
BIOLOGY

SCIENCE Paper – 3

(Two hours)

Answers to this Paper must be written on the paper provided separately.

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

This 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 answers.

*Attempt **all** questions from **Section I** and **any four** questions from **Section II**.*

The intended marks for questions or parts of questions are given in brackets [].

SECTION I (40 Marks)

*Attempt **all** questions from this Section*

Question 1

- (a) Name the following: [5]
- (i) The hormone that regulates the basal metabolic rate.
 - (ii) The part of the internal ear related to the static balance of the body.
 - (iii) The soluble protein in blood plasma responsible for blood clotting.
 - (iv) The gaseous plant hormone.
 - (v) The uptake of mineral ions against the concentration gradient.
- (b) Choose the correct answer from the four options given for each below: [5]
- (i) The rate of transpiration will be fastest when the day is:
 - A. Hot, humid and windy
 - B. Cool, humid and windy
 - C. Hot, humid and still
 - D. Hot, dry and windy

- (ii) Cytokinins are predominantly present in:
- A. Permanent tissues
 - B. Meristematic tissues
 - C. Endodermis
 - D. Cortical region
- (iii) A cell has five pairs of chromosomes. After mitotic division, the number of chromosomes in the daughter cells will be:
- A. Five
 - B. Ten
 - C. Twenty
 - D. Forty
- (iv) Learning is related to:
- A. Cerebrum
 - B. Cerebellum
 - C. Medulla Oblongata
 - D. Hypothalamus
- (v) The most primitive ancestor of man is:
- A. Homo habilis
 - B. Cro- magnon
 - C. Neanderthal
 - D. Australopithecus

(c) The following paragraph is related to absorption of water from the soil. [5]

Complete the following paragraph by selecting the correct word from those given below. You may use a term only once.

exosmosis, hypertonic, osmosis, isotonic, hypotonic, cortical, endosmosis, phloem.

Water enters the root hair from the soil by the process of (i) _____. This is because the solution in the soil is (ii) _____ whereas the cell sap in the root hair cell is (iii) _____. The water then passes through the (iv) _____ cells by cell to cell (v) _____ and reaches the xylem of the root.

- (d) Give the exact location of each of the following structures: [5]
- (i) Corpus Callosum
 - (ii) Adrenal gland
 - (iii) Acrosome
 - (iv) Amnion
 - (v) Monocytes

- (e) Given below are five sets of terms. In each case arrange and rewrite each set so as to be in a logical sequence. [5]

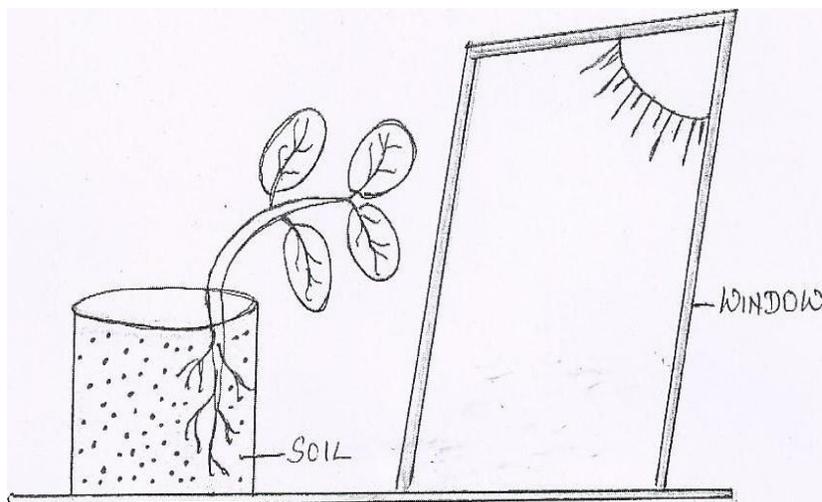
One is done as an example for you:

Eg: Large intestine, stomach, mouth, small intestine, oesophagus.

Ans: Mouth, oesophagus, stomach, small intestine, large intestine.

- (i) Metaphase, interphase, anaphase, prophase, telophase
 - (ii) Vagina, sperm, uterus, oviduct, cervix
 - (iii) Pinna, cochlea, tympanum, ossicles, auditory canal
 - (iv) Posterior venacava, renal artery, aorta, renal vein, kidney
 - (v) Synapse, axon endings, cyton, node of Ranvier, dendrite
- (f) Identify the odd term in each set and name the category to which the remaining 3 belong. [5]
- Example: Ovary, Fallopian tube, Ureter, Uterus.
- Odd term: Ureter
- Category: Parts of female reproductive system.
- (i) Basophil, Neutrophil, Eosinophil, Lymphocyte
 - (ii) Pulmonary vein, Hepatic vein, Renal vein, Post caval
 - (iii) Gibberellin, Auxin, Vasopressin, Abscisic acid
 - (iv) Wind energy, Tidal energy, Petroleum, Solar energy
 - (v) Plastic, Paper, Glass, Aluminium

- (g) The diagram given below represents a plant growing in a glass jar. The glass jar is placed near a window. Study the diagram and answer the questions that follow: [5]



- (i) Name the tropic movements shown by the shoot and roots.
- (ii) What is the stimulus that made the shoot bend towards the window?
- (iii) Which plant hormone caused the above effect?
- (iv) Explain the role of the hormone in bending the shoot towards the window.
- (h) Match the items of Column A with those in Column B and rewrite the correct matching pairs: [5]

Column A

Column B

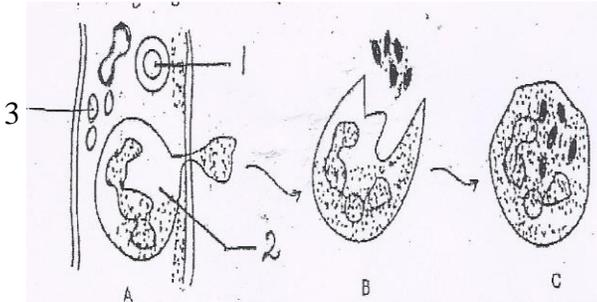
- | | |
|-------------------------|------------------------------------|
| (i) Diabetes mellitus | – Hyper secretion of thyroxine |
| (ii) Diabetes insipidus | – Hypo secretion of thyroxine |
| (iii) Cretinism | – Hyperglycemia |
| (iv) Insulin shock | – Hypo secretion of growth hormone |
| (v) exophthalmic goitre | – Hypoglycemia |
| | – Hypo secretion of ADH |
| | – Over secretion of Adrenalin |

SECTION II (40 Marks)

Attempt any four questions from this Section.

Question 2

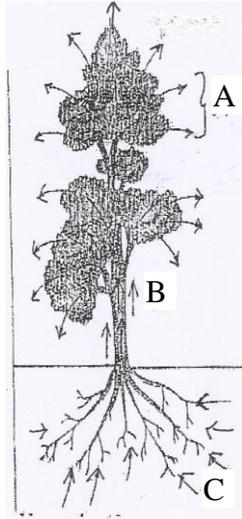
- (a) Study the diagrams given below and answer the questions that follow: [5]



- (i) Name the cells labelled 1, 2 and 3.
- (ii) Identify the phenomenon occurring in A. Explain the phenomenon.
- (iii) Mention two structural differences between 1 and 2.
- (iv) Name the process occurring in B and C.
- (v) State the importance of this process in the human body.
- (b) Give one difference between each of the following pairs on the basis of what is given in the brackets: [5]
- (i) Mitral valve and Aortic semilunar valve [location]
- (ii) Hydrotropism and Thigmotropism [stimulus]
- (iii) Metaphase and Anaphase [position of chromatids]
- (iv) Demography and Population density [definition].
- (v) Turgid cell and Plasmolysed cell [tonicity of the surrounding solution]

Question 3

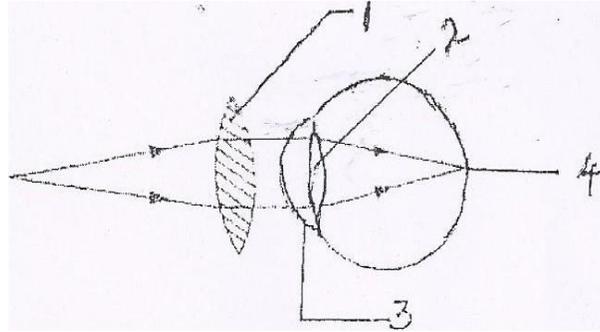
- (a) An outline sketch of a tree is shown in the diagram below. Study the same and answer the questions that follow: [5]



- (i) Name the phenomenon that is labelled A in the diagram.
 - (ii) Explain the phenomenon occurring in A.
 - (iii) What is the importance of this phenomenon in plants?
 - (iv) Explain the role of any three external factors that will increase the rate of the phenomenon.
 - (v) What do the direction of arrows in B and C indicate?
- (b) Mention the exact function of the following structures: [5]
- (i) Iris
 - (ii) Plasma membrane
 - (iii) Nephron
 - (iv) Thylakoids
 - (v) Hydathodes

Question 4

- (a) Given below is a diagrammatic representation of a defect of the human eye which has been corrected using a suitable lens. Study the diagram and answer the questions that follow: [5]

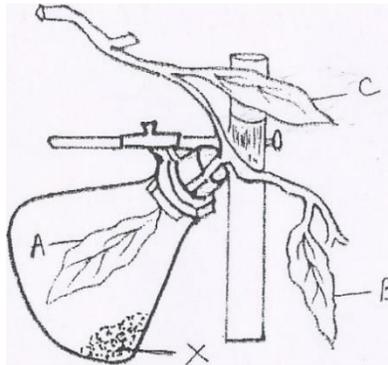


- (i) Identify the defect that has been corrected.
 - (ii) Mention two reasons for the above defect.
 - (iii) Label the parts numbered 1 to 4.
 - (iv) State the functions of the parts numbered 3 and 4.
 - (v) What maintains the shape of the eye ball?
- (b) Give the biological / technical terms for the following: [5]
- (i) The quick actions which are involuntary and controlled by the spinal cord.
 - (ii) The structure formed after the release of ovum from the Graafian follicle.
 - (iii) The surgical technique used in human females to prevent pregnancy.
 - (iv) The stage of cell division in which the nuclear membrane disappears and the Chromosomes become short and thick.
 - (v) The onset of menstruation in a young girl of 13 years.
 - (vi) The canal through which testes descend into the scrotum just before birth in a human male baby.
 - (vii) The repeating components of each DNA strand lengthwise.
 - (viii) The site of photosynthesis in a plant cell.

- (ix) The constituents which cause the natural quality of the environment to deteriorate.
- (x) The defect of vision in which some parts of the objects are seen in focus while the others are blurred.

Question 5

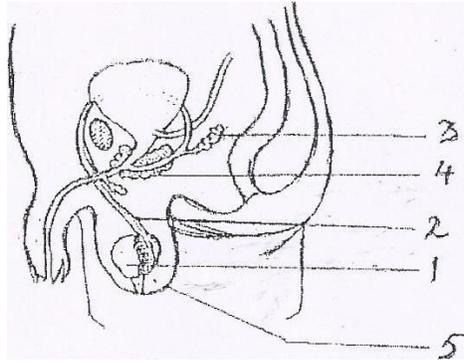
- (a) The diagram below represents an experiment to demonstrate a particular aspect of a physiological process in plants. Study the diagram and answer the questions that follow: [5]



- (i) What is the aim of the experiment?
 - (ii) What is the chemical substance named X in the diagram? What is the special condition created inside the flask due to the presence of the substance X?
 - (iii) In what way will the three leaves A, B and C differ at the end of the experiment when tested with iodine solution?
 - (iv) Write the overall chemical equation for the process mentioned in (i).
 - (v) Explain the term 'Destarching'.
- (b) Briefly explain the following: [5]
- (i) Plasmolysis
 - (ii) Gestation
 - (iii) Synapse
 - (iv) Photophosphorylation
 - (v) Lamarck's theory of use and disuse of organs

Question 6

- (a) Given below is the diagram of the male reproductive system and its associated parts in the human body. Study the diagram and answer the questions that follow: [5]



- (i) Name the parts labelled 3 to 5.
- (ii) State the function of the part marked 2 and 3.
- (iii) What is the significance of the part labelled 5.
- (iv) Mention the hormone secreted by the part labelled 1.
- (v) Draw a neat labelled diagram of a human sperm.
- (b) Give scientific reasons for the following statements: [5]
- (i) Foetus cannot develop without placenta.
- (ii) Throat infections can lead to ear infections.
- (iii) We feel blinded for a short while entering a dark room when coming from bright light.
- (iv) Urine is slightly thicker in summer than in winter.
- (v) Loss of nucleus and mitochondria make erythrocytes more efficient in their function.

Question 7

- (a) A homozygous purple flower variety of pea plant [PP] is crossed with white flower variety of pea [pp]. Answer the questions that follow: [5]
- (i) Mention the phenotype and genotype of the F₁ generation of offsprings.
 - (ii) If the offsprings of the F₁ generation are crossed, what will be the phenotypic and genotypic ratios of the F₂ generation?
 - (iii) State Mendel's law of dominance.
 - (iv) What is the scientific name of pea plants?
 - (v) Name two genetic diseases in humans.
- (b) Answer the following questions briefly: [5]
- (i) Mention two features of a Neanderthal man.
 - (ii) What are the age restrictions for marriage by law for boys and girls in India?
 - (iii) State two objectives of 'Swachh Bharat Abhiyan'.
 - (iv) Mention two functions of the amniotic fluid.
 - (v) List two reasons for the population explosion in India.