

ICSE EXAMINATION

BIOLOGY

Solved Paper - 2023

Class-10th

Maximum Marks: 80

Time allowed: Two hours

Answer to this paper must be written on the answer sheet provided separately.

You will **not** be allowed to write during the first 15 minutes.

The time is to be spent in reading the question paper.

The time given at the head of this Paper is the time allowed for writing the answer.

Section A is compulsory. Attempt any four questions from **Section B**.

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. Select the correct answer to the questions from the given options.

[15]

(Do not copy the questions, write the correct answer only.)

- (i) The sex chromosome in a human ovum is:
- (a) X chromosome (b) Y chromosome
(c) Both X and Y chromosome (d) Either X or Y chromosome
- (ii) Which one of the following is a biodegradable waste?
- (a) Metal cans (b) E-waste
(c) Plastic (d) Flowers
- (iii) The heart sound 'Dup' is produced when:
- (a) Semilunar valves open (b) Atrio ventricular valves close
(c) Semilunar valves close (d) Atrio ventricular valves open
- (iv) Deplasmolysis occurs when a plasmolysed cell is placed in:
- (a) Concentrated salt solution (b) Tap water
(c) Concentrated sugar solution (d) Hypertonic salt solution
- (v) Alpha cells of Pancreas secrete:
- (a) Glycogen (b) Glucose
(c) Glucagon (d) Insulin
- (vi) Haploid number chromosomes are found in:
- (a) Nephrons (b) Neurons
(c) Skin cells (d) Sperms
- (vii) The life span of a RBC is:
- (a) 120 days (b) 220 days
(c) 20 days (d) 2 weeks
- (viii) The statistical study of human population is called:
- (a) Mortality (b) Demography
(c) Natality (d) Equality

- (ix) The pale yellow colour of normal human urine is due to the pigment:
 (a) Melanin (b) Anthocyanin
 (c) Urochrome (d) Haemoglobin
- (x) Stimulation of the nerves of the sympathetic nervous system:
 (a) Accelerates heartbeat
 (b) Constricts pupil of eyes
 (c) Increases peristalsis
 (d) Retards heartbeat
- (xi) The site of light reaction in the cells of a green leaf is:
 (a) Nucleus (b) Grana of chloroplast
 (c) Cytoplasm (d) Stroma of chloroplast
- (xii) The paper used to demonstrate unequal transpiration in a dicot leaf is:
 (a) Filter paper (b) Litmus paper
 (c) Starch paper (d) Cobalt chloride paper
- (xiii) Vitreous humour is present between:
 (a) Cornea and Iris (b) Lens and Retina
 (c) Iris and Lens (d) Cornea and Lens
- (xiv) Oxygenated blood to liver is supplied by:
 (a) Hepatic artery (b) Hepatic vein
 (c) Inferior vena cava (d) Hepatic portal vein
- (xv) During the synthesis phase of the cell cycle, more of:
 (a) RNA is synthesised (b) RNA and proteins are synthesised
 (c) DNA is synthesised (d) Glucose is synthesised

Question 2.

- (i) Name the following [5]
 (a) The organelle that forms the aster during cell division.
 (b) A genetic disorder in which the blood does not clot.
 (c) The permanent stoppage of menstruation in human females around the age of 45 years.
 (d) The openings on the barks of trees through which transpiration occurs.
 (e) A gaseous plant hormone which promotes ripening of fruits.
- (ii) Arrange and rewrite the terms in each group in correct order to be in a logical sequence beginning with the term that is underlined: [5]
 (a) Snake, Rabbit, Cabbage, Hawk.
 (b) Xylem, Soil water, Cortical cells, Root hair.
 (c) Receptor, Response, Effector, Spinal Cord.
 (d) Fovea, Lens, Cornea, Conjunctiva.
 (e) Testis, Urethra, Sperm duct, Epididymis.
- (iii) Match the items given in **Column I** with most appropriate ones in **Column II** and rewrite the correct matching pairs: [5]

Column I

- (a) Hyposecretion of Thyroxine in adults
 (b) Hyposecretion of Insulin
 (c) Hypersecretion of growth hormone in childhood
 (d) Hyposecretion of ADH

Column II

1. Diabetes insipidus
 2. Myxedema
 3. Dwarfism
 4. Gigantism

- (e) Hypersecretion of Thyroxine
5. Diabetes mellitus
6. Exophthalmic goitre.
7. Cretinism
- (iv) Choose the odd one out from the following terms and name the category to which the others belong. [5]
- (a) Used bandages, Pesticides, Face masks, Syringes.
- (b) Dust, Smoke, Carbon monoxide, Effluents.
- (c) Uterus, Urethra Urinary bladder, Ureter
- (d) Menstrual phase, Telophase, Follicular phase, Luteal phase.
- (e) Malleus, Incus, Cochlea, Stapes..
- (v) State the exact location of the following structures: [5]
- (a) Thyroid gland
- (b) Dura mater
- (c) Amniotic fluid
- (d) Papillary muscles
- (e) Islets of Langerhans

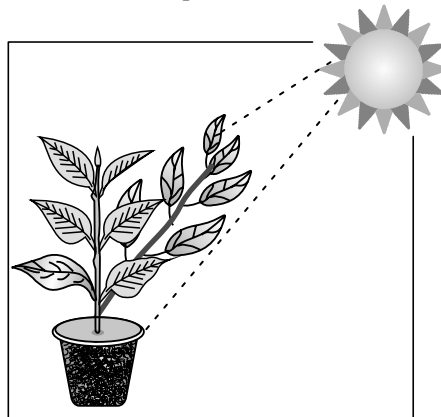
SECTION - B

(40 Marks)

(Attempt **any four** questions from this **Section**.)

Question 3

- (i) Write the overall chemical equation for photosynthesis [1]
- (ii) Mention any two functions of blood. [2]
- (iii) Differentiate between Karyokinesis and Cytokinesis. [2]
- (iv) Excessive use of fertilisers in agricultural fields reduces the yield of crops. Justify the statement. [2]
- (v) Study the diagram given below and answer the questions that follow: [3]



- (a) Name the phenomenon depicted by the shoot in the above diagram.
- (b) Which plant hormone plays an important role in the above movement?
- (c) Complete and rewrite the given statement by filling in the correct terms:
Shoots show positive _____ whereas, roots show positive _____.

Question 4

- (i) Explain the abbreviation - DNA. [1]
- (ii) What is Active transport? [2]
- (iii) Mention the two pairs of nitrogenous bases which pair with each other with hydrogen bonds. [2]
- (iv) State Mendel's Law of Segregation'. [2]
- (v) Draw a neat, labelled diagram of a human sperm. [3]

Question 5

- (i) Explain the term 'Population density'. [1]
- (ii) Name the *two* surgical methods of population control. [2]
- (iii) Mention *two* factors responsible for population explosion in India. [2]
- (iv) Name *any two* resources which come under pressure due to rising population. [2]
- (v) The diagram given below depicts the climate change on plant Earth. [3]

Answer the following questions:



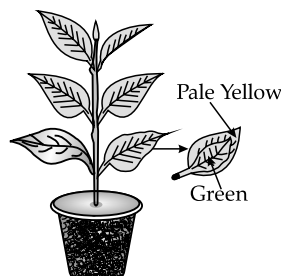
- (a) Name the climate phenomenon for the increase in Earth's temperature.
- (b) Mention *one* reason for this warming.
- (c) What measure can be taken to prevent this climate change?

Question 6

- (i) Define the term Transpiration. [1]
- (ii) State *any two* adaptations in plants to reduce transpiration. [2]
- (iii) Mention *any two* function of the human foetal placenta. [2]
- (iv) What is the significance of the human testes being located in scrotal sacs outside the abdomen? [2]
- (v) Draw a neat, labelled diagram of Malpighian capsule. [3]

Question 7

- (i) What is a Reflex action? [1]
- (ii) Renal cortex has a dotted appearance and Renal medulla has a striped appearance. Explain. [2]
- (iii) What are the two functions of cerebellum. [2]
- (iv) Distinguish between Semicircular canals and Utriculus based on their function. [2]
- (v) A potted plant with variegated leaves was kept in dark for 24 hours and then placed in bright sunlight. Answer the following questions. [3]



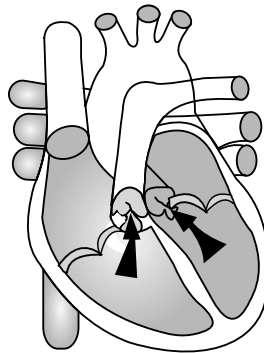
- (a) Which aspect of photosynthesis is being tested in the above diagram?
- (b) Why was the plant kept in dark for 24 hours?

- (c) After the starch test what will be the colour of the yellow and green parts of the leaf? Give reasons to support your answer.

Question 8

- (i) Define the term Mutation. [1]
- (ii) A pure breeding red flower variety of pea plant (RR) is crossed with a pure breeding white flower variety of pea plant (rr). [2]
Draw a Punnett square to find out the Phenotypic and Genotypic ratios of the progeny belonging to the F₂ generation.
- (iii) Leaves of certain plants roll up on a hot sunny day. Explain by giving suitable reasons. [2]
- (iv) What is the semi permeable membrane? [2]
Name the semi permeable membrane present in a plant cell.
- (v) The diagram below depicts the human heart in one of its phase. [3]

Answer the questions that follow:



- (a) Which part of the heart is in the contraction phase?
- (b) Give a suitable reason to justify your answer in (a).
- (c) Distinguish between Systole and Diastole.

ANSWERS

SECTION - A

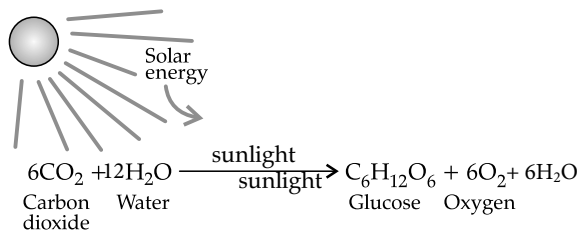
1. (i) **Option (a) is correct.**
Explanation: Human ovum (female gamete) is homozygous and have two XX chromosome.
 - (ii) **Option (d) is correct.**
Explanation: Flowers can be easily decomposed by the action of micro-organisms but the others such as plastic, metal cans and E-waste cannot be decomposed.
 - (iii) **Option (c) is correct.**
Explanation: When semilunar valve closes rapidly it produces dub sound at the time of ventricular diastole.
 - (iv) **Option (b) is correct.**
Explanation: When plasmolysed cell is placed in tap water (a hypotonic solution) in which solute concentration is less than the cell sap, the water travels inside the cell due to higher concentration of water outside.
 - (v) **Option (c) is correct.**
Explanation: Alpha cells of pancreas secrete glucagon as a response to low blood glucose.
 - (vi) **Option (d) is correct.**
Explanation: A mature human sperm cell contains a haploid number of chromosomes. It is also known as 'spermatozoa'.
 - (vii) **Option (a) is correct.**
Explanation: The life span of RBCs is 120 days.
 - (viii) **Option (b) is correct.**
Explanation: Demography is the statistical analysis of human population, where different parameters such as education, nationality, religion, etc., are studied.
 - (ix) **Option (c) is correct.**
Explanation: The pale yellow color of normal human urine is due to the presence of the pigment urochrome which is formed by bile pigment bilirubin.
 - (x) **Option (a) is correct.**
Explanation: Sympathetic nervous system control the involuntary actions in human body.
 - (xi) **Option (b) is correct.**
Explanation: Light reaction occurs in the membrane of thylakoids of grana in the chloroplast of green leaf where the reaction centre are found to absorb sunlight.
 - (xii) **Option (d) is correct.**
Explanation: Cobalt chloride paper is used to demonstrate unequal transpiration in a dicot leaf.
 - (xiii) **Option (b) is correct.**
Explanation: The vitreous humor (also known as vitreous fluid) is a transparent, colourless, gel-like substance that fills the space between the lens and the retina within the eye.
 - (xiv) **Option (a) is correct.**
Explanation: Artery connected to liver are called hepatic artery and carry oxygenated blood towards the liver.
 - (xv) **Option (c) is correct.**
Explanation: S phase is the phase of the cell cycle when DNA packaged into chromosomes is replicated. This event is an essential aspect of the cell cycle because replication allows for each cell created by cell division to have the same genetic make-up.
2. (i) (a) Centrosomes
(b) Haemophilia
(c) Menopause
(d) Lenticels
(e) Ethylene
 - (ii) (a) Cabbage, Rabbit, Snake, Hawk
(b) Soil water, Root hair, Cortical cell, Xylem
(c) Receptor, Spinal cord, Effector, Response
(d) Conjunctiva, Cornea, Lens, Fovea
(e) Testis, Epididymis, Sperm duct, Urethra
 - (iii)

Column A	Column B
(a) Hyposecretion of Thyroxine in adults	Myxoedema
(b) Hyposecretion of Insulin	Diabetes mellitus
(c) Hypersecretion of GH in childhood	Gigantism
(d) Hyposecretion of ADH	Diabetes insipidus
(e) Hypersecretion of Thyroxine	Exophthalmic goitre
 - (iv) **Odd one name**

(a) Pesticides	Category name for others Medical waste (Used garbage, face mask, syringes) Industrial air pollutants (Smoke, CO, effluents) Organs of urinary system(Urethra, urinary bladder, ureter) Stages of menstrual cycle (menstrual phase, follicular phase, Luteal phase)
(b) Dust	
(c) Uterus	
(d) Telophase	

- (e) Cochlea Middle ear bones (Malleus, incus, stapes)
- (v) **Structure name** **Location**
- (a) Thyroid gland- Visceral compartment of neck.
- (b) Dura mater Outermost meninges of the skull.
- (c) Amniotic fluid In an amniotic sac surrounding the fetus.
- (d) Papillary muscles In the cavity of the ventricles of heart.
- (e) Islets of Langerhans Pancreas

3. (i) Chemical equation of photosynthesis-



(ii) Functions of blood-

- (a) It helps to transport oxygen and hormones throughout the body.
- (b) It helps to transport absorbed nutrition all over the body.

(iii) Differences Between Karyokinesis and Cytokinesis

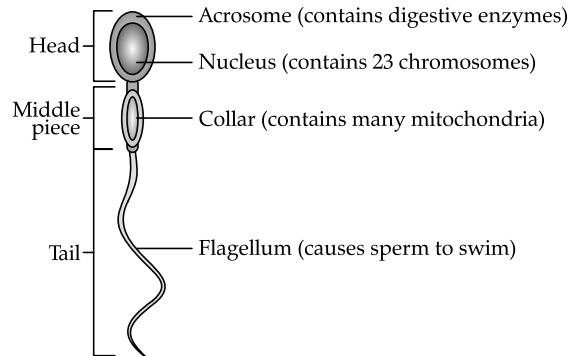
Feature	Karyokinesis	Cytokinesis
Definition	Division of the nucleus during cell division.	Division of the cytoplasm to form two daughter cells.
Process	Involves the separation of genetic material (chromosomes).	Involves the division of the cytoplasm and organelles.
Stages Involved	Occurs in four stages: Prophase, Metaphase, Anaphase, and Telophase.	Usually occurs after Karyokinesis, in the Cytoplasmic division phase.
Occurrence	Takes place in both Mitosis and Meiosis.	Takes place after Karyokinesis to complete cell division.
End Result	Two nuclei are formed within a single cell.	Two separate daughter cells are formed.

- (iv) Excessive use of fertilisers affect the soil fertility as well as the productivity of the soil. Fertilisers also destroys the rich nutrients of the soil. Thus it is true to say that excessive use of fertilisers in agricultural field reduces the yield of the crop.
- (v) (a) Photoperiodism
(b) Auxins
(c) Shoots show positive **phototropism** and roots show positive **geotropism**.
- (vi) (i) **DNA**: Deoxyribonucleic Acid.
(ii) **Active transport**: The movement of molecules across the permeable membrane in the direction of lower concentration with the utilisation of energy.
(iii) Pairs of nitrogen bases are A-T and G-C .
(iv) **Law of segregation**: The Law of Segregation states that during the formation of gametes, the two alleles for a trait separate (or segregate) so that each gamete receives only one allele from each pair.
> Each organism carries two alleles for each trait (one from each parent).

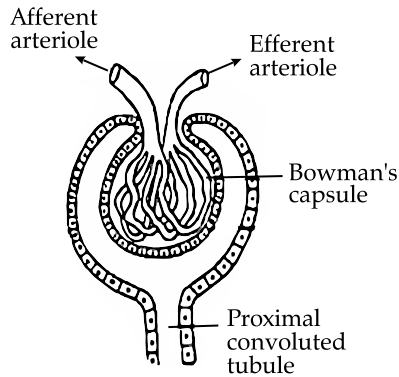
- > These alleles separate during gamete formation (meiosis).
> Each gamete receives only one allele for a given trait.
> The segregation is random, ensuring genetic variation.

or separate from each other to ensure only a single allele for a single gene.

(v) Structure of male sperm:



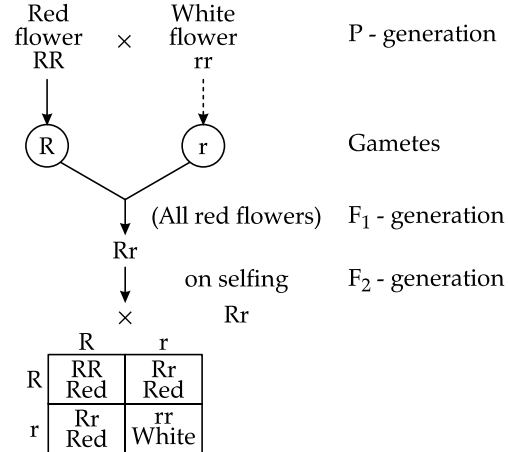
5. (i) **Population density**: The number of individual or people per unit area is called population density.
- (ii) Vasectomy (in males) and Tubectomy (in females) are the surgical methods of population control.
- (iii) Factors responsible for population explosion can be-
- Less awareness about the control measure and family planning.
 - In most of the families desire for male child.
- (iv) Many resources come under pressure due to rise in population such as water, food, etc.,
- (v) (a) Global warming
(b) **Reasons for global warming can be:**
- High emission of greenhouse gases.
 - Due to deforestation, harmful gases cannot be trapped.
 - High fuel utilization. **(Any one)**
- (c) **Measures to prevent climate changes are-**
- Afforestation (plant more and more trees).
 - Reduces the fossil fuel consumption.
 - Save water and electricity.
6. (i) **Transpiration**: The loss of water from the surface of leaf through stomata and from lenticels in the stem.
- (ii) **Adaptation**: Sunken stomata in xerophyte and cuticle layer reduces the rate of transpiration.
- (iii) (a) Placenta provide nutrition and oxygen to the fetus from the mother.
(b) Remove the waste produced in the fetus.
- (iv) In human males, testis are located outside the abdominal cavity because testis require 2°C less temperature than the body temperature for the formation of sperms.

(v) **Structure of malpighian capsule-**

7. (i) **Reflex action:** It can be defined as the automatic and mechanical response to a stimulus, acting on a specific receptor, without desire of an individual.
- (ii) Renal cortex has a dotted appearance due to the presence of convoluted parts of the tubule (proximal and distal convoluted tubules) whereas the renal medulla has striped appearance due to the presence of tubular part of the nephron.
- (iii) **Functions of cerebellum:**
- It coordinates muscular activities or voluntary action.
 - It maintains equilibrium of the body.
- (iv) Semicircular canal is a fluid filled canal that helps in balancing, while the utricle canal is located near the inner ear and helps in orientation and static equilibrium.
- (v) (a) The necessity of chlorophyll was tested.
 (b) The plant was kept in dark for destarching that is to remove all the starch from the leaves.
 (c) After performing test the pale yellow portion of a leaf showed a negative result for the presence of starch and the green portion of leaf showed positive result as it turns blue- black in colour.

This experiment prove that chlorophyll (green pigment) is necessary for photosynthesis.

8. (i) **Mutation:** A sudden change in the base pair sequences of DNA due to the various factors such as radiation, chemical, etc.

(ii) Phenotypic ratio in F_2 generation is 3:1

Genotypic ratio in F_2 generation is 1:2:1

- (iii) Leaves of some plants roll up on a bright sunny day to reduce the effective surface area for transpiration. The reduced surface area ultimately reduces the rate of transpiration.
- (iv) **Semi-permeable membrane:** The membrane which allows only certain molecules to pass through them by simple diffusion process.
 In plant cell, plasma membrane is semi-permeable.
- (v) (a) Ventricular phase is contracting phase in the heart.
 (b) Ventricles contract to pump blood forcefully to the aorta and to pulmonary artery.
 (c) Systole occurs when the heart contracts to pump blood out, and diastole occurs when the heart relaxes after contraction.

