

ICSE EXAMINATION PAPER - 2025
BIOLOGY
(SCIENCE PAPER - 3)
Class-10th
(Solved)

Maximum Marks: 80

Time Allotted: Two Hours

Instructions to Candidates:

1. Answers to this Paper must be written on the paper provided separately.
 2. You will not be allowed to write during first 15 minutes.
 3. This time is to be spent in reading the question paper.
 4. The time given at the head of this Paper is the time allowed for writing the answers.

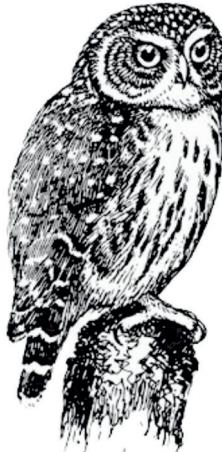
 5. Section A is compulsory. Attempt any four questions from Section B.
 6. The intended marks for questions or parts of questions are given in brackets [].

SECTION – A (40 Marks)
(Attempt all questions from this Section.)

Question 1

[15]

Select the correct answers to the questions from the given options.
(Do not copy the questions, write the correct answer only).



	Tropism	Stimulus
P	Thigmotropism	Touch
Q	Geotropism	Water
R	Chemotropism	Chemicals
S	Phototropism	Gravity

Identify the correct pair:

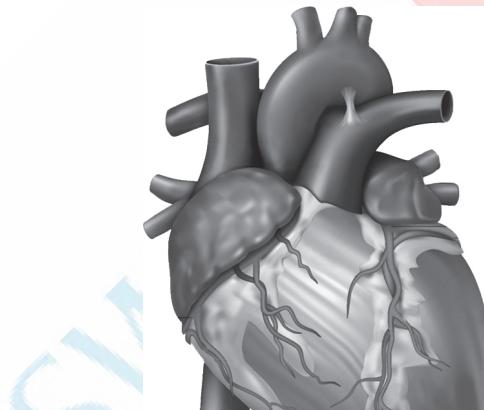
- (xv) Observe the following picture, identify the defect and the cause of the defect.



- (a) Simple goitre, under secretion of thyroxine.
- (b) Ex-ophthalmic goitre, over secretion of thyroxine.
- (c) Simple goitre, over secretion of thyroxine.
- (d) Ex-ophthalmic goitre, under secretion of thyroxine.

Question 2

- (i) Name the following: [5]
- (a) The fully developed part of the ovary containing a mature ovum.
 - (b) A waxy layer on the upper epidermis of leaves meant to reduce Transpiration.
 - (c) The ear ossicle which opens into the oval window of Cochlea.
 - (d) The physiological process which is the starting point of all food chains.
 - (e) An insect which is a classic example of natural selection due to industrial melanism.
- (ii) Given below is the diagram of a human heart. Read the information below the diagram and fill in the blanks: [5]



The human heart pumps blood throughout the body. It is the size of a large fist. The heart is located between the lungs in the thoracic cavity. It has four chambers. The heart functions all through the lifespan of a person and is responsible for the survival of the person.

The heart is enclosed by a membrane called (a) _____. The ventricles give rise to two large blood vessels called (b) _____ and (c) _____. The flaps of the cuspid valves are kept in position by (d) _____. (e) _____ arteries supply oxygenated blood to the walls of the heart.

- (iii) Arrange the terms in each group in the correct order. Write them in a logical sequence beginning with the term that is **underlined**. [5]
- (a) Palisade cells, Cuticle, Upper epidermis, Spongy cells.
 - (b) Hepatic portal vein, Stomach, Hepatic vein, Liver.
 - (c) Cyton, Dendrites, Synaptic cleft, Axon endings.
 - (d) Insulin release, High blood sugar, Lowers blood sugar, Stimulates glucose uptake from blood.
 - (e) Sperm duct, Seminiferous tubule, Epididymis, Efferent ducts.

- (iv) Read the explanations given below and name the structures:

Example: The tubules which produce sperms.

Answer: Seminiferous tubules

[5]

- (a) The canal through which the testes descend down into the scrotum just before the birth of a male baby.
- (b) The part of the brain that regulates the peristaltic movement of the alimentary canal.
- (c) A structure that collects the soundwaves and conducts them through the external auditory canal.
- (d) The point of attachment of two chromatids of a chromosome.
- (e) Regulation of the opening and closing of stomata.

- (v) Given below is an outline of the human body showing the important endocrine glands. Match the glands marked (a) to (e) with their correct functions:

[5]

Example: (f) - 6. Secretes Testosterone.

Endocrine glands	Functions
<p>The diagram shows a human figure from the neck down. The pituitary gland (a) is at the base of the brain. The thyroid gland (b) is a butterfly-shaped gland in front of the trachea. The adrenal glands (c) are on top of the kidneys. The pancreas (d) is behind the stomach. The ovaries (e) are in the pelvic region. The testes (f) are in the scrotum.</p>	<ol style="list-style-type: none"> 1. Prepares the body to face stress. 2. Secretes tropic hormones 3. Secretes oestrogens 4. Maintains blood sugar level 5. Regulates basal metabolism 6. Secretes testosterone.

SECTION – B (40 Marks)

(Attempt any four questions from this Section.)

Question 3

- (i) Write the overall chemical equation for photosynthesis.

[1]

- (ii) Ramesh is a farmer who has a vineyard and cultivates grapes. To improve the shape of the grapes and make them elongated he sprays a particular *phytohormone* at the time of fruiting.

[2]



- (a) Name the *phytohormone* that Ramesh sprays on the plant at the time of fruiting.

- (b) These grapes are said to be seedless. What is the technical term for the formation of such fruits?

- (iii) Mention the two pairs of nitrogenous bases that are present in a DNA strand and pair with each other by hydrogen bonds.

[2]

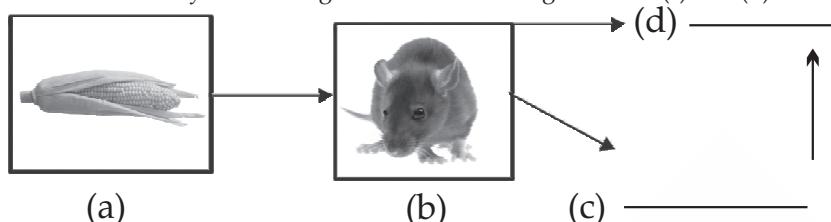
- (iv) State *any two* disadvantages of living close to an airport.

[2]

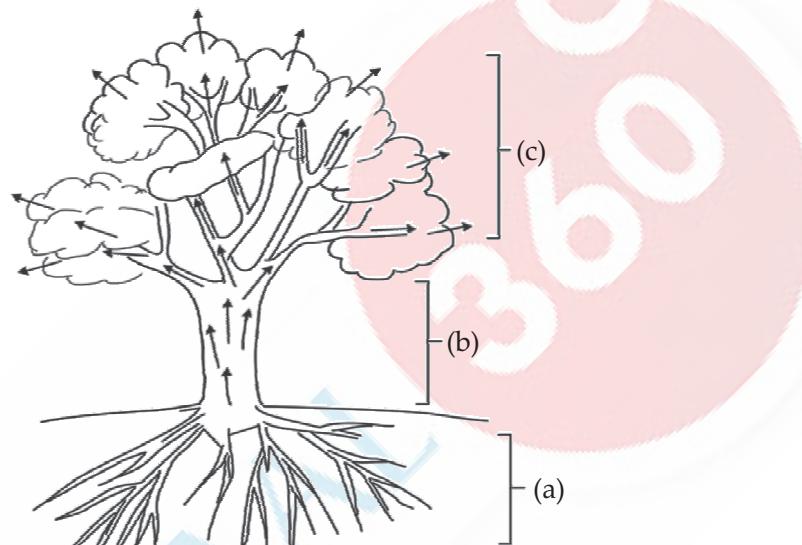
- (v) Draw a neat, labelled diagram of an animal cell showing metaphase with four chromosomes. [3]

Question 4

- (i) What is the structure of DNA as proposed by Watson and Crick? [1]
- (ii) Name the white blood cells that: [2]
- show phagocytosis
 - produce antibodies
- (iii) Complete the food chain by mentioning the names of the organisms in (c) and (d): [2]



- (iv) State *any two* harmful effects of acid rain. [2]
- (v) Given below is a picture of a tree. Mention the scientific phenomena occurring in the parts labelled (a), (b) and (c). [3]



Question 5

- (i) What is Micturition? Explain. [1]
- (ii) What are biomedical wastes? Give an example. [2]
- (iii) Differentiate between the functions of Urethra and Uterus. [2]
- (iv) Rachna is an expert gymnast on the balance beam. She has been vigorously practising for the Olympic Games. Lately, she has been experiencing dizziness and losing her balance during the practise sessions. [2]



- (a) Which part of the membranous labyrinth is responsible for maintaining the body balance on the beam? [1]
- (b) Which type of balance is maintained by the structure mentioned in (a)? [1]

- (v) Draw a neat, labelled diagram to show that oxygen is released during photosynthesis. [3]

Question 6

- (i) Where are Hydathodes located? [1]
- (ii) What are Vestigial organs? Give *one* example of a vestigial structure in the human mouth. [2]
- (iii) Ahmed had a severe throat infection. After a few days he developed an earache too. What could be the reason for the pain in his ears? Explain. [2]
- (iv) Mr. Sharma is a 76-year-old man. His vision was gradually becoming blurred. He consulted an eye doctor and it was diagnosed as cataract. [2]

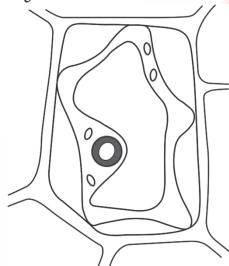


Health Eye



Cataract Eye

- (a) Which part of the eye does cataract affect?
- (b) Why does the vision become blurred?
- (v) Given below is the diagram of a *plasmolysed* cortical cell of a root. [3]



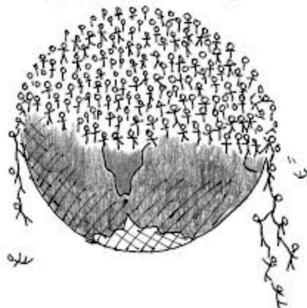
Copy the diagram and label the following parts in the diagram:

- (a) Cytoplasm
- (b) Hypertonic solution
- (c) Plasma membrane

Question 7

- (i) Define the term Allele. [1]
- (ii) In the last century, the human population has increased tremendously. Death rate has reduced and life expectancy has increased. This rapid growth has placed significant pressure on resources. Global cooperation is needed for environmental preservation. [2]

Overpopulation



- (a) Mention *any one* reason for reduction in the death rate.
- (b) Name *any one* resource that is under pressure due to population explosion.
- (iii) Mention *any two* functions of amniotic fluid. [2]
- (iv) Expand the following abbreviations: [2]
 - (a) CFC
 - (b) CNG

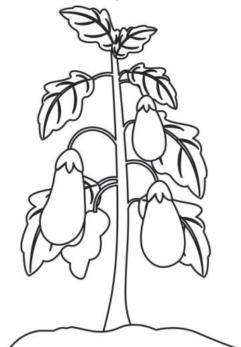
- (v) Vineet's day begins with a cup of piping hot coffee. Caffeine is a stimulant present in coffee which increases the circulation of Adrenaline in the body. Vineet feels refreshed, alert and focussed. [3]



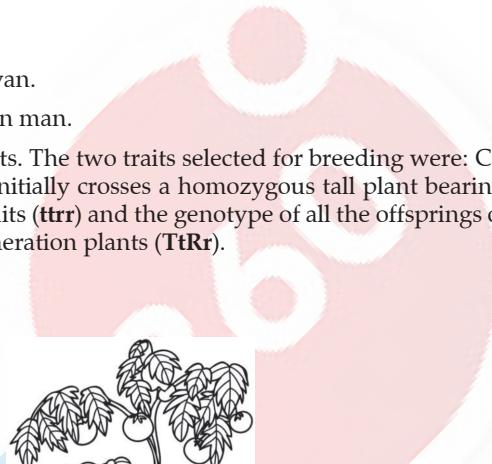
- (a) Name the organ that is stimulated by caffeine which makes Vineet alert and focussed.
- (b) Give the collective term for the protective membranes of the organ mentioned in (a).
- (c) Which part of the autonomic nervous system increases the secretion of Adrenaline?

Question 8

- (i) Explain the term Excretion. [1]
- (ii) State the difference between *Nephron* and *Neuron*. [2]
- (iii) Mention *any two* objectives of Swachh Bharat Abhiyan. [2]
- (iv) Give *any two* characteristic features of a Cro-Magnon man. [2]
- (v) A farmer cultivates a unique species of tomato plants. The two traits selected for breeding were: Colour of the fruits and height of the plants. The farmer initially crosses a homozygous tall plant bearing red fruits (**TTRR**) with a dwarf plant bearing yellow fruits (**ttrr**) and the genotype of all the offsprings of the **F₁** generation was **TtRr**. Next, he crosses two **F₁** generation plants (**TtRr**). [3]



Tall plant with red fruit



Dwarf plant with yellow fruits

- (a) Explain the phenotype of the offsprings of the **F₁** generation obtained from the initial cross.
- (b) Mention the phenotypic ratio of the **F₂** generation offsprings.
- (c) State Mendel's Law of Independent Assortment.

Answers

SECTION A

Answer 1
(i) Option (d) is correct.

Explanation: Natality or birth rate is the term used for the number of births during a given period in the population. It is typically expressed as the number of births per 1,000 individuals in a population each year.

(ii) Option (a) is correct.

Explanation: The structure that lies at the junction of the choroid and the iris and is itself a part of the choroid is called the ciliary body. It plays a vital role in accommodation by adjusting the shape of the lens for focusing and producing aqueous humour, which maintains intraocular pressure and nourishes the eye.

(iii) Option (b) is correct.

Explanation: Assertion (A) is false as the seminal vesicles secrete an alkaline fluid into the semen as it passes through the ejaculatory duct.

Reason (R) is true as the female vagina has acidic environment which is neutralised by the alkaline semen helping the sperms to survive.

(iv) Option (c) is correct.

Explanation: Oxytocin is a hormone secreted by the pituitary gland that stimulates the contraction of uterine muscles to facilitate the process of parturition (childbirth).

(v) Option (c) is correct.

Explanation: The offspring will have tails because tail cutting is an acquired trait that affects somatic cells, not germ cells. Only changes in germ cells or reproductive cells are inherited and passed on to the next generation.

(vi) Option (a) is correct.

Explanation: Assertion (A) is true, as in a turgid state the cell is in a balanced state with no movement of water in and out of the cell. Reason (R) is false as the turgor pressure and wall pressure act in opposite directions. When water enters the cell, the components of cell exert turgor pressure towards the cell wall. To counter this, the cell wall exerts equal but opposite pressure on the cell contents, maintaining structural stability.

(vii) Option (d) is correct.

Explanation: The rate of photosynthesis is optimum between the temperature range of 25–35°C. If temperature rises beyond 35°C, the efficiency of photosynthesis declines, and at extremely high temperatures, it may stop.

(viii) Option (d) is correct.

Explanation: Tongue rolling is a dominant trait, meaning that if a person has at least one copy of the dominant allele, they will be able to roll their

tongue.

Vijay cannot roll his tongue, which means he must have two copies of the recessive allele.

Ajay can roll his tongue, so he has at least one dominant allele.

For Ajay to inherit at least one dominant allele and Vijay to inherit two recessive alleles, both parents must be heterozygous (having one dominant and one recessive allele). This allows them to pass on either allele to their children.

(ix) Option (c) is correct.

Explanation: Assertion (A) and Reason (R) are both true, as deficiency of antidiuretic hormone (ADH) does cause an increase in urination. ADH helps the kidneys to reabsorb water from the kidney tubules, so a deficiency leads to more water being excreted as urine.

(x) Option (a) is correct.

Explanation: Telophase is the final phase of karyokinesis, during which the chromosomes reach the poles; the nuclear membrane and nucleolus reappear, and spindle fibres disappear.

(xi) Option (d) is correct.

Explanation: Assertion (A) is false, as the arachnoid layer is one of the three meninges that cover the brain and protect it. The speeding up of the transmission of nerve impulses is due to the presence of a myelin sheath around the axons.

Reason (R) is also false, as the axon endings have swollen ends called synaptic knobs, which contain vesicles filled with neurotransmitter acetylcholine, released at the synapse.

(xii) Option (d) is correct.

Explanation: Many nuclear power plants are built near water sources because they require large amounts of water to cool their reactors and machinery. The heated water is then released back into the environment, often at a significantly higher temperature than that of the natural water body. This causes thermal pollution, which can disrupt aquatic ecosystems by lowering oxygen levels and affecting the survival of fish and other marine organisms.

(xiii) Option (c) is correct.

Explanation: Rods are the photoreceptor cells present in the retina that are sensitive to light intensity. They enable vision in low-light conditions, i.e., night vision. Nocturnal animals like owls have a high concentration of rods in their retinas. Rhodopsin is the light-sensitive pigment found in the rod cells and helps the owl with night vision.

(xiv) Option (a) is correct.

Explanation: Thigmotropism is the type of tropic movement in which the stimulus is 'touch'.

Chemotropism is a growth movement observed under the influence of chemicals.

Geotropism refers to the tropic movement due to gravity while phototropism is the tropic movement where the stimulus is light.

*The Board has provided two identical options; therefore, both Option (a) and Option (d) are correct.

(xv) Option (b) is correct.

Explanation: Exophthalmic goitre, also known as Graves' disease, is an autoimmune disorder that leads to the overproduction of thyroid hormones (hyperthyroidism). This over secretion causes the thyroid gland to enlarge and can lead to symptoms such as bulging eyes (exophthalmos), anxiety, weight loss and rapid heartbeat.

Answer 2

- (i) (a) Graffian follicle
- (b) Cuticle
- (c) Stapes
- (d) Photosynthesis
- (e) *Biston betularia* or peppered moth.

- (ii) (a) pericardium
- (b) aorta
- (c) pulmonary trunk or pulmonary artery
- (d) chordae tendineae
- (e) coronary

- (iii) (a) Cuticle, Upper epidermis, Palisade cells, Spongy cells

Explanation: The cuticle is the outermost protective layer, beneath which lies the upper epidermis, followed by palisade cells (where most photosynthesis occurs), and then spongy cells below, which facilitate gas exchange.

- (b) Stomach, Hepatic portal vein, Liver, Hepatic vein

Explanation: The stomach processes food and absorbs nutrients (small intestine); the hepatic portal vein carries nutrient-rich blood to the liver, and the hepatic vein transports blood from the liver to the heart.

- (c) Dendrites, Cyton, Axon endings, Synaptic cleft

Explanation: The cyton (cell body) receives signals through dendrites, which travel down the axon to the axon endings, and finally cross the synaptic cleft to reach the next neuron.

- (d) High blood sugar, Insulin release, Stimulates glucose uptake from blood, Lowers blood sugar

Explanation: High blood sugar triggers the release of insulin, which stimulates glucose uptake by body cells, thereby lowering blood sugar to maintain homeostasis. This is called feedback mechanism.

- (e) Seminiferous tubules, Efferent ducts, Epididymis, Sperm duct

Explanation: Sperm is produced in the seminiferous tubules of the testes, moves through the efferent ducts to the epididymis for maturation, and is finally transported via the sperm duct (vas deferens).

- (iv) (a) Inguinal canal

- (b) Medulla part of hind brain

- (c) Pinna

- (d) Centromere

- (e) Guard cells

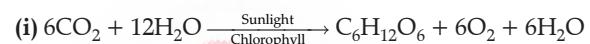
- (v) (a) – (2), (b) – (5), (c) – (1), (d) – (4), (e) – (3), (f) – (6)

Explanation:

- (a) is pituitary gland that secretes tropic hormones.
- (b) is thyroid gland that regulates basal metabolism.
- (c) is adrenal gland that prepares to face the stress.
- (d) is pancreas that maintains blood sugar level.
- (e) is ovary and f is testis that secretes estrogen and testosterone respectively.

SECTION B

Answer 3



- (ii) (a) The phytohormone that Ramesh sprays on the grape plants at the time of fruiting is gibberellin. Gibberellin is known to promote cell elongation and is used to improve the shape and size of the grapes.

- (b) The technical term for the formation of seedless fruits is 'parthenocarpy' in which the fruits develop without fertilisation resulting in seedless products.

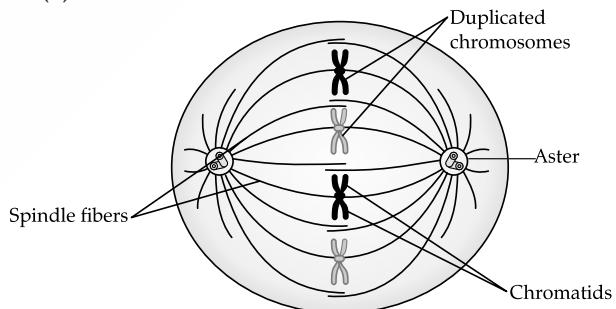
- (iii) Two pairs of nitrogenous bases that are present in the DNA strand are purines (Adenine and Guanine) and pyrimidines (Cytosine and Thymine).

Adenine pairs with thymine through two hydrogen bonds ($A = T$); guanine pairs with cytosine through three hydrogen bonds ($G \equiv C$).

- (iv) Two significant disadvantages of living near to an airport are;

- Noise pollution from continuous aircraft take-offs and landings, which can cause stress, sleep disturbances and hearing problems over time.
- Potential exposure to air pollution from aircraft emissions, which can lead to respiratory issues, poor air quality and environmental degradation.

(v)



Animal cell showing metaphase stage of mitosis

Answer 4

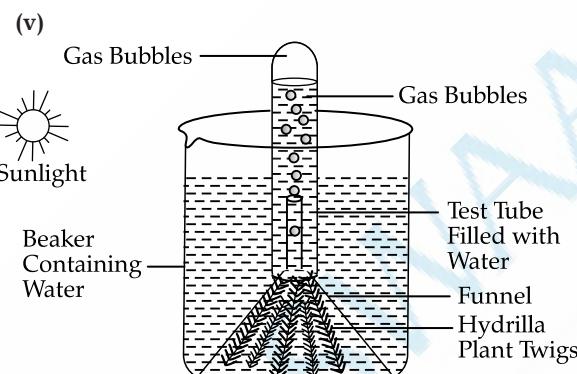
- (i) Watson and Crick proposed that DNA has a double-helix structure consisting of two intertwined strands in antiparallel manner, with the sugar-phosphate

backbone on the outside and nitrogenous bases pairing on the inside, forming a twisted ladder-like shape.

- (ii) (a) Neutrophils, monocytes and macrophages
 - (b) Lymphocytes
 - (iii) Organism (c) is snake; organism (d) is eagle.
 - (iv) Acid rain refers to the presence of excessive acids in rainwater, formed when oxides such as nitrogen dioxide and sulphur dioxide react with water.
- Effects of acid rain:
1. Acid rain increases acidity in the soil and destroys forests and crops.
 2. It corrodes fences, buildings, monuments, bridges and statues.
- (v) The scientific phenomena occurring in the parts labelled (a), (b) and (c) are:
- (a) Absorption of water and minerals by the roots.
 - (iii) Differences between urethra and uterus

Urethra	Uterus
<p>1. The urethra is a tubular structure that expels urine from the urinary bladder to the outside of the body. In males, it also carries semen.</p> <p>2. Urethra is a part of the excretory system. In males, it is a part of both excretory and reproductive system.</p>	<p>1. Uterus is a pear-shaped organ in the female reproductive system where a fertilised egg implants and a foetus develops.</p> <p>2. Uterus is essentially a part of the female reproductive system.</p>

- (iv) (a) The semicircular canals of the membranous labyrinth are responsible for maintaining body balance on the beam.
- (b) The structure mentioned in (a) maintains dynamic balance, which is the ability to maintain stability during movement.



Answer 6

- (i) A hydathode is a pore or opening in the leaf epidermis at the tips or margins of leaves. Guttation takes place through hydathodes, which is loss of water in liquid form.
- (ii) Vestigial organs are structures that were functional in an organism's ancestors but have lost their original function over time and now serve little or no purpose. An example of a vestigial structure in the human mouth is wisdom teeth, also referred to as third molars.
- (iii) Ahmed's earache after a severe throat infection could be due to the spread of infection through the

- (b) Ascent of sap by which water and minerals are transported upwards via the stem to the leaves.
- (c) Transpiration which refers to the loss of water in the form of water vapour from the aerial parts of plants like the leaves.

Answer 5

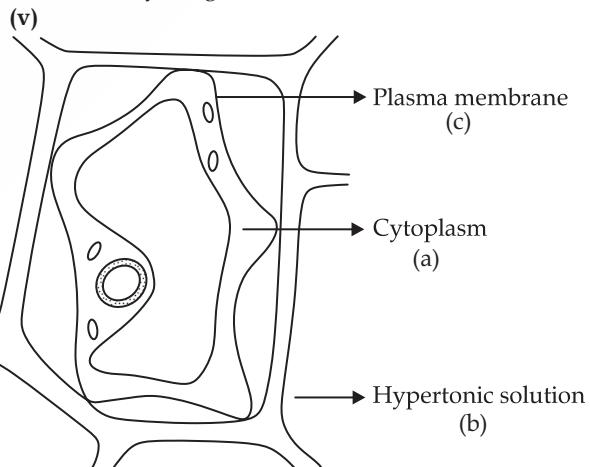
- (i) Micturition, also known as urination, is the process of expelling urine from the urinary bladder through the urethra to the outside of the body. It is regulated by the nervous system and smooth muscles present in the urinary bladder and the urethra.
- (ii) Biomedical waste refers to any solid or liquid waste generated during the diagnosis, treatment, or immunisation of humans or animals, and includes items like used needles, syringes, cotton swabs, body organs, blood and tissues.

Eustachian tube.

The infection that caused the throat pain could spread to the ears through the Eustachian tubes, which connect the middle ear to the back of the throat.

The Eustachian tubes help equalise pressure in the middle ear. If they become swollen or blocked due to the throat infection or a cold, fluid can build up in the middle ear, causing pressure and pain.

- (iv) (a) Cataract affects the lens, the clear, natural part of the eye that focuses light onto the retina.
- (b) Vision becomes blurred because the lens becomes cloudy or opaque, preventing light from passing through it clearly, leading to a blurry image on the retina.



Answer 7

- (i) Alleles are referred to alternate forms of a gene that are responsible for the expression of traits of a character.
- (ii) (a) The reason for the reduction in the death rate is the improvement in medical science and technology, which has led to better ways to treat and prevent diseases.
- (b) Due to population explosion, freshwater resources are under increasing pressure as a growing population demands more water for drinking, household chores, agriculture and industry.
- (iii) Two key functions of amniotic fluid are:
- Act as shock absorber and protect the developing foetus from injury and keep a constant temperature around the developing foetus.
 - Allow for free foetal movement, which is
- (iv) Differences between nephron and neuron:

Nephron	Neuron
1. Nephrons are functional units of kidneys.	1. Neurons are functional units of nervous system.
2. Nephrons are responsible for filtering blood for nitrogenous wastes and producing urine.	2. Neurons are responsible for transmitting nerve impulses between different parts of the body such as other neurons, muscle, or gland cells.

- (iii) Two objectives of Swachh Bharat Abhiyan are:
- To eliminate open defecation by building individual and public toilets even in the remotest areas.
 - To make our villages, cities and towns clean by removing wastes from streets, roads, parks, gardens, houses, etc.
- (iv) Two characteristics of Cro-magnon man were:
- Large skull, rounded forehead, a distinct chin and a nose.
 - The cranial capacity was about 1600 cc.
- (v) (a) The phenotype of the offspring of the F_1 generation from the initial cross (between homozygous or pure-line individuals) would be tall plants with red fruits. This is because

essential for development of bones and muscles.

- (iv) (a) CFC – Chlorofluorocarbon
 (b) CNG – Compressed Natural Gas
 (v) (a) Caffeine stimulates the brain, leading to increased alertness and focus.
 (b) The collective term for the protective membranes of the organ mentioned in (a) is 'meninges'. There are three meninges around the brain. Starting from the outside – Dura mater, Arachnoid mater and Pia mater.
 (c) The sympathetic nervous system is the part of the autonomic nervous system that increases the secretion of adrenaline (epinephrine).

Answer 8

- (i) Excretion is the elimination of metabolic wastes, and is an essential life process in all organisms. In vertebrates, it is primarily carried out by the lungs (excrete CO_2), kidneys (excrete urine) and skin (excretes sweat).

tallness and red colour of fruits are the dominant traits and in the F_1 generation, the dominant traits are expressed. The offspring are however heterozygous ($TtRr$).

- (b) The phenotypic ratio of the F_2 generation offspring would be 9:3:3:1, where
 9 plants would be tall plants with red fruits
 3 plants would be tall plants with yellow fruits
 3 plants would be dwarf plants with red fruits
 1 plant would be dwarf plant with yellow fruits
 (c) In case of dihybrid cross, the alleles of the genes of two characters separate at the time of gamete formation and then recombine independently to give new combinations
 This is the law of independent assortment.