
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 organization which procures and supplies blood during an emergency.
 - (ii) The blood vessel which supplies blood to the liver.
 - (iii) The number of chromosomes present in a nerve cell of a human being.
 - (iv) The layer of the eyeball that forms the transparent Cornea.
 - (v) The wax-like layer on the epidermis of leaves which reduces transpiration.

This paper consists of 12 printed pages.

(b) Choose the correct answer from each of the four options given below:

[5]

(i) The number of Spinal nerves in a human being are:

- A. 31 pairs
- B. 10 pairs
- C. 21 pairs
- D. 30 pairs

(ii) Which one of the following is non-biodegradable?

- A. DDT
- B. Vegetable peel
- C. Cardboard
- D. Bark of trees

(iii) Aqueous humour is present between the:

- A. Lens and Retina
- B. Iris and Lens
- C. Cornea and Iris
- D. Cornea and Lens

(iv) A strong chemical substance which is used on objects and surfaces in our surroundings to kill germs:

- A. Cresol
- B. Carbolic acid
- C. Iodine
- D. Mercurochrome

(v) Which one of the following is a Greenhouse gas?

- A. Oxygen
- B. Methane
- C. Sulphur dioxide
- D. Nitrogen

- (c) Complete the following paragraph by filling in the blanks (i) to (v) with appropriate words: [5]

To test a leaf for starch, the leaf is boiled in water to (i)_____. It is then boiled in Methylated spirit to (ii)_____. The leaf is dipped in warm water to soften it. It is placed in a petri dish, and (iii)_____ solution is added. The region of the leaf which contains starch, turns (iv)_____ and the region which does not contain starch, turns (v)_____.

- (d) Match the items given in **Column A** with the most appropriate ones in **Column B** and rewrite the correct matching pairs. [5]

Column A

Column B

- | | |
|---------------------------|--------------------------------------|
| (i) Cretinism | (a) Hypersecretion of adrenal cortex |
| (ii) Diabetes insipidus | (b) Hyposecretion of Thyroxine |
| (iii) Exophthalmic Goitre | (c) Hyposecretion of growth hormone |
| (iv) Adrenal virilism | (d) Hyposecretion of Vasopressin |
| (v) Dwarfism | (e) Hyposecretion of adrenal cortex |
| | (f) Hypersecretion of Growth hormone |
| | (g) Hypersecretion of Thyroxine |

- (e) Correct the following statements by changing the underlined words: [5]

- (i) Normal pale yellow colour of the urine is due to the presence of the pigment Melanin.
- (ii) The outermost layer of Meninges is Pia mater.
- (iii) The cell sap of root hair is Hypotonic.
- (iv) Xylem transports starch from the leaves to all parts of the plant body.
- (v) Nitrogen bonds are present between the complementary nitrogenous bases of DNA.

- (f) Choose between the two options to answer the question specified in the brackets [5]
for the following:

An example is illustrated below.

Example: Corolla or Calyx (Which is the outer whorl?) Answer: Calyx

- (i) Blood in the renal artery or renal vein (Which one has more urea?)
 - (ii) Perilymph or endolymph (Which one surrounds the organ of Corti?)
 - (iii) Lenticels or stomata (Which one remains open always?)
 - (iv) Sclerotic layer or choroid layer (Which one forms the Iris?)
 - (v) Blood in the pulmonary artery or pulmonary vein (Which one contains less oxyhaemoglobin?)
- (g) Given below is a representation of a type of pollution. [5]

Study the picture and answer the questions:



- (i) Name the type of pollution shown in the picture.
- (ii) Name one source of this pollution.
- (iii) How does this pollution affect human health?
- (iv) Write one measure to reduce this pollution.
- (v) State one gaseous compound that leads to the depletion of the ozone layer and creates 'Ozone holes'.

- (h) Choose the **ODD** one out from the following terms given and name the [5]

CATEGORY to which the others belong:

Example: Nose, Tongue, Arm, Eye

Answer: Odd Term – Arm, Category – Sense organs

- (i) Detergents, X-rays, sewage, oil spills
- (ii) Lumen, muscular tissue, connective tissue, pericardium
- (iii) Dendrites, Medullary Sheath, Axon, Spinal cord
- (iv) Centrosome, Cell wall, Cell membrane, Large vacuoles
- (v) Prostate gland, Cowper's gland, seminal vesicle, seminiferous tubules.

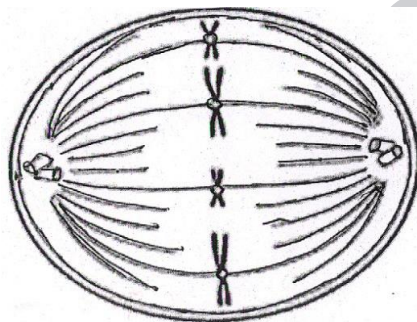
SECTION II (40 Marks)

Attempt any **four** questions from this Section

Question 2

- (a) The diagram given below represents a stage during cell division. [5]

Study the same and answer the questions that follow:



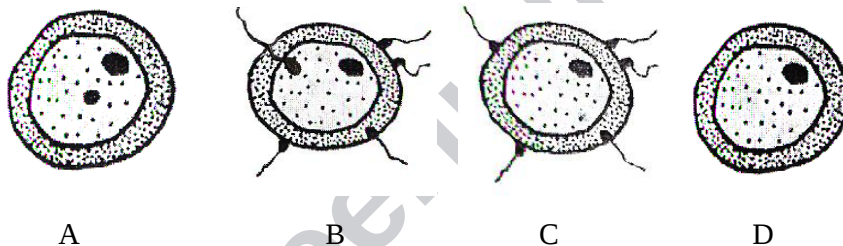
- (i) Identify whether it is a plant cell or an animal cell.
Give a reason in support of your answer.
- (ii) Name the stage depicted in the diagram.
What is the unique feature observed in this stage?
- (iii) Name the type of cell division that occurs during:
 - 1. Replacement of old leaves by new ones.
 - 2. Formation of gametes.

- (iv) What is the stage that comes before the stage shown in the diagram?
- (v) Draw a neat, labelled diagram of the stage mentioned in (iv) above keeping the chromosome number constant.
- (b) Mention the exact location of the following: [5]
- (i) Epididymis
 - (ii) Lacrimal gland
 - (iii) Malleus
 - (iv) Hydathodes
 - (v) Pulmonary semilunar valve

Question 3

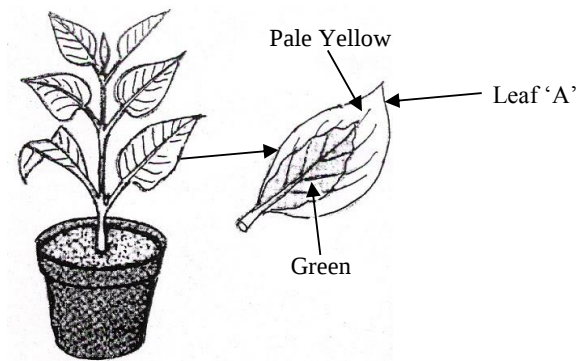
- (a) Given below are diagrams showing the different stages in the process of fertilisation of an egg in the human female reproductive tract. [5]

Study the diagrams and answer the questions:



- (i) Arrange the letters given below each diagram in a logical sequence to show the correct order in the process of fertilisation.
- (ii) Where does fertilisation normally take place?
What is 'Implantation' that follows fertilisation?
- (iii) Mention the chromosome number of the egg and zygote in humans.
- (iv) Explain the term 'Gestation'. How long does Gestation last in humans?
- (v) Draw a neat, labelled diagram of a mature human sperm.

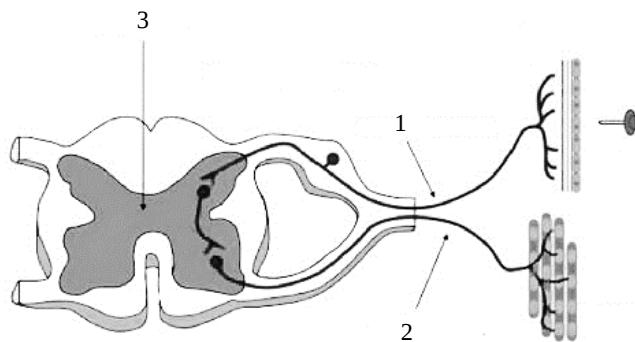
- (b) A potted plant with variegated leaves was taken in order to prove a factor necessary for photosynthesis. The potted plant was kept in the dark for 24 hours and then placed in bright sunlight for a few hours. Observe the diagrams and answer the questions. [5]



- (i) What aspect of photosynthesis is being tested in the above diagram?
- (ii) Represent the process of photosynthesis in the form of a balanced equation.
- (iii) Why was the plant kept in the dark before beginning the experiment?
- (iv) What will be the result of the starch test performed on leaf 'A' shown in the diagram? Give an example of a plant with variegated leaves.
- (v) Draw a neat labelled diagram of a chloroplast.

Question 4

- (a) The diagram given below shows the internal structure of a spinal cord depicting a phenomenon. Study the diagram and answer the questions: [5]

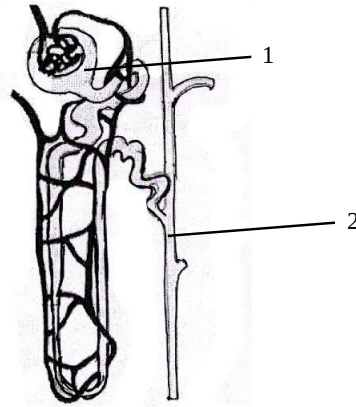


- (i) Name the phenomenon that is depicted in the diagram. Define the phenomenon.
 - (ii) Give the technical term for the point of contact between the two nerve cells.
 - (iii) Name the parts numbered 1, 2 and 3.
 - (iv) How does the arrangement of neurons in the spinal cord differ from that of the brain?
 - (v) Mention two ways by which the spinal cord is protected in our body.
- (b) Give appropriate *biological or technical terms* for the following: [5]
- (i) Process of maintaining water and salt balance in the blood.
 - (ii) Hormones which regulate the secretion of other endocrine glands.
 - (iii) Movement of molecules of a substance from their higher concentration to lower concentration when they are in direct contact.
 - (iv) The condition in which a pair of chromosomes carry similar alleles of a particular character.
 - (v) The complex consisting of a DNA strand and a core of histones.
 - (vi) The onset of menstruation in a young girl.
 - (vii) Squeezing out of white blood cells from the capillaries into the surrounding tissues.
 - (viii) The fluid which surrounds the foetus.
 - (ix) The relaxation phase of the heart.
 - (x) The difference between the birth rate and the death rate.

Question 5

- (a) The diagram given below is that of a structure present in a human kidney. [5]

Study the same and answer the questions that follow:



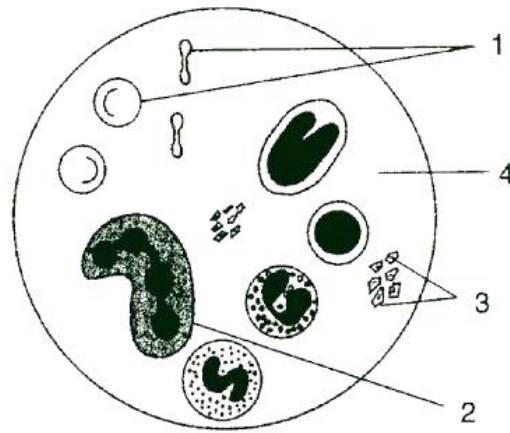
- (i) Name the structure represented in the diagram.
 - (ii) What is the liquid entering part '1' called?
Name two substances present in this liquid that are reabsorbed in the tubule.
 - (iii) What is the fluid that comes to part '2' called?
Name the main nitrogenous waste in it.
 - (iv) Mention the three main steps involved in the formation of the fluid mentioned in (iii) above.
 - (v) Name the substance which may be present in the fluid in part '2' if a person suffers from Diabetes mellitus.
- (b) Differentiate between the following pairs on the basis of what is indicated in the brackets. [5]
- (i) Leaf and Liver [form in which glucose is stored]
 - (ii) ATP and AIDS [expand the abbreviations]
 - (iii) Testosterone and Oestrogen [organ which secretes]
 - (iv) Ureter and Urethra [function]
 - (v) Hypotonic solution and Hypertonic solution [condition of a plant cell when placed in them]

Question 6

(a) Given below is a diagram of a human blood smear.

[5]

Study the diagram and answer the questions that follow:



- (i) Name the components numbered '1' to '4'.
- (ii) Mention two structural differences between the parts '1' and '2'.
- (iii) Name the soluble protein found in part '4' which forms insoluble threads during clotting of blood.
- (iv) What is the average lifespan of the component numbered '1'?
- (v) Component numbered '1' do not have certain organelles but are very efficient in their function. Explain.

(b) Give biological explanations for the following:

[5]

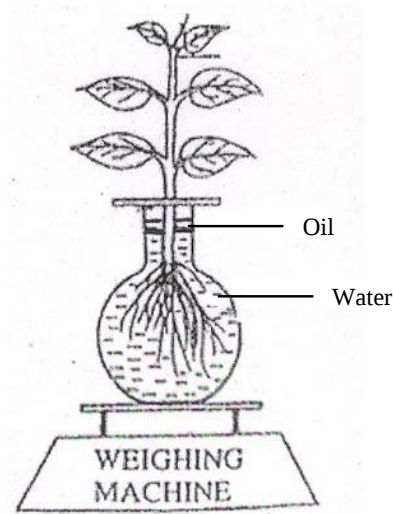
- (i) Education is very important for population control.
- (ii) The placenta is an important structure for the development of a foetus.
- (iii) All the food chains begin with green plants.
- (iv) Plants growing in fertilized soil are often found to wilt if the soil is not adequately watered.
- (v) We should not put sharp objects into our ears.

Question 7

- (a) The diagram below represents a process in plants.

[5]

The setup was placed in bright sunlight. Answer the following questions:



- (i) Name the physiological process depicted in the diagram.
Why was oil added to the water?
- (ii) When placed in bright sunlight for four hours, what do you observe with regard to the initial and final weight of the plant?
Give a suitable reason for your answer.
- (iii) What happens to the level of water when this setup is placed in:
 1. Humid conditions?
 2. Windy conditions?
- (iv) Mention any three adaptations found in plants to overcome the process mentioned in (i).
- (v) Explain the term 'Guttation'.

- (b) A pea plant which is homozygous for Green pods which are inflated [GGII] is crossed with a homozygous plant for yellow pods which are constricted [ggii]. [5]

Answer the following questions:

- (i) Give the phenotype and genotype of the F_1 generation.

Which type of pollination has occurred to produce F_1 generation?

- (ii) Write the phenotypic ratio of the F_2 generation.

- (iii) Write the possible combinations of the gametes that can be obtained if two F_1 hybrid plants are crossed.

- (iv) State Mendel's law of 'Segregation of Gametes'.

- (v) What is the scientific name of the plant which Mendel used for his experiments on inheritance?