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# 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.*

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*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 [ ].*

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### SECTION I (40 Marks)

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

#### Question 1

- (a) Name the following: [5]
- (i) The process by which root hairs absorb water from the soil.
  - (ii) The organ which produces urea.
  - (iii) The kind of lens required to correct Myopia.
  - (iv) The pituitary hormone which stimulates contraction of uterus during child birth.
  - (v) The international health organisation which educates people in accident prevention.

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**This paper consists of 11 printed pages and 1 blank page.**

- (b) Choose the correct answer from each of the four options given below: [5]
- (i) The prime source of chlorofluorocarbons is:
- A. Vehicular emissions
  - B. Industrial effluents
  - C. Domestic sewage
  - D. Refrigeration equipments
- (ii) Penicillin obtained from a fungus is:
- A. Antibiotic
  - B. Antiseptic
  - C. Antibody
  - D. Antiserum
- (iii) Marine fish when placed in tap water bursts because of:
- A. Endosmosis
  - B. Exosmosis
  - C. Diffusion
  - D. Plasmolysis
- (iv) Surgical method of sterilization in a woman involves cutting and tying of:
- A. Ureter
  - B. Uterus
  - C. Urethra
  - D. Oviduct
- (v) Synthesis phase in the cell cycle is called so, because of the synthesis of more:
- A. RNA
  - B. RNA and proteins
  - C. DNA
  - D. Glucose

(c) The statements given below are *incorrect*. **Rewrite the correct statement** by changing the underlined words of the statements. [5]

- (i) The Graafian follicle, after ovulation turns into a hormone producing tissue called Corpus callosum.
- (ii) Deafness is caused due to the rupturing of the Pinna.
- (iii) Gyri and Sulci are the folds of Cerebellum.
- (iv) Free movement of solutes in and out of the cell takes place across the cell membrane.
- (v) The solvent used to dissolve the chlorophyll pigments while testing a leaf for starch is Soda lime.

(d) Given below are sets of five terms each. Rewrite the terms in correct order in a logical sequence. [5]

*Example:* Large intestine, Stomach, Mouth, Small intestine, Oesophagus.

*Answer:* Mouth → Oesophagus → Stomach → Small intestine → Large intestine.

- (i) Fibrin, Platelets, Thromboplastin, Fibrinogen, Thrombin.
  - (ii) Cochlea, Malleus, Pinna, Stapes, Incus.
  - (iii) Receptor, Spinal cord, Effector, Motor neuron, Sensory neuron.
  - (iv) Uterus, Parturition, Fertilisation, Gestation, Implantation.
  - (v) Caterpillar, Snake, Owl, Frog, Green leaves.
- (e) Choose the **ODD** one out of the following terms given and name the **CATEGORY** to which the others belong: [5]
- (i) Aqueous humour, Vitreous humour, Iris, Central canal
  - (ii) Formalin, Iodine, DDT, Lime
  - (iii) ACTH, TSH, ADH, FSH
  - (iv) Phosphate, RNA, Sugar, Nitrogenous base
  - (v) Bile, Urea, Uric acid, Ammonia

- (f) Given below are groups of terms. In each group the first pair indicates the relationship between the two terms. Rewrite and complete the second pair on a similar basis. [5]

Example: Oxygen : Inspiration :: Carbondioxide : Expiration

- (i) Eye : Optic nerve :: Ear : \_\_\_\_\_
- (ii) Cytoplasm : Cytokinesis :: Nucleus : \_\_\_\_\_
- (iii) TT : Homozygous :: Tt : \_\_\_\_\_
- (iv) Foetus : Amnion :: Heart : \_\_\_\_\_
- (v) Adenine : Thymine :: Cytosine : \_\_\_\_\_
- (g) Match the items given in **Column A** with the most appropriate ones in **Column B** and rewrite the correct matching pairs. [5]

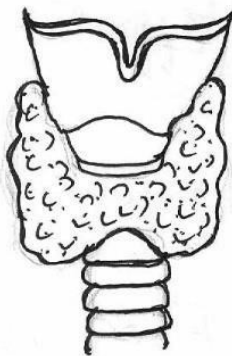
**Column A**

1. Sacculus
2. Birth rate
3. DNA and histones
4. Euro norms
5. Diabetes mellitus

**Column B**

- dynamic body balance
- Hyperglycemia
- Hypoglycemia
- Natality
- static body balance
- vehicular standards
- nucleosome

- (h) The diagram given below represents the location and structure of an endocrine gland. Study the same and answer the questions that follow: [5]



- (i) Name the endocrine gland shown in the diagram.
- (ii) Name the secretion of the gland which regulates basal metabolism.

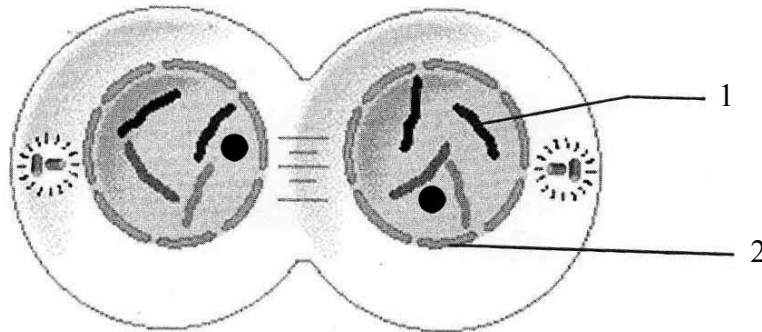
- (iii) Name the mineral element required for the synthesis of the above mentioned hormone.
- (iv) Name the disease caused due to undersecretion of the above mentioned hormone in children.
- (v) Name the disease caused due to hypersecretion of the above mentioned hormone.

**SECTION II (40 Marks)**

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

**Question 2**

- (a) Study the diagram given below which represents a stage during the mitotic cell division and answer the questions that follow: [5]

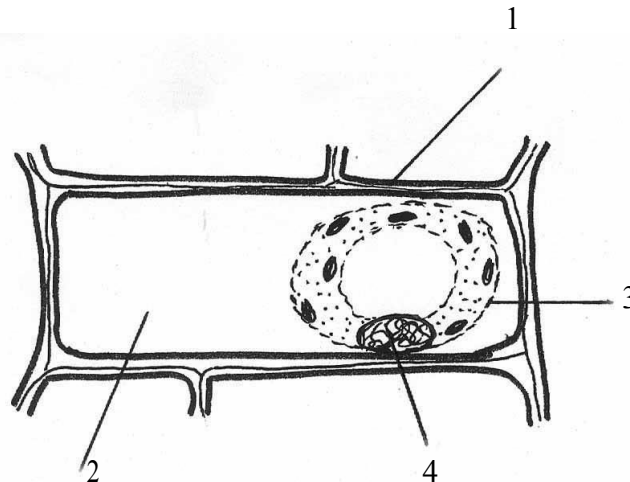


- (i) Identify the stage giving suitable reasons.
- (ii) Name the parts numbered 1 and 2.
- (iii) What is the technical term for the division of nucleus?
- (iv) Mention the stage that comes before the stage shown in the diagram.  
Draw a neat labelled diagram of the stage mentioned.
- (v) Which is the cell division that results in half the number of chromosomes in daughter cells?

- (b) Differentiate between the following pairs on the basis of what is mentioned in brackets: [5]
- (i) Active Transport and Diffusion [*significance in plants*]
  - (ii) Demography and Population density [*Definition*]
  - (iii) Antibiotic and Antibody [*Source*]
  - (iv) Renal cortex and Renal medulla [*Parts of the nephrons present*]
  - (v) NADP and ATP [*Expand the abbreviation*]

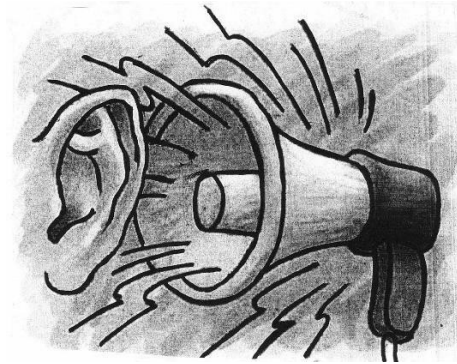
**Question 3**

- (a) The diagram given below represents a plant cell after being placed in a strong sugar solution. Study the diagram and answer the questions that follow: [5]



- (i) What is the state of the cell shown in the diagram?
- (ii) Name the structure that acts as a selectively permeable membrane.
- (iii) Label the parts numbered 1 to 4 in the diagram.
- (iv) How can the above cell be brought back to its original condition?  
Mention the scientific term for the recovery of the cell.
- (v) State any two features of the above plant cell which is not present in animal cells.

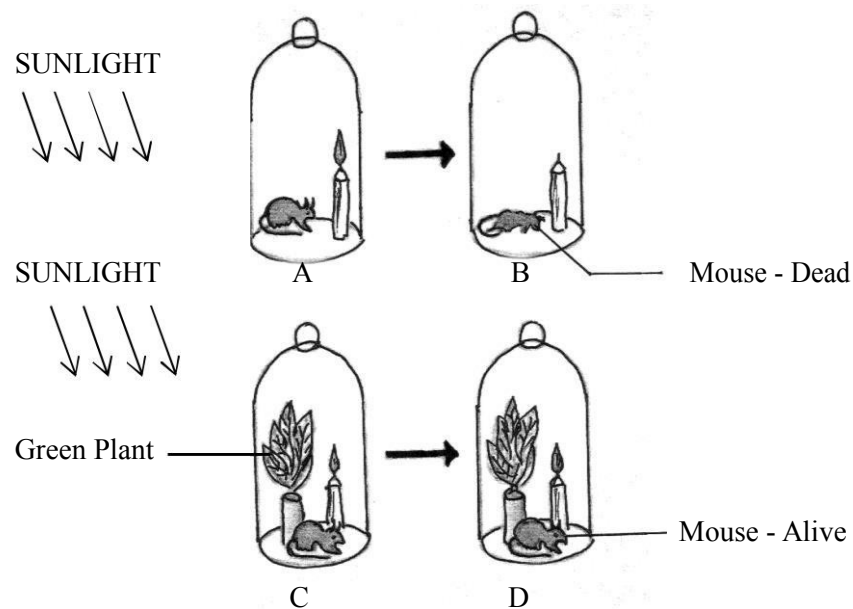
- (b) Given below is a representation of a kind of pollution. Study the same and answer the questions that follow: [5]



- (i) Name the kind of pollution.
- (ii) List any three common sources of this pollution.
- (iii) Mention three harmful effects of this pollution on human health.
- (iv) Explain the term 'Pollutant'.
- (v) Name two soil pollutants.

**Question 4**

- (a) The diagrams given below represent the relationship between a mouse and a physiological process that occurs in green plants. Study the diagrams and answer the questions that follow: [5]



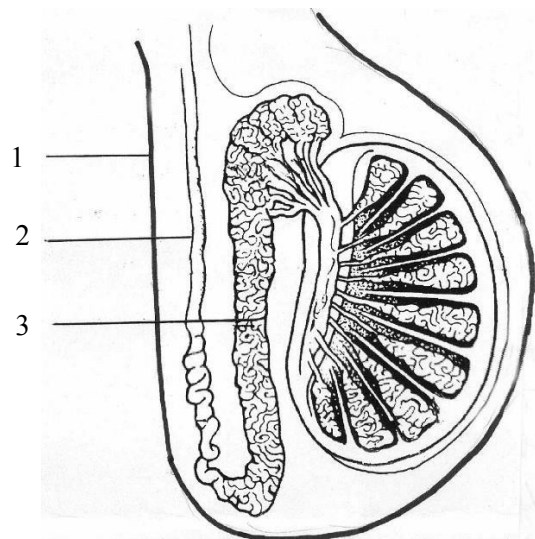
- (i) Name the physiological process occurring in the green plant that has kept the mouse alive.
- (ii) Explain the physiological process mentioned above.
- (iii) Why did the mouse die in bell jar **B**?
- (iv) What is the significance of the process as stated in (i) for life on earth.
- (v) Represent the above mentioned physiological process in the form of a chemical equation.

(b) Mention the exact location of the following: [5]

- (i) Prostate gland
- (ii) Myelin sheath
- (iii) Islets of Langerhans
- (iv) Semi-circular canals
- (v) Eustachian tube

**Question 5**

(a) The diagram shown below is the longitudinal section of a testis of man. Study it carefully and answer the questions that follow: [5]



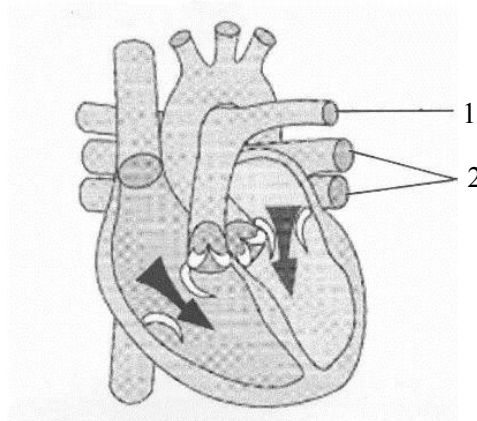
- (i) Label the parts numbered 1 to 3 in the diagram.
- (ii) In which part of the testis are the sperms produced?
- (iii) State the functions of the parts labelled 1 and 3 in the diagram.



- (iv) Name the cells that secrete Testosterone.
- (v) Draw a neat, labelled diagram of a sperm.
- (b) Give biological reasons for the following statements: [5]
- Some women have facial hair like beard and moustache.
  - Cutting of trees should be discouraged.
  - In some xerophytes leaves are modified into spines.
  - There is frequent urination in winter than in summer.
  - The left ventricle of the heart has a thicker wall than the right ventricle.

**Question 6**

- (a) The diagram given below represents a section of the human heart. Answer the questions that follow: [5]



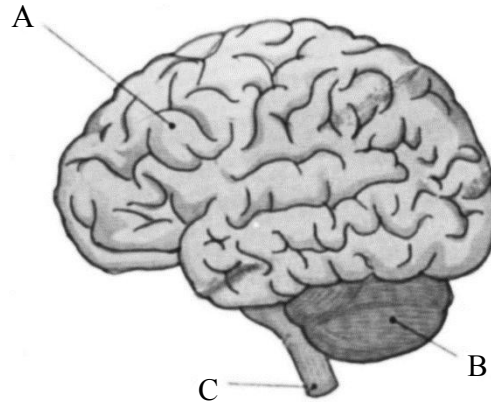
- Which parts of heart are in the diastolic phase? Give a reason to support your answer.
- Label the parts numbered 1 and 2 in the diagram. What type of blood flows through them?
- What causes the heart sounds 'LUBB' and 'DUP'?
- Name the blood vessels that supply oxygenated blood to the heart muscles.
- Draw neat labelled diagrams of a cross section of an artery and a vein.

- (b) Give appropriate **biological** / **technical** terms for the following: [5]
- (i) The type of immunity that exists in our body due to our genetic makeup.
  - (ii) The suppressed allele of a gene.
  - (iii) The accessory gland in human males whose secretion activates the sperms.
  - (iv) An apparatus that measures the rate of water uptake in a cut shoot due to transpiration.
  - (v) The kind of twins formed from two fertilised eggs.
  - (vi) A pair of corresponding chromosomes of the same size and shape, one from each parent.
  - (vii) The mild chemical substance which when applied on the body kills germs.
  - (viii) The type of waste generated in hospitals and pathological laboratories.
  - (ix) The antiseptic substance in tears.
  - (x) Cellular components of blood containing haemoglobin.

**Question 7**

- (a) In a homozygous pea plant, axial flowers (**A**) are dominant over terminal flowers (**a**). [5]
- (i) What is the phenotype and genotype of the **F<sub>1</sub>** generation if a plant bearing pure axial flowers is crossed with a plant bearing pure terminal flowers?
  - (ii) Draw a Punnett square board to show the gametes and offsprings when both the parent plants are heterozygous for axial flowers.
  - (iii) What is the phenotypic ratio and genotypic ratio of the above cross shown in (ii).
  - (iv) State Mendel's Law of Dominance.
  - (v) Name two genetic disorders commonly seen in human males.

- (b) The diagram given below is an external view of the human brain. Study the same [5]  
and answer the questions that follow:



- (i) Name the parts labelled A, B and C in the diagram.
- (ii) State the main functions of the parts labelled A and B.
- (iii) What are the structural and functional units of the brain? How are the parts of these units arranged in A and C?
- (iv) Mention the collective term for the membranes covering the brain.
- (v) What is the function of Cerebrospinal fluid?