

BIOLOGY
SCIENCE Paper - 3

III. ANALYSIS OF PERFORMANCE

Question 1

- (a) Name the following:
- (i) The phenomenon by which living or dead plant cells absorb water by surface attraction.
 - (ii) The phase of cardiac cycle in which the auricles contract.
 - (iii) The organ where urea is produced.
 - (iv) The hormone that helps increase the reabsorption of water from the kidney tubules.
 - (v) Chemical substances produced by microorganisms that can kill or inhibit the growth of other microorganisms. [5]
- (b) Choose the correct answer from the four options given below each statement:
- (i) BCG vaccine is used to build immunity against:
 - A. Poliomyelitis
 - B. Tuberculosis
 - C. Malaria
 - D. Whooping cough.
 - (ii) A plant is kept in a dark cupboard for about 48 hours before conducting any experiment on photosynthesis to:
 - A. Remove starch from the plant
 - B. Ensure that starch is not translocated from the leaves.
 - C. Remove chlorophyll from the leaf of the plant.
 - D. Remove starch from the experimental leaf.
 - (iii) The part of the human eye where rod cells and cone cells are located is the:
 - A. Retina
 - B. Cornea
 - C. Choroid
 - D. Sclera.

- (iv) A reflex arc in man is best described as movement of stimuli from:
- A. Receptor cell, sensory neuron, relaying neuron, effector muscles.
 - B. Receptor cell, efferent nerve, relaying neuron, muscles of the body.
 - C. Receptor cell, spinal cord, motor neuron, relaying neuron.
 - D. Receptor cell, synapse, motor neuron, relaying neuron.

(v) NADP is expanded as:

- A. Nicotinamide, adenosine dinucleostide phosphate.
- B. Nicotinamide, adenine dinucleotide phosphate
- C. Nicotinamide, adenine dinucleous phosphate
- D. Nicotinamide, adenosine dinucleous phosphate.

[5]

(c) State the main function of the following:

- (i) Chordae tendinae
- (ii) Lymphocytes
- (iii) Seminiferous tubule
- (iv) Thylakoids
- (v) Beta cells of pancreas

[5]

(d) Give the exact location of the:

- (i) Lenticels
- (ii) Prostate gland
- (iii) Thyroid gland
- (iv) Centrosome
- (v) Mitral valve.

[5]

(e) Given below are sets of five terms each. In each case rewrite the terms in logical sequence as directed at the end of each statement. *An example has been done for you:*

Example:

Cortical cells, Root hair, xylem, Soil water, endodermis (absorption of water by the plants)

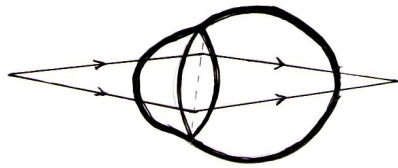
Answer: Soil water, Root hair, cortical cells, endodermis, xylem

- (i) Active immunity, Antigen, Antibody, Bacteria, Lymphocytes (defence mechanism of the body).

- (ii) Implantation, Parturition, Ovulation, Gestation, Fertilisation (stages leading to formation of foetus and birth).
- (iii) Oval window, Tympanum, Cochlea, Auditory canal, Ear ossicles (path through which a vibration of sound is transferred in the human ear).
- (iv) Karyokinesis, S- phase, Cytokinesis, G1 – phase, G2 – phase (cell cycle).
- (v) Renal vein, Renal artery, Afferent arteriole, Efferent arteriole, Glomerulus (pathway of blood through glomerulus).

[5]

- (f) Study the following diagram carefully and then answer the questions that follow. The diagram is depicting a defect of the human eye:



- (i) Identify the defect shown in the diagram.
- (ii) Give *two* possible reasons for the above defect.
- (iii) Draw a neat labelled diagram to show how the above defect can be rectified.

[5]

- (g) Match the items in column A with that which is most appropriate in column B.

Rewrite the matching pairs:

Column A	Column B
(1) Potometer	(a) Antiseptic
(2) Hypothalamus	(b) Disinfectants
(3) Formalin	(c) Vasectomy
(4) Contraception in males	(d) Sudden change in genes
(5) Mutation	(e) Pituitary gland
	(f) Tubectomy
	(g) Transpiration
	(h) Thyroid gland
	(i) Alleles
	(j) Photosynthesis

[5]

- (h) 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 has been done for you as an example.

No.	Set	Odd one	Category
eg:	Cell wall, large vacuole, plastids, centrosome	centrosome	Parts of plant cell
(i)	Cerebrum, cerebellum, thalamus, hypothalamus		
(ii)	Ovary, ureter, fallopian tube, uterus.		
(iii)	Adrenal gland, liver, thyroid gland, pituitary gland		
(iv)	Malleus, pinna, incus, stapes		
(v)	Haemophilia, colour blindness, albinism, night blindness		

[5]

Examiners' Comments

- (a) (i) The majority of candidates wrote the correct answer. However there were candidates who were unsure of the content and wrote 'Osmosis', while others did not spell the term correctly. For 'imbibition' they wrongly wrote 'inhibition, inhibition, imbibition'.
- (ii) Most candidates wrote the correct answer. A few candidates were unsure of the content and hence answered 'diastole' instead of 'systole'.
- (iii) Most candidates wrote this answer correctly. There were a few candidates however who were not alert and named the organ where urea is formed as 'kidney'. They failed to differentiate between formation of **urea** in the liver and **urine** in the kidney. A few candidates failed to score as the term liver was spelt as 'lever'.
- (iv) The majority of candidates wrote the correct answer. A few candidates however were unsure of the content and named the hormone as insulin instead of ADH / Vasopressin.
- (v) Many candidates did not write the correct answer as they were confused between 'antibiotics, antibodies and antitoxin.' Many wrote antibodies instead of antibiotics.
- (b) (i) Most candidates made the right choice. However a

Suggestions for teachers

- Insist on the correct spelling of biological / technical terms.
- Students must be trained to read, understand and comprehend the given statement and answer as per the spirit of the statement / question.
- Guide and help students to differentiate between antibiotics /antibodies /antitoxin 'Stroma and Stomata'.
- Drill students about the fact that 'destarching' a plant means ensuring that the **leaves** of the plant are free from starch and **not the plant**. Destarching is done by keeping the plant in the dark for about 48 hours.
- With the help of a diagram explain 'reflex action' so as to give students a clear understanding of the path of a nerve impulse in the human body.

few candidates were unsure of their content and chose 'Poliomyelitis'.

- (ii) Most candidates made the wrong choice. They chose, 'remove starch from the plant, instead of remove starch from the experimental leaf.' Candidates must be alerted on the fact that destarching a plant is not removing starch from the plant, for a plant will have starch in its storage organs etc. Destarching is done to ensure that the leaves are free from starch before the start of the experiment.
- (iii) The majority of candidates made the right choice in their selection.
- (iv) Most candidates made the right choice. There were a few candidates who were not alert or were unsure of the path of a nerve impulse and hence chose 'D' / 'C'.
- (v) The majority of candidates were able to choose the correct expansion of NADP. There were candidates who were unsure and got confused between adenosine/ and adenine, nucleoside /and nucleotide.
- (c) (i) The majority of candidates failed to write the main function, their explanation was either incomplete or not specific. Most candidates failed to mention that it holds the bicuspid valve and the tricuspid valve in position. Many did not name the valves, if they did so they named only one of the two valves.
- (ii) The majority of candidates were able to state the main function. A few candidates who were unsure of the function of lymphocytes and leucocytes mentioned 'phagocytosis'.
- (iii) Most candidates were able to write the function of seminiferous tubule. A few candidates were confused and wrote the main function as producing hormones namely testosterone.'
- (iv) Most candidates were able to write the correct function of thylakoids. However there were a few candidates who failed to score as poor expression distorted facts.
- (v) The majority of candidates wrote the correct function of the beta cells of the pancreas. There were a few candidates who were unsure of the content and hence confused the secretion of the alpha cells of pancreas with that of beta cells.

Suggestions for teachers

- Train students to read and assimilate the statement first, then the choices given after each, so as to make the right choice.
- Students must be trained to be specific and to the point when stating the main function of cells/ organs / structures. The statement should be complete.
- Students to be taught the different types of White blood cells and the function of each type.
- Students to be trained in the right use of terms and vocabulary when stating the Function of organs/structures.
- Train students to be specific and give clear, complete answers, incomplete and vague answers to be pointed out by the teacher.
- Give importance to the use of prepositions like, 'in, on, above, below, under, etc. while giving the location of organs and structures, as they have an impact on the answer when it comes to exact location.
- Students attention to be drawn to the difference between 'Centrosome' and 'Centromere'.
- Insist on the use of correct expression and use of words when describing / stating the exact location of the organ / structure in plants or the human body.

- (d) (i) Most candidates wrote the correct location of 'lenticels'. A few candidates were familiar with the term but failed to write the exact location, they wrote in the stem / found on stems. They failed to specify 'on older/old stems or bark of stems.
- (ii) The majority of candidates wrote the exact location. A few candidates were not specific in their answer, they just stated below the urethra. The answer is vague and in no way reflects the exact location.
- (iii) Most candidates wrote the correct answer. A few candidates failed in writing the exact location as their answer was not directive and specific. They just stated 'in the neck' /below the neck'. They failed to specify where in the neck region namely below the larynx/voice box etc.'
- (iv) The majority of candidates were able to specify the exact location. A few candidates just stated in the cell, they failed to state in the animal cell near the nucleus. Some candidates mistook centrosome for centromere, and stated that it was found joining the two chromatids.
- (v) The majority of candidates wrote the correct location of the mitral valve. However there were a few candidates who were not specific, and failed to write the exact location they wrote, 'in the heart.' They failed to state where in the heart? Right side or Left side, and if in the left side where?
- (e) (i) The correct sequence of events was written by The majority of students. A few candidates wrote the wrong sequence, as they got confused between antigen, antibody and active immunity.
- (ii) This question was well attempted by most candidates. A few candidates were careless and left out terms affecting the sequence.
- (iii) This question was answered correctly by most candidates. A few candidates who were not clear of the parts of the ear and its role in hearing wrote the wrong sequence.
- (iv) The majority of candidates failed to score as the sequence was not correct. Candidates were not familiar with the terms G1 Phase, S Phase and G2 Phase and hence placed them after Karyokinesis instead of before.
- (v) The majority of candidates were correct in their sequential order. A few candidates wrote the wrong sequence as they were not able to differentiate between afferent and efferent arteriole.
- (f) (i) A large number of candidates failed to identify the defect as hypermetropia. They identified it as myopia, instead.
- (ii) Many candidates were able to write the possible reasons for the defect by virtue of the diagram, even though they were not correct in naming the defect. A few candidates failed to write a complete reason for the defect. They stated, 'lens is shortened', instead of stating **eyeball is shortened from front to back.**

Suggestions for teachers

- Guide and train students by giving similar questions in Unit tests and school examinations.
- Use diagrams and teaching aids to impress upon students the correct sequence of events.
- Students to be given a clear understanding of biological and technical terms so as to help them to understand the logical sequence of events in life processes.
- The defects of the eye to be taught clearly and the candidates should be able to identify between them from a diagram.
- Students should be made to draw correct diagrams showing how each defect can be rectified, and the type of lens used.
- Insist that arrows are drawn on the light rays entering the eye, convergence of rays to be shown in the diagram in the case of myopia divergence, and then convergence of rays to be shown in the diagram.

- (iii) Quite a few candidates drew a correct diagram to show how the defect can be rectified. Some were not able to differentiate between a converging lens namely convex from concave and hence drew a concave lens and converged the light rays.
- (g) (i) This question was answered correctly by most candidates. A few candidates who were unsure of the content, paired potometer with photosynthesis.
- (ii) The majority of candidates matched hypothalamus with Pituitary. A few candidates were confused and paired it with thyroid.
- (iii) The majority of candidates wrote the correct pair. A few candidates however made a wrong choice as they were unable to differentiate between antiseptic and disinfectant, they paired formalin with antiseptic instead of with disinfectant.
- (iv) The majority of candidates wrote the correct answer.
- (v) Most candidates wrote the correct answer. A few candidates answered incorrectly as they paired mutation with alleles instead of sudden change in genes.
- (h) (i) The majority of candidates failed to identify the odd one and categorise the other three as they were not clear about the structure /parts of the human brain.
- (ii) Most candidates were able to identify the odd one, but failed to be specific in categorizing the other three. They just stated 'reproductive organs' for the category, they failed to state female reproductive organs.
- (iii) The majority of candidates were able to identify the odd one and categorise the other three.
- (iv) The majority of candidates were able to identify the odd one and categorise the other three. A few candidates however failed to be specific while naming the category, for 'ear ossicles', they named the bones or just wrote bones of middle ear.
- (v) The majority of candidates failed to identify the odd one and were unable to categorise the other three. This is because of a poor understanding of genetic / hereditary diseases.

Suggestions for teachers

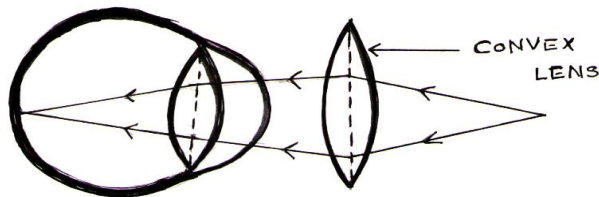
- Students to be enlightened on the names of various apparatus used in experiments connected with plant physiology.
- A clear understanding of biological and technical terms is called for.
- Students to be taught the endocrine glands, their structure, functions and secretions using charts and diagrams.
- Train students to follow instructions in the question, to comprehend the same, and then answer as per the example and directions given in the question.
- Similar questions to be set and students need to be guided on how to be specific in answering.
- Parts and working of the human brain to be taught with the help of charts and models so that the students have a clear understanding of the topic.

MARKING SCHEME

Question - 1

- (a) (i) Imbibition
(ii) Atrial systole
(iii) Liver
(iv) Antidiuretic hormone (ADH, Vasopressin)
(v) Antibiotics
- (b) (i) Tuberculosis / (i) – B.

- (ii) Remove starch from the experimental leaf / (ii) – D
 - (iii) Retina / (iii) – A.
 - (iv) Receptor cell, sensory neuron, relaying neuron, effector muscle / (iv) – A.
 - (v) Nicotinamide, adenine dinucleotide phosphate / (v) - B
- (c)
- (i) Chordae tendinae: The apices of the flaps of the tricuspid and bicuspid valves are held in position by chordae tendinae.
 - (ii) Lymphocytes: produces antibodies.
 - (iii) Seminiferous tubules: Sperms are produced.
 - (iv) Thylakoids: The light dependent phase (photochemical phase, Hill reaction) of photosynthesis takes place in Thylakoids.
 - (v) Beta cells – Secretion of insulin.
- (d)
- (i) Lenticels:- on surface of old stem
 - (ii) Prostate gland:- It surrounds the urethra close to its origin from the bladder.
 - (iii) Thyroid:- located in front of the neck just below the larynx.
 - (iv) Centrosome:- only in animal cells, near the nucleus.
 - (v) Mitral valve – between the left auricle and left ventricle.
- (e)
- (i) Bacteria, Antigen, Lymphocytes, antibody, active immunity
 - (ii) Ovulation, Fertilisation, Implantation, Gestation, Parturition
 - (iii) Auditory canal, Tympanum, Ear ossicles, Oval window, Cochlea.
 - (iv) G1 phase, S phase, G2 phase, Karyokinesis, Cytokinesis
 - (v) Renal artery, Afferent arteriole, Glomerulus, Efferent arteriole, Renal vein
- (f)
- (i) Hyperopia (Hypermetropia)
 - (ii)
 - Shortening of the eyeball from front to back
 - Lens is too flat
 - (iii)



Convergence of rays shown with arrows on it

(g)

Column A

- (1) Potometer
- (2) Hypothalamus
- (3) Formalin
- (4) Contraception in male
- (5) Mutation

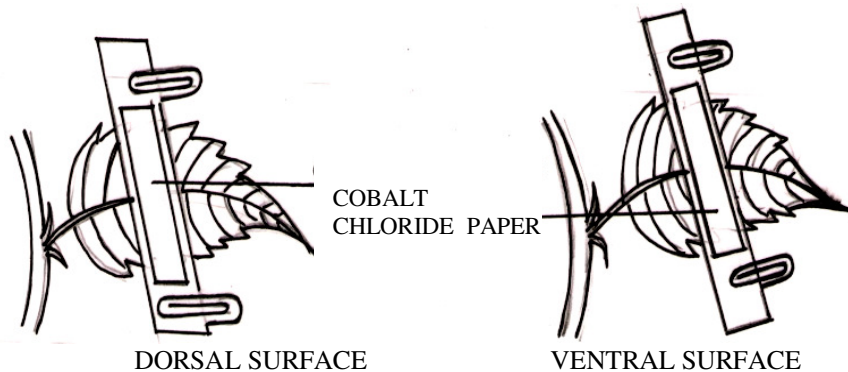
Column B

- (g) Transpiration
- (e) Pituitary gland
- (b) Disinfectants
- (c) Vasectomy
- (d) Sudden change in genes

(h)			
No	Set	Odd One	Category
(1)	Cerebrum, cerebellum, thalamus, hypothalamus	cerebellum	Parts of forebrain
(2)	Ovary, ureter, fallopian tube, uterus	Ureter	Parts of female reproductive system
(3)	Adrenal gland, liver, thyroid gland, pituitary gland	liver	Endocrine glands
(4)	Malleus, Pinna, Incus, Stapes	Pinna	Ear Ossicles
(5)	Haemophilia, colour blindness, albinism, night blindness	Night blindness	Hereditary/genetic diseases

Question 2

- (a) Given below is an experimental set up to demonstrate a particular process. Study the same and answer the questions that follow:



- Name the physiological process being studied.
 - Explain the process mentioned above.
 - What is the aim of the above experiment?
 - What would you observe in the experimental set-up after an hour? Give a reason to support your answer.
 - Mention any *three* adaptations found in plants to overcome the physiological process mentioned in (i) above.
- (b) Give the biological / technical terms for the following:
- A membrane which allows the passage of molecules selectively.
 - The suppressed allele of a gene.
 - Structure that carries visual stimuli from retina to the brain.
 - WBCs squeeze through the walls of the capillaries into the tissue.
 - Protective coverings located round the human brain and spinal cord.

[5]

- (vi) Eye lens losing flexibility resulting in a kind of long sightedness in elderly people.
- (vii) Hormones which stimulate other endocrine glands to produce their specific hormones.
- (viii) The phase in the menstrual cycle in which the remnant of follicle in the ovary turns to Corpus luteum.
- (ix) Statistical study of human population.
- (x) Artificially introducing weakened germs or germ substance into the body for developing resistance to a particular disease.

[5]

Examiners' Comments

- (a) (i) The majority of candidates were able to name the physiological process. A few candidates who were unsure of their content and the physiological experiments identified the process as photosynthesis instead of transpiration.
- (ii) The majority of candidates explained the process correctly. There were a few candidates who were careless and wrote an incomplete explanation as they failed to state 'loss of water as water vapour'. A few others misunderstood the question and described the experiment instead of the process as asked in the question.
- (iii) The majority of candidates failed to score in stating the aim of the experiment as they were not able to distinguish between the dorsal and ventral side of the leaf and hence, state from which side more transpiration occurred.
- (iv) The majority of candidates failed to state the correct observation as they were unable to distinguish between the dorsal and ventral side of the leaf. They associated the lower surface of the leaf as the dorsal side and stated there were no stomata and hence no colour change in the cobalt chloride paper, and the upper surface of the leaf as the ventral side having stomata and hence change in colour of the cobalt chloride paper.
- (v) Most candidates who identified the process as transpiration in (i) wrote the correct adaptations however those who identified the process as Photosynthesis failed to score as they wrote the adaptations for Photosynthesis.
- (b) (i) The majority of candidates wrote the correct term. A few candidates however did not understand the statement and wrote an example of a semipermeable membrane instead of the technical term of the membrane.
- (ii) This question was answered correctly by the majority of candidates. A few candidates failed to score as they wrote their own expression for the technical term namely 'Subordinate' for 'Recessive'.
- (iii) This question was answered correctly by the majority of candidates. A few candidates wrote their own expression for the technical term namely 'Optical' for 'Optic nerve'.

Suggestions for teachers

- Insist on the correct spelling of biological or technical terms.
- Different phases of the menstrual cycle to be taught.
- Train students to be alert and observant, to comprehend and assimilate the statements and then write the correct biological/technical term. For eg Vaccination is the process and vaccine is the preparation that is introduced.
- Defects of the human eye to be discussed and differentiated in class revisions.

- (iv) The majority of candidates wrote the correct term. A few candidates were confused or unsure of the content and wrote phagocytosis.
- (v) Most candidates wrote the correct term. However a few candidates did not comprehend the statement and named the protective coverings of the brain. A few others lost marks due to poor spelling. 'Meninges' was spelt as – 'Meanings / Meniges/ Meningites'.
- (vi) This question was answered correctly by the majority of candidates. However a few candidates failed to score as they were unsure of the content and answered, 'Hypermetropia/ Cataract/ Astigmatism' instead of 'Presbyopia'.
- (vii) The majority of candidates wrote the correct term. However a few candidates did not go by the spirit of the statement and instead of 'trophic hormones' answered pituitary hormones / Somatotrophin / named Pituitary hormones.
- (viii) A poor attempt at answering by most candidates. Candidates were unfamiliar with the phase and most answered, 'menstruation'.
- (ix) Most candidates answered the question correctly.
- (x) The majority of candidates wrote the correct term. However a few candidates did not go by the spirit of the statement and instead of vaccination, wrote vaccine.

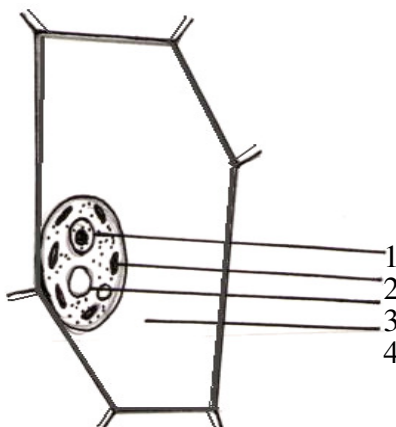
MARKING SCHEME

Question - 2

- (a) (i) Transpiration
- (ii) Transpiration is the loss of water in the form of water vapour from the aerial parts of the plant
- (iii) To demonstrate that more transpiration occurs from the lower surface of a dorsiventral leaf (dicot leaf)
 - Cobalt chloride paper which is facing the upper surface of the leaf either does not turn pink or turns pink in a much longer time than the one on the lower surface. It turns pink much faster.
 - The lower surface of the leaf has larger distribution of stomata.
- (vi)
 - Sunken stomata
 - Fewer stomata
 - Narrow leaves
 - Reduced exposed surface
 - Loss of leaves
 - Thick cuticle
- (b) (i) Semipermeable membrane
- (ii) Recessive allele
- (iii) Optic nerve
- (iv) Diapedesis
- (v) Meninges
- (vi) Presbyopia
- (vii) Tropic hormones
- (viii) Luteal Phase
- (ix) Demography
- (x) Vaccination

Question 3

- (a) Given below is the diagram of a cell as seen under the microscope after having been placed in a solution:



- (i) What is the technical term used for the state/condition of the cell given above?
- (ii) Give the technical term for the solution in which the cell was placed.
- (iii) Name the parts numbered 1 to 4.
- (iv) Is the cell given above a plant cell or an animal cell? Give two reasons in support of your answer as evident from the diagram.
- (v) What would you do to bring this cell back to its original condition? [5]
- (b) Differentiate between the following pairs on the basis of what is mentioned in brackets:
- (i) Natality and mortality (definition)
- (ii) Stoma and Stroma (describe its structure)
- (iii) Acromegaly and Cretinism (symptoms)
- (iv) Transpiration and Guttation (structures involved)
- (v) Diabetes mellitus and Diabetes insipidus (reason /cause) [5]

Examiners' Comments

- (a) (i) The majority of candidates failed to comprehend the question and wrote 'Plasmolysis' as the technical term for the condition of the cell shown, instead of 'Plasmolysed / Flaccid' which is the technical term for the condition.
- (ii) This question was answered correctly by most candidates. A few candidates failed to write the correct answer and wrote examples of hypertonic solution instead of writing the technical term of the solution, namely 'hypertonic'.

Suggestions for teachers

- Guide and train students to understand and state Mendel's laws in simple words and with accuracy giving importance to key words.
- Make genetics interesting by narrating simple and practical examples.

- (iii) Most candidates named the parts labelled 1,2,3 correctly. A few candidates got confused with the part labelled '4', they named it as cytoplasm.
- (iv) This question was answered correctly by most candidates.
- (v) This question was answered correctly by most candidates.
- (b) (i) Many candidates were unfamiliar with the terms, 'Natality and Mortality'. A few candidates wrote an incomplete definition for Natality. They failed to state 'live births in the definition. In the case of mortality they left out the words, 'per thousand' in the definition.
- (ii) Some candidates were able to describe the structure of stroma, but not stoma. They were confused between stomata and chloroplast.
- (iii) The majority of candidates were able to write the symptoms for acromegaly but were not clear of the symptoms for cretinism.
- (iv) This question was answered correctly by most candidates.
- (vi) Most candidates were able to write the reason for diabetes mellitus, but a few candidates were confused between the cause for diabetes insipidus and diabetes mellitus, for the former they answered due to increase in insulin and for the latter due to deficiency of ADH.

Suggestions for teachers

- Train students to write complete explanations of biological terms and processes using key words.
- Physiological processes in plants and the experiments associated with each to be taught with a clear understanding of the aim of the experiment.
- The working of the endocrine glands, their function, and their secretions to be explained and taught using charts or the blackboard to enable the students have a clear understanding of the same.

MARKING SCHEME

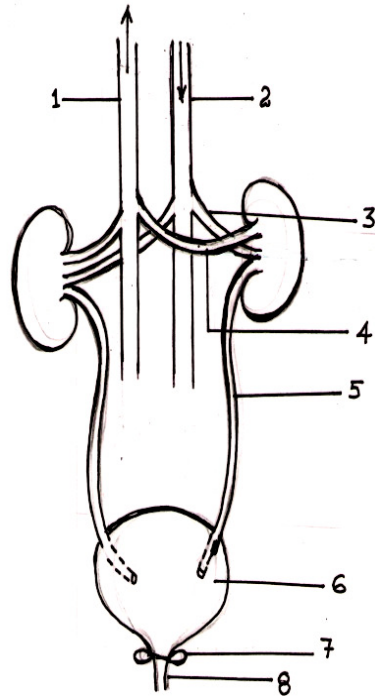
Question - 3

- (a) (i) Plasmolysed cell
(ii) Hypertonic solution
(iii) 1. Nucleus
2. Chloroplast
3. Vacuole
4. Hypertonic solution
(iv) Plant cell
- Chloroplast present
 - Cell wall present
 - Centrosome absent
 - Vacuole present - [Any two reasons]
- (v) Immerse the Plasmolysed cell in distilled water
- (b) (i) Natality is the number of live births per 1000 people of population per year. Mortality is the number of deaths per 1000 people of population per year.
- (ii) Stoma is a minute opening surrounded by guard cells in the epidermal layer of leaves. Stroma is the colourless ground substance present in chloroplast
- (iii) Acromegaly- Extra growth of bones in the face (particularly jaws) and hands and feet. Large nose and thick lips.
Cretinism- Affects the growth of the children showing dwarfism and mental

- retardation.
- (iv) Transpiration- stomata, lenticels, surface of cuticle
Guttation- Hydathodes
- (v) Diabetes mellitus- Insufficient secretion of insulin
Diabetes insipidus- Deficiency of ADH.

Question 4

- (a) The diagram below shows the Excretory System of a Human being. Study the same and then answer the questions that follow:



- (i) Name the parts labelled 1 2, 3 and 4.
- (ii) Give the main function of the parts labelled 5, 6, 7 and 8.
- (iii) Name the endocrine gland which could be added in the diagram and state its location/position. [5]
- (b) Briefly explain the following:
- (i) Osmosis
- (ii) Allele
- (iii) Pulse
- (iv) Reflex action
- (v) Synapse. [5]

Examiners' Comments

- (a) (i) The majority of candidates named the parts labelled 1 and 2 correctly, but were confused in naming parts 3 and 4. They got confused between which was the renal artery and renal vein.
- (ii) Most candidates wrote the correct function of the parts labelled. A few candidates were unable to write the complete explanation for the parts labelled 5 and 8 as they failed to state 'from where'---' to where ' in their answer.
- (iii) Most candidates were rather vague in describing the location of the gland, instead they stated 'over the kidney/ above the kidney / below the kidney. They also failed in their expression to convey that it was seated on top of the kidney.
- (b) (i) This question was answered correctly by most candidates. A few candidates however failed to write a complete explanation as they left out the key words 'through a semipermeable membrane'.
- (ii) The majority of candidates failed to write a complete explanation of the term allele, and inadvertently stated that they were 'alternative forms of a gene'.
- (iii) The majority of candidates were unable to write a clear explanation of the term 'pulse'. They failed to convey the idea of alternate expansion and contraction felt along the wall of a superficial artery, during ventricular systole in their answers.
- (iv) Most candidates were able to write the correct explanation for reflex action. However a few candidates failed to write a complete explanation, some left out the idea of involuntary, while others left out the idea of immediate / spontaneous/ quick in their explanation.
- (v) The majority of candidates were able to write the correct explanation for 'synapse'. A few however who were not specific wrote an explanation that was incomplete. For eg : they answered 'point of contact between two neurons /dendrites of two neurons,' They failed to state the point of contact between dendrites of one neuron and the terminal endings of another neuron.

Suggestions for teachers

- Use good charts, models and diagrams to teach the different systems of the body. Drawing diagrams on the black board helps students to imitate, assimilate and develop the required skill.
- Give a clear explanation of the location, structure, and function of the different organs of the respective systems.
- Train students to write complete explanations for technical / biological terms by using the right expression, correct terminology and the key words.

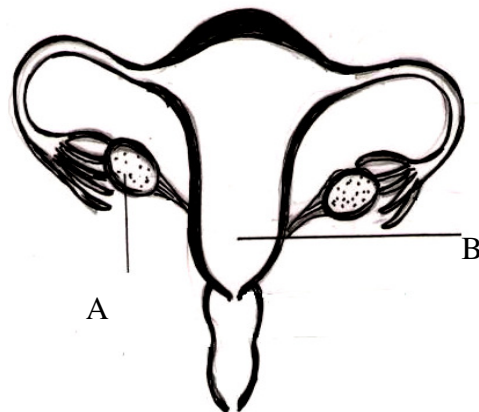
MARKING SCHEME

Question - 4

- (a) (i) • Part 1-Posterior Venacava
• Part 2-Dorsal aorta
• Part 3 -Renal artery
• Part 4 - Renal vein
- (ii) • Part 5- Ureter- carry the urine produced in the kidney to the urinary bladder
• Part 6- Urinary bladder- Temporary storage of urine
• Part 7 - Sphincter muscle- guards the opening of the urinary bladder into the urethra and relaxes only at the time of micturition (urination).
• Part 8 - Urethra- urine is expelled out from the urinary bladder through urethra.
- (iii) Adrenal gland. Located superior to each kidney fitting like a cap
- (b) (i) Osmosis- is the diffusion of water molecules across a semi permeable membrane from a more dilute solution to a less dilute solution.
- (ii) Allele- The alternative form of a gene occupying the same position on a chromosome and affecting the same characteristic but in two alternative ways.
- (iii) Pulse- is the alternate expansion and elastic recoil of the wall of the artery during ventricular systole.
- (iv) Reflex action- is an automatic/ quick, involuntary action in the body brought about by a stimulus.
- (v) Synapse- is the point of contact between the terminal branches of the axon of a neuron with the dendrites of another neuron separated by a fine gap.

Question 5

- (a) Study the diagram given below and then answer the questions that follow:



- (i) Name the part labelled A. Name any *two* hormones produced by the part labelled A.
- (ii) What happens to the part labelled B —
- (1) If fertilisation takes place?
 - (2) If fertilisation does not take place?

- (iii) Where does fertilisation occur?
- (iv) Draw a neat diagram of the human sperm as seen under high magnification and label the following parts.
- (1) Acrosome
 - (2) Mitochondria

[5]

(b) A homozygous plant having round (R) and yellow (Y) seed is crossed with homozygous plant having wrinkled (r) and green (y) seeds:

- (i) Give the scientific name of the plant on which Mendel conducted his hybridization experiments.
- (ii) Give the genotype of the F_1 generation.
- (iii) Give the dihybrid phenotypic ratio and the phenotype of the offspring of the F_2 generation when two plants of the F_1 generation are crossed.
- (iv) Name and state the law which explains the dihybrid ratio.
- (v) Give the possible combinations of gametes that can be obtained from F_1 hybrid.

[5]

Examiners' Comments

- (a) (i) This question was answered correctly by most candidates. A few candidates however failed to score as they were unable to differentiate between male and female hormones.
- (ii) The majority of candidates were able to write the correct answer. A few candidates however were unable to score as they were unfamiliar with the biological terms 'implantation' and 'menstrual discharge'.
- (iii) This question was answered correctly by most candidates. A few candidates however were not clear in their concepts with regard to the working of the female reproductive system and answered, 'uterus / ovary' for fallopian tube, instead.
- (iv) The diagram of a sperm was of a poor standard in most cases. The three regions were not distinct and the position of the nucleus and the acrosome were defective.
- (b) (i) The majority of candidates were unfamiliar with the scientific name of the pea plant. Instead of *Pisum sativum* they wrote 'Pea plant'.

Suggestions for teachers

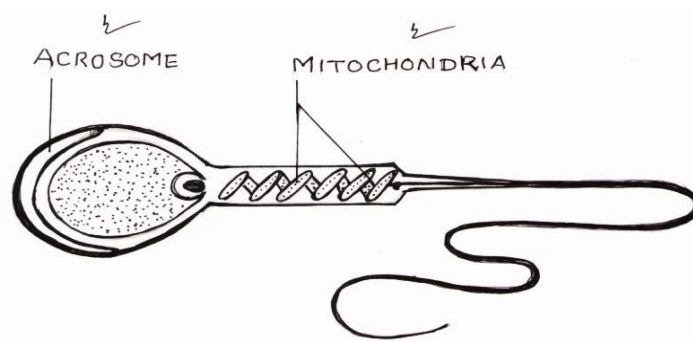
- The reproductive system - male and female to be taught and explained using good charts and models. The function of the different parts and the role of the accessory glands to be explained clearly.
- Importance to be given to drawing of neat labelled, accurate diagrams of sperm and egg.
- Genetics to be made simple and clear. Students to be given a clear understanding of technical terms used in genetics like - Genotype, Phenotype, Phenotypic ratio, Genotypic ratio.
- Monohybrid cross, Dihybrid cross, F_1 and F_2 generation to be explained clearly using simple examples.

- (ii) The majority of candidates were unable to differentiate between Phenotype and Genotype, between F₁ and F₂ generation and hence could not write the genotype.
- (iii) The majority of candidates wrote the dihybrid phenotypic ratio, but were unable to list the phenotype of the F₂ generation. Candidate's answers indicate a poor and vague understanding of Monohybrid and Dihybrid cross.
- (iv) Most candidates were able to name the law, but found difficulty in stating the same.
- (v) The majority of candidates were unable to understand the question and failed to list the possible combination of gametes. A few candidates repeated the combination. For eg - RY,Ry, yR, ry. The second and third combination are the same. It should have been – RY, Ry, Yr,ry

MARKING SCHEME

Question - 5

- (a) (i) Part labelled A is ovary.
Two hormones produced by the ovary are oestrogen and progesterone.
- (ii) (Part labelled B is uterus.)
 - (1) If fertilisation takes place, the egg gets implanted in the uterus wall and there is no menstrual discharge.
 - (2) If fertilisation doesn't take place, the egg disintegrates and the uterine lining restarts shedding on the 28th day.
- (iii) The fertilisation occurs in the fallopian tubes(oviduct / uterine tubes)



- (b) (i) Pisum sativum
- (ii) RrYy

(iii) Dihybrid phenotypic ratio is 9 : 3 : 3 : 1

The phenotype of F₂ generation is as follows:

- 9/16 plants are with Round and Yellow seeds
- 3/16 plants are with Round and Green seeds
- 3/16 plants are with Wrinkled and Yellow seeds
- 1/16 plant is with Wrinkled and Green seeds

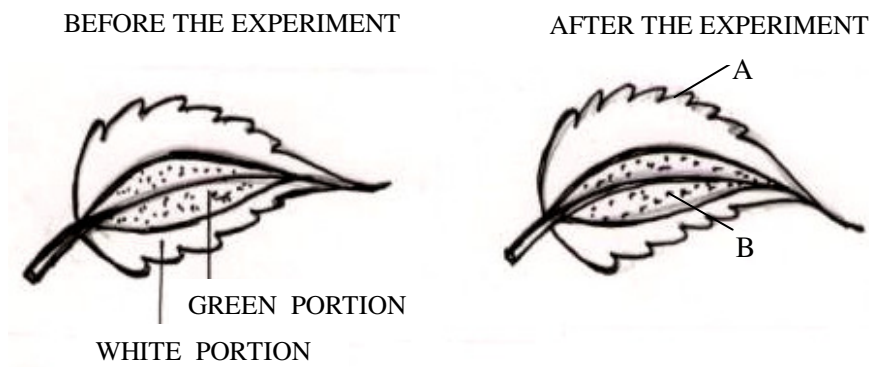
(vi) Law of independent Assortment

When there are two pairs of contrasting characters, the distribution of the members of one pair into the gametes is independent of the distribution of the other pair.

(vii) Possible combinations of gametes are: RY, Ry, rY, ry

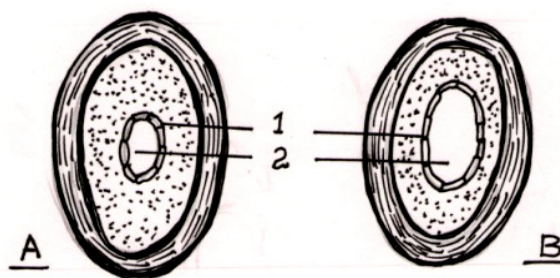
Question 6

(a) The diagram given below is an experiment conducted to study a factor necessary for Photosynthesis. Observe the diagrams and then answer the following questions:



- What is the aim of the experiment?
- Name the test performed on the leaf and the solution used for the test.
- What type of leaf was used for the experiment? Give an example.
- What is the expected result of the above test on the parts labelled A and B?
- Give a balanced chemical equation to represent the process of Photosynthesis. [5]

(b) The diagrams given below show the cross section of two kinds of blood vessels:



- (i) Identify the blood vessels A and B. In each case give a reason to support your answer.
- (ii) Name the parts numbered 1 and 2.
- (iii) When are the sounds “LUBB” and “DUP” produced during a heartbeat?
- (iv) Name the blood vessel that
 - (1) begins and ends in capillaries.
 - (2) supplies blood to the walls of the heart.

[5]

Examiners’ Comments

- (a) (i) The majority of candidates were able to state the aim of the experiment. A few candidates were unsure of the content and hence were confused if the experiment was set up to prove that sunlight was necessary/or chlorophyll was necessary for Photosynthesis.
- (ii) The majority of candidates wrote the correct answer. A few candidates however answered iodine test for starch test.
- (iii) The majority of candidates stated that the type of leaf was variegated and also wrote a correct example of a variegated leaf. Some candidates were unfamiliar with the term variegated and for type of leaf stated ‘leaf with green and white portion – lifted from the diagram in the question.
- (iv) The majority of candidates wrote the correct answer with reference to A and B. A few candidates were careless and ignoring portion A and B as shown in the diagram and asked in the question, just stated green portion turns blue black and white portion does not. They failed to score as the answer was incorrect as per the question.
- (vi) The majority of candidates wrote the correct balanced equation. However a few candidates failed to score as the equation was not balanced or sunlight and chlorophyll was not shown on the arrow.
- (b) (i) The majority of candidates wrote the correct answer with reference to A and B. A few candidates interchanged the names of the blood vessels and hence went wrong in the reason.
- (ii) This question was answered correctly by the majority of candidates. A few candidates however wrote ‘endodermis’ for endothelium.

Suggestions for teachers

- Instruct and guide students on how to answer precisely and clearly the aim of an experiment – or different experiments in plant physiology.
- Students to be guided in identifying and differentiating between experiments conducted to study the importance of the various factors essential for Photosynthesis from that of transpiration.
- Use the term variegated leaf and also give examples of the same when describing / performing the experiment to prove that chlorophyll is necessary for the process of photosynthesis.
- Students to be trained to write a complete balanced equation to represent Photosynthesis.
- Names of blood vessels entering and leaving the heart and other organs (as per the syllabus) to be stressed and revised while teaching the process of blood circulation in a human body.
- Structure and working of the human heart to be explained clearly, with reference to pulse and the sounds LUBB and DUP during a heartbeat.

- (iii) The majority of candidates were unable to explain when the sounds ‘LUBB’ and ‘DUP’ were produced during a heartbeat. The candidates wrote vague answers.
- (iv) The majority of candidates named the blood vessels correctly. Some of the candidates who were unsure of the content answered 1. Hepatic vein for Hepatic portal/ portal vein and 2. Carotid artery for Coronary artery.’

MARKING SCHEME

Question - 6

- (a)(i) The aim of the experiment is to show that chlorophyll is necessary for photosynthesis
- (ii) Starch test using Iodine solution.
- (iii) It is a variegated leaf.
Example: Coleus / Geranium / Croton [Any one]
- (iv) The expected result:
B- The green parts of the leaf turn blue-black showing the presence of starch.

A- White parts of the leaf turn yellowish-brown showing the absence of starch.
- (v)
$$6\text{CO}_2 + 12 \text{H}_2\text{O} \xrightarrow[\text{Chlorophyll}]{\text{Light energy}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$$
- (b)
 - (i) Blood vessel A is an artery and blood vessel B is a vein.
Reasons
 - Blood vessel A shows thick muscular wall and blood vessel B shows thin muscular wall.
 - Blood vessel A shows a narrow lumen and blood vessel B shows a wider lumen
 - (ii) Part 1:- Endothelium
Part 2:- Lumen
 - (iii)
 - “LUBB” is produced when atrio-ventricular valves (tricuspid and bicuspid) get closed at the start of ventricular systole.
 - “DUP” sound is produced when the semilunar valves at the roots of Aorta and Pulmonary artery get closed at the beginning of ventricular diastole.
 - (iv)
 - (1) Hepatic portal vein
 - (2) Coronary Artery

Question 7

- (a) Answer the following:
 - (i) Draw a well labelled diagram of a ‘Neuron’ and name the following parts:
 - (1) Node of Ranvier
 - (2) Nissil granules
 - (3) Cyton
 - (ii) Name the part of the human brain which is concerned with the following:
 - (1) Seat of memory

(2) Coordinates muscular activity.

(iii) Mention any *three* major activities of the WHO. [5]

(b) (i) Draw a well labelled diagram to show the metaphase stage of Mitosis in an animal cell having four chromosomes.

(ii) Mention any *two* reasons for the population explosion in INDIA.

(iii) Give biological reasons for the following:

(1) Pituitary gland is also known as the master gland.

(2) Gametes have a haploid number of chromosomes. [5]

Examiners' Comments

(a) (i) The majority of candidates did not have a clear concept of the structure of a neuron, as a result the diagrams were of a poor standard. If the diagram had a semblance to that of a neuron then the labelling of parts in the diagram were incorrect.

(ii) This question was answered correctly by most candidates.

(iii) The majority of candidates were able to state the functions of WHO correctly. A few candidates however failed to score as they were unable to identify the activities of WHO from that of the Red Cross and wrote the functions of the Red Cross instead of the WHO.

(b) (i) The majority of students were able to draw a correct diagram to depict the condition of the animal cell during 'Metaphase'. Some candidates however were not alert and they failed to draw 4 pairs of duplicated chromosomes on the equatorial plane as per the question, some drew two pairs while some drew six.

(ii) This question was answered correctly by most candidates. Some candidates failed to score as they deviated from the question by giving the reason for population explosion in the world instead of in India as per the question.

(iii) 1. The majority of candidates were able to write the reason correctly. Some candidates wrote vague answers by stating that the Pituitary controls all glands. Candidates should specify **endocrine** glands.
2. The majority of candidates were able to write the reason correctly. A few candidates however were confused between the terms 'haploid' and 'diploid' and hence were unable to write a relevant answer.

Suggestions for teachers

- Attach importance to drawing of accurate, neat and well labelled diagrams.

- Students' attention must be drawn to activities of WHO and the Red Cross, guide students to express them correctly.

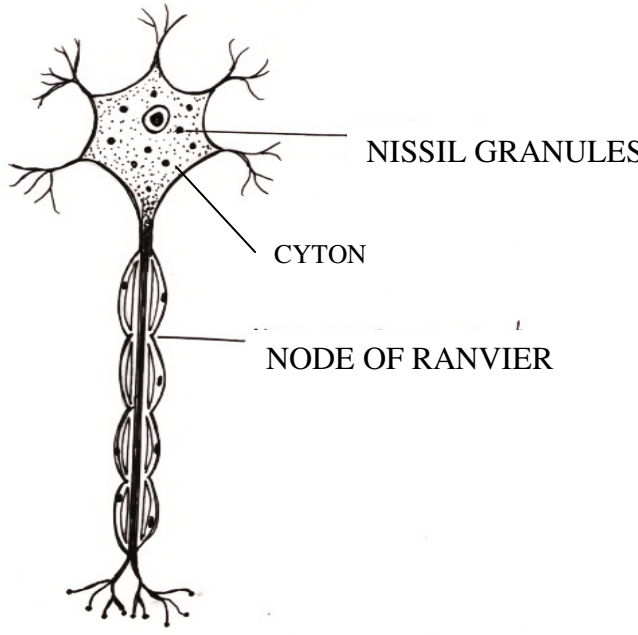
- Instill in students that brand names are not accepted as examples for antiseptics, disinfectants and insecticides. The chemical that constitute them are accepted.

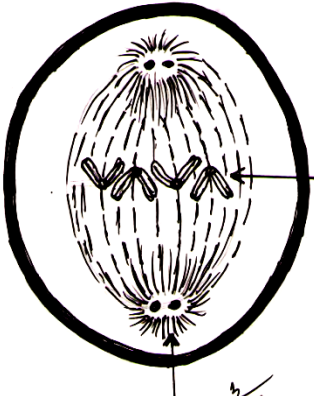
- The different stages in cell division to be explained with the help of correct diagrams. Draw the attention of students to the characteristic features which help to identify one stage of cell division from the other.

- Draw the attention of students to the fact that all glands in the body are not endocrine and that the pituitary gland is called the master gland because its tropic hormones controls the working of **endocrine** glands only.

MARKING SCHEME

Question - 7

<p>(a)(i)</p>	 <p>The diagram shows a multipolar neuron. At the top is the cell body (cyton) containing a nucleus and numerous small, dark-stained Nissl granules. Several dendrites extend from the cyton. A long axon extends downwards from the cyton, covered by a myelin sheath. A gap in the myelin sheath is labeled as the Node of Ranvier. The axon ends in several smaller branches at the bottom.</p>
<p>(ii)</p>	<p>(1) Cerebrum (2) Coordinate muscular activity:- Cerebellum</p>
<p>(iii)</p>	<p>Major activities of WHO:</p> <ul style="list-style-type: none">• Promote and support projects for research on diseases• Collect and supply information about the occurrence of epidemic diseases• Suggest quarantine measures to prevent spread of diseases.• To lay pharmaceutical standards for certain groups of drugs.• To organise campaigns for the control of epidemic and endemic diseases.• To supply information on latest developments about the use of vaccines, cancer research, nutritional discoveries, control of drug addiction and about health hazards of nuclear radiation. <p>(Any three points)</p>

<p>(b)(i)</p>	<div style="text-align: center;">  </div> <p style="text-align: right;">Chromosomes Lying on the equatorial plane $\frac{1}{2}$</p> <p style="text-align: right;">Labelling : any four Aster Spindle/spindle fibre Centromere Chromatids Centriole</p> <p style="text-align: center;">Chromosomes shown duplicated</p>
<p>(ii)</p>	<p>Population explosion in INDIA</p> <ul style="list-style-type: none"> • Illiteracy • Traditional beliefs:- children are regarded as gift of God • Due to high mortality rate • Economic reason:- Children are regarded as helping hands to increase the income. • Desire for a male child.
<p>(iii)</p>	<p>Give reason</p> <p>(1) Pituitary gland controls practically all other endocrine glands. Hence pituitary gland is known as the master gland.</p> <p>(2) During fertilisation the male and the female gametes fuses to form zygote. This is essential to maintain the normal diploid number of chromosomes in the living beings. Hence gametes have a haploid number of chromosomes.</p>

Topics found confusing/difficult:

- Genetics, describing the phenotype of the F₂ generation, confused between Phenotype and Genotype, explaining the term allele.
Stating the exact location of organs / structures in the body of Plants and Animals.
- Identifying experiments associated with Transpiration from those of Photosynthesis.
- Identifying the dorsal surface of the leaf from the ventral surface.
- Identifying functions of WHO from Red Cross.
- Drawing the diagram of the sperm and neuron.
- Differentiating between biological terms which appear similar – Antibody, Antibiotic. Antitoxin, Antiseptic.
- Structure of the human heart and its working.
- Parts and working of the male and female reproductive system in man.

Suggestions for Students :

- Make optimum use of the reading time to understand and assimilate the fine points in the question, then having made your choice of questions as per the rubrics, plan and organize your thoughts.
- Do not attempt more questions than given in the rubrics of the question paper. Instead go through your answers carefully and check for mistakes in terms of spelling or expression in your answers. Give importance to the correct spelling of biological and technical terms. You are penalised for incorrect spellings of biological and technical terms. For eg:- Meanings for meninges, Inhibition for imbibitions.
- Follow instructions and directions given in the question. Give importance and attention to drawing neat, accurate, correctly labelled diagrams.
Be methodical and organized while answering, do not separate the sub questions in a question.
- Pay attention to fine details in performing an experiment in plant physiology, be able to state the aim of the experiment and the result of the experiment clearly.
- Observe carefully the diagrams and the labelling of the diagram in the question, then assimilate the questions that follow before answering, do not blindly presume an experiment.