GENERAL SCIENCE PAPER - II
BIOLOGICAL SCIENCE
MODEL PAPER - I

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

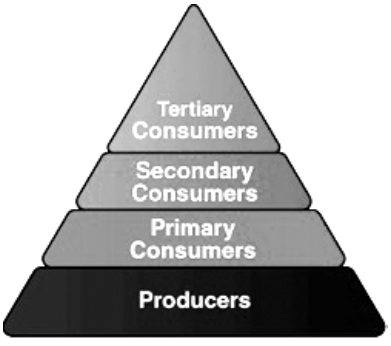
Instructions :

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 question 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. Answer should be written neatly and legibly.

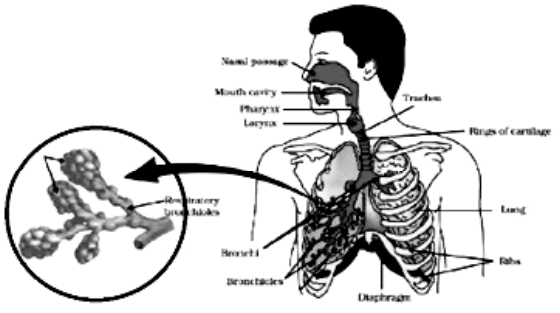
SECTION - I **6 × 1 = 6 M**

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

1. What is the equation of photosynthesis?
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. On which plant did Gregor Johann Mendel conduct his famous experiments on inheritance?
6. Observe the diagram of human respiratory system and identify the circled part and name it.

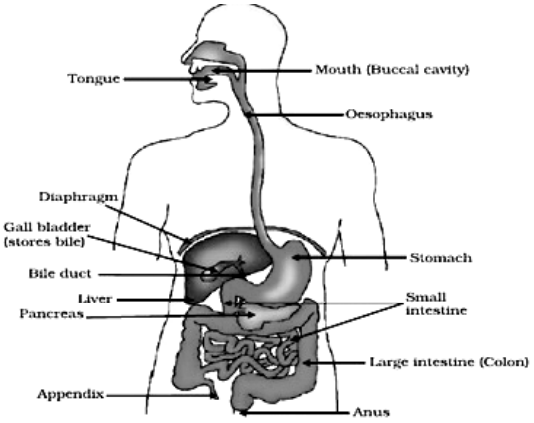


Human respiratory system

SECTION - II **4 × 2 = 8 M**

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

7. Why is the use of iodised salt advisable?
8. Observe the diagram and answer the following questions.



Human alimentary canal

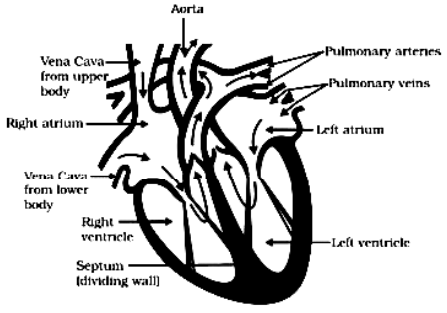
i. What is the longest part of the alimentary canal?
ii. Which part connects the mouth and stomach?

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.
2) Each question carries 4 marks.

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



Schematic sectional view of the human heart

i. How many Chambers are there in the human heart?
ii. Which Chamber of the heart receives deoxygenated blood?

iii. Which chamber pumps oxygenated blood to the body?

iv. Where is the tricuspid valve located?

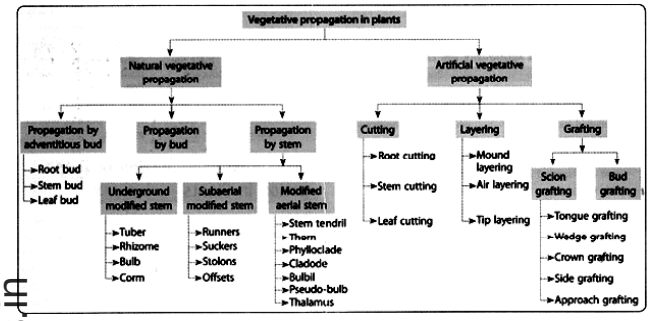
(OR)

12.(B) Draw a neat labelled diagram of human male reproductive system.

13. Explain the process of nutrition in Amoeba with the help of a diagram.

14. What is a food chain? Explain with a suitable example.

15. Observe the flowchart and answer the following questions.



i. What are the two main types of vegetative propagation in plants?

ii. Name the three methods of artificial vegetative propagation?

iii. Which category of vegetative propagation does grafting belong to?

iv. Give two examples of natural vegetative propagation.

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 an experiment to prove the action of saliva on starch?

(OR)

16.(B) Write differences between binary fission and multiple fission.

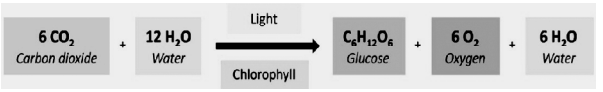
17.(A) What is the difference between the manner in which movement takes place in a sensitive plant and the movement in a leg?

(OR)

17.(B) Write about Mendel's Monohybrid experiment

ANSWERS

SECTION – I

1. 

2. The main function of Ozone layer (O3) is to protect the earth by absorbing most of the harmful ultraviolet (UV) rays from the sun, which can be dangerous to the living things on the Earth.

3. DNA – Deoxyribonucleic acid carries genetic information from parents to off springs and serves as the hereditary material.

4. The producers are the most numerous (highest), while the tertiary consumers are the fewest in number in the given number pyramid.

5. Gregor Johann Mendel conducted his experiments on **pea plants (Pisum sativum).**

6. The labelled part is identified as alveoli

SECTION – II

7.

i. Iodine is essential for making thyroid hormones, like thyroxin

ii. Thyroxin regulates carbohydrates and protein metabolism in our body.

iii. When there is insufficient iodine in the diet, the thyroid gland enlarges in size.

iv. This enlargement of thyroid is called as simple goitre.

v. Therefore to prevent goitre the use of iodized salt is recommended.

8.

i. Small intestine is the longest part of the alimentary canal.

ii. Oesophagus connects the mouth to the stomach.

9. **<u>Role of decomposers in the ecosystem</u>**:

i. Decomposers like bacteria and fungi breakdown dead plants and animals.

ii. This process releases nutrients back into the soil which plants use to grow.

iii. Decomposers play a critical role in the flow of energy through an ecosystem.

iv. They recycle matter in ecosystem, keeping environment clean and supporting new life.

10. Ozone is a gas made up of three oxygen atoms(O_3). It is found in the earth's atmosphere, mostly in ozone layer

Effects on ecosystem:

i. Ozone absorbs harmful UV rays, protecting living beings from radiation that can cause skin cancers, eye damage and the other health issues.

ii. Ozone helps plants grow properly, which is essential for food chains and O_2 production

SECTION – III

11. **Differences between Autotrophic nutrition and Heterotrophic nutrition:**

S. No	AUTOTROPHIC NUTRITION	HETEROTROPHIC NUTRITION
1	Food is synthesized from simple inorganic raw materials such as CO_2 and water	Food is obtained directly or indirectly from autotrophs, which is broken down with the help of enzymes
2	Presence of green pigment (chlorophyll) is necessary	No pigment is required in this type of Nutrition
3	Food is generally prepared during the day time	Intake of food takes place at any time
4	All green plants and some bacteria exhibit this type of Nutrition	All animals and fungi exhibit this type of Nutrition

12.(A)

I. There are four Chambers in the heart.

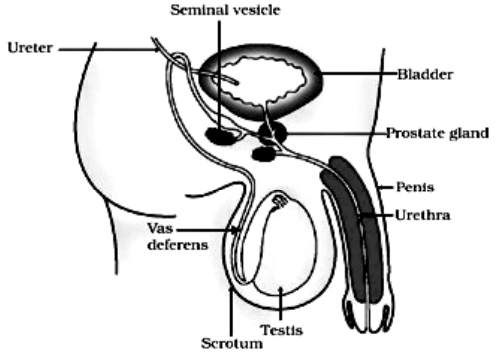
II. The right Atrium receives deoxygenated blood from the body.

III. The left ventricle pumps oxygen blood to the entire body via the Aorta

IV. Tricuspid valve is located between the right Atrium and the right ventricle in the heart

(OR)

12.(B)



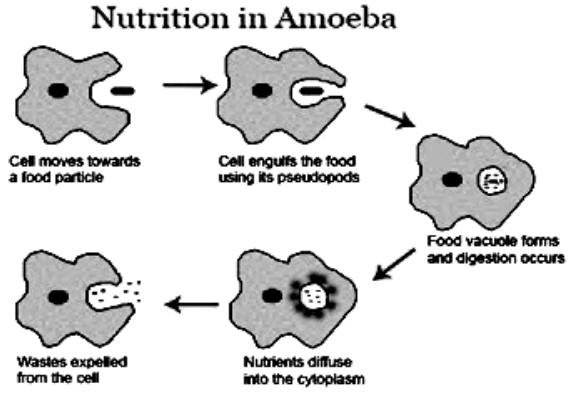
Human–male reproductive system

13. The process of nutrition in Amoeba involves five steps

1. Ingestion
2. Digestion
3. Absorption
4. Assimilation
5. Egestion

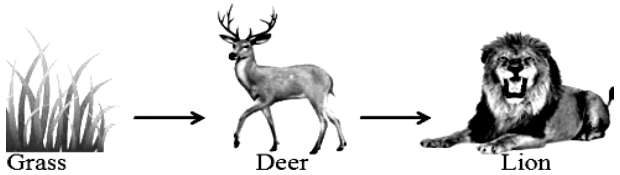
Amoeba obtains food by Phagocytosis

1. **Ingestion:** Amoeba engulfs food particles such as small algae and bacteria. The pseudopodia fuse over the food particle forming a food vacuole.
2. **Digestion:** Inside the food vacuole Complex food substances are broken down into simple ones
3. **Absorption:** The digested simple substances are diffused into the cytoplasm
4. **Assimilation:** The digested food is utilized for the metabolic activities.
5. **Egestion :** The remaining undigested waste material is moved near the surface of the unicellular body of amoeba and expelled from the cell



14. **Food chain:** A food chain is a sequence that shows how energy and nutrients flow from one organism to another in an ecosystem.

An example of a simple food chain is that operating in grassland



Grass (Producer) → Deer (Herbivore) → lion (Carnivore)

1. **Producers (Autotrophs):** Organisms that produce their own food through photosynthesis or chaemosynthesis. They are usually plants or algae that convert Sunlight into energy.
   Example: Grass is a producer, because it uses sunlight to produce its own food through photosynthesis.
2. **Primary consumers(Herbivores):** These are organisms that feed directly on producers. They are herbivores that consume plants for their energy
   Example: A rabbit is a primary consumer, because it eats grass
3. **Secondary consumer (Carnivores or omnivores):** Secondary consumers are animals that survive by eating animals that eat plants. If they eat only meat, they are called carnivores. If they eat both plants and animals, they are called omnivores.

5.

i. The two main types of vegetative propagation in plants are 1. Natural vegetative propagation and 2. Artificial vegetative propagation
ii. Three methods of artificial vegetative propagation are cutting, layering and grafting
iii. Grafting belongs to artificial vegetative propagation.
iv. Two examples of natural vegetative propagation are Runners (Strawberry) and tubers (potatoes).

SECTION – IV

16.(A)

Aim: To demonstrate the action of saliva on starch

Materials Needed:

- Starch solution (1-2% concentration)
- Test tubes (at least 2)
- Fresh saliva sample (from rinsed mouth)
- Iodine solution (indicator for starch)
- Water bath (optional, to maintain temperature)
- Dropper

Procedure:

1. **Collect a Saliva Sample:** Rinse your mouth with water, then wait a few minutes and collect a small amount of saliva in a clean container (e.g., test tube).
2. **Prepare Test Tubes:**

o Label two test tubes as **A** and **B**.

o In both tubes, add 5ml of the starch solution.

3. **Add Saliva:**

o In test tube **A**, add 1ml of saliva.

o Do not add saliva to test tube **B**

4. **Incubate the Test Tubes:**

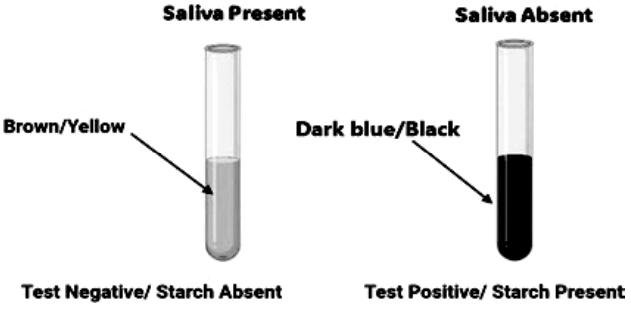
o Place both test tubes in a water bath at around 37°C (body temperature) for 10–15 minutes. This temperature is optimal for enzyme activity in saliva.

o Alternatively, you can leave the tubes at room temperature if a water bath is not available.

5. **Test for Starch with Iodine:**

o After incubation, add a few drops of iodine solution to both test tubes.

o Observe the color change in each test tube.



Observation:

- **Test Tube A (with saliva):** The solution should remain brown or yellow (the color of iodine) if starch has been broken down by the saliva.
- **Test Tube B (without saliva):** The solution should turn blue-black, indicating the presence of unbroken starch.

Results and Conclusion:

- **Interpretation:** If the solution in test tube **A** does not turn blue-black, it indicates that the starch has been broken down into simpler sugars by the amylase enzyme in saliva.
- **Conclusion:** This experiment demonstrates that saliva contains an enzyme (amylase/Ptylin) that can break down starch into simpler sugars.

(OR)

16.(B)

Differences between binary fission and multiple fission:

Feature	Binary Fission	Multiple Fission
Definition	Division of a single organism into two equal parts.	Division of a single organism into many smaller parts.
Number of Offspring	Produces two daughter cells.	Produces multiple daughter cells.
Process	The cell splits into two after duplicating its genetic material.	The nucleus divides repeatedly to form several nuclei, followed by cell division.
Example Organisms	Bacteria, Amoeba, Paramecium	Plasmodium (malaria parasite), some amoebae
Environmental Conditions	Commonly occurs in favorable conditions.	Often occurs in unfavorable conditions for survival.
Speed of Process	Usually quick; takes less time.	Takes more time as multiple divisions occur.
Genetic Similarity	Offspring cells produced are generally of similar size to the parent cell	Offspring cells produced are often similar in size to the parent cell.

17.(A) Comparison between movement in a sensitive plant and movement in a leg:

Feature	Sensitive Plant (e.g., *Mimosa pudica*)	Movement in Leg (Human/Animal)
Type of Movement	Plant movement (non-muscular)	Animal movement (muscular)
Control System	Triggered by touch (not controlled by brain) – Classified as tropic or nastic movement	Controlled by the nervous system, specifically the brain and spinal cord
Cause of Movement	Changes in water pressure in cells	Muscle contraction and relaxation
Energy Requirement	Less energy, based on internal water pressure changes	Requires more energy (ATP) for muscle contraction
Response Time	Quick, but slower than muscles	Very fast response due to direct nerve impulses
Example	Leaf folds when touched	Leg bends or moves upon nerve signals from the brain

17.(B)

1. Introduction :

- Gregor Johann Mendel, known as the "Father of Genetics," conducted experiments on pea plants to understand how traits are passed from one generation to the next.
- He chose pea plants because they have easily observable traits and can be easily cross-pollinated.

2. Trait Selection :

- Mendel focused on *one trait at a time* to keep the experiment simple. For example, he chose plant height as a trait, with two variations: *tall* and *short*.

3. Parental Cross (P Generation):

- Mendel selected two *pure-breeding parent plants*: one tall and one short.
- "Pure-breeding" means that these plants consistently produced the same trait over many generations.
- He cross-pollinated the tall parent plant with the short parent plant.

4. First Filial Generation (F1 Generation) :

- All plants in the first generation, called the *F1 generation*, were *tall*.
- The short trait seemed to disappear, which suggested that tallness was *dominant* over shortness.

5. Self-Fertilization of F1 Plants :

- Mendel then allowed the tall F1 plants to self-pollinate (fertilize themselves) to produce the next generation, called the *F2 generation*.

6. Second Filial Generation (F2 Generation) :

- In the F2 generation, both tall and short plants appeared. About *75% of the plants were tall*, and *25% were short*, showing a 3:1 ratio of tall to short plants.

7. Conclusion

- Mendel concluded that traits are controlled by "factors" (now known as *genes*) that exist in pairs. Each parent passes one factor to the offspring. In the case of plant height, the tall factor was *dominant*, while the short factor was *recessive*.
- This experiment laid the foundation for the *laws of inheritance* in genetics.

GENERAL SCIENCE PAPER - II
BIOLOGICAL SCIENCE
MODEL PAPER - II

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

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2. Internal choice is available only for Q.No. 12 in section III and for all the question in section IV.
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SECTION - I **6 × 1 = 6 M**

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

1. What is the main purpose of valves in the heart?
2. $O_2 \rightarrow O + O, O + O_2 \rightarrow O_3$ (Ozone)
   i. How many oxygen atoms are there in one molecule of Ozone?
   Arrange the following in the correct order of the food chain.

Grass hopper ⇨ Hawk ⇨ Frog ⇨ Grass ⇨ Snake

4. Observe the checker board

♂ \ ♀	T	t
T	TT	Tt
t	Tt	tt

Q) What is the genotypic ratio in the f2 generation shown in the above checker board?

5. What is the purpose of variations? Please provide a brief answer.
6. What are the functional units of the human kidney?

SECTION - II **4 × 2 = 8 M**

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

7. What questions will you ask, if you have a chance to meet a Cardiologist?
8. What is the role of saliva in the Digestion of food?
9. Read the paragraph.

   Substances that are broken down by biological processes are said to be biodegradable. Substances that are not broken down in this manner are said to be non bio-degradable. These Substances may be inert and simply persist in the environment for a long time or may harm the various members of the Eco-system.

Answer the following questions

I) What do you mean by biodegradable substances?

II) Why are non-bio-degradable substances harmful to the environment?

10. What will happen to the food chain, if all the organisms in one trophic level are removed?

SECTION - III **5 × 4 = 20 M**

1) Answer all the Questions.
2) Each question carries 4 marks.

11. Read the following table & answer the questions

S. No	Hormone	Endocrine Gland	Function
1	Growth Hormone	Pituitary Gland	Stimulates growth in all organs
2	Thyroxin	Thyroid	Regulates metabolism
3	Testosterone	Testes	Development of male sex organs, beard, moustaches
4	Progesterone & Estrogens	Ovaries	Development of female sex organs, regulates menstrual cycle
5	Adrenaline	Adrenal	Increasers heart beat, rate of breathing, emotions
6	Insulin	Pancreas	Regulates blood sugar level

i) Name the hormone that regulates blood sugar level?

ii) Which hormone is responsible for development of secondary Sexual Characters in males?

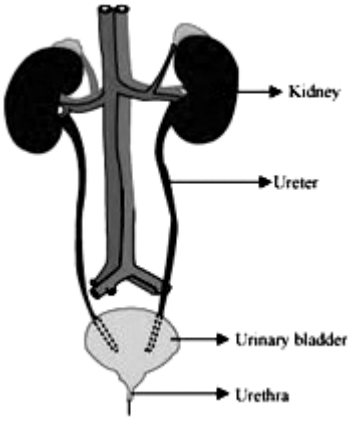
iii) Which hormone is responsible for human growth & increase in height?

iv) Which gland produces the hormone " Thyroxin"?

12. Draw a neat, labelled diagram of the Longitudinal Section (L.S) of a flower.

(OR)

12.(B) Observe the given diagram and answer the following questions.



i) What is the main function of the kidneys in the human body?

ii) Which part of the excretory system connects Kidneys to the urinary bladder?

iii) Where is urine stored in the human excretory system?

iv) What is the name of the opening through which urine is expelled from the urinary bladder?

13. How can you help in reducing the problem of waste disposal? Give any two methods.

14. Write any four differences between xylem & phloem.

15. Why does menstruation happen each month in the female body?

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 do you demonstrate the presence of starch in various areas of a leaf?

(OR)

16.(B) What are the different methods of contraception?

17.(A) Explain tropic movements with suitable examples.

(OR)

17.(B) How is the sex of the child determined in human beings?

ANSWERS

SECTION – I

1. Heart Valves keep blood flowing in one direction only and prevent backward flow.
2. One molecule of ozone contains three oxygen atoms
3. Grass ➡ Grass Hopper ➡ frog ➡ snake ➡ Hawk
4. The genotypic Ratio

i.e TT : Tt : tt is 1: 2: 1

5.i) Variations provide a better adaptation of an organism to the changing environmental Conditions.

ii) Variations create diversity within a Species to develop disease resistant Varieties.

6. Nephrons/ Uriniferous tubules are the functional units of the human kidney.

SECTION – II

7. Any two from the following:
   i) How Can I keep my heart healthy for a longer period?
   ii) What are the main signs of heart disease? How can we recognise them early?
   iii) How does stress affect the heart?
   iv) How does walking & exercise influence the heart?
   v) What is the difference between heart attack and Cardiac arrest?

8.
   i) Saliva contains a digestive enzyme called salivary amylase/ Ptyalin, which breaks down starch into Sugars.
   ii) It is thoroughly mixed with the food to form food bolus. & helps in swallowing the food.

9.
   i) A substance is biodegradable, if it can be broken down by natural or biological processes.
   ii) Non-biodegradable Substances can harm the environment, by persisting for a long time.

10. If we kill all the organisms in one trophic level

i) The transfer of food energy to the next trophic level will be stopped.

ii) The population in the previous trophic level will increase.

iii) Similarly the organisms of higher trophic level will also die of starvation.

iv) Hence, it will result in imbalance in the Ecosystem.

For example: If we remove frogs from the food chain, the population of grass hoppers will be increased, on the other hand the population of Snakes which depend on frogs will be decreased, resulting in ecological imbalance

SECTION – III

11.

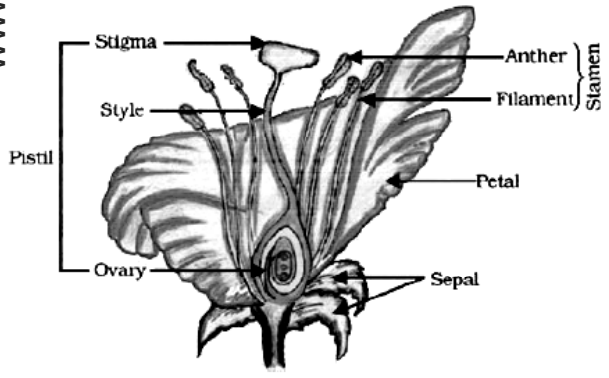
i) The hormone – **Insulin**, regulates the Blood Sugar level.

ii) **Testosterone** is the hormone, responsible for secondary Sexual Characters in males

iii) **Growth hormone** is responsible for human growth & increase in height.

iv) Thyroxin is produced by the **thyroid gland**.

12.(A)



Longitudinal section of flower

OR

12.(B)

i) The main function of the Kidneys is excretion of nitrogenous wastes such as urea and uric acid.

ii) The ureters connect the kidneys to the urinary bladder.

iii) Urine is stored in the urinary bladder.

iv) Urine is expelled out through the urethra.

13. The following are few methods to help reduce the problem of waste disposal:

i) **Composting**: Turn organic waste into nutrient-rich Compost.

ii) **Recycling**: Encourage recycling of materials like paper, plastic and metal to conserve resources and decrease their use

iii) Use reusable bottles and cups

iv) Avoid Single use plastic.

v) Reduce Paper usage by opting alternatives like e-books, e-receipts, e-magazines etc...

vi) Purchase wisely & recycle.

vii) Buy Second hand items to limit demand for new products.

viii) Donate used goods to extend their life and benefit others.

14.

Sl. No.		XYLEM	PHLOEM
1.	Function:	Transports water and minerals from roots to the rest of the plant.	Transports food (sugars) made in the leaves to other parts of the plant.
2.	Direction of Flow:	Moves mostly upward from roots to leaves	Moves both upward and downward, depending on where the food is needed
3.	Structure:	Made of thick-walled cells, providing support to the plant	Made of thin-walled cells, which are more flexible
4.	Dead or Alive:	Cells are mostly dead at maturity, helping to form strong tubes.	Cells are alive, allowing for active transport of food

15.

i) Menstruation is a part of the body's monthly cycle for pregnancy preparation.

ii) Each month an egg is released from an ovary & travels through the fallopian tube to the uterus.

iii) The inner lining of the uterus thickens to support a possible pregnancy.

iv) If the egg is not fertilized by the sperm, pregnancy does not occur.

v) Without pregnancy, the thickened lining of uterus is not needed and the body sheds it.

vi) This shedding is released through the vagina as menstrual bleeding, marking the start of new cycle.

SECTION – IV

16.(A) **Aim:** To prove the presence of starch in various areas of a leaf

Materials required: ***Variegated leaf, Iodine solution, Alcohol, Beaker, Bunsen burner***

Procedure:

a. Take a potted plant with variegated leaves. For example money plant or Crotons.
b. Keep the plant in a dark room for three to four days, so that all the starch gets used up.
c. Now keep the plant in sunlight for about 6 hours.
d. Pluck a leaf from the plant. Mark the green areas in it and trace them on a sheet of paper.
e. Dip the leaf in boiling water for a few minutes.
f. After that, place it in a beaker with alcohol.
g. Carefully place the above beaker in a water bath and heat, till the alcohol begins to boil.

Observation:

The leaf turns colourless. Chlorophyll dissolves in alcohol, making the alcohol turn green. If we dip the leaf in a weak iodine solution for a few minutes, the green parts turn dark blue. This shows that starch is present in those areas. The colorless parts of the leaf show no starch.

Result:

The green areas of the leaf, which have chlorophyll, are able to perform photosynthesis. We can use iodine solution to confirm that starch is produced during this process

Variegated leaf
(a) before and (b) after starch test

(OR)

16.(B) **Contraception** is a way to prevent pregnancy during or after sex.

- It's important because it helps people plan, if and when they want to have children.
- The following are some important methods of contraception:

- **Barrier Methods**:
  - **Condoms**: A thin cover is put on the penis during sex to stop sperm from getting to the egg.
  - **Diaphragms**: A small cup is placed inside the vagina to block sperm.
- **Hormonal Methods**:
  - **Birth Control Pills**: Pills taken by the females every day to stop the body from releasing eggs.
  - **Patch**: A sticker is placed on the skin that releases hormones to prevent pregnancy.
  - **Injection**: A shot is given every few months that stops ovulation.
- **IUDs (Intra Uterine Devices)**:
  - Small devices are put inside the uterus by a doctor or a qualified person to stop pregnancy. Some of these IUDs use hormones, and others use copper.
- **Natural Methods**:
  - **Fertility Awareness**: Keeping the track of the menstrual cycle to avoid sex on fertile days.
  - **Withdrawal**: The man pulls out his penis before ejaculation to prevent sperm from entering the vagina.
- **Permanent / Surgical Methods**:
  - **Sterilization**: A surgical procedure that makes it impossible to have children. This is permanent
  - **Vasectomy for males and Tubectomy for females are surgical methods**.
- **Emergency Contraception**:
  - These pills are taken immediately after a rape or an unprotected sex to help prevent pregnancy.

17.(A) **Tropic Movements** are the ways plants grow or move in response to different environmental factors. Here are the main types with examples:

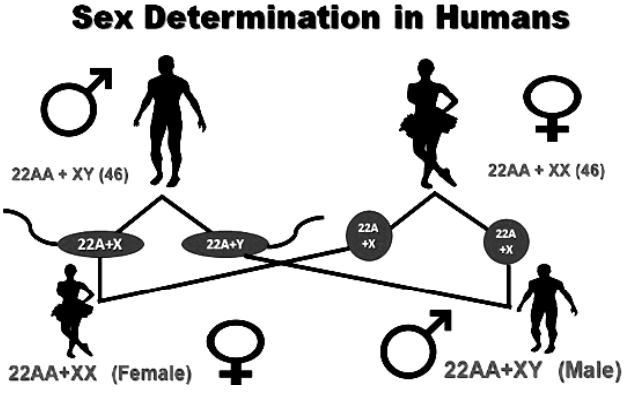
1. **Phototropism**: Response of a plant to light is called phototropism
   - Plants grow towards light.
   - **Example**: A sunflower turns to face the sun as it moves across the sky.
2. **Geotropism (or Gravitropism)**: Response of a plant to gravitational force is called Geotropism
   - Plants respond to gravity. Roots grow down (positive gravitropism), while stems grow up (negative gravitropism).
   - **Example**: A seedling's roots grow downward into the soil, while its stem grows upward toward the light.
3. **Hydrotropism**: Response of a plant to water availability in the soil is called Hydrototropism
   - Plants grow towards water.
   - **Example**: Roots of a plant will grow in the direction where there is more moisture in the soil.
4. **Thigmotropism**: Response of a plant to touch is called Thigmotropism.
   - Plants respond to touch.
   - **Example**: Climbing plants, like vines, wrap around nearby objects, when they touch them.
5. **Chemotropism**: Response of a plant to chemical is called Chemotropism
   - Plants grow towards or away from chemicals.
   - **Example**: Roots may grow toward nutrients in the soil, like fertilizers.

These movements help plants adapt and survive better in their environments

(OR)

17.(B) Sex determination in humans refers to how our biological sex is established at the moment of conception. This process involves both genetic and chromosomal factors.

1. **Chromosomes**:
   i. Humans have 23 pairs of chromosomes, totalling 46.
   ii. Among these, one pair is known as the sex chromosomes, which are either XX or XY. They are also called as Allosomes.
   iii. Females typically have two X-chromosomes (XX), while males have one X and one Y-chromosome (XY). – (XX-XY type of sex determination)
2. **Fertilization**:
   1. When a sperm fertilizes an egg, the combination of sex chromosomes from both parents determines the biological sex of the offspring.
   2. Eggs always carry an X-chromosome, while sperm can carry either an X or a Y chromosome (50% of the sperms with X-chromosome and remaining 50% with Y chromosome).
   3. If the sperm carrying an X-chromosome fertilizes the egg, the result is a female (XX).
   4. If the sperm carrying a Y chromosome fertilizes the egg, the result is a male (XY).
3. **Development**: After fertilization, the embryo begins to develop. Around the 6th week of gestation, the presence of the Y-chromosome triggers the development of male characteristics. If the Y-chromosome is absent (as in XX embryos), the default development leads to female characteristics.
4. **Hormonal Influence**:
   i. The sex hormones produced by the developing testes or ovaries further influence sexual development.
   ii. In males, testosterone promotes the development of male reproductive structures.
   iii. In females, the absence of testosterone allows for the development of female reproductive structures.



GENERAL SCIENCE PAPER - II
BIOLOGICAL SCIENCE
MODEL PAPER - III

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

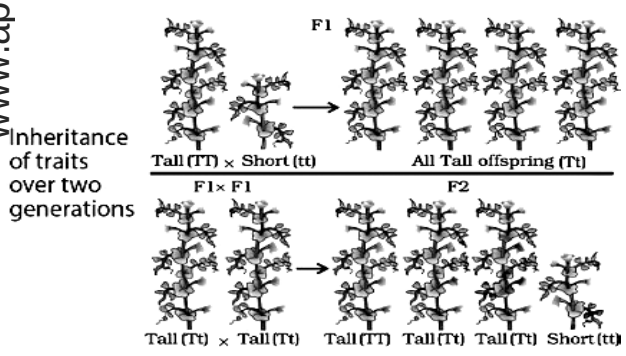
Instructions :

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 question 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. Answer should be written neatly and legibly.

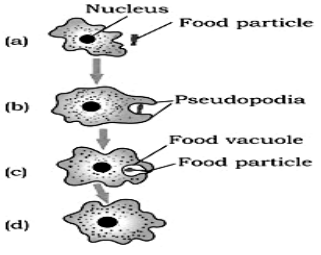
SECTION - I **6 × 1 = 6 M**

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 given diagram and write the **phenotypic ratio** of the F, generation.



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 **2** marks.

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

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 .

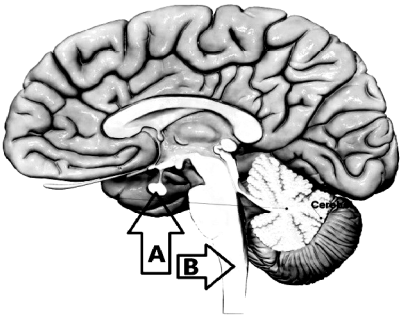
i. Who is at the second trophic level in a food chain?
ii. What do autotrophs do with solar energy?

10. 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.(A) Observe the given diagram and answer the questions that follow.



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)

12.(B) Draw a neat labeled diagram of the **human female reproductive system**.

13. Why does excessive accumulation of pesticides in rivers or Ponds, become a serious environmental concern?

14. How can you maintain good genital hygiene? Suggest some tips.

15. Read the following table

SI. 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 that acts on proteins?
ii. Where is salivary amylase secreted?
iii. Name any two enzymes secreted by pancreas.
iv. Which life process is represented 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 an experiment to prove that carbon dioxide (CO2) is essential for photosynthesis?

(OR)

16.(B) How do modes for reproduction different in unicellular and multicellular organisms?

17.(A) Describe the structure and functions of a neuron..

(OR)

17.(B) Write the **differences between F1 and F2 generations**.

ANSWERS

SECTION – I

1. The enzyme present in human saliva, that helps in the digestion of carbohydrates is Salivary amylase or Ptyalin
2. The depletion of the ozone layer is mainly caused by **ozone-depleting substances (ODS)** such as **chlorofluorocarbons (CFCs)** used in refrigerators, air conditioners, and aerosols.
3. The phenotypic ratio in the F2 generation is **3:1** - three tall plants and one dwarf plant.
4. The term 3R stands for **Reduce, Reuse and Recycle**
5. In the **F_1 generation**, **100%** of the plants are tall; in the **F_2 generation**, **75%** are tall and **25%** are dwarf.
6. The figure represents **holozoic nutrition** (as seen in Amoeba).

SECTION – II

7. More urine is produced in winter because the body **sweats less** in cold weather. As a result, **excess water** is eliminated through urine.
8. Sample questions to ask a nephrologist: (Any two from the following)
   - What foods should I eat or avoid for healthy kidneys?
   - How can I prevent kidney stones?
   - How often should I check my kidney function?
   - Are there any medicines that may harm my kidneys?
   - What are the factors responsible for kidney failure?
9.

(a) **Herbivores** or **primary consumers** occupy the second trophic level.

(b) **Autotrophs** capture solar energy and convert it into **chemical energy** through photosynthesis, making it available to other organisms.

10. Eco-friendly alternatives to plastic:

Any two from the following :

- Use **cloth or jute bags** instead of plastic ones.
- Store food in **glass or metal containers.**
- Carry **refillable water bottles.**
- Use **bamboo or wooden utensils.**
- Replace disposable wipes with **cloth towels.**

SECTION – III

11. Differences between Aerobic and Anaerobic Respiration

	Aerobic respiration	Anaerobic respiration
Oxygen	Requires oxygen	Occurs in the absence of oxygen
Energy yield	Produces about **38 ATP molecules**	Produces only **2 ATP molecules**
End products	Carbon dioxide and water	Lactic acid (in animals) or alcohol and CO_2 (in yeast)
Site of occurrence	Mitochondria	Cytoplasm
Oxidation of substrate	Respiratory materials are completely oxidized	Respiratory Materials are incompletely oxidized
Example	Normal muscle activity	Intense exercise or fermentation
Chemical equations:	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + Energy (ATP)	$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$ + Energy (ATP)

12.(A)

i. A - Pitutory gland, B – Medulla Oblongata

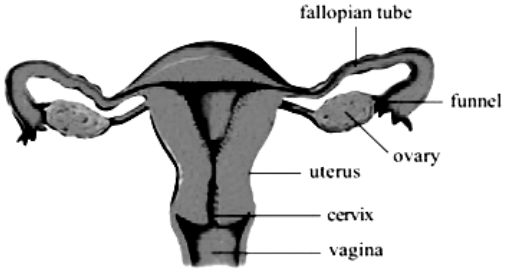
ii. The medulla oblongata of the hind brain controls involuntary actions such as blood pressure, Salivation, vomiting etc.

iii. The **midbrain** connects the forebrain and hindbrain.

iv. The **cerebrum** is the largest part of the brain, responsible for thinking, reasoning, and perception

OR

12.(B)



13. *Female reproductory system*

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 - A Process biomagnification.

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

14. **Tips for Good Genital Hygiene:**

- Wash the genital area daily with mild soap and warm water.
- Wear **cotton underwear** to allow air circulation.
- Change undergarments daily.
- Keep the area dry; avoid wearing wet clothes for long.
- Avoid **scented soaps or sprays** that can cause irritation.
- Trim pubic hair regularly to maintain cleanliness.
- Avoid using sanitary pads or liners unnecessarily.

15. (a) The enzymes that act on proteins are **pepsin** and **trypsin.**

(b) **Salivary amylase** is secreted into the **buccal cavity.**

(c) The pancreas secretes **trypsin** and **lipase.**

(d) The table represents the life process of **digestion.**

SECTION – IV

16.(A) Experiment to Prove that Carbon Dioxide is Essential for Photosynthesis

Aim: To demonstrate that carbon dioxide (CO_2) is necessary for photosynthesis.

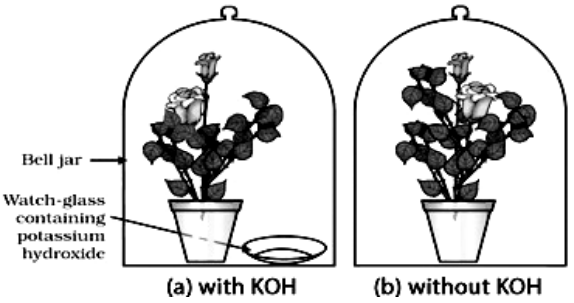
Materials: Two healthy potted plants, two bell jars, potassium hydroxide (KOH), vaseline, glass plates, iodine solution.

Procedure:

1. Keep both plants in darkness for 2–3 days to remove starch.

2. Place each plant on a glass plate and cover with a bell jar.

3. Keeps a dish containing KOH in one bell jar to absorb CO_2 ?
4. Seal both jars with Vaseline and expose them to sunlight for 2–3 hours.
5. Test a leaf from each plant with iodine solution.



Observation:

The leaf from the plant with KOH does not turn blue-black (no starch formed).

The leaf from the other plant turns blue-black (starch formed).

Result:

This proves that carbon dioxide is essential for photosynthesis.

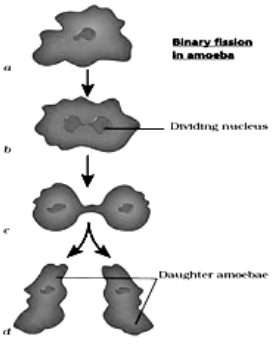
16.(B) Comparison of Modes of Reproduction in Unicellular and Multicellular Organisms:

1. **Reproduction in Unicellular Organisms:**

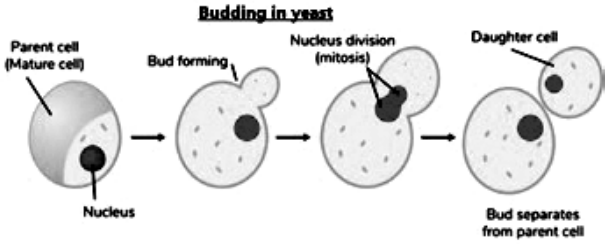
Asexual Reproduction:

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

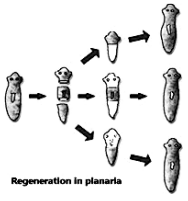
2. **Reproduction in Multi cellular Organisms:**

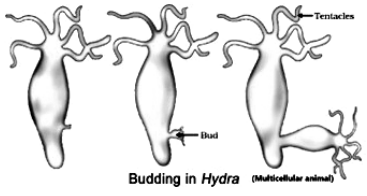
Purpose:

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..





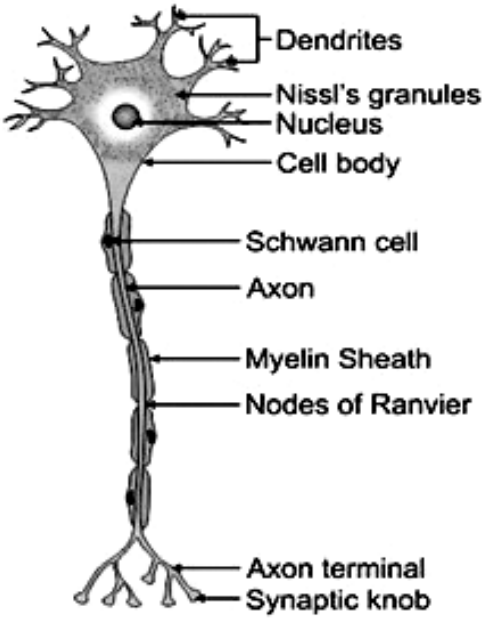
- **Sexual Reproduction:**
  - Involves the fusion of specialized cells, or gametes (sperm and egg), from two parents.
  - Results in offspring that have a unique combination of genes, promoting genetic diversity.

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 and F2 Generations:**

Feature	F1 Generation	F2 Generation
Definition	First filial generation (offspring of the parent generation) (P).	Second filial generation (offspring of the F1 generation)
Genetic Makeup	Uniform (usually all show dominant trait)	Shows both dominant and recessive traits
Genotypic Ratio	All are similar (e.g., Tt)	1:2:1 ratio (TT:Tt:tt)
Phenotypic Ratio	All individuals show the dominant trait.	Traits appear in a 3:1 ratio for dominant to recessive traits
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).
Importance in Genetics	Helps in understanding dominant traits in inheritance.	Helps in understanding segregation of alleles and genetic variation.

(20E)

GENERAL SCIENCE PAPER - II
BIOLOGICAL SCIENCE
MODEL PAPER - IV

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

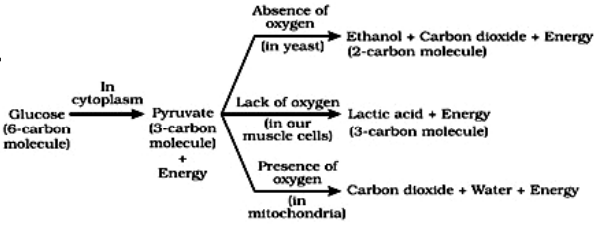
Instructions :

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 question 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. Answer should be written neatly and legibly.

SECTION - I **6 × 1 = 6 M**

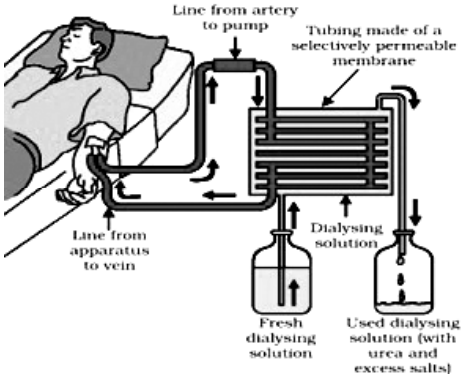
1. Answer **all** the questions.
2. Each question carries **1** marks.

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 **4 × 2 = 8 M**

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

7. What questions will you ask, if you have a chance to meet a Gastroenterologist?
8. Read the paragraph:

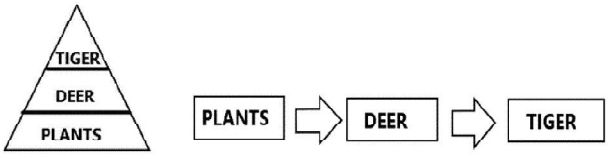
The roots of a plant always grow downwards while the shoots usually grow upwards and away from the Earth. This upward and downward growth of shoots and roots respectively, in response to the pull of Earth or gravity, is called geotropism.

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?

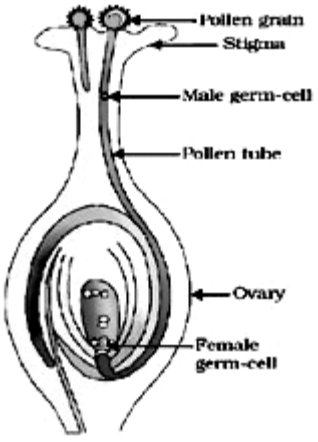
9. What is the difference between Bioaccumulation and biomagnifications?
10. In the following food chain, if 100 J of energy is available to the tiger, then how much energy was available to the deer (primary consumer) and the plants (the producers)



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.(A) Observe the diagram and answer the following questions



Germination of pollen on stigma

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 CO2 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)

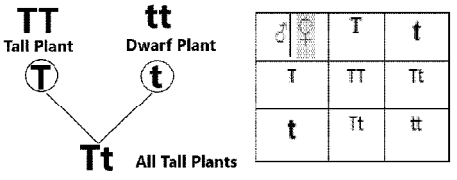
17.(B) Write about Mendel's Dihybrid experiment.

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 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.

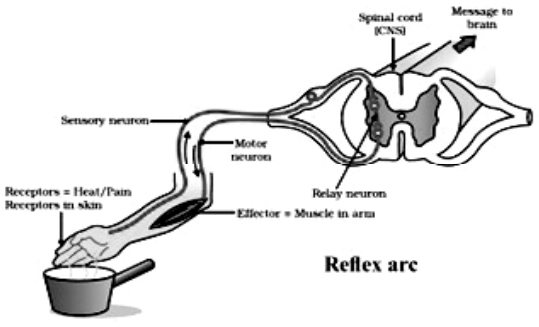
LIGHT REACTION	DARK REACTION
1. Occurs in the presence of light	1. It is light independent reaction
2.Occurs in the Grana thylakoids	2. Occurs in Stroma of Chlorophyll
3.ATP & NADPH are **formed** in this reaction	3. ATP & NADPH are **utilised**
4. This reaction is also known as Photochemical Phase	4. This is also called biosynthetic phase
5.ATP, NADPH & O2 are the end products in this reaction	5. 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)



Reflex arc

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 of 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 (Dexygenated 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_2) is released during anaerobic respiration (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_2 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.

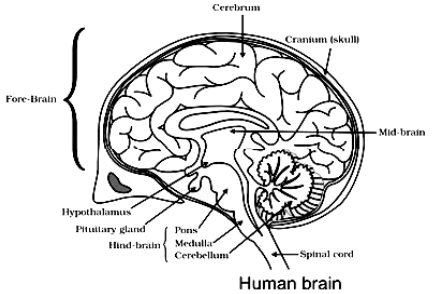
4. Hypothalamus:

- **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.



Human brain

17.(B) **Mendel's Dihybrid Experiment:**

1. Objective:

- Gregor Johann 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).