GENERAL SCIENCE PAPER - II
BIOLOGICAL SCIENCE
MODEL PAPER - IV

(20E)

Class : X Max.Marks : 50 Time : 2hrs.15min.

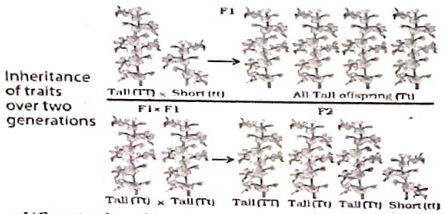
Instructions :

1. Question paper consists of 4 sections and 17 questions.
2. Internal choice is available only for Q.No.12 in section III and for all the questions in section IV.
3. In the duration of 2 hours, 15 minutes of time is alloted to read the question paper.
4. All answers shall be written in the answer booklet only.
5. Answers shall be written neatly and legibly.

SECTION - I **6 × 1 = 6 M**

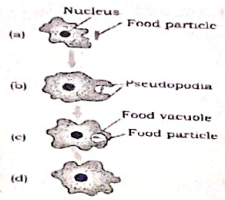
1. Answer **all** the questions.
2. Each question carries **1** marks.

1. Name the enzyme present in The Saliva of human beings that helps in the digestion of carbohydrate?
2. What is the main cause of the depletion of Ozone layer?
3. Observe the diagram



What is the phenotypic ratio in F2 generation in the above diagram?

4. What does the term 3R refer to?
5. If a pure Tall pea plant is crossed with a dwarf pea plant what percentage of plants in the F1 and F2 generations will be tall?
6. What type of Nutrition is depicted in the following figure?



SECTION - II **4 × 2 = 8 M**

1. Answer all the questions.
2. Each question carries 4 marks.

7. Why is more urine produced in winter? Give reason.
8. What question would you ask a nephrologist to maintain your kidney health?
9. Read the paragraph

Each step or level of the food chain forms a trophic level. The autotrophs or the producers are at the first trophic level. They fix up the solar energy and make it available for heterotrophs or the consumers. The herbivores or the primary consumers come at the second, small carnivores or the secondary consumers the third and larger carnivores or the tertiary consumers form the fourth trophic level.

Answer the following questions.

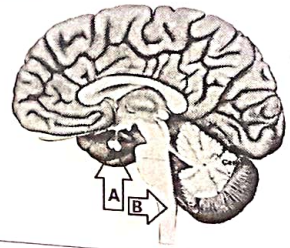
i. Who is at the second trophic level in the food chain?
ii. What do Autotrophs do with solar energy?

As a student of Biology suggest some eco friendly alternatives to plastic use in daily life

SECTION - III **5 × 4 = 20 M**

1. Answer all the questions.
2. Each question carries 4 marks.

11. What are the differences between aerobic and anaerobic respiration?
12. Observe the diagram and answer the following questions.



i. Identify parts A and B and Name them.
ii. Which part of the Hind brain controls involuntary actions such as blood pressure salivation vomiting etc.?
iii. Which part of the brain connects forebrain to the Hindbrain?
iv. What is the largest part of the brain responsible for controlling thinking, reasoning and perception?

(OR)

B) Draw a neat labeled diagram of human female reproductive system.

13. Why is the excessive accumulation of pesticides in rivers or Ponds, resulting from the use of several pesticides a serious environmental concern?
14. How can you keep good genital hygiene? Suggest some tips for a good genital hygiene.
15. Read the following table

Sl. NO	NAME OF THE ENZYME	SECRETED AT	ACTS ON
1	Salivary Amylase	Buccal cavity	Carbohydrates
2	Pepsin	Stomach	Proteins
3	Trypsin	Pancreas	Protein
4	Lipase	Pancreas	Fats

Answer the following questions

i. Name the enzyme which acts on proteins?
ii. Where does salivary amylase secreted?
iii. Write the names of some enzymes secreted by pancreas.
iv. Which life process is depicted in the table?

SECTION - IV **2 × 8 = 16 M**

1. Answer all the questions.
2. Each question carries 8 marks.
3. Each question has internal choice.

16. A) Write about an experiment to prove that CO2 is essential for photosynthesis?

(OR)

B) How are the modes for reproduction different in unicellular and multi cellular organisms?

17 A) Describe the structure of neuron and explain its functions.

(OR)

B) Write differences between F1 and F2 generations.

ANSWERS

SECTION – I

1. The enzyme present in The Saliva of human beings, that helps in the digestion of carbohydrates is Salivary amylase or Ptyalin
2. The main cause of ozone layer depletion, is the release of certain Chemicals called Ozone Depleting Substances (ODS,) primarily Chloro Floro Carbons (CFCs) which are used in Refrigerators, A.Cs and Fire Extinguishers etc..
3. The phenotypic ratio in F2 generation in the given diagram is **3:1**. Out of which 3 are tall and 1 is dwarf/ short
4. The term 3R refers to the principle of **Reduce, Reuse and Recycle**
5. **100% of the F1** plants and **75% of the F2** plants will be tall
6. The figure depicts holozoic nutrition in Amoeba

SECTION – II

7. More urine is produced in cold conditions because; our body does not lose water through sweating as a result the excess water is eliminated as urine.
8. Any two from the following:
   i. What foods should I eat or avoid for better kidney health?
   ii. What should I know about kidney stones and how to prevent them?
   iii. Are there any medicine or supplements that could hurt my Kidneys?
   iv. How often should I get my kidney function checked?
   v. what are the factors responsible for kidney failure?
   vi. What shall I do to keep my Kidneys healthy for a longer period?
9. i. The herbivores or the primary consumers are at the second trophic level.
   ii. The autotrophs fix up the solar energy and make it available for heterotrophs or the consumers.

10. Any two from the following

i. Reusable bags instead of plastic bags.

ii. Glass or metal containers for storage.

iii. Refillable Water bottles instead of single use plastic bottles.

iv. Cloth towels instead of disposable wipes

v. Wooden or bamboo utensils

11. Aerobic respiration VS Anaerobic respiration

	AEROBIC RESPIRATION	ANAEROBIC RESPIRATION
Oxygen	Requires molecular oxygen	Does not require molecular oxygen
Energy	Produces more energy - 38 ATP molecules are generated	Produces less energy - About 2 ATP molecules are only generated
Waste products	Produces CO2 and H2O as waste	Produces Lactic acid in animals or alcohol and CO2 in Yeast as Waste
Where Happens in muscles	Happens in most cells, especially during regular activities like walking sitting etc	Happens During intense exercise when O2 is low
Oxidation of respiratory material	Respiratory materials are completely oxidized	Respiratory Materials are incompletely oxidised
Reaction	C6 H12 O6 + 6 O2 à 6CO2 + 12H2O + 680 kilo calories	C6H12O6 à 2C2H5OH+ 2CO2+ 56 K.Cal

SECTION – III

12. i. A - Pitutory gland, B – Medulla Oblongata

ii. Cerebellum of the Hind brain controls involuntary actions such as blood pressure, Salivation, vomiting etc.

iii. Midbrain connects the fore brain to the Hind brain.

iv. Cerebrum is the largest part of the brain.

13. i. Several pesticides and other chemicals are used to protect our crops from diseases and pests.

ii. These Chemicals are either washed into the soil or carried into Water bodies.

iii. Plants absorb these Chemicals from the soil along with water and Minerals.

iv. Aquatic plants and animals take in these Chemicals from water bodies.

v. Since these Chemicals do not breakdown easily, they accumulate in living organisms at each trophic level of the food chain biomaganification.

vi. This is why; using large amounts of pesticides is very worrying as it leads to dangerous accumulation in Rivers and Ponds.

14. To maintain good genital hygiene wash daily

i. **Wash daily:** Clean Genital area With warm water and mild soap every day.

ii. **Wear cotton underwear:** Cotton allows our skin to breathe and keep the area dry.

iii. **Change underwear daily:** This helps prevent bacteria and infections.

iv. **Stay dry:** Keep the area dry by changing out of wet cloths quickly.

v. **Avoid scented products:** Strong soap or sprays that can irritate the area. So we should avoid using them

vi. **Trim hair regularly:** This can help keep the area clean and reduce sweat build up.

vii. Don't use sanitary wear unnecessarily

15. i. The enzymes pepsin and trypsin act on protein.

ii. Salivary amylase is secreted at buccal cavity.

iii. Pancreas secretes pancreatic lipage, trypsin etc.

iv. This table Depicts the life processes - **Digestion**

SECTION – IV

16. A) **Experiment: To Prove that Carbon Dioxide is Necessary for Photosynthesis**

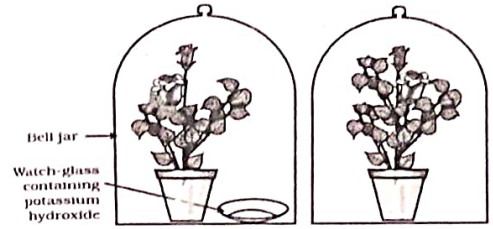
Aim: To show that carbon dioxide (CO_2) is essential for photosynthesis.

Materials Required:

- Two healthy potted plants
- Two bell jars
- Potassium hydroxide (KOH) (to absorb CO_2)
- Vaseline (to seal the jars)
- Two glass plates
- Iodine solution (to test for starch)

Procedure:

1. Take two healthy potted plants of similar size.
2. Place both plants in a dark room for three days to use up any stored starch in their leaves.
3. Set up each plant on a separate glass plate.
4. Place a small container with potassium hydroxide next to one of the plants. This will absorb the CO_2 inside the jar for that plant.
5. Cover each plant with a separate bell jar.
6. Seal the edges of each bell jar with vaseline to make the setup air-tight.
7. Expose both plants to sunlight for about two hours.
8. After two hours, pluck a leaf from each plant and test for starch by using iodine solution.



Observation:

- The leaf from the plant with potassium hydroxide (which absorbed CO_2) does not turb blue-black when iodine is applied, indicating no starch production.
- The leaf from the other plant turns blue-black, showing starch production.

Result: This experiment demonstrates that CO_2 is necessary for photosynthesis.

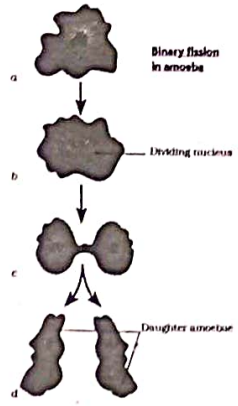
16 B) **Comparison of Modes of Reproduction in Unicellular and Multicellular Organisms:**

1. ***Reproduction in Unicellular Organisms:***

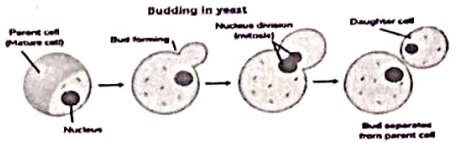
Asexual Reproduction:

Unicellular organisms primarily reproduce asexually, allowing rapid population growth and genetic consistency within the species.

- **Binary Fission:**
  - The most common method of reproduction.
  - The cell duplicates its DNA and then divides, forming two genetically identical daughter cells.
  - **Examples:** Amoeba, bacteria and many protists.



- **Budding:**
  - A small bud or growth forms on the parent cell, gradually enlarges, and eventually separates as a new individual.
  - **Examples:** Yeast and some protists.
- **Fragmentation:**
  - The parent cell breaks into fragments, each capable of growing into a new individual.
  - **Examples:** Some protists



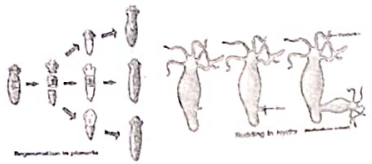
2. ***Reproduction in Multi cellular Organisms:***

Purpose:

Reproduction allows multi cellular organisms to produce new individuals of the same species, contributing to the continuity of life and genetic diversity.

Two Main Types:

- **Asexual Reproduction:**
  - New individuals are created from a single parent, without the involvement of gametes.
  - Offspring are genetically identical to the parent, leading to less genetic diversity.
  - Common in simpler multi cellular organisms, such as certain plants and fungi.
  - **Examples:** Budding in Hydra, Regeneration in Planaria, Vegetative propagation in plants, spore formation in Rhizopus etc..



- **Sexual Reproduction:**
  - Involves the fusion of specialized cells, or gametes (sperm and egg), from two parents.
  - Results in offspring that have a unique combination of genes, promoting genetic diversity.

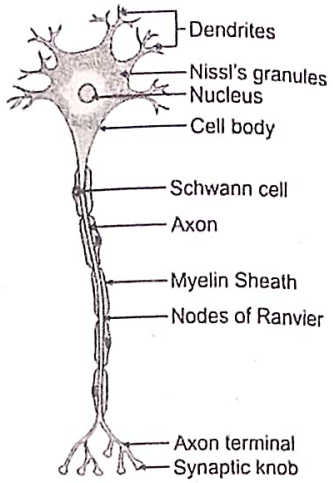
17.A)

A neuron (nerve cell) is the basic unit of the nervous system. It transmits information in the form of electrical and chemical signals.

Structure of a Neuron:

A neuron consists of the following parts:

1. **Cell Body (Soma):**
   - The central part of the neuron.
   - Contains the nucleus, which controls the neuron's activities.
   - Processes information and provides energy for the neuron.
2. **Dendrites:**
   - Branch-like extensions from the cell body.
   - Receive signals from other neurons and pass them to the cell body.
3. **Axon:**
   - A long, single fiber that extends from the cell body.
   - Carries electrical impulses away from the cell body to other neurons, muscles, or glands.
4. **Myelin Sheath:**
   - A fatty layer that covers the axon in segments.
   - Insulates the axon and speeds up the transmission of impulses.
   - Not continuous; gaps called *nodes of Ranvier* are present between segments.
5. **Axon Terminals:**
   - Small branches at the end of the axon.
   - Send signals to other neurons or target cells through structures called *synapses*.



Functions of a Neuron:

1. **Signal Reception:**
   - Dendrites receive signals (information) from other neurons or sensory receptors.
2. **Signal Processing:**
   - The cell body processes incoming signals and decides if they should be passed on.
3. **Signal Transmission:**
   - The axon transmits electrical impulses from the cell body to axon terminals.
4. **Signal Transfer:**
   - Axon terminals release neurotransmitters (chemical messengers) across the synapse to the next neuron, muscle, or gland, passing on the message.

17. B) **DIFFERENCES BETWEEN F1 & F2 GENERATIONS:**

	F1 GENERATION	F2 GENERATION
Definition	First filial generation, offspring of the parent generation (P).	Second filial generation, offspring of the F1 generation.
Genetic Makeup	Usually shows uniform traits, often showing the dominant trait if parents are true-breeding.	Shows a mix of traits, including both dominant and recessive traits.
Genotype Ratio	Typically all similar (e.g., heterozygous if one parent is homozygous dominant and the other is homozygous recessive).	Shows a variety of genotypes, usually in a 1:2:1 ratio (e.g., 1 homozygous dominant : 2 heterozygous : 1 homozygous recessive).
Phenotype Ratio	All individuals show the dominant trait.	Traits appear in a 3:1 ratio for dominant to recessive traits (in cases of complete dominance).
Example	If P generation is pure tall (TT) and short (tt) plants, all F1 plants will be tall (Tt).	In the F2 generation, plants can be tall (TT or Tt) or short (tt).
Use in Genetics	Helps in understanding dominant traits in inheritance.	Helps in understanding segregation of alleles and genetic variation.