'to kill germs' for the first part of the question and 'to remove enzymes' for the second part of the question.
- (iv) Only some candidates wrote the complete chemical equation. Most of them overlooked the conditions necessary for photosynthesis and some did not balance the equation.
- (vi) Most candidates drew well labelled diagrams. Some of them were not aware of the fact that chloroplast has a double membrane.

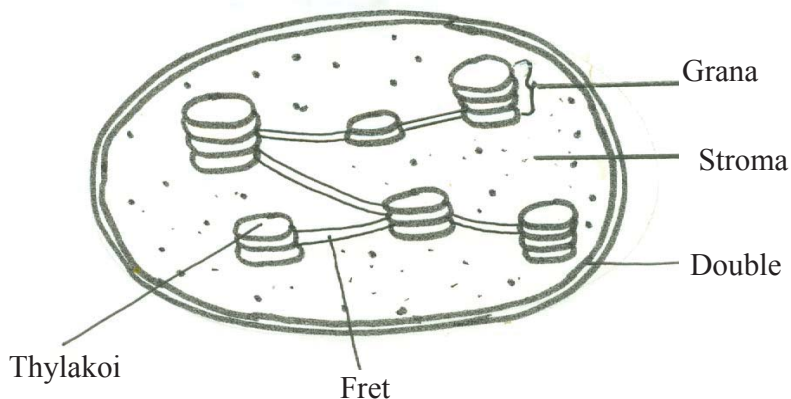
### Suggestions for teachers

- Significance of semipermeable membrane is osmosis should be stressed upon. Appropriate biological terms to be used to show difference between the permeability of cell wall and cell membrane.
- Experiments must be set up to enable students to identify the factors necessary for photosynthesis.
- Importance must be given to 'starch test' at the end of every experiment for photosynthesis.
- Make candidates practise writing a balanced chemical equation to represent photosynthesis.
- Students must practise the diagram of chloroplast with a double layered membrane.
- Arrangement of grey matter – white matter and cytons-Axons in the brain and spinal chord to be given significance.
- Candidates must practise drawing a reflex arc and label all the parts.
- They must be able to identify the various neurons and the location of synapse.
- Similar questions must be given in Unit Tests and Term examinations to enable candidates to get a clear understanding.

## MARKING SCHEME

### Question - 3

- a) i) 1 – Hypotonic Solution /Hypo osmotic solution  
2 – Hypertonic Solution / Hyper osmotic solution  
3 – Isotonic Solution / Iso osmotic solution.
- ii) In beaker 3. There is no difference in concentration of solutions/ concentration of cell sap and concentration of solution in the beaker is same. so there is no movement of water molecules / No osmosis.
- iii) Concentrated cell sap.
- iv) It is the movement of water /solvent molecules from their region of higher concentration to their region of lower concentration. across a semi-permeable membrane.
- v) Cell wall – Freely permeable  
cell membrane – Selectively permeable/semi permeable.
- b) i) Sunlight (operative) is necessary for photosynthesis.
- ii) To destarch the leaves of the plant.
- iii) 1) To kill cells.  
2) To dissolve chlorophyll/To make leaf free from chlorophyll.
- iv)  $6 \text{ CO}_2 + 12 \text{ H}_2\text{O} \xrightarrow[\text{chlorophyll}]{\text{sunlight}} \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{ H}_2\text{O} + 6 \text{ O}_2$
- v) Diagram



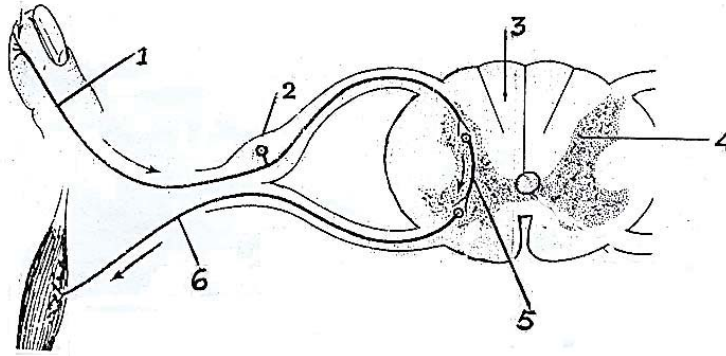
Double membrane and rod/ Oval shaped -

Labelling any two :

Grana, Stroma, thylakoids, membranes

#### 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 that 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 C.F.C is banned in many countries.
- (ii) We cannot distinguish colours in moonlight.
- (iii) Balsam plants wilt during midday even if the soil is well watered.
- (iv) Carbon monoxide is highly dangerous when inhaled.
- (v) A person after consuming alcohol walks clumsily. [5]



## Examiners' Comments

- (a) (i) This question was correctly answered.  
(ii) Most candidates wrote the correct answer. A few mentioned 'Synaptic cleft' instead of 'Synapse'.  
(iii) Most candidates wrote the correct names of parts 1, 3 and 4. However, most candidates labelled part 2 as 'dorsal root' instead of Dorsal Root Ganglion.  
(iv) Many candidates did not write the complete answer. The path of impulse mentioned 'from' and 'to' was not written.  
(v) Many candidates failed to understand this question. They wrote about the location of grey and white matter instead of cytons and axon.
- (b) (i) Errors were not noticed in the answers.  
(ii) Answered correctly by most candidates.  
(iii) Most candidates answered correctly. A few did not relate transpiration to absorption of water and lost marks.  
(iv) Many candidates were unsure of the answer. They did not mention the formation of carboxyhaemoglobin due to lack of content.  
(v) Answered correctly by most candidates.

### Suggestions for teachers

- Explain clearly the compounds formed by haemoglobin in combination with oxygen, carbondioxide and carbon-monoxide to eliminate confusion between carbaminohaemoglobin and carboxyhaemoglobin.
- Lay emphasis on the hazards of CFCs and Biomedical waste on environment.
- Explain the concept of witting of herbaceous plants during midday so that candidates have the required knowledge to correlate transpiration with absorption of water.
- Effect of alcohol on the brain and its ill effects to be emphasised.
- Train students to draw labelled diagrams of the phases of mitosis and duplicated chromosomes.
- Lay emphasis on the changes visible in nucleus during mitosis as

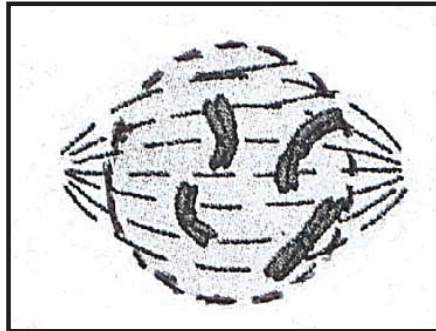
## MARKING SCHEME

### Question - 4

- a) i) Reflex action /Reflex arc / Nervous pathway of Reflex action.  
ii) Synapse  
iii) 1 – Sensory neuron / Afferent fibre/Axon of sensory neuron.  
2 – Dorsal Root Ganglion /aggregates of cell bodies of sensory neuron.  
3 – White matter  
4 – Grey matter  
iv) 5 – Carry impulses from (operative) sensory neuron to motor neuron  
(connect sensory and motor neuron = 0)  
6 – Carry impulses from (operative) central neurons system / brain and spinal cord/to effectors/muscle/gland.  
v) In spinal cord - cytons are in the inner grey matter and Axons in the outer white matter.  
In Brain - cytons are in the outer grey matter and Axons in the inner grey matter.
- b) i) C.F.C can cause ozone depletion.  
U.V radiations can reach earth and cause harmful effect on living organisms or mention any one harmful effect.  
ii) In moon light Rods/Rhodopsin are active which help us to see.  
Cones/Iodopsin help us in colour vision which can get activated only in bright light.  
iii) The rate of transpiration is more than the rate of absorption of water as the intensity of light and temperature is high during midday.  
iv) Carbon monoxide forms Carboxyhaemoglobin with oxygen and cuts off the supply of oxygen to tissues.  
v) Alcohol affects cerebellum which controls body balance.

### Question 5

- (a) Given below is a diagram representing a stage during mitotic cell division. Study it carefully and answer the questions that 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 that 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) B.C.G.
- (ii) Give one example of each of the following:
- (1) Water pollutant.
  - (2) An aquatic plant used in the lab 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]

## Examiners' Comments

- (a) (i) The question was correctly answered.  
(ii) Most candidates wrote the correct answer. A few mistook it for Metaphase stage and did not score.  
(iii) Only those candidates who wrote incorrect answer in the previous question did not score as they wrote Anaphase instead of 'Metaphase' stage.  
(iv) Most candidates did not read the question properly and wrote the number of daughter cells instead of chromosome number.  
(v) It was evident that candidates were not trained to draw this diagram as they copied the entire diagram from the question paper and labelled it. Some candidates lost marks as they did not know the difference between chromosome and chromatid.
- (b) (i) Answered correctly by most candidates. A few wrote 'Typhoid' as the disease for which B.C.G. vaccine is given.  
(ii) Answered correctly by most candidates. However, a few candidates in haste wrote 'Hydra' for 'Hydrilla' and Thiamine (a vitamin) instead of 'Thymine'.  
(iii) Most candidates were able to expand the abbreviations ATP and DNA. They were unaware of the expansions of TSH and DPT.

### Suggestions for teachers

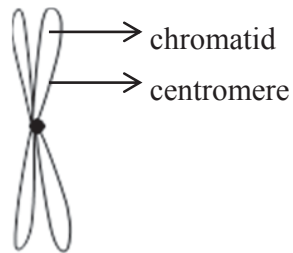
- Help students to make a list of vaccines and the diseases prevented as per the syllabus.
- List out the abbreviations and their expansions related to the syllabus.
- Discourage students from using common terms instead of biological/technical terms.
- Textbook explanation must be simplified for students so that they convey the answers in simple, short sentences.
- Writing practice must be given for all definitions emphasizing on operative terms.
- Charts and interactive boards must be used to explain structure of kidney. Nephron and the process of urine formation.
- Students must learn to draw labelled diagram of longitudinal section of kidney and structure of Malpighian capsule.
- Significance related to difference in diameter of Afferent and Efferent arteriole must be explained.
- While teaching structure of nephron, the different parts lying in Renal Cortex and renal medulla should be emphasized.

## MARKING SCHEME

### Question - 5

- a) i) Plant cell  
No centriole / Aster formation  
ii) Prophase  
iii) Meta phase Chromosomes are arranged in the equatorial plane of the cell.  
iv) Mitosis – Daughter cells will have same number of chromosome with respect to parental cell.  
Equational division = 0  
Meiosis – Daughter cells will have half the number of chromosome with respect to parental Cell. Reduction division = 0

v)



Identical parallel strands (shape) and centromere shown

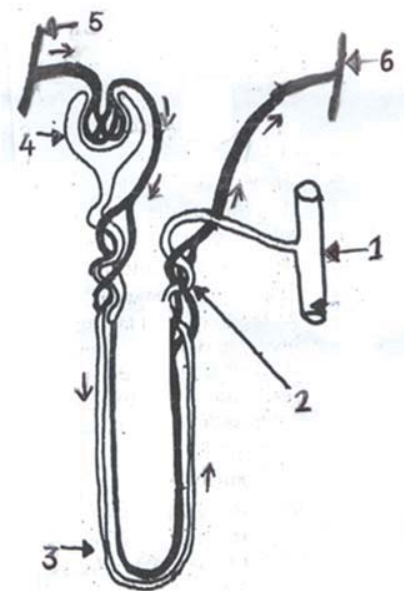
Labeling chromatids

Centromere

- b)
- i)
    1. Poliomyelitis
    2. Tuberculosis
  - ii)
    1. Sewage / detergents / oil spills
    2. Hydrilla
    3. Penicillin / Streptomycin / Amphotericin, etc.
    4. Adenine / Guanine / Cytosine / Thymine
  - iii)
    1. ATP – Adenosine tri phosphate
    2. TSH – Thyroid Stimulating Hormone
    3. DPT – Diphtheria, Pertussis, Tetanus
    4. DNA – Deoxyribo Nucleic Acid

### 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]

#### Examiners' Comments

- (a) (i) Most candidates were able to label the parts correctly. A few wrote Collecting tubule instead of 'Collecting duct'.
- (ii) Correctly answered by most candidates.
- (iii) Answered correctly by most candidates.
- (iv) Most candidates answered correctly.
- (v) Correctly answered by most candidates.
- (b) (i) Some candidates appeared unprepared to answer this question due to lack of content. Most of them failed to score as they did not mention the concept of a pair of contrasting characters.
- (ii) Most candidates failed to score full marks. They wrote examples of Biomedical wastes but were unable to mention their hazardous impact on the environment.
- (iii) Majority of candidates were unsure of the answer and hence merely defined 'immunity'.
- (iv) Most candidates lost marks for writing 'oozing out' instead of 'squeezing out of WBCs from capillaries'.
- (v) Only a few candidates wrote correct and complete answers. Most however did not mention the term 'Endocrine glands' in the definition.

#### Suggestions for teachers

- Candidates must be discouraged from writing 'oozing out of WBCs' while defining Diapedesis.
- Train students to understand and state Mendel's laws in simple words.
- Students must practice examples of Monohybrid and Dihybrid Cross using Punnett Square.
- Guide students to clearly differentiate between Innate immunity and Acquired Immunity.
- The lesson on Pollution must be taught keeping in mind the various pollutants, their sources. The effect on environment and ways and means to curb them.
- Familiarise students with the activities of Red Cross Society and WHO.
- Advise students to read and understand statements before writing the reasons.

## MARKING SCHEME

### Question - 6

- a) i) 1 – Collecting duct  
2 – Distal convoluted tubule  
3 – Henle’s loop / loop of Henle  
4 – Bowman’s capsule
- ii) afferent arteriole is wider than efferent arteriole (large / big = 0)
- iii) Renal vein / renal venule
- iv) Ultrafiltration  
Selective reabsorption
- v) Henle’s loop/ loop of Henle / collecting duct
- b) i) A cross between two plants taking into consideration the two alternative forms of a single characteristic feature (Dependent)
- ii) Causes soil pollution needle, syringe/distarded medicinal tablets (Any one example)
- iii) Capacity of our body to fight with disease causing microbes by birth/virtue of genetic constitution.
- iv) Process of squeezing out of WBC/leucocytes through minute walls of blood capillaries (operative)
- v) Chemical substance produced by endocrine/ductless gland and poured into blood to act on target organs / cells.

### Question 7

- (a) (i) State any two harmful effects of noise pollution on human health.
- (ii) Categorize the following activities as per 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 that 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 that covers the testes.
- (x) The permanent stoppage of the menstrual cycle in a woman aged 50 years. [5]

### Examiners' Comments

- (a) (i) Answered correctly by most candidates.
- (ii) All candidates wrote correct answers.
- (iii) Most candidates were able to write this answer correctly. A few however were confused and wrote on the reasons for an increase in world population.
- (iv) Only a few candidates wrote the correct law. Most failed to identify the law and wrote all the three laws of Mendel.
- (v) Answered correctly by most candidates.
- (b) (i) Majority of candidates wrote the correct answer. Some were confused and wrote 'Tubectomy' instead of 'Vasectomy'.
- (ii) Most candidates wrote the correct answer.
- (iii) The question was answered correctly.
- (vi) Most candidates wrote the correct answer.
- (v) A few candidates wrote 'genes' and lost marks.
- (vi) Most candidates answered correctly.
- (vii) Majority of candidates wrote the correct answer.
- (viii) Most candidates wrote the correct answer. However, some wrote 'Pituitary hormone' and failed to score.
- (ix) Most candidates wrote the correct answer.
- (x) Majority of candidates wrote the correct answer. Some were unsure and wrote 'Menarche' instead of 'Menopause'.

#### Suggestions for teachers

- Give a clear understanding of reasons of population explosion in India and World.
- Explain the difference between a duct and a tubule.
- Confusion relating to Vasectomy and Tubectomy Menarch & Menopause, Genes and Nucleotides, Serum & Plasma must be eliminated with suitable explanations.
- While teaching the functions of sensory cells of retina, emphasis must be laid on the pigments and their functions in bright and dim light.
- Importance of destarching the leaves of plants before beginning an experiment on photosynthesis must be explained.

## MARKING SCHEME

### Question - 7

- a) i) Damage ear drum / Nervous irritability/ Disturbs sleep (Any two)
- ii) 1) WHO  
2) Red Cross  
3) Red Cross  
4) WHO
- iii) Illiteracy/Traditional beliefs/ Desire for a male child/ High infant mortality rate. Any two.
- iv) Two members of a pair (operative) of factor separate during gamete formation (Dependent)
- b) i) Vasectomy  
ii) Demography  
iii) Pericardium / pericardial membrane  
iv) Mutation  
v) Nucleotide  
vi) Plasma  
vii) Auditory nerve  
viii) Tropic hormones  
ix) Scrotum / Scrotal sac  
x) Menopause

### Topics found confusing/difficult:

- Parts of ear and their functions.
- Location of structures/organs in plants and animals.
- Definitions of Photophosphorylation, Hormones, antiseptic and disinfectant.
- Identifying the odd term and mentioning the category of the rest.
- Disorders in human body due to Hyposecretion and Hypersecretion of hormones.
- Stages of Mitosis, number of chromosomes in daughter cells as a result of Mitosis and Meiosis.
- Right and left sides of heart and the associated structures.
- Exact location of accessory glands of male reproductive system, yellow spot in eye.
- Number of spinal and cranial nerves.
- Reasons for myopia and hyperopia and their correction.
- Names of blood vessels in general circulation of blood in body.
- Importance of Hepatic portal vein.
- Tonicity of solutions and their effect on cells.
- Various steps involved in starch test while testing a leaf for starch and their importance.
- Significance of destarching before beginning an experiment on photosynthesis.
- Reflex arc and the neurons associated with it.
- Functions of Rods and Cones in Retina.



- Compounds formed by CO<sub>2</sub> and CO with haemoglobin. Effect of CO poisoning.
- Diagram of duplicated chromosome.
- Name of vaccines and the diseases they prevent.
- Biological abbreviations and expansions.
- Structure of Nephron and the reason for ultrafiltration.
- Mendel's Laws and definitions in Genetics.
- Types of immunity.
- Distinguishing reasons for population explosion in India and in the world.

### **Suggestions for Students :**

- Make the best use of the 15 minute reading time to read the question paper thoroughly and plan writing answers.
- Mark the four questions you know best in Section II.
- All questions are equally scoring.
- Practice drawing neat, labelled diagrams.
- Do not be in a hurry to conclude an answer.
- Comprehend what is asked in the question before answering.
- Definitions and explanations of biological terms must be precise and complete.
- Follow carefully the instructions given for each question.
- Answer the number of questions as asked in the rubrics of question paper.
- Never omit answering any part of a question.
- Practice writing the spellings of biological and scientific terms to eliminate errors.
- Repeated revision of topics will help in better understanding of concepts.
- Handwriting must be neat and legible.
- Correct question number must be written for the answers.
- Do a comparative study of closely related topics.
- Practise collecting data and analyse the result of the experiment in Practical record to improve skills in answering experiment related questions.
- Maintain a list of abbreviations related to your syllabus.
- Read the scope and syllabus prescribed for the subject.
- Revise your answers after completion so as to identify errors or terms/words missed out while writing.