



ICSE YEAR 2013 BIOLOGY

(SCIENCE - PAPER 3)

- **SOLUTION OF 2013**
- **COMMENTS OF COUNCIL EXAMINERS**
- **SUGGESTIONS FOR TEACHERS**

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

This small booklet contains solution of 2013 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 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, Myxedema, Simple goitre, Acromegaly.
 - (iv) Sneezing, coughing, blinking, typing.
 - (v) Semicircular canals, Cochlea, tympanum, utriculus. [5]

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

Column A	Column B
(1) Testis	(a) Kidney
(2) Poliomyelitis	(b) Water vapour
(3) Transpiration	(c) 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

[5]

- (e) Choose the correct answer from the four options given below:
- (i) The cell component visible only during cell division:
- 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 that 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.

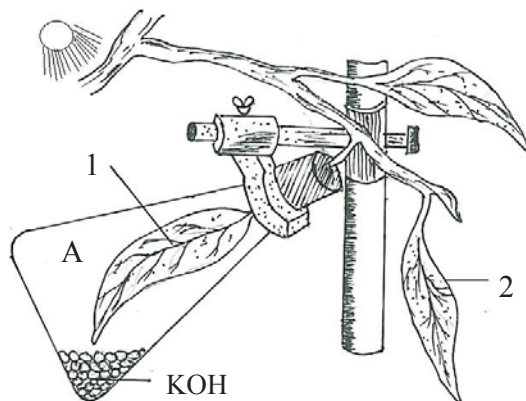
[5]

(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 alphabet '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 that 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, Fertilization.

Answer : Ovulation, Fertilization, Implantation, Gestation, Parturition.

- (i) Spongy cells, Upper epidermis, Stoma, Palisade tissue, Substomatal 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]

Examiners' Comments

- (a) (i) Most candidates wrote correct answers. 'Axon' was written as an occasional incorrect answer instead of 'Cyton'
- (ii) Majority of candidates answered correctly however a few were unsure of their content and did not attempt the question.
- (iii) Most candidates were unaware of what pesticides were and wrote incorrect answers like glass, steel etc.
- (iv) Most candidates wrote the correct answer. However, a few were confused between 'Phenotype' and Genotype.
- (v) Correct answers were written by most candidates. A few however lost marks for having spelt the term 'glomerulus' as 'golmerulus'.
- (b) (i) Most candidates were unable to specify the exact location. They stated 'in plant Cells' / 'in epidermal cells of leaves' with no reference to green cells of plants.
- (ii) Some candidates wrote 'inner ear' instead of 'middle ear'. A few did not know the difference between 'ear and year'. Many candidates used common names like 'between Hammer and Stirrup' which otherwise have different meanings.
- (iii) Most candidates wrote the correct answer. Some however were unsure and stated 'in the brain'.
- (iv) Most candidates wrote the correct answer. A few lacked expression and wrote 'in the Stomata' / 'between epidermal layers'. Some candidates mentioned between Epithelial cells' instead of 'Epidermal cells'.
- (v) Only a few candidates were able to write the correct location. Most however were confused with the right and the left side of the heart. A few mentioned 'inside Pulmonary Artery' instead

Suggestions for teachers

- Train students to use biological/technical terms rather than common names. Insist on the correct spelling of biological terms.
- Advise students to read the statements carefully and understand it properly before writing the answer.
- Give a clear and logical explanation of the structure of a leaf while teaching the lesson on 'Transpiration'
- Stress on the importance of prepositions like in, on, between, around; while stating the exact location of structures and organs.
- Importance of 'Calcium ions' in the process of clotting of blood to be stressed upon.
- Explain the structure and function of Malpighian capsule and ensure regular practice of diagrams.
- Guide students to clearly differentiate between Antiseptic and Disinfectant, Simple and Conditioned reflex, Transpiration and Guttation, Phenotype and Genotype.
- Train students to draw a simplified sketch of the heart to learn the right and left of the heart, position of valves and the blood vessels entering and leaving the heart.

- of at the beginning or entrance of Pulmonary Artery'.
- (c) (i) Most candidates were confused because neither acetic acid nor carbonic acid are Antiseptics.
- (ii) Candidates were unsure of the answer as all the terms were Germ-killing body secretions.
- (iii) Most candidates wrote the correct answer. However a few failed to write the correct Category and vaguely mentioned 'disorders of thyroid gland'.
- (iv) Most candidates were casual in approach and did not mention the type of reflex action, though the odd term was correct.
- (v) Most candidates were able to write correct answers. Some however were unsure of the parts of the ear and mentioned 'Utriculus' as the odd term and just 'ear' for the category.
- (d) (i) Most candidates were able to write the correct pair. Those who were unsure of the parts of male reproductive system paired 'Testis' with 'Prostate gland'.
- (ii) Most candidates answered correctly as no error was observed.
- (iii) Correct pairing was done by most candidates. A few were confused with 'Transpiration' and 'Guttation' and hence paired 'Transpiration' with 'water droplets'.
- (iv) Most candidates wrote the correct pair. Some were not sure of the mineral required for clotting of blood and hence chose 'Iron' instead of 'Calcium'.
Most candidates wrote the correct matching pair.
- (e) (i) Most candidates wrote the correct answer. A few were unable to distinguish between 'Chromosome' and 'Chromatin' and made the wrong choice.
- (ii) Most candidates wrote the right choice. A few who were not sure of the right and left side of the heart chose 'systole of right ventricle' instead of 'systole of the left ventricle'.
- (iii) Candidates were confused as there were three correct choices. The recessive gene can express itself in 'Homozygous condition', 'F₂ generation' and 'Y-linked inheritance'.
- (iv) Correctly answered by most candidates.
- (v) Most candidates were unaware because there is no 'ventral root ganglion' of spinal cord.
- (f) (i) Most candidates were confused with the function of the different types of WBCs and wrote 'Production of Antibodies'/'Production of Antitoxins' instead of 'Phagocytosis' for Neutrophils.
- (ii) Some candidates failed to answer correctly as they did not write the idea of 'from and to' for the transport of urine. They merely stated 'carries urine'.
- (iii) Many candidates failed to score as the answer was incomplete. They did not explain the transmission of impulse across synapse.

Suggestions for teachers

- With the help of a flow chart make the students practice the nervous pathway of reflex action.
- Advise students to take Practical work seriously to enable them to identify the factors necessary for Photosynthesis.
- Give importance to 'Starch Test' at the end of an experiment on Photosynthesis.
- Students must know the change in colour of leaf when starch is present or absent on adding Iodine solution.
- Students must know the change in colour of leaf when starch is present or absent on adding Iodine solution.
- Display the transverse section of a root and explain with the help of a flow chart the movement of water absorbed by root hairs.
- Award marks only for complete and relevant explanations during school examinations.

- (iv) The concept of regulating the size of the pupil for entry of light inside the eyes was missing. Instead most candidates wrote 'allows light to enter the eye'.
 - (v) Most candidates wrote the correct answer. A few lost marks as they wrote just 'transports food' without emphasizing on the process of diffusion of named substances to and from the mother and foetus.
- (g)
- (i) Most candidates answered correctly. A few wrote 'Sunlight' as the factor instead of 'Carbon dioxide'.
 - (ii) Answered correctly by most candidates.
 - (iii) Most candidates wrote the correct answer. Some however did not state the alternative chemical for KOH.
 - (iv) The change in colour of leaf and the presence and absence of starch in the leaves was not written completely by majority of candidates. Some only wrote on one leaf and did not explain the other due to oversight.
- (h)
- (i) A large number of candidates failed to score as the sequence of terms were wrong.
 - (ii) Correctly answered by most candidates.
 - (iii) Most candidates failed to score as they were unsure of the regions in a transverse section of the root.
 - (iv) Most candidates answered the question correctly.
 - (v) Only a few candidates wrote the sequence correctly as there is no specific 'intestinal artery' among the blood vessels.

MARKING SCHEME

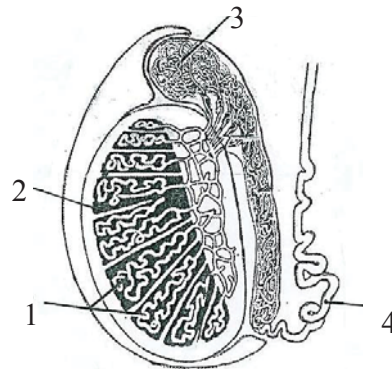
Question - 1

- (a)
- (i) Perikaryon/ cyton
 - (ii) Cuticle
 - (iii) DDT, BHC (any one)
 - (iv) Phenotype
 - (v) Glomerulus/Glomerular Capillaries
- (b)
- (i) In the cytoplasm (operative) of green plant cell (operative).
 - (ii) Inside the human middle ear (operative) between Malleus and stapes (operative) .
 - (iii) Seen between two cerebral hemisphere (operative) in human brain.
 - (iv) Seen in between the epidermal cells (operative) of a leaf.
 - (v) Located at the opening (operative) of the right ventricle into the pulmonary artery (operative).
- (c)
- (i) Mark awarded.
 - (ii) Mark awarded
 - (iii) Odd term : Acromegaly; c:c – Disease condition due to hypothyroidism.
 - (iv) Odd term : Typing; category – Simple /Natural reflexes.
 - (v) Odd term : Tympanum; category: parts of human internal/inner ear /parts of membraneous labyrinth.
- (d)
- (i) Testes – Gonad / 1 - f
 - (ii) Poliomyelitis - Salk's vaccine / 2- g
 - (iii) Transpiration – water vapour / 3 - b
 - (iv) Clotting of blood – calcium / 4 - i
 - (v) Uriniferous tubule – kidney/ 5 - a
- (e)
- (i) Chromosome/C
 - (ii) Systole of left ventricle

- (iii) Mark awarded.
- (iv) Pancreas / B
- (v) Mark awarded.
- (f) (i) Neutrophils : Phagocytosis /engulf bacteria.
- (ii) Ureter: passes the urine produced in the kidney to the urinary bladder.
- (iii) Neurotransmitters: Transfer the impulse from the terminal end of an axon to the dendrites of the adjacent neuron.
- (iv) Iris of the eye: Regulates the size of the pupil (operative) so as to control the amount of light entering the eyes.
- (v) Placenta: Diffusion of Carbon dioxide urea from foetus to mother, acts as an endocrine gland. Diffusion of O₂ / nutrients from mother to foetus.
- (g) (i) To prove that CO₂ is essential for photosynthesis.
- (ii) There is no carbon dioxide inside the flask.
- (iii) Soda lime or lime water (any one)
- (iv) At the end of starch test Leaf 1 turns brownish which indicates the absence of starch. Leaf 2 turns bluish black which indicates the presence of starch.
- (h) (i) Upper epidermis, palisade tissue, spongy cells, substomatal 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) Mark awarded.

Question 2

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



- (i) Label the parts numbered 1 to 4 of 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 that 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]

Examiners' Comments

- (a) (i) Most candidates answered correctly. Some made spelling errors and wrote 'Vas difference' for 'Vas deferens' and 'Epididamis' for 'Epididymis'. A few were not sure of the structure of testis and were unable to label parts 2 and 3.
- (ii) Most candidates wrote the function of part 1 correctly. However, a few who knew the function of Epididymis just mentioned about storage of sperms.
- (iii) Correctly answered by most candidates. A few failed to score as they only stated about lowering the temperature but did not the reason.
- (iv) A few candidates were able to mention the role of 'inguinal canal'. Most candidates however merely stated that 'it allows testis to descend below abdomen'.
- (v) Most candidates did not write the complete answer in mentioning the accessory glands of males. They wrote just 'mixture of sperms'.

Suggestions for teachers

- Advise students to read the instructions given in the question carefully before answering.
- While teaching the lesson on Reproductive system, stress on the structure and function of every part.
- Give importance to the male accessory glands and their role in production of semen.
- Train students to know the difference between Stomata, Lenticels and their location in plants.

- (b)(i) This question was answered correctly by most candidates.
- (ii) Most candidates answered correctly however a few did not read the instructions and wrote examples of pollutants instead of the term 'pollutant'.
- (iii) This question was answered correctly by most candidates.
- (iv) Most candidates answered the question correctly.
- (v) This question was answered correctly by most candidates.
- (vi) Most candidates wrote the correct term. However, some wrote; V, 'Stomata' instead of 'lenticels' as they were not sure of their content.

- (vii) Most candidates wrote the correct term. However, a few wrote 'green plants' for photosynthesis.
- (viii) Many candidates answered correctly. A few however were confused with 'Response' and 'Reflex action',
- (ix) Answered correctly by most candidates. Due to carelessness, some wrote 'lysosomes' instead of 'lysozymes'.
- (x) This question was answered correctly by most candidates.

MARKING SCHEME	
Question - 2	
(a)	<ul style="list-style-type: none"> (i) Part 1 – seminiferous tubule Part 2 – Interstitial cells Part 3 – Epididymis Part 4 – Vas deferens / sperm duct (vas difference = 0) (ii) Function of Part 1 (seminiferous tubule) – Production of sperm - Part 2 – stores the sperms for some days till they mature (operative) (iii) Scrotal sac provides the optimum temperature for the maturation of sperms - (iv) Vas deference travels upward into the abdomen passing through an inguinal canal /In the embryonic stage, the testes descend into the scrotum through the inguinal canal. (any one point) (v) Mixture of sperms and the secretions from all accessory male reproductive glands or name of glands
(b)	<ul style="list-style-type: none"> (i) Antibody /immunoglobulins. (ii) Pollutant (iii) Menarche (iv) Umbilical Cord (v) Cerebrospinal fluid (vi) Lenticels (vii) photosynthesis (viii) Response (ix) Lysozymes (lysosomes = 0) (x) Isotonic /Isoosmotic solution

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]

Examiners' Comments

- (a) Most candidates were unsuccessful in drawing the vertical section of the human eye with a bulge in front of the eyeball and the four concentric circles depicting the 3 layers. Though the descriptions for labeling the diagram was given in the question, candidates labeled other parts which may be factually correct, but did not provide reason to justify their answers. Candidates were confused on the numbering of the labels.. They wrote 'ciliary muscles' for holding the eye lens in position and labeled cornea for conjunctiva.
- (b) (i) The fact that there were many incorrect answers suggests that due importance was not given to the conditions required for Photolysis and Photophosphorylation. Presence of Chlorophyll and sunlight as conditions was lacking in most answers.
- (ii) A general confusion regarding the right and left side of heart was evident in the answers. Too many answers referred to allowing the blood to flow from auricles to ventricles of heart which can also happen due to gravity. What was required was the prevention of a backflow of blood into auricles which was missing.
- (iii) This question was answered correctly by most candidates. A few however were confused as to which surgical method applied to males and which one to females.
- (iv) Majority of candidates failed to write the arrangement of nerve cells in the brain and spinal cord. They explained it in terms of gray and white matter but did not specify which matter lies outside and which one inside.
- (vi) The structure of the question led to confusion in candidates regarding the parts included in Bowman's capsule. However, they were able to score for Malpighian capsule.

Suggestions for teachers

- Arrangement of cytons and axons in the brain and spinal cord to be given importance.
- Surgical method of contraception to be stressed upon to avoid confusion between Tubectomy and vasectomy
- Construct similar questions in Unit Tests and Term examinations for practice and correct students when errors are committed..
- Give a clear understanding of the functions of structures with regard to transport of substances, laying emphasis on 'from' and 'to' like - Ureter transports urine from kidney to_ urinary bladder.
- Make use of charts, models and interactive smart boards to explain the parts and functions of the eye and ear.

MARKING SCHEME

Question - 3

(a)

(v) aqueous chamber

(vi) Conjunctiva

(iii) Vitreous humour

(iv) blind spot

(i) Retina

(ii) Suspensory

(b) (i) Photolysis: Splitting of water molecules in the presence of light energy (operative into hydrogen and hydroxyl / ions taking place during photosynthesis / in green living plant cells. Conversion of ADP into ATP taking place during photosynthesis / in green living plant cells in the presence of light.

(ii) Bicuspid valve: Prevents the backward flow of blood from left ventricle to left auricle.
Tricuspid valve: Prevents the backward flow of blood from right ventricle to right auricle.

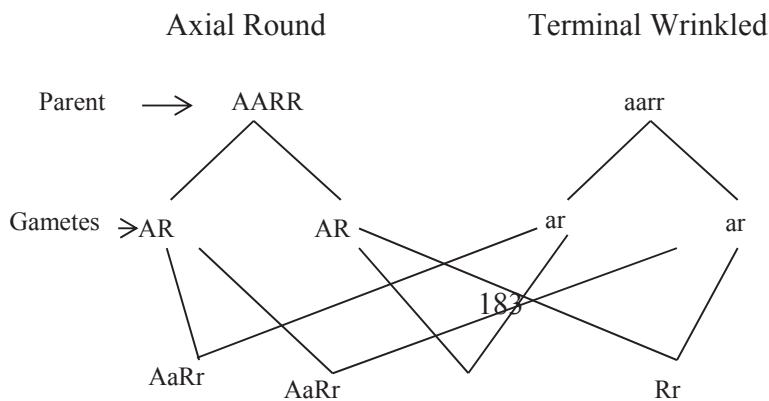
(iii) Vasectomy - Surgical method of contraception in males in which vas deferens is ligated.
Tubectomy - Surgical method of contraception in females in which oviducts are ligated.

(iv) Cerebrum - cytons are in the inner grey matter. Axons are in the inner white matter.
Spinal cord - cyton are in the inner grey matter; axons are in the outer white maater.

(v) Bowman's capsule – cup shaped structure enclosing Glomerulus.
Malpighian Capsule – Bowman's capsule and Glomerulus together is known as malpighian capsule.

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 that follow:



- (i) Give the phenotype of F₁ progeny.
- (ii) Give the phenotypes of F₂ progeny produced upon by the self- pollination of F₁ progeny.
- (iii) Give the phenotypic ratio of F₂ progeny.
- (iv) 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:

S.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 utilization by the body cells.
4.	Lacrimal gland	<u>7</u>	<u>8</u>
5.	Adrenal medulla	<u>9</u>	<u>10</u>

[5]

Examiners' Comments

- (a) (i) Most candidates wrote the genotype of F₁ generation instead of Phenotype. A few did not know the difference between F₁ and F₂ generation.
- (ii) Candidates appeared unprepared to answer this question due to lack of content and inadequate practice. They failed to score as they did not understand the question.
- (iii) Majority of the candidates answered correctly.
- (iv) Candidates failed to identify the law applied to dihybrid cross. Some mentioned the correct law but failed to explain it. A few wrote all 3 laws as they did not understand the question.
- (b) Majority of candidates answered the question correctly. A few were able to write the name of the gland and its secretion correctly but could not apply their knowledge to the function of the secretion. Some wrote 'communicates emotions' as the main function¹ of tears and failed to secure marks. Some were confused with

Suggestions for teachers

- Train students to understand and state Mendel's laws in simple words, giving importance to operative words. -Stress on the difference between Monohybrid and Dihybrid Cross, F₁ and F₂ generation.
- On the topic of ' Endocrine Glands', train students to draw a tabular column stating the gland, its secretion, function of the hormone and the disorders due to Hypo and Hypersecretion.
- Students must practice a number of examples on Monohybrid and Dihybrid cross using various contrasting characters.

the secretion of Adrenal medulla and wrote cortisones instead of Adrenaline.

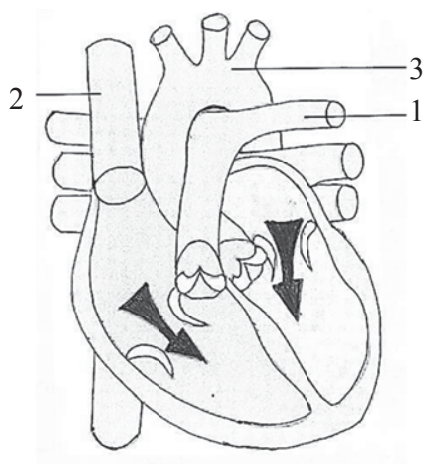
MARKING SCHEME

Question - 4

- (a) (i) All plants have axial flowers with round seeds
(ii) Axial flowers with round seeds.
Axial flowers with wrinkled seeds.
Terminal flowers with round seeds
Terminal flowers with wrinkled seeds
(iii) 9 : 3 : 3 : 1
(iv) Law of independent assortment. When there are two pairs of contrasting characters the distribution of the members of one pair into the gamete is independent of the distribution of the other pair.
- (b) (i) Thyroxine
(ii) Regulates basal metabolism
(iii) Posterior (operative) lobe or pituitary.
(iv) Initiates reabsorption of water from kidney / contraction of blood vessels causing rise of blood pressure. (any one)
(v) Pancreas
(vi) Insulin
(vii) Tears
(viii) Lubricates eye / kills harmful microbes / wash away dust particles/ communicate emotions (any one)
(ix) Adrenaline
(x) Prepares the body for emergency situation/ increases heart beat / increases blood supply to the muscle / more glucose is released into the blood by the liver.

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 that 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 well labelled diagrams 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 auricles.
- (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]

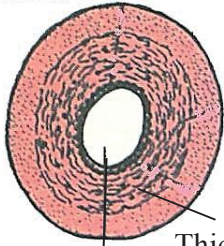
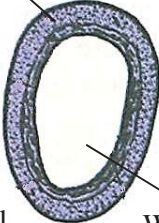
Examiners' Comments

- (a)(i) Majority of candidates answered correctly. Some were not specific in answering and wrote contraction of heart instead of Auricular Systole and Ventricular Diastole.
- (ii) The difference between Pulmonary artery and Pulmonary vein was not understood by many candidates. Spelling errors were observed in the labelling of the aorta.
- (iii) The first part of the question was answered correctly. However, most candidates failed to provide a proper reason for their answers suggesting a lack of attention to syllabus specifics. They just wrote 'since valves are open' instead of specifying 'Tricuspid' and 'bicuspid valves'.
- (iv) A few candidates could not comprehend the question and drew pulmonary artery and Superior Venacava directly from the question. Others did not show the difference in thickness of muscular layer and the diameter of lumen in artery and vein.
- (b)(i) Most candidates failed to read the question carefully and made references to only the thickness of ventricles and did not reason as to why auricles are thinner.
- (ii) Only a few candidates wrote complete explanations. A majority mentioned the Malpighian/Bowman's Capsule but did not refer to 'Convolute Tubules'.

Suggestions for teachers

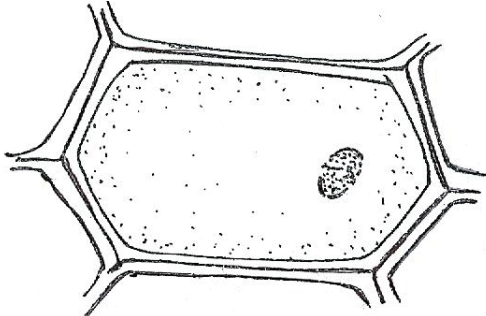
- Attach importance to technical terms for contraction and relaxation of heart.
- Regular practice of diagrams showing cross-sections of artery, vein and capillary. Structural differences to be stressed upon.
- Students must practice the diagram showing vertical section of Kidney. They must know as to why they draw stripes for medulla and dots for cortex.
- Students must be taught to reason out practical examples in daily life related to diffusion, osmosis and imbibition.
- Frame application based questions on reflex actions so that students apply their knowledge to give logical reasons.

- (iii) The two concepts expected in this answer namely- imbibition; and swell/ increase in size were written by most candidates. A few who wrote about Endosmosis lost marks.
- (iv) Answered correctly by most candidates. A few failed to mention 'Eustachian Tube'.
- (v) Correctly answered by most candidates. On the other hand, there were many who did not relate conditioned reflex to previous learning of experience.

MARKING SCHEME	
Question - 5	
(a)	<ul style="list-style-type: none"> (i) Auricular systole (Atrial systole) and ventricular diastole (ii) Part 1 – pulmonary artery (to the left lung). Part 2 – Superior venacava. Part 3 - Aorta (iii) Auricles are contracting in this phase because bicuspid (operative) and tricuspid valves (operative) are open to allow the blood to flow from auricles to ventricles. (iv) <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;"> <p>ARTE</p>  <p>Narrow lumen</p> </div> <div style="text-align: center;"> <p>Thin muscular wall</p>  <p>Wide lumen</p> </div> </div>
[10 x ½ =	
(b)	<ul style="list-style-type: none"> (i) Ventricles has to pump the blood to different parts of the body. But auricles are mainly receiving chambers and it has to pump the blood only to the next chamber. (ii) Nephrons are arranged in such a way that Bowman’s capsule and convoluted tubules comes in the cortex. (iii) Wooden doors absorb water due to imbibition and the cells become turgid and increase in size. (iv) Middle ear is connected to pharynx through Eustachian tube. So microbes can travel through this tube and can cause infections. (v) This is a conditioned reflex happening due to prior learning or experience.

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) above?
- (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]

Examiners' Comments

- (a) (i) The diagram required a shrunken protoplasm. Most candidates did not know the concept of a plasmolysed cell, they drew large vacuoles. Some of them were not aware of the fact that the cell membrane withdraws from the cell wall and the space between the two gets occupied by a sugar solution.
- (ii) The question was correctly answered.
- (iii) Correctly answered by most candidates.
- (iv) Most candidates answered correctly.
- (vi) Most candidates wrote the correct definition. Due to carelessness a few did not mention semipermeable membrane. Some were not clear about the concept of movement of water molecules.
- (b) (i) Most candidates wrote the correct explanation, however a few failed to make a reference to transmission of characters from parents to off springs.

Suggestions for teachers

- Writing practice to be given for definitions emphasizing on operative terms.
- Modify textbook explanations and advise student to use simple, short sentences to convey their answers.
- Explain the concept of endosmosis and plasmolysis clearly so that students have the required knowledge to correlate hypotonic solution with endosmosis and hypertonic solution with plasmolysis.
- Assign regular practice in drawing a well labeled turgid cell and plasmolysed cell.
- Students must know the importance of shrunken protoplasm and withdrawal of cell membrane from cell when the cell is placed in a hypertonic solution

- (ii) Many candidates missed the idea of cell plate formation in the division of cytoplasm in plant cells. They failed to score as they were not sure of their subject matter.
- (iii) Correctly answered by most candidates. A few were confused with Transpiration and wrote 'water vapour' instead of 'water droplets'. Some candidates were unsure about the loss of water droplets.
- (iv) Most candidates made no mention of the condition that leads to the disease as they wrote the symptom only.
- (v) It was felt that most candidates were not trained to write the operative term 'strong Chemicals' and hence failed to score marks.

MARKING SCHEME

Question - 6

(a) (i)

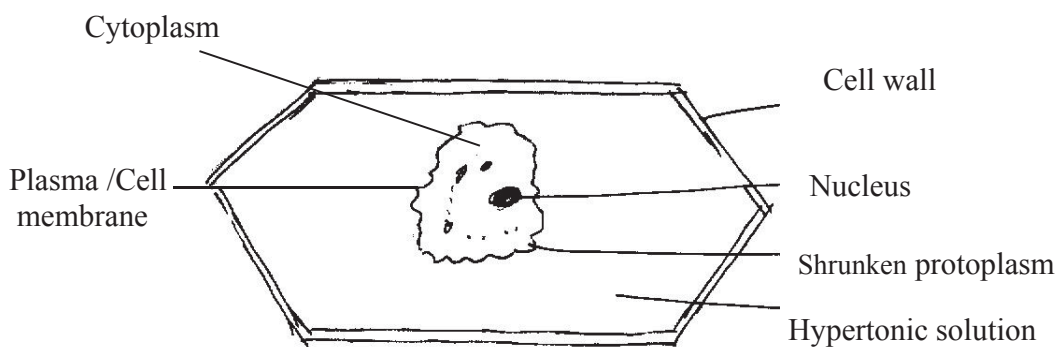


Diagram: Shaper of the cell
Shrunken protoplasm

- (ii) Plasmolysis
 - (iii) Place the cell in hypotonic solution.
 - (iv) Deplasmolysis.
 - (v) Osmosis is the process of movement of water molecules from its higher concentration to its lower concentration through a semipermeable membrane (dependent).
- (b) (i) Special sequences on the DNA molecule which are responsible for the transmission of characters from parents to offsprings (dependent).
- (ii) It is the division of cytoplasm in plant cell. A cell plate appears in the centre of the cell which divides the cell into two.
 - (iii) Loss of water as water droplets through hydanthodes.
 - (iv) Disease due to hypo secretion / under secretion of ADH/Vasopressin resulting in diluted urine / urine loaded with water.
 - (vi) Strong chemicals applied on spots and places to kill harmful microbes.

Question 7

- (a) (i) Draw a well labelled 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]

Examiners' Comments

- (a) (i) Only a few candidates were able to draw a proper diagram of the Anaphase stage in a plant cell. The common errors observed were:
- Not reading the question carefully and hence, drew an animal cell instead of a plant cell.
 - Unaware of Mitosis in plant cells.
 - Drew Asters and Centrioles.
 - Absence of spindle fibres and Centromeres. Drew 6 to 8 chromatids instead of 4.
 - Paired chromatids going to the poles of the cell without separating.
- (ii) This question was answered correctly by most candidates.
- (iii) Most candidates were able to expand NADP correctly. Some of them lost marks for writing 'Nicotinamide Adenosine Diphosphate', as they were confused.
- (b) (i) Most candidates wrote correct answers. A few however mixed up the activities of the Red Cross with that of the WHO.
- (ii) Majority of candidates failed to score as they wrote the reasons for population explosion in India instead of the world reflecting they did not read the question properly.
- (iii) Candidates were able to write the names of the 4 Nitrogenous bases, but a few lost marks due to spelling errors. 'Adenine' was spelt as 'Adenosine', 'Thymine' as 'Thiamine' which otherwise have different biological meanings.

Suggestions for teachers

- Students must be trained to understand the changes visible in nucleus during mitotic cell division as a result of which the stages can be identified.
- Insist on students drawing labeled diagrams of the different phases in mitosis with a given number of Chromosomes.
- Clarify the concept of duplication of chromosomes during prophase and separation of chromatids during Anaphase.
- Students must be trained to clearly distinguish between Chromosome and Chromatid, Centromere and Centrosome.
- Emphasize on the difference between the Plant and Animal mitotic cell division
- Make a list of all biological abbreviations related to their syllabus and assign writing practice to students.

MARKING SCHEME

Question - 7

(a) (i)

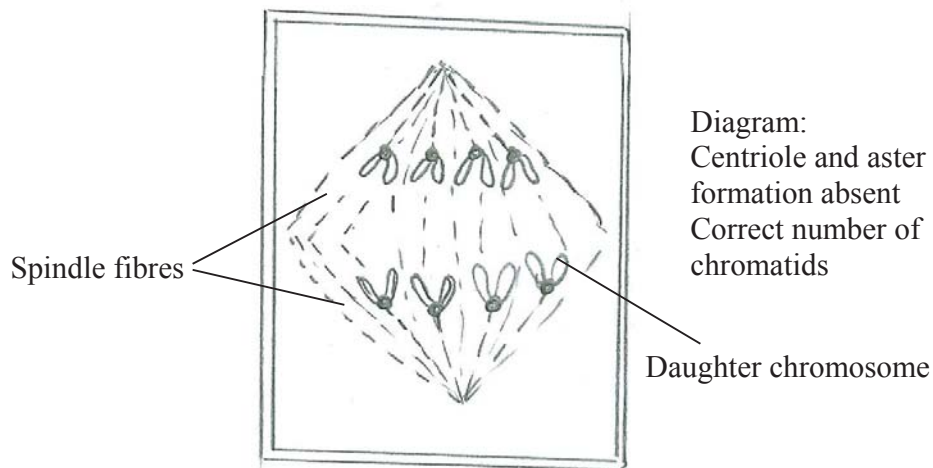


Diagram:
Centriole and aster
formation absent
Correct number of
chromatids

- (ii)
1. Damage to vegetation
 2. Decay or building materials and paints
 3. Erosion of ancient monuments
 4. Kill aquatic animals.

(iii) Nicotinamide adenine dinucleotide phosphate.
(dinucleotide = 0, Adenosine = 0) Dependent
Adreno corticotrophic hormone

- (b) (i)
1. To extend help to the victims of any calamity.
 2. Provide blood for the needy victims of war
 3. Provide first aid in accident
 4. Arrange ambulance service in al emergencies. (any four functions)

- (ii)
1. Better health care.
 2. Fewer deaths
 3. Improved nutrition
 4. Large scale immunization

(iii) Adenine
Guanine
Thymine
Cytosine

Topics found confusing/difficult:

- Internal structure of human heart, valves inside the heart and their functions.
- Distinguishing Phenotype from Genotype.
- Phenotypic ratio of F₂ generation in a dihybrid cross.
- Diagram of a plasmolysed plant cell.
- Diagrammatic representation of Structural differences between artery and vein.
- Identifying the physiological experiments associated with Photosynthesis and Osmosis.
- Exact location of structures / organs in plants and animals.
- Arrangement of terms in a logical sequence.
- Right and left sides of the heart and the associated structures.
- Names of the accessory glands of male reproductive system.
- Definitions of Antiseptic and Disinfectant.
- Parts of Eye and Ear and their functions.
- Brain and Spinal cord with reference to arrangement of neurons.
- Differences between Photolysis and Photophosphorylation and the factors.
- Functions of Hormones.
- Distinguishing simple from Conditioned Reflex actions.
- Stages of Mitosis.

Suggestions for Students :

- All questions are equally scoring and no question takes precedence over the other.
- Repeated revision of topics will help in a proper understanding of concepts.
- Do not overlook any part of a question and avoid being in a hurry to conclude an answer.
- Comprehend what is being asked before answering by reading the question carefully.
- Give importance to spellings of biological and technical terms.
- Explanations of biological terms must be precise and complete.
- Importance must be given to drawing accurate, neat, and well labelled diagrams.
- Follow instructions given in each question.
- Answer the number of questions as asked in the rubrics of the question paper.
- Never omit answering any part of a question.
- Revise your answers after completion so as to identify the terms left out or spelt wrongly.