ICSE Specimen Question Paper

Biology

(Science Paper – 3)

Maximum Marks: 80 Time Allowed: Two Hours

General Instructions

1. *Answers to this paper must be written on the paper provided separately.*
2. *You will not be allowed to write during the 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]**

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

(i) A doctor found glucose in the urine of a patient whose blood glucose was very high. This indicates that the process that could not take back all the glucose was

(a) ultrafiltration in the Bowman's capsule

(b) tubular secretion in the distal convoluted tubule

(c) selective reabsorption in the proximal convoluted tubule

(d) water reabsorption in the collecting duct

(ii) A potted plant placed near a window bends towards the incoming sunlight. Which plant hormone is primarily responsible for this directional growth response?

(a) Cytokinin
(b) Auxin
(c) Gibberellin
(d) Abscisic acid

(iii) Assertion (A): The testes are located outside the abdominal cavity in the scrotum.

Reason (R): The scrotum maintains a temperature slightly lower than the normal body temperature, which is essential for sperm production.

(a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true, and (R) is the correct explanation of (A).

(d) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(iv) During ventricular contraction, which sequence correctly describes the movement of blood through the human heart?

(a) Right ventricle → Pulmonary artery → Lungs
(b) Left ventricle → Pulmonary artery → Lungs
(c) Right atrium → Aorta → Body tissues
(d) Left atrium → Vena cava → Body tissues

(v) Which of the following statements are correct?

P – Auxins are mainly synthesised in the root tips and move upwards.

Q – Cytokinins delay the ageing of leaves.

R – Sister chromatids are held together by the centromere.

S – Photolysis of water occurs in the light-independent phase.

(a) P and Q

(b) Q and R

(c) R and S

(d) P and S

(vi) Rishi accidentally touches a hot utensil and immediately pulls back his hand even before consciously realizing the pain. Which of the following correctly explains this response?
(a) The cerebrum processes the information and directly sends signals to the hand muscles.
(b) The spinal cord coordinates a reflex action by transmitting impulses through a reflex arc.
(c) The cerebellum detects the heat and controls the withdrawal of the hand.
(d) The medulla oblongata controls the movement by regulating involuntary actions.

(vii) A plant is kept in a well-ventilated room under bright sunlight. On a hot, dry afternoon, the rate of transpiration increases initially but later decreases. Which of the following best explains this decrease?

(a) Stomata open wider to increase water loss.
(b) Guard cells lose water, causing stomata to close partially.
(c) Root hairs stop absorbing minerals from the soil.
(d) Chlorophyll becomes inactive due to high temperature.

(viii) Which feature of root hair cells helps them absorb water efficiently from the soil?

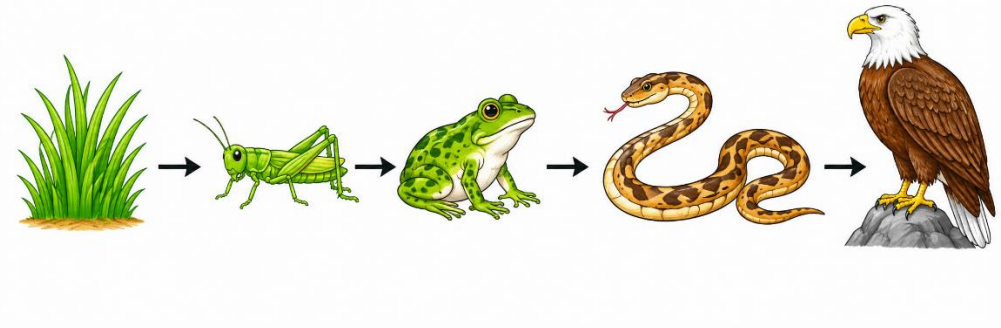
(a) A thick, waterproof cell wall
(b) A large surface area and thin cell wall
(c) Numerous chloroplasts in the cytoplasm
(d) A small vacuole with concentrated cell sap

(ix) In a monohybrid cross between two heterozygous tall pea plants (Tt × Tt), the probability of obtaining a dwarf offspring is

(a) 0% (b) 25%

(c) 50% (d) 75%

(x) Study the given food chain. If the population of frogs suddenly decreases due to a disease, which of the following changes is most likely to occur initially?



(a) The population of grasshoppers will decrease.

(b) The population of grasshoppers will increase.

(c) The population of snakes will increase.

(d) The population of grass will decrease.

(xi) During dancing which part of the brain is primarily responsible for maintaining body balance and coordinating muscular movements?

(a) Cerebrum

(b) Cerebellum

(c) Medulla oblongata

(d) Hypothalamus

(xii) Assertion (A): When two heterozygous black-coated guinea pigs are crossed, their offspring are expected to show a phenotypic ratio of 3 black-coated : 1 white-coated.

Reason (R): The two alleles of a gene separate during gamete formation, so each gamete receives only one allele.

a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true, and (R) is the correct explanation of (A).

(d) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(xiii) If the stomata of the leaf are blocked with petroleum jelly, which of the following changes is most likely to occur?

(a) Absorption of water by roots will stop completely.
(b) Exchange of gases will be restricted, reducing the rate of photosynthesis.
(c) Chlorophyll will stop absorbing light energy.
(d) Transport of prepared food through phloem will increase.

(xiv) A country experiences a rapid increase in population due to a high birth rate and a decline in death rate. Which of the following is the most likely consequence of this population explosion?

(a) Increased availability of natural resources per person
(b) Reduced pressure on housing, healthcare and education
(c) Increased demand for food, water and employment
(d) Decreased generation of domestic waste

(xv) A factory releases sulphur dioxide and nitrogen oxides into the atmosphere. Which environmental problem is most likely to occur due to these gases?

(a) Ozone layer depletion
(b) Acid rain
(c) Global cooling
(d) Increase in soil fertility

Question 2

(i) Give the biological or technical terms for the following. [5]

(a) The chromosomes that decide the sex of an individual.

(b) The physical expression of genes in an individual.

(c) The pigment present in red blood cells that transports oxygen.

(d) Condition of a cell placed in a hypotonic solution.

(e) A hormone secreted by alpha cells of islets of Langerhans.

(ii) Cell division is the process by which a parent cell divides to form new daughter cells. Mitosis helps in growth, repair and replacement of damaged cells, whereas meiosis is essential for the formation of gametes. Both processes involve the division of genetic material and play an important role in maintaining continuity of life.

Select the correct terms from the given box to fill in the blanks. [5]

[Chromosomes, four, mitosis, meiosis, two, diploid, haploid, prophase, metaphase, crossing over]

(a) The type of cell division responsible for growth and repair of damaged tissues is called _____.

(b) At the end of mitosis, a parent cell produces _____ genetically identical daughter cells.

(c) The type of cell division that reduces the chromosome number to half is called _____.

(d) During _____, homologous chromosomes exchange genetic material, resulting in genetic variation.

(e) At the end of meiosis, a single parent cell generally produces _____ daughter cells.

(iii) Choose the ODD term out from each of the following sets of terms. Mention the category to which the remaining three belong. [5]

(a) Retina, Cornea, Iris, Cochlea

(b) Cerebrum, Cerebellum, Medulla oblongata, Spinal cord

(c) Vas deferens, Epididymis, Fallopian tube, Urethra

(d) Pepsin, Trypsin, Amylase, Insulin

(e) *Australopithecus, Homo habilis, Homo erectus*, Gorilla

(iv) Green plants prepare their own food through the process of photosynthesis. For this process, plants require sunlight, carbon dioxide, water and chlorophyll. The food prepared is stored in the form of starch in different parts of the plant. Answer the following questions. [5]

(a) Name the green pigment that traps solar energy for photosynthesis.

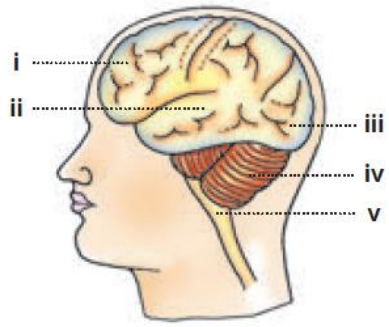
(b) Which part of the plant absorbs water from the soil?

(c) Name the tiny pores on the surface of leaves through which carbon dioxide enters.

(d) Which gas is released during photosynthesis?

(e) How can the presence of starch in a leaf be tested?

(v) Study the following diagram of a human brain and answer the questions given below. [5]

Column A	**Column B**
	(a) Maintains body balance and coordinates muscular movements
	(b) Responsible for processing visual information
	(c) Controls voluntary movements and helps in reasoning
	(d) Responsible for hearing and interpretation of sounds
	(e) Controls involuntary activities such as breathing and heartbeat

SECTION B (40 Marks)

(Attempt any four questions from this Section.)

Question 3

During a school science activity, Meera observed that a ringing bell produced sound waves that travelled through the air and reached her ears. She learned that different parts of the ear work

together to collect sound, transmit vibrations and convert them into nerve impulses that are interpreted by the brain.

(i) Name the part of the ear that collects sound waves from the surroundings. [1]

(ii) Explain how the eardrum responds when sound waves strike it. [2]

(iii) What is the role of the three small bones present in the middle ear in the process of hearing? [2]

(iv) Identify the part of the inner ear where sound vibrations are converted into nerve impulses. [2]

(v) Explain how the auditory nerve and the brain help us recognise and interpret different sounds. [3]

Question 4

Riya placed fresh potato strips in three different solutions. She observed that the potato strips placed in concentrated salt solution became soft and shrunk, while those placed in distilled water became firm and swollen. Her teacher explained that these changes occur due to the movement of water across the cell membrane and differences in solute concentration.

(i) Name the process responsible for the movement of water across a selectively permeable membrane. [1]

(ii) Define osmosis and mention the role of the selectively permeable membrane in this process. [2]

(iii) Why did the potato strips become soft and shrink when placed in concentrated salt solution? Name the process involved. [2]

(iv) What is the term used to describe a solution having the same solute concentration as the cell sap? [2]

(v) Differentiate between diffusion and osmosis on the basis of the substances involved and the requirement of a selectively permeable membrane. [3]

Question 5

The human nervous system coordinates various activities of the body and enables an individual to respond appropriately to different situations.

(i) Name the two main divisions of the human nervous system. [2]

(ii) Differentiate between sensory neurons and motor neurons on the basis of the direction in which they conduct nerve impulses. [2]

(iii) State any two functions of the medulla oblongata. [2]

(iv) Why is the human brain protected by three membranes? Name these membranes. [2]

(v) Draw a neat, labelled diagram of a neuron. [2]

Question 6

In pea plants, the character for round seeds (R) is dominant over that for wrinkled seeds (r). A pure-breeding round-seeded plant is crossed with a pure-breeding wrinkled-seeded plant.

(i) Write the genotypes of the two parental plants. [1]

(ii) Show the cross between the parental plants and determine the genotype and phenotype of the F_1 generation. [2]

(iii) What is meant by a homozygous condition? Give one example using the above cross. [2]

(iv) What will happen if the parentals plants are heterozygous? [2]

(v) If two F_1 plants are crossed, calculate the phenotypic ratio expected in the F_2 generation. [3]

Question 7

Ananya, during a sports competition, noticed that her heartbeat increased and she began sweating due to excitement and physical activity. Her biology teacher explained that these changes are regulated by hormones released by endocrine glands, which help coordinate various activities of the body.

(i) Name the endocrine gland that releases adrenaline during emergency situations. [1]

(ii) Explain the role of adrenaline in preparing the body to face stressful or emergency situations. [2]

(iii) Which hormone regulates the blood glucose level in the human body? Name the gland that secretes it. [2]

(iv) Identify the endocrine gland known as the master gland. Why is it called so? [2]

(v) Explain how the thyroid gland helps regulate body metabolism. What may happen if insufficient thyroxine is produced due to iodine deficiency? [3]

Question 8

During a biology lesson, Rohan learned about the human reproductive system. He observed a diagram showing the male and female reproductive organs and understood how specialised organs produce gametes and support fertilisation and the development of a new individual.

(i) Name the male reproductive organ responsible for producing sperms. [1]

(ii) Explain the role of the testes in the human male reproductive system. [2]

(iii) What is the function of the fallopian tubes in the female reproductive system? [2]

(iv) Identify the organ in which the embryo gets implanted and develops during pregnancy.[2]

(v) Explain the role of the placenta in the development of the foetus. Mention any three functions. [3]