

# GENERAL SCIENCE PAPER - II BIOLOGICAL SCIENCE MODEL PAPER - II

(20E)

Class : X Max.Marks : 50

Time : 2hrs.15min.

4 × 2 = 8 M

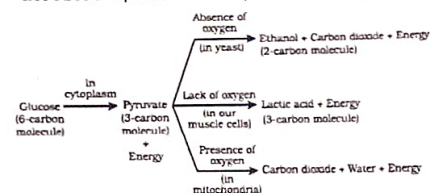
## Instructions :

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 allotted 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

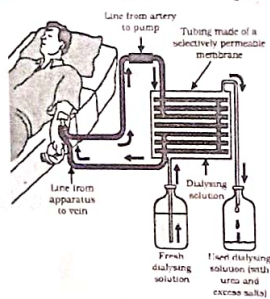
6 × 1 = 6 M

1. Answer all the questions.
2. Each question carries 1 marks.
1. Write a slogan on waste management
2. Expand UNEP.
3. Read the given flowchart and find out where does aerobic respiration take place in the cell?



Break-down of glucose by various pathways

4. What is the unit shown in the diagram?



5. In an experiment a homozygous tall plant (TT) is crossed with a recessive plant(tt). What is the ratio of a pure tall plant(TT) to a pure short plant (tt) in the F2 generation?
6. What do you mean by the term "Allele"

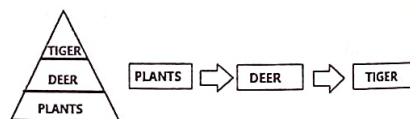
## SECTION - II

1. Answer all the questions.
2. Each question carries 4 marks.
7. What questions will you ask, if you have a chance to meet a Gastroenterologist?
8. Read the paragraph:

The roots of a plant always grow downwards while the shoots usually grow upwards and away from the Earth. This upward and downward growth of shoots and roots respectively In response to the pull of earth or gravity is obviously geotropism.

## Answer the following questions

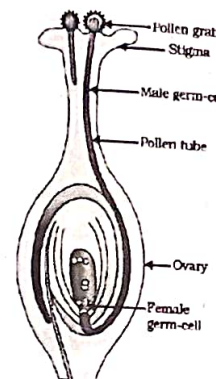
- 1) What is the term used to describe the growth response of roots and shoots to gravity?
- 2) In which direction do plant shoots typically grow?
9. What is the difference between Bioaccumulation and biomagnifications?
10. In the following food chain 100 J of energy is available to the tiger. How much energy was available to the deer (primary consumer) and the plants (the producers)



## SECTION - III

5 × 4 = 20 M

1. Answer all the questions.
2. Each question carries 4 marks.
11. Write any four differences between light reaction and dark reaction.
12. Observe the diagram and answer the following questions



1. What is the female part of a flower called?
2. What part of the flower does the Pollen land on for germination?
3. What does the Pollen tube carry to the ovule for fertilization?
4. Where are the female germ cells found in the pistil?

(OR)

- 12(b) Draw a neat labelled diagram of Reflex arc.
13. What are the problems caused by the non biodegradable waste that we generate?
14. What are the advantages of sexual reproduction over asexual reproduction?
15. What are the components of the transport system in human beings? What are the functions of these components?

## SECTION - IV

2 × 8 = 16 M

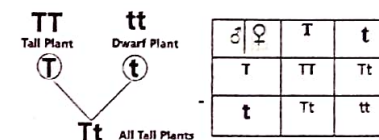
1. Answer all the questions.
2. Each question carries 8 marks.
3. Each question has internal choice.
16. A) How can you prove that CO<sub>2</sub> is released during anaerobic respiration?  
(OR)
16. B) Write about fertilization process in plants in detail.
17. A) Write important parts of human brain and their functions.  
(OR)
17. B) Write about Mendel's Dihybrid experiment.

## ANSWERS

### SECTION - I

- 1) Any one from the following:
  - 1) Clean today for the greener tomorrow.
  - 2) Let's make everyday -Earth Day.
  - 3) Less waste -More life.
  - 4) Trash less- Save more.
  - 5) Clean city -Green Planet
- 2) UNEP- United Nations Environment Programme
- 3) Aerobic respiration takes place in mitochondria
- 4) The unit shown in the diagram is a Dialysis unit
- 5) The ratio of pure tall plant (TT) to pure short plant (tt) in the F2 generation is 1:1

### Explanation:



By self crossing F1 plants

we get 1 TT (Homozygous tall)  
2 Tt (Heterozygous tall) &  
1 tt (Homozygous short)

- 6) The two alternate forms of a single gene are called as alleles  
- Each individual inherits two alleles for every gene, one from each parent

### SECTION - II

- 7) Any two from the following:
  1. Which food should I avoid to maintain good health of the gut?
  2. What are the most common causes of digestive issues?
  3. What are early signs of serious Gastro intestinal problems?
  4. Is there Any relationship between acidity and indigestion?
  5. How can I keep my gut healthy?
  6. When should I think about getting an endoscopy?
- 8) 1. The term used to describe the growth response of roots and shoots to gravity is - Geotropism
2. The shoots of the plants typically grow upwards (Negative Geotropism)



9) Bio-accumulation: It is the build up of pollutants or toxins in a single organism overtime Bio-magnification: It is the increase in toxin concentration as it moves up in the food chain through multiple organisms

10) As per the 10% of law of flow of energy in an ecosystem only 10% of the energy is received by the next trophic level. Hence in the given food chain-

If 100 joules of energy is available to Tiger the deer has 1000 joules of energy and the plants or producers have 10000 joules of energy available to them

Producer — deer — tiger  
10000J. 1000J — 100J

### SECTION - III

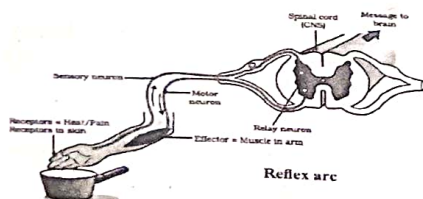
11.

Sl. No.	LIGHT REACTION	DARK REACTION
1	Occurs in the presence of light	- It is light independent reaction
2	Occurs in the Grana thylakoids	- Occurs in Stroma of Chlorophyll
3	ATP & NADPH are formed in this reaction	- ATP & NADPH are utilised
4	This reaction is also known as Photochemical Phase	- This is also called biosynthetic phase
5	ATP, NADPH & O <sub>2</sub> are the end products in this reaction	- Glucose is the end product in this reaction

- 12) A. 1) The female part of flower is called the Pistil (or carpel), which includes the stigma, style and ovary
2. The Pollen lands on the stigma for germination.
3. The Pollen tube carries male germ cells to the ovary for fertilization
4. The female Germ cells are found in the ovary of the pistil

(OR)

12) B



13) The waste that does not break down naturally or takes an extremely long time to decompose is said to be the non-biodegradable waste

Eg: Plastic, synthetic fibres, metals, pesticides and certain other chemicals

The following are some problems caused by the non-biodegradable waste that we generate:

#### 1. Environmental pollution:

It causes pollution in air water and soil, as it stays in the environment for a long time

#### 2. Harms wildlife:

Animals can mistake it for food, which can hurt or even kill them

#### 3. Blocks water flow:

It clogs rivers, drains and oceans, which can lead to flooding and damage to marine life

#### 4. Health risks:

Non-Biodegradable Chemicals and materials can seep into soil and water creating health risks for humans and animals.

#### 5. Bio accumulation and magnification:

Pesticides and other harmful chemicals accumulate at each trophic level, leading to biomagnification

14) Advantages of sexual reproduction are:

#### 1. More variations:

sexual reproduction combines genes from two parents.

As a result more variations are found in the off springs

#### 2. Better disease resistance:

As more variations are observed, better disease resistance and better survival of species is possible.

#### 3. Better adaptation:

Help species, survive better in changing environments.

4. Healthier population: Harmful traits are less likely to pass to off springs keeping the population healthier

#### 5. Stronger evolution:

Since off springs inherit characters from both parents, the chances of evolution increase, resulting in origin of new species.

15) The human transport system, also called the circulatory system, has three main components:

#### 1. Heart

• **Function:** Pumps blood throughout the body, ensuring that oxygen and nutrients reach every cell and waste products are removed.

#### 2. Blood Vessels

• **Arteries:** Carry oxygen-rich blood (Oxygenated blood) away from the heart to the rest of the body.

• **Veins:** Bring oxygen-poor blood (Deoxygenated blood) back to the heart

• **Capillaries:** Tiny blood vessels that connect arteries and veins; allow exchange of gases, nutrients, and waste between blood and tissues.

#### 3. Blood

• **Red Blood Cells:** Carry oxygen from the lungs to cells and bring back carbon dioxide to the lungs.

• **White Blood Cells:** Protect the body by fighting infections.

• **Platelets:** Help in blood clotting to prevent bleeding.

• **Plasma:** Liquid part that carries nutrients, hormones, and waste products.

Each of these components works together to transport essential substances like oxygen, nutrients, and waste, maintaining the body's health.

### SECTION - IV

16. A) **Aim:** To show that carbon dioxide (CO<sub>2</sub>) is released during fermentation.

#### Materials Needed:

- ▶ Test tubes
- ▶ Lime water
- ▶ Fruit juice or sugar solution
- ▶ Bent glass tube
- ▶ Yeast
- ▶ One-holed cork

#### Procedure:

1. Take some fruit juice or sugar solution in a test tube and add a small amount of yeast
2. Seal the test tube with a one-holed cork.
3. Insert a bent glass tube into the hole in the cork, and place the other end of the tube into a separate test tube containing freshly prepared lime water.
4. Leave the setup for some time.

#### Observation:

▶ The lime water in the second test tube turns milky.

#### Result:

▶ During fermentation, yeast breaks down the sugar in the fruit juice, releasing carbon dioxide and alcohol. The CO<sub>2</sub> travels through the bent tube and makes the lime water milky, confirming its presence.

16. B) **Fertilization Process in Plants:** In plants, fertilization involves pollen germination, double fertilization, and the formation of a zygote, leading to the development of seeds and fruits.

#### 1. Pollination:

• Pollen grains from the male part of the flower (anther) are transferred to the female part (stigma) of the same or another flower.

#### 2. Pollen Germination:

• When a pollen grain lands on a compatible stigma, it starts to germinate.

• A pollen tube grows from the pollen grain through the style, reaching the ovule inside the ovary.

#### 3. Double Fertilization:

• The pollen tube carries two male nuclei (sperm cells) into the ovule.

• One male nucleus fertilizes the egg cell, forming a zygote.

• The other male nucleus fuses with two polar nuclei in the ovule, forming a triploid cell, which develops into the endosperm (food for the developing seed).

#### 4. Formation of the Zygote:

• The fertilized egg cell (zygote) starts to divide and develop into an embryo, which will become the future plant.

#### 5. Seed and Fruit Formation:

• The ovule develops into a seed containing the embryo and endosperm.

• The ovary transforms into a fruit, which protects the seed and aids in its dispersal.

#### 17) A. Important Parts of the Human Brain and Their Functions:

##### 1. Cerebrum:

• **Details:** It's the largest part of the brain and is divided into two halves, called cerebral hemispheres.



- The outer dark coloured region is called as the cortex
- The inner light coloured region is called as the medulla
- **Function:** The Cerebrum controls thinking, memory, emotions, and voluntary actions like moving arms and legs.

## 2. Cerebellum:

- **Details:** It's located at the back of the brain, below the cerebrum.
- It is the second largest part of the brain commonly called as the little brain
- **Function:** Coordinates muscular activities and maintains equilibrium of the body.

## 3. Medulla Oblongata:

- **Details:** Located at the base of the brain.
- It connects the brain to the spinal cord
- **Function:** Controls involuntary actions like breathing, heartbeat, and digestion.

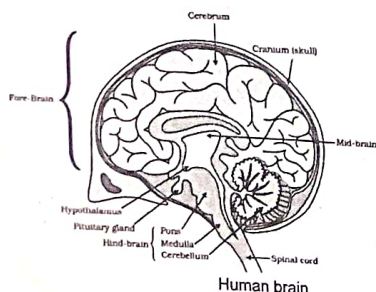
## 4. Hypothalamus:

- **Details:** Seen just below the Thalamus
- **Function:** Regulates body temperature, hunger, thirst, and sleep.
- It also controls the release of hormones by working with the pituitary gland

## 5. Thalamus:

- **Details:** Located above the hypothalamus
- **Function:** Acts as a relay center, sending sensory information (like touch and sound) to the cerebrum.
- It helps in processing and directing sensory signals.

Each part of the brain has a specific role, and they all work together to keep our body functioning properly.



## 17. B) Mendel's Dihybrid Experiment:

### 1. Objective:

- Gregor Mendel wanted to understand how two different traits are inherited together. So, he conducted an experiment on pea plants, focusing on **two traits at the same time**: seed color (yellow or green) and seed shape (round or wrinkled).

### 2. Selection of Parent Plants:

- Mendel chose pure-breeding plants with two contrasting traits:
  - ▶ One parent had **yellow, round seeds**.
  - ▶ The other parent had **green, wrinkled seeds**.

### 3. First Generation (F1 Generation):

- Mendel crossed the two parent plants. All the offspring in the F1 generation had **yellow, round seeds**.
- This showed that yellow color and round shape are **dominant traits**.

### 4. Second Generation (F2 Generation):

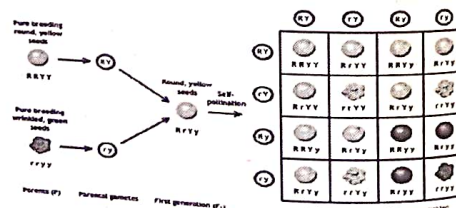
- Mendel then allowed the F1 plants to self-pollinate.
- In the F2 generation, he observed four types of seeds:
  - ▶ **Yellow, round**
  - ▶ **Yellow, wrinkled**
  - ▶ **Green, round**
  - ▶ **Green, wrinkled**

### 5. Results:

- The F2 generation showed a **9:3:3:1 ratio**:
  - ▶ 9 plants with yellow, round seeds
  - ▶ 3 plants with yellow, wrinkled seeds
  - ▶ 3 plants with green, round seeds
  - ▶ 1 plant with green, wrinkled seeds

### 6. Conclusion:

- Mendel concluded that each trait is inherited independently, following the **Law of Independent Assortment**.
- This means the inheritance of one trait (like color) does not affect the inheritance of another trait (like shape).



# GENERAL SCIENCE PAPER - II BIOLOGICAL SCIENCE MODEL PAPER - III

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## SECTION - I

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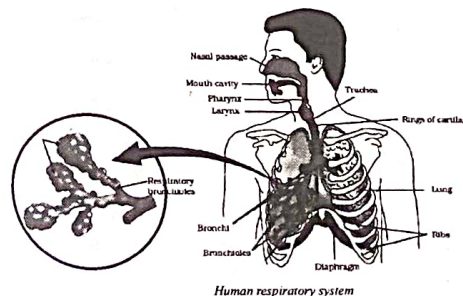
1. Answer **all** the questions.

2. Each question carries **1** marks.

1. What is a catabolic process? Give an example for it
2. What is the main function of the ozone layer?
3. What is the role of DNA in genetics?
4. Look at the number pyramid showing the trophic levels, based on the number of organisms in each trophic level, which group of organisms has the highest (most) individuals and which group has the Fewest?



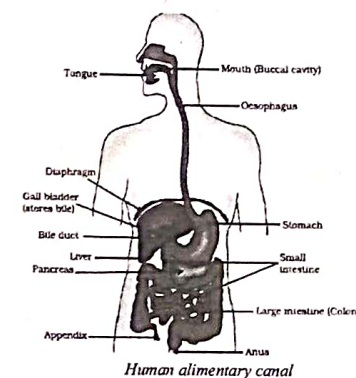
5. What is a Pedigree chart?
6. Observe the diagram of human respiratory system and identify the circled part and name it



## SECTION - II

4 × 2 = 8 M

1. Answer all the questions.
2. Each question carries 4 marks.
7. Why is the use of iodised salt advisable?
8. Observe the diagram and answer the following questions.



- i. What is the longest part of the alimentary canal?
  - ii. Which part connects the mouth and stomach?
9. What is the role of decomposers in the ecosystem?
  10. What is ozone and how does it affect an ecosystem?

## SECTION - III

5 × 4 = 20 M

1. Answer all the questions.
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11. Write differences between autotrophic nutrition and heterotrophic nutrition.
12. Observe the diagram and answer the following questions.

