SCIENCE

Paper 3 (Biology)

(One hour and a half)

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.

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*Attempt **all** questions form **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:

(i) A membrane that disappears during late prophase.

(ii) A fluid that occupies the larger cavity of the eyeball behind the lens.

(iii) The ground substance present in a chloroplast.

(iv) A specific part of a chromosome that determines hereditary characteristics.

(v) A neurotransmitter stored at the terminal end of the axon. [5]

(b) The following paragraph is related to absorption of water from the soil. Copy and complete the following paragraph by selecting the correct word from those given in the box. You may **use** the term only once.

Exosmosis, Hypertonic, Osmosis, Isotonic, Hypotonic, Cortical, Endosmosis

Water enters the root hair from the soil by the process of_____. This is because the solution in the soil is _____ whereas the cell sap in the root hair cell is _____. The water then passes through

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the _____ cells by cell to cell _____ and reaches the xylem of the root. [5]

(c) Given below are sets of 5 terms each. **Without changing the first term,** rearrange the remaining four, so as to be in logical sequence as per the directions given in brackets for each. One has been done for you as an example.

Example: **Pathogen**, active immunity, produces antibodies, lymphocytes, antigen. (defence mechanism of the body)

Answer : Pathogen → antigen → lymphocytes → produces antibodies → active immunity.

(i) **Destarched plant**, iodine added, washed in water, a leaf boiled in alcohol, placed in sunlight. (testing for presence of starch)

(ii) **Interphase**, Anaphase, Prophase, Telophase, Metaphase (sequential stages in Karyokinesis)

(iii) **Seminiferous tubule**, penis, urethra, epididymus, vas deferens. (course of passage of sperms in man)

(iv) **Pinna**, cochlea, tympanum, ear ossicles, auditory canal (route through which vibrations of sound enter the ear)

(v) **Soil water**, xylem, cortex, endodermis, root hair (conduction of water) [5]

(d) State whether the following statements are **'True'** or **'False'**. If **'False'** **rewrite** the correct form of the statement by only changing the **last word** of the statement.

(i) The alpha cells of the pancreas secrete insulin.

(ii) Duplicated chromosomes remain attached at a point termed centrosome.

(iii) The number of pairs of autosomes in man is 22.

(iv) Penicillin obtained from a fungus is an example of an antibody.

(v) Plants that manufacture their own food are termed heterotrophs. [5]

(e) Given below is an example of a particular structure and its special functional activity. e.g., Glomerules and ultra filtration.

On a similar pattern complete the following:

(i) Corpus luteum and _____.

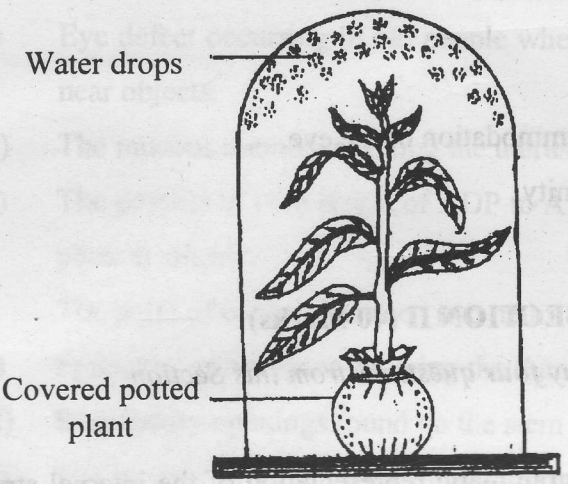
(ii) Iris of the eye and _____.

(iii) Seminal vesicle and _____.

(iv) Phloem and _____.

(v) Eustachian tube and_____. [5]

(f) Given below is an experimental set up to study a particular process:



(i) Name the process being studied.

(ii) Explain the process named in (i) above.

(iii) Why is the pot covered with a plastic sheet?

(iv) Mention one way in which this process is beneficial to the plant.

(v) Suggest a suitable control for this experiment. [5]

(g) Given below are incomplete explanations of certain biological processes / terms where a key word has been left out. **Rewrite** the completed explanation by **inserting** the **key word** in the space indicated by '^'.

(i) Birth rate is the number of '^' births per thousand of the population per year.

(ii) Photolysis is the splitting of water molecules into Hydrogen ions and Hydroxyl ions in the presence of '^' and light.

(iii) Vaccine is a preparation consisting of '^' microbes which help to build immunity in the human body.

(iv) Osmosis is the movement of water molecules from its region of high concentration to its region of low concentration through a '^' membrane.

(v) Antiseptics are chemical substances applied to the '^' to destroy or prevent the growth and multiplication of harmful microbes. [5]

(h) Briefly explain the following terms:

(i) Destarched plant.

(ii) Phenotype.

(iii) Death rate

(iv) Power of accommodation of the eye.

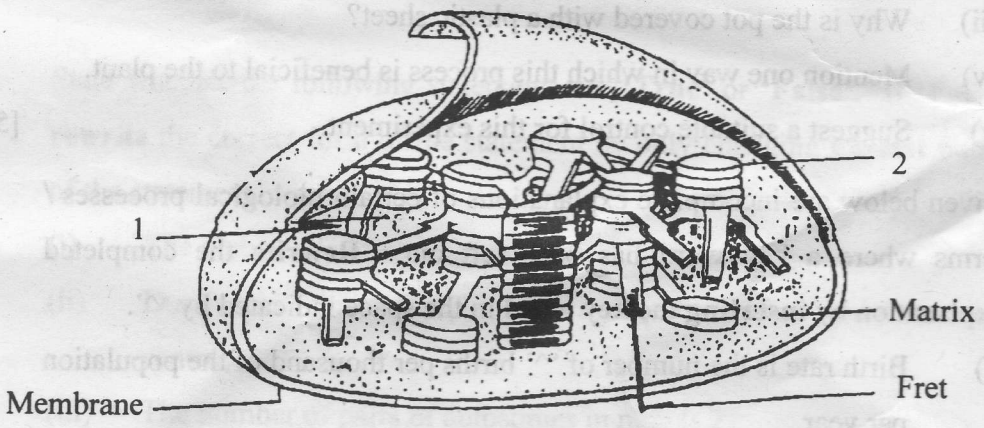
(v) Natural immunity. [5]

SECTION II (40 Marks)

*Attempt any **four** questions from this Section*

Question 2

(a) Given below is a diagrammatic representation of the internal structure of an organelle found in a plant cell. Study the same and then answer the questions that follow:



(i) Identify the organelle.

(ii) Name the physiological process occurring in this organelle.

(iii) Mention one way in which this process is beneficial to man.

(iv) Name the phases of the process occurring in the part labelled '1' and '2'.

(v) A chemical substance 'NADP' plays an active part in one of the phases. Give the expanded form of NADP and state its role in the above process.

(vi) Represent the physiological process mentioned in (ii) above in the form of a chemical equation. [5]

(b) Give the technical/biological term for the following:

(i) Onset of menstruation in a young girl around the age of 13 years.

(ii) Eye defect occurring in old people whereby they are unable to see near objects.

(iii) The mucous membrane lining the uterus.

(iv) The process of conversion of ADP to ATP during the first phase of photosynthesis.

(v) The point of contact between two neurons.

(vi) Protective membranes covering the human brain and spinal cord.

(vii) Respiratory openings found on the stem of woody plants.

(viii) The process by which white blood cells engulf harmful microbes.

(ix) The process of mixing of two different substances/molecules.

(x) Exudation of sap from injured parts of a plant. [5]

Question 3

(a) Draw a diagram of the human eye as seen in a vertical section and label the part which suits the following functions/descriptions:-

(i) The layer which prevents reflection of light.

(ii) The structure that alters the focal length of the lens.

(iii) The region of distinct vision.

(iv) The part which transmits the impulse to the brain.

(v) The outermost transparent layer in front of the eye lens.

(vi) The fluid present in the anterior part of the eye in front of the eye lens. [5]

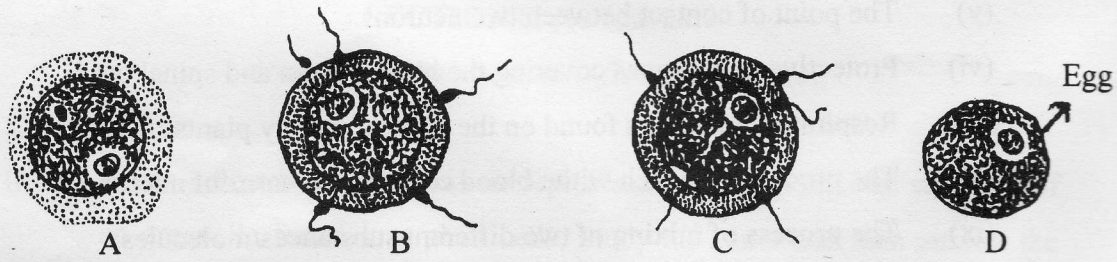
(b) Complete the following table by filling in the blanks 1 to 10 with the appropriate terms:-

GLAND	SECRETION	FUNCTION/EFFECT on BODY
1	Testosterone	2
Adrenal	3	4
5	6	Influences metabolism of cells.
Lachrymal	7	8
9	Growth hormone	10

[5]

Question 4

(a) Given below are diagrams showing different stages in the process of fertilization of an egg in the female reproductive tract:



(i) Use the alphabets given below each diagram to show the correct order in the process of fertilisation.

(ii) Where in the female reproductive system does this process normally take place?

(iii) What is the biological term for the product of fusion?

(iv) What is the chromosome number of (1) the egg (2) the fused product?

(v) Draw a neat labelled diagram of a mature human sperm. [5]

(b) Differentiate between the following on the basis of what is given in brackets:

(i) Myopia and Hypermetropia (Condition of eyeball)

(ii) Rods and Cones (Pigment Present)

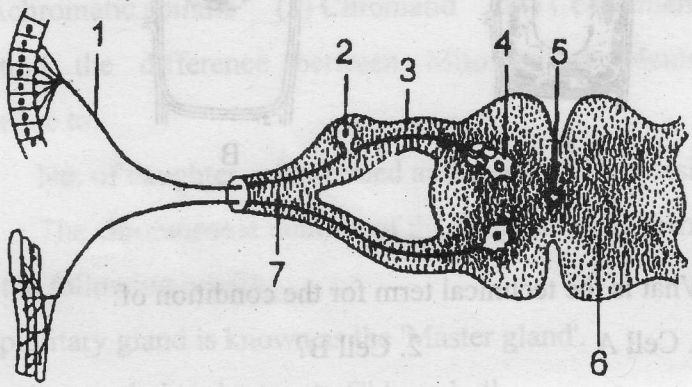
(iii) Tonoplast and Plasma membrane (Location)

(iv) Wall pressure and Turgor pressure (Explain briefly)

(v) DPT and BCG (Expanded form of the vaccine) [5]

Question 5

(a) The diagram given below depicts the cross section of the spinal cord. Study the same and then answer the questions that follow:



(i) Name the process that is being depicted.

(ii) Name the parts labelled 2, 5 and 6.

(iii) Name the cells in contact with the part labelled '1'.

(iv) What is the function of the parts labelled 3, 4, and 7? What is the technical term given to the pathway represented by 3, 4 and 7?

(v) How does the arrangement of cells in the spinal cord differ from that in the brain? [5]

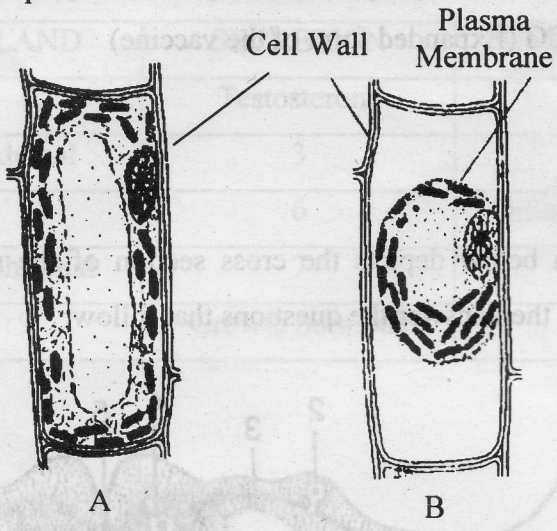
(b) (i) Mention any *three* functions of the Red Cross.

(ii) Name any two microbes that cause diseases in man. In each case give an example of a disease caused by them.

(iii) Mention three reasons why the growth of population has not been appreciably checked in India. [5]

Question 6

(a) Given below are diagrams of plant cells as seen under the microscope after having been placed in two different solutions:



(i) What is the technical term for the condition of:

1. Cell A 2. Cell B?

(ii) From the solutions given in brackets (water, strong sugar solution, 1% salt solution) name the solution into which:

1. Cell A 2. Cell B was placed before being viewed under the microscope.

(iii) Under what conditions in the soil will the root hair cell resemble:

1. Cell A 2. Cell B?

(iv) Name the pressure responsible for the movement of water from the root hair cell to the xylem of the root. How is it set up?

(v) Name the pressure that helps in the movement of water up the xylem of the root. [5]

(b) (i) Explain the following terms:

(1) Mutation

(2) Homologous chromosomes

(3) Alleles

(ii) Give the dihybrid ratio. Name and state the law which explains the same.

(iii) Mention three main reasons for the sharp rise in 'Human population' in the world. [5]

Question 7

(a) (i) Draw a diagram of the nucleus of a cell, having chromosome number 6, as it would appear in the Metaphase stage of Mitosis and label the following parts in the diagram; (1) Aster (2) Achromatic spindle (3) Chromatid (4) Centromere.

(ii) Mention the difference between Mitosis and Meiosis with reference to:

1. No. of daughter cells formed at the end of the division.
2. The chromosome number of the daughter cells formed. [5]

(b) Account for the following briefly:

(i) The pituitary gland is known as the 'Master gland'.

(ii) Animals owe their existence to Chlorophyll.

(iii) Twins may or may not be identical.

(iv) Herbaceous plants growing in well watered soils are found to wilt on a hot day.

(v) Throat infections can lead to ear infections. [5]

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