SMART SKILLS

2020-21

BIOLOGY

GRADE X

INDEX

SYLLABUS

FIRST TERM
March 2020 • Our Environment • Life Processes : Nutrition
April 2020 • Life Processes : Nutrition (Contd.) • Life Process: Respiration and Transportation
May 2020 • Life Processes: Transportation (Contd.) • Life Process: Excretion.
July 2020 • Control and Coordination. • Practical's: • To prepare a temporary mount of a leaf peel to observe stomata. • To show experimentally that carbon dioxide is given out during respiration.
August 2020 • Sustainable Management of Natural Resources • Practical's: ➢ To study (a) Binary fission in *Amoeba* (b) Budding in Yeast and *Hydra* with the help of prepared slides. ➢ To study the parts of a Dicot seed.
September 2020 • Term I Exams

SECOND TERM
October 2020 • How do organisms reproduce? • Heredity and Evolution
November 2020 • Heredity and Evolution (contd.) • Sustainable Management of Resources
December 2020 • Sustainable Management of Resources (Contd.) • Pre-Board exams
January 2021 • Pre- Board exams contd

Chapter 6

LIFE PROCESSES: Nutrition

Nutrition in plants

1. Define the following

   a) Saprophytic nutrition : _____

   _____

   b) Parasitic Nutrition: _____

   _____

   c) Holozoic Nutrition: _____

   _____

   _____

2. Define photosynthesis and write the equation. What is the source of oxygen that is produced during photosynthesis?

_____

_____

_____

_____

3. List the events occurring during the process of photosynthesis.

_____

_____

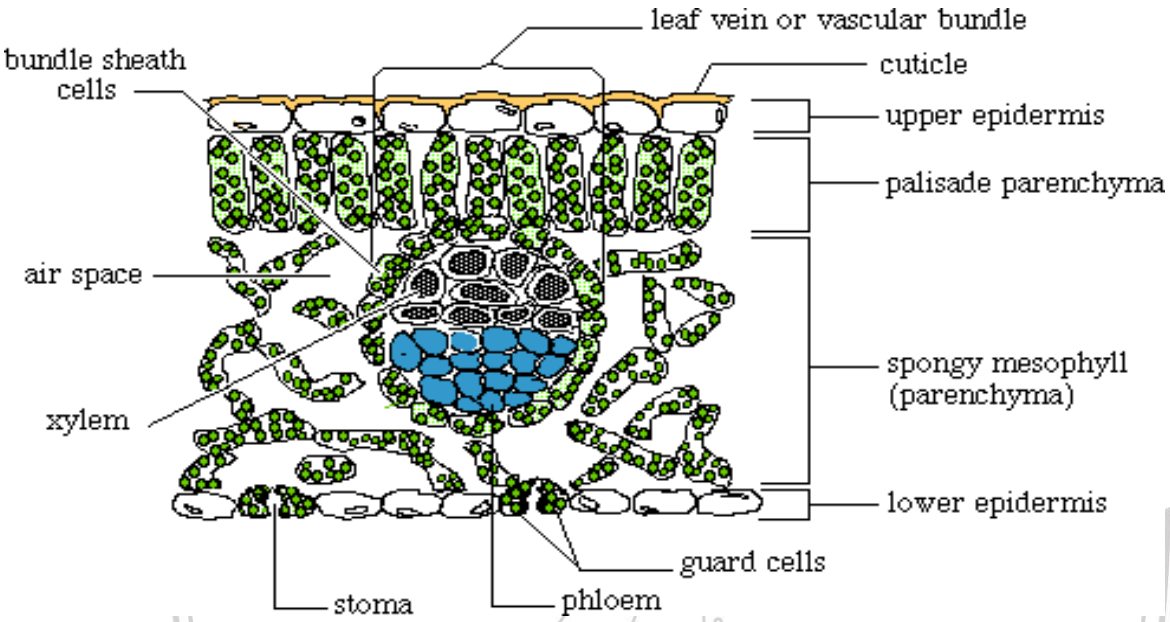
_____

4. If the surfaces of leaves are smeared with vaseline will it affect photosynthesis? Why?

_____

_____

_____



5. Identify the diagram given above and answer the following question –

a) Why it is that most of the stomata are present on the lower epidermis.

_____

_____

b) Name the two parts of mesophyll. What is the function of mesophyll tissue?

_____

_____

_____

c) Give two functions of stomata.

_____

_____

6. In desert plants stomata are closed during the day. How do they get CO_2 for photosynthesis?

_____

_____

_____

7. How do guard cells regulate the opening and closing of stomata?

_____

_____

_____

_____

8. Mention the raw materials required for photosynthesis.

_____

_____

9. Name the carbohydrate that is the reserve food material in plants.

_____

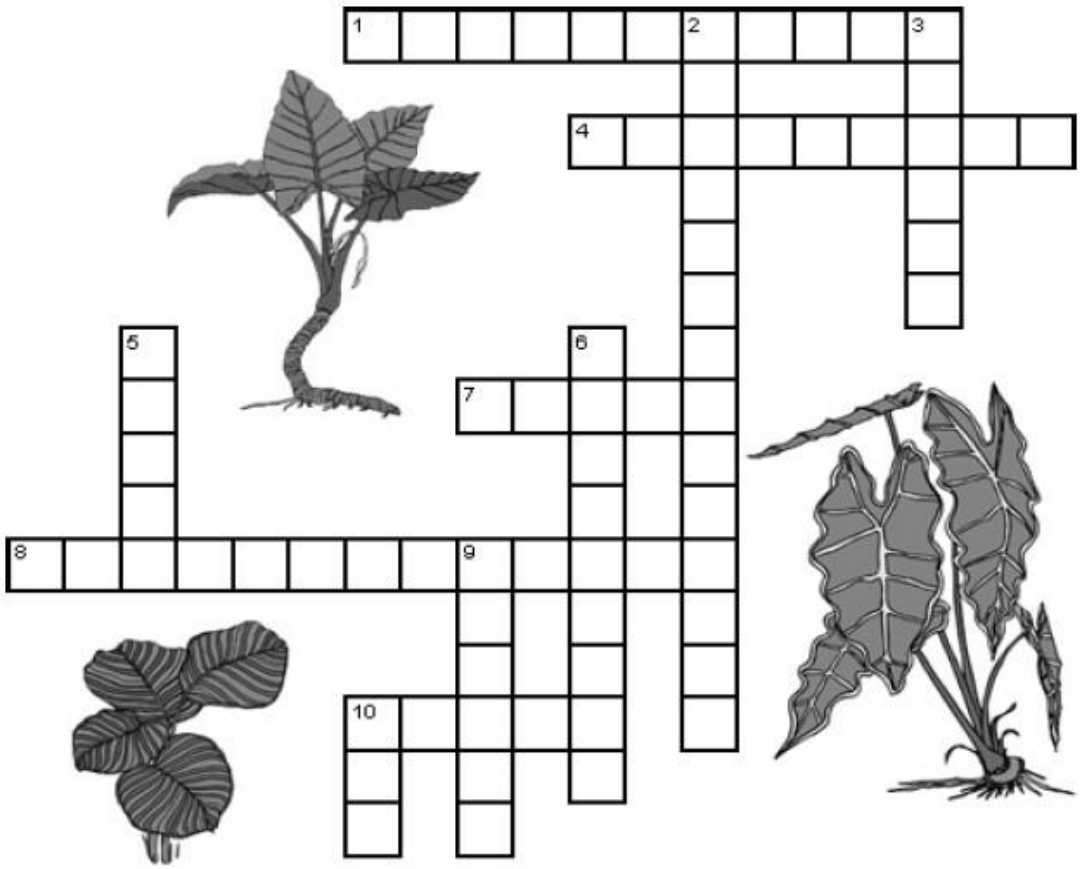
10. Photosynthesis converts energy **P** into energy **Q**. Identify **P** and **Q**

_____-

11. Two similar green plants **A** and **B** are kept separately in oxygen free containers, one in dark and the other in continuous light. Which will live longer? Give reason

_____

Photosynthesis – Crossword puzzle



Across

1 A plant pigment that absorbs sunlight. (11)

4 The links between the energy that carnivores get from eating to the energy captured by photosynthesis. (4,5)

7 Chlorophyll absorbs every color of sunlight except this. (5)

8 A compound needed for photosynthesis. (6,7)

10 The product of photosynthesis. (5)

Down

2 The process by which plants and some bacteria use the energy from sunlight to produce sugar. (14)

3 Part of the plant where photosynthesis generally occurs. (6)

5 A compound needed for photosynthesis. (5)

6 An animal that eats plants. (9)

9 A by-product of photosynthesis. (6)

10 Number of molecules of oxygen produced along with one molecule of sugar. (3)

Chapter 6

Life Process

Nutrition In Animals

1. Name the mode of nutrition seen in *Amoeba* & Humans. _____

2. Name the 5 steps involved in nutrition in human beings._____, _____, _____, _____& _____.

3. In human beings digestion begins in the mouth. Justify.

_____

_____

_____

4. Herbivores have longer intestine than carnivores. Explain.

_____

_____

_____

5. **Three common features** are necessary in all surfaces through which **absorption occurs**. State the features. Name the structure in the digestive system where absorption occurs.

_____

_____

_____

_____

6. What are biological catalysts?

_____

_____

7. Name the digestive enzymes produced from the following along with their function/s

ORGAN	DIGESTIVE ENZYME/S PRODUCED	FUNCTION
Salivary Glands		
Stomach		
Pancreas		
Small Intestine		

8. How would digestion of food be affected if:

a) Bile duct is completely blocked.

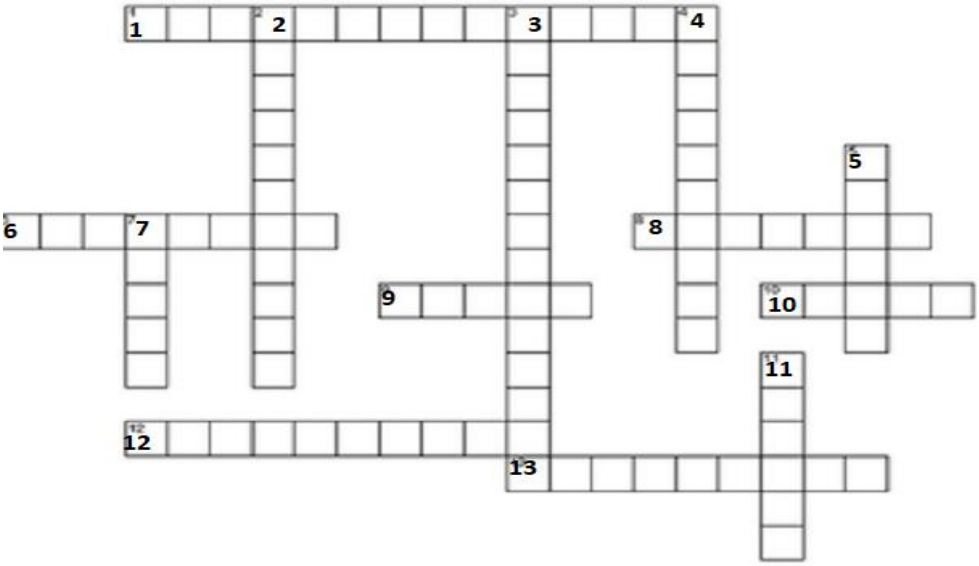
b) No HCl is secreted in our stomach

c) Blockage in the pancreatic duct

9. What is emulsification of fats?

Name:

Digestive System



ACROSS :

1. Large canal that absorbs water back into the body

6. An organ that makes digestive juice and also secretes a hormone

8. Large muscular sac that digests food

9. A large reddish organ that filters blood and secretes bile used for digestion

10. An oral cavity where digestion takes place

12. Process by which nutrients pass from wall of digestive cavity into the blood

13. A muscular passage that brings food from the mouth to the stomach

DOWN:

2. An organ located under the liver that stores bile which helps digestion

3. A winding, tightly coiled tube that absorbs digested food

4. The flap over trachea that prevents the food from entering the wind pipe

5.A section of large intestine that temporarily stores faeces before it exits the body

7. Another name for large intestine

11. Muscular organ that assists in chewing, swallowing and tasting of food

VERY SHORT ANSWER QUESTIONS (1 mark)

ASSERTION (A) and REASON(R) The following two questions consists of two statements- ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below

a) Both A and R are true and R is the correct explanation for A
b) Both A and R are true and R is not the correct explanation for A
c) A is true but R is false
d) A is false but R is true

1. **ASSERTION (A):** Opening and closing of stomatal pore is a function of guard cells.
   REASON (R): Stomatal pores are site of exchange of gases by diffusion.

_____

2. **ASSERTION (A):** Saliva contains pepsin enzyme
   REASON(R): Pepsin digests proteins

_____

3. **ASSERTION(A)**: The inner lining of small intestine has finger like projections

   REASON(R): The villi increase surface area of absorption

_____

4. Answer question 4(a) to 4(b) on the basis of your understanding of the passage and related studied concepts:

The stomach is a sac-like organ at the end of the esophagus. It has thick muscular walls that contract and relax to squeeze and mix food. This helps break the food into smaller pieces. It also helps mix the food with enzymes and other secretions in the stomach. For example, the stomach secretes the enzyme pepsin, which helps digest proteins. However, most substances must undergo further digestion in the small intestine before they can be absorbed. The stomach stores the partly digested food until the small intestine is empty. Then a sphincter between the stomach and small intestine relaxes, allowing food to enter the small intestine.

4(a) Name the enzyme secreted by the wall of the stomach.

_____

4(b) Name the component of food on which this enzyme acts.

_____

4(c) How does the thick muscular wall of stomach help in the process of digestion?

_____

_____

_____

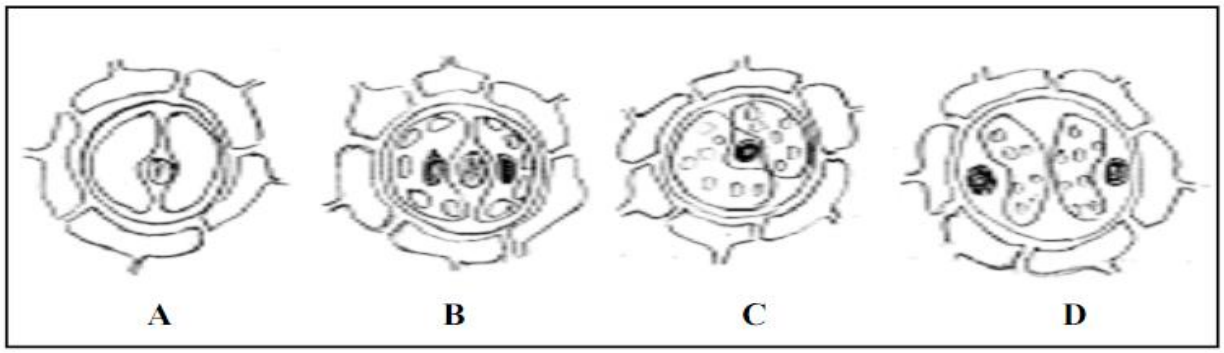
4(d) What is the role of other secretions made by the wall of stomach in the process of digestion?

_____

_____

Practical Based Multiple Choice Questions: Nutrition

1. Students observed the epidermal peel of a leaf under the high power of a microscope. The following are the sketches made by them.

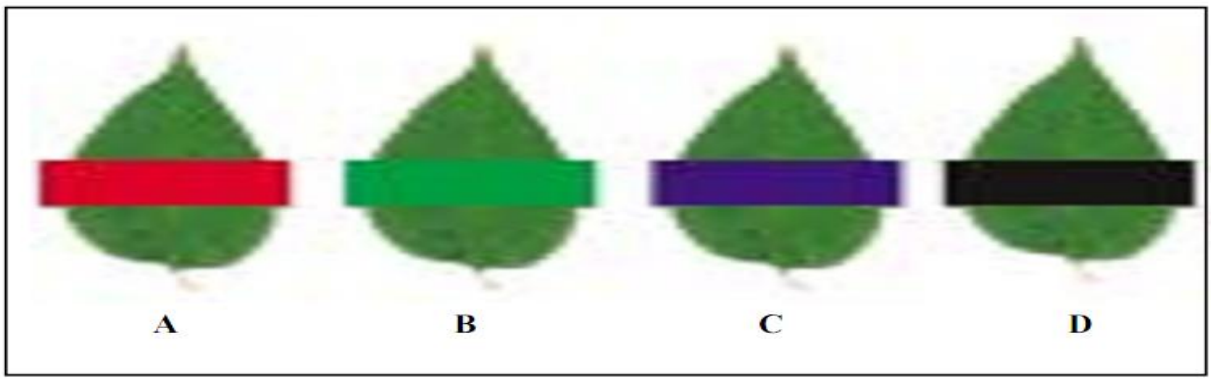


The correct sketch is

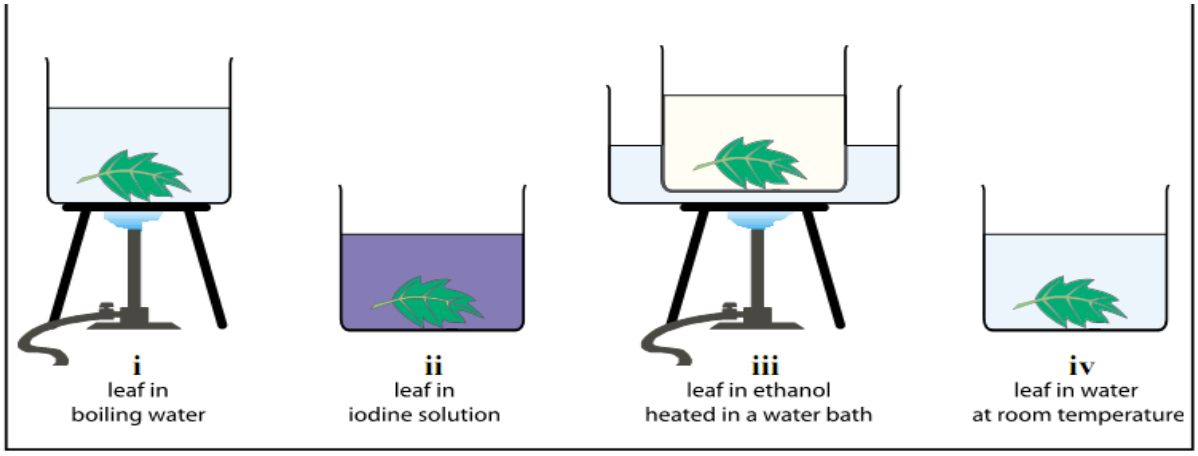
(a) A.
(b) B.
(c) C.
(d) D.

2. In an experiment on photosynthesis, students were instructed to cover a portion of a leaf of a de-starched potted plant with opaque paper as shown in the figure. "A" covered one of the leaves with red strip, "B" with green, "C" with blue and "D" with black. When the starch test was done on the leaves after 4 hours, the result showed no starch in

(a) The portion covered with red, green and blue strips.
(b) The portion covered with green strip.
(c) The portion covered with black and blue strips.
(d) Any of the covered portions.



3. A student performed the starch test on a leaf. Some steps involved are shown below.



The correct sequence of steps should be

(a) iv; iii; ii; i. (b) i; ii; iii; iv. (c) ii; iii; iv; i. (d) i; iii; iv; ii .

4. A part of de-starched leaf of a potted plant was covered with black paper strips on both sides and the plant was kept in sunlight for 8 hours. The leaf was then tested with iodine after boiling it in alcohol. Only the uncovered part of the leaf turned blue black. The inference is that

(a) CO_2 is necessary for photosynthesis.
(b) Light is necessary for photosynthesis.
(c) Chlorophyll is necessary for photosynthesis.
(d) Water is necessary for photosynthesis.

5. A student covered a leaf from a de-starched plant with a black paper strip and kept it in the garden outside his house in fresh air. In the evening, he tested the covered portion of the leaf for presence of starch. The student was trying to show that

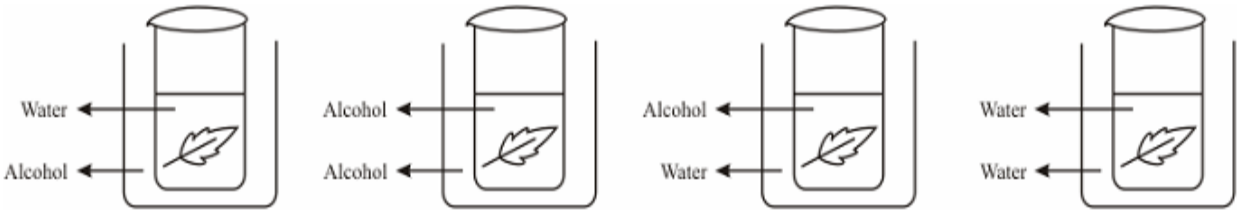
a. CO_2 is given out during respiration
b. CO_2 is necessary for photosynthesis
c. Chlorophyll is necessary for photosynthesis
d. Light is necessary for photosynthesis

6. The best results for the experiment, that light is necessary for photosynthesis, would be yielded by using leaves from a plant kept for over twenty four hours

a) In a pitch dark room
b) In a dark room with the table lamp switched on.
c) Outside in the garden
d) Outside in the garden, covered by a glass case.

7. A student wanted to decolourise a leaf. He should boil the leaf in
a) Alcohol b) water c) KOH solution d) glycerine

8. The figures given below illustrate boiling of leaf to remove chlorophyll. This is one of the steps in the experiment to show that light is necessary for photosynthesis

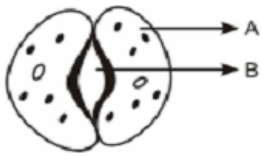


(I) (II) (III) (IV)

The correct method is

a) I b) II c) III d) IV

9. The parts shown as A and B in the given diagram are



a. A is epidermal cell, B is stomatal pore
b. A is guard cell, B is stomatal pore
c. A is epidermal cell, B is guard cell
d. A is guard cells, B is epidermal cell

10. When students observed a stained epidermal peel of a leaf under the microscope, it appeared pinkish red. The stain used was
(a) Iodine.
(b) Acetocarmine.
(c) Safranin.
(d) Colchicin.

11. The correct procedure to prepare a temporary mount of a stained leaf epidermis is

A	B	C	D
Take a peel of a leaf Stain it with safranin; Transfer the peel to the slide; Remove the excess stain; Put a cover slip on it.	Take a peel of a leaf; Wash it in water; Place it on the slide; Add a drop of glycerin on it; Put a cover slip gently.	Stain the leaf; Take a peel; Wash the peel in water; Place it on a slide; Put a cover slip on it.	Take a peel; Stain it with iodine; Transfer the peel to the slide; Remove excess stain with blotting paper; Put a cover slip on it.

(a) A. (b) B. (c) C. (d) D.

12. The part of leaf commonly used for preparing the slide of stomata is
    a. leaf margin
    b. leaf apex
    c. leaf epidermis
    d. leaf petiole

13. The correct sequence, out of the following options, for focusing a slide of epidermal peel of a leaf under a microscope to show the stomatal apparatus is

    a) Observe under low power.
    b) Adjust mirror to get maximum light.
    c) Place the slide on the stage.
    d) Focus under high power

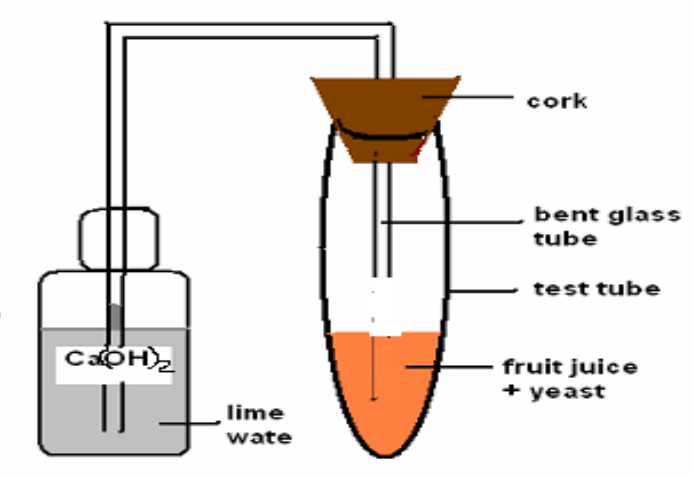
1. b, c, a, d 2. a, b, c, d 3. c, b, d, a 4. d, c, b, a

Chapter 6

LIFE PROCESSES

Respiration

1.



Answer the following questions for the above experimental setup.

a) Will there be any change in the lime water? If yes, what and why?

_____

_____

_____

b) Will there be a change in the taste of the fruit juice?

_____

_____

c) Name the process that takes place in the test tube and write the equation.

_____

2.

Point of difference	BREATHING	RESPIRATION
1. Type of process 2. Energy released 3. Location (cell) 4. Enzymes needed		

3. Respiration takes place at all the times in living organisms, but in plants CO_2 emission is not observed during the day. Give reason

4. Name the intermediate and final products of respiration in :
   (a) Yeast (b) Human beings

5. What is the role of ribs and diaphragm in exchange of gases?

6. List the three common features seen in all respiratory organs (absorbing surfaces).

7. What happens to the air after it reaches the lungs?

8. Give reasons for the following

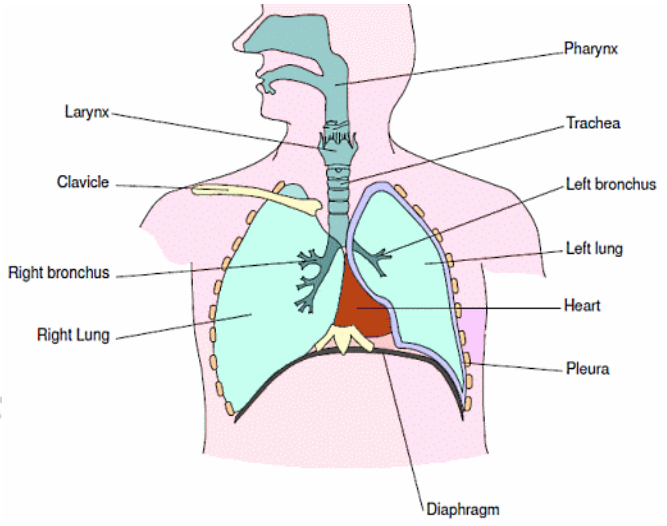
a) Nasal cavity is lined with fine hair & sticky mucous

b) Epiglottis closes the mouth of the glottis.

c) Majority of CO_2 is carried by the plasma but not O_2.

d) If one holds breath after expiration for about 30 seconds, there will still be some exchange of gases occurring in the lungs during this period.

9. Observe the diagram of Human Respiratory System and draw the structure that helps in the exchange of gases.



10. Why do the walls of the trachea not collapse even when there is less air in it?

_____

_____

11. Name the energy currency in living organisms. Where is it produced in the cell?

_____

12 Name the respiratory pigment in human beings. Where is it present?

_____

_____

VERY SHORT ANSWER BASED QUESTIONS (1 mark)

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c) A is true but R is false
d) A is false but R is true

Q.1 **ASSERTION (A):** Pyruvate is a 6- carbon molecule
REASON (R): It is prepared in cytoplasm as a first step in cellular respiration.

_____

Q.2. **ASSERTION(A)**: Rings of cartilage are present in the throat.
REASON (R): These ensure that the air passage does not collapse.

_____

Q.3. **ASSERTION (A)**: The rate of breathing of a normal person is 15-18 times per minute but during vigorous exercise it increases by about 20-25 times per minute
REASON (R): During vigorous activity the demand for oxygen increases to release more energy for extra work, so breathing rate increases to generate more energy

_____

Q.4. Read the passage and answer the questions that follow

Smoking is injurious to health. The upper part of respiratory tract is provided with columnar ciliated epithelium which has small hair like structures called cilia. These cilia help to remove germs, dust and other harmful particles from inhaled air. Smoking destroys these hairs due to which germs, dust, smoke and other particles enter lungs, cause infection, cough and even lung cancer.

4(a) Name the hair like structure present in the upper part of respiratory tract.

_____

4(b) What is the function of these hair like structure?

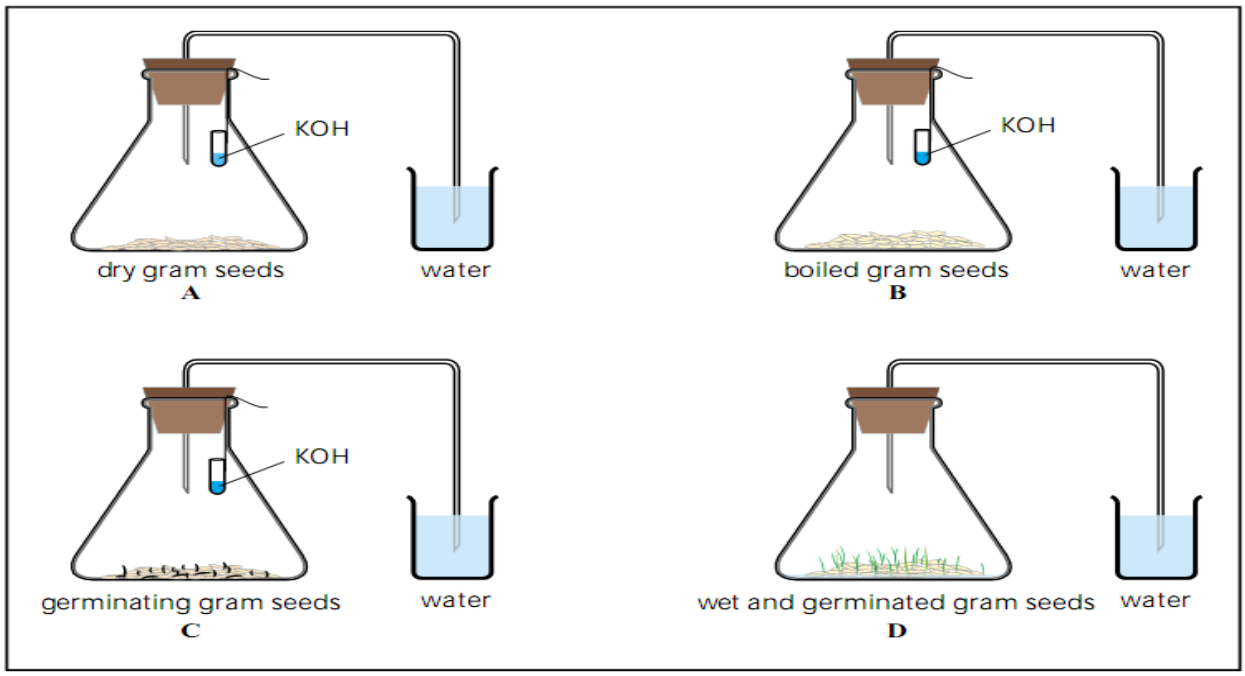
_____

4(c) How does smoking lead to cancer?

4(d) Name the type of epithelium present in the upper respiratory tract.

Practical Based Questions: Respiration

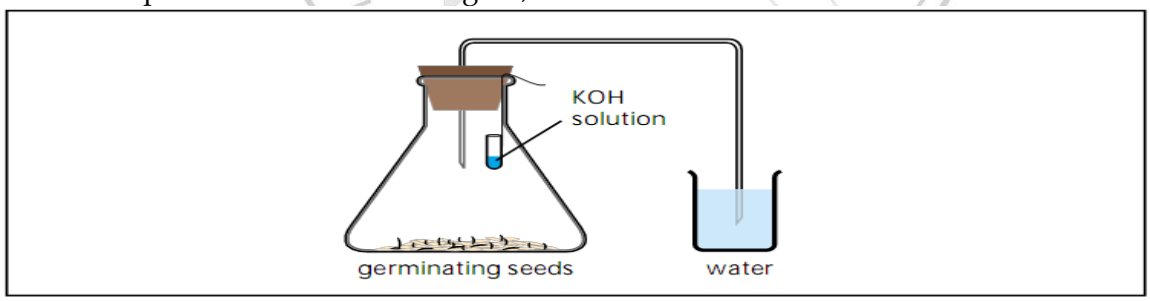
1. Given below are four different set ups to show that CO2 is released during respiration.



The set up that will give the desired result is

(a) A.
(b) B.
(c) C.
(d) D.

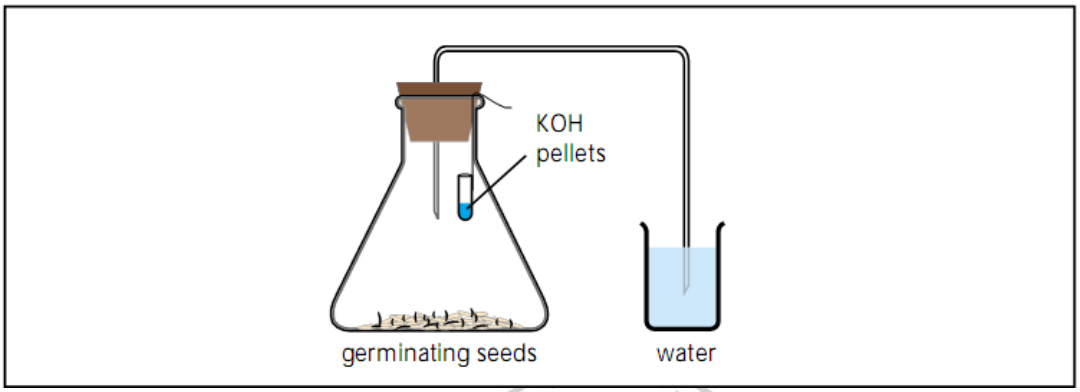
2. In the experiment shown in the figure, water is found to rise in the bent tube.



The reason is that

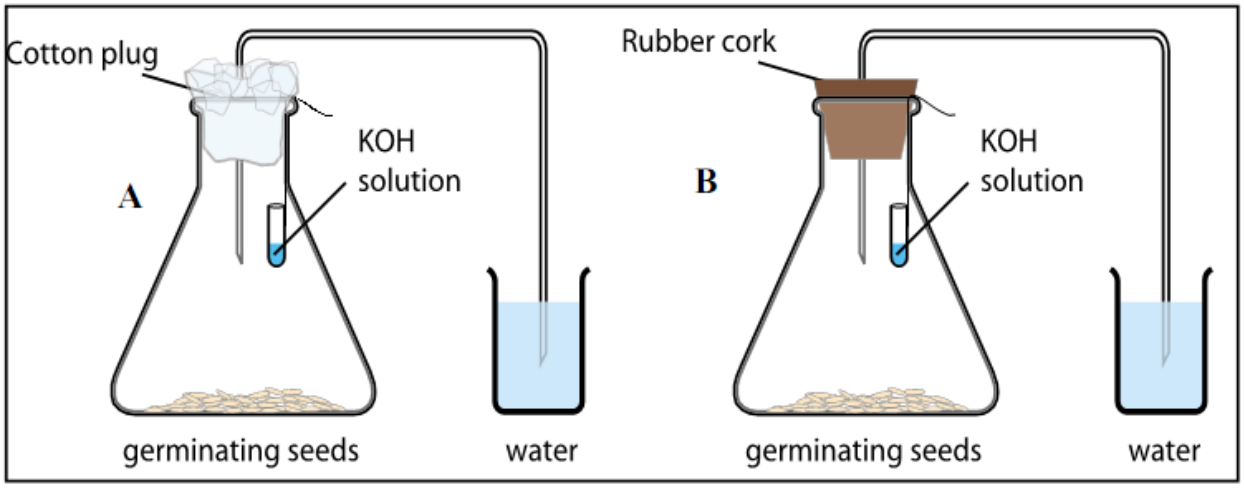
(a) Seeds use up oxygen in the flask.
(b) Carbon dioxide is given out by the germinating seeds.
(c) Germinating seeds attract water from the beaker.
(d) Seeds use oxygen and release carbon dioxide which is absorbed by potassium hydroxide.

3. The following experiment is set up to show that a gas is released during respiration.



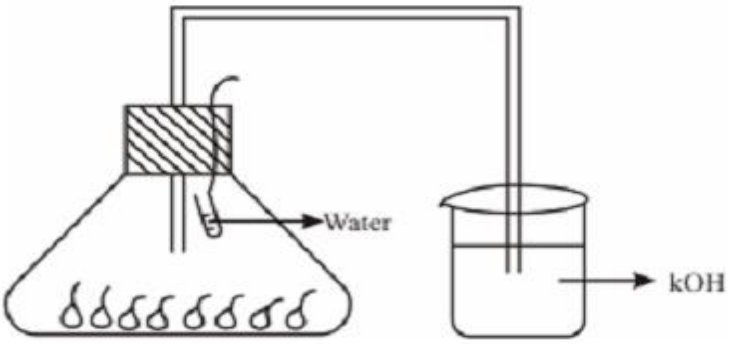
In this set up, the small test tube containing pellets of KOH is kept in the conical flask to absorb
(a) air in the flask.
(b) moisture in the flask in the air in the flask.
(c) O2
(d) CO2 released by the germinating seeds.

4. Using the same number of given germinating gram seeds, two students A and B set up the experiment separately. Student A used a cotton plug to hold the bent tube in the mouth of the flask. Student B used a rubber cork.



After 4 hours they noticed that
(a) water level increased in the bent tube only of A.
(b) water level increased in the bent tube only of B.
(c) the cotton plug was wet.
(d) the water in the beaker of B turned milky.

5. A student while setting up the experiment to show that CO2 is evolved during respiration committed some errors shown in the figure



What changes should be made in the set up to get the desired results?

a. KOH solution should be taken in the small test tube inside the flask and germinating seeds in the beaker.

b. Water should be taken in the beaker and KOH solution in the flask.

c. KOH solution should be taken in the small test tube inside the flask and water should be taken in the beaker

d. Water should be taken in the flask and KOH solution in the small test tube.

6. Why do we take germinating seeds?

_____

7. How can we make the connections of the given set up airtight?

_____

_____

Chapter 6

LIFE PROCESSES

Transportation

1. Blood is a liquid connective tissue. Identify the components of blood that perform the following functions:
   a) Clotting of blood_____
   b) Carrier of Oxygen _____
   c) Carrier of essential components and waste _____

2. Tabulate three differences between arteries and veins

S.NO	Arteries	Veins

3. Define the following:

i) Single Circulation : _____

_____

_____

_____

ii) Double Circulation : _____

_____

_____

_____

4. The internal structure of the vertebral heart explains why mammals and bird are warm-blooded animals while reptiles; amphibians and fish are cold-blooded animals. Justify.

_____

_____

_____

5. Fill the following table:

S No	Points of difference	Xylem	Phloem
1	Functional cells		
2	Dead /alive		
3	Function		
4	Direction of movement		

6. Movement of substances in Xylem is unidirectional while in Phloem it is multidirectional. Explain.

7. Give the role of transpiration and water column in the movement of water from roots to above ground parts.

_____

_____

_____

_____

8 How would our body be affected if the blood vessels start bleeding due to an injury? How does the body avoid this damage?

9. State the functions of Lymph.

10. Why do plants have lower energy needs as compared to animals?

11. What are the two advantages of transpiration in plants?

12. List the two forces that help in movement of water from roots to the leaves.

VERY SHORT ANSWER BASED QUESTIONS (1 mark)

Q.1.Question 1 (a) to (d) are based on two tables given below. Study these tables related to hemoglobin levels and answer the questions that follow.

TABLE A :

Hemoglobin level chart	
Remarks	Hemoglobin (g/dl)
Doctor's advice needed	4-9
Good	10-13
Excellent	14-16

TABLE B :

Hemoglobin Level of patient X and Y		
	Hemoglobin (g/dl)	
	Patient X	Patient Y
	4	6

(a) Refer to Table B showing hemoglobin level reports of patient X and Y. Which disease can be diagnosed from the given data?

_____

(b) Name the element that is transported by hemoglobin from lungs to all parts of the body.

_____

(c)In human beings hemoglobin has a very high affinity for _____ and is carried by the _____.

(i) Oxygen, red blood cells
(ii) Carbon dioxide, Red blood cells
(iii) Oxygen, White blood cells
(iv) Carbon di oxide, White blood cells

(d) The haemoglobin level which is considered excellent is:

(i) 15g/dl
(ii) 10g/dl
(iii) 7 g/dl
(iv) 4g/dl

1. Valves are present in
   a) Arteries
   b) Veins
   c) Capillaries
   d) All the above

2. Deoxygenated blood is received by the _____.
   a) left auricle
   b) right auricle
   c) left ventricle
   d) right ventricle

3. The liquid portion of the blood is called _____.
   a) water
   b) plasma
   c) serum
   d) sap

4. Much of the transpiration takes place through _____.
   a) stomata
   b) lenticels
   c) cuticle
   d) epidermis

Chapter 6

LIFE PROCESSES

Excretion

Define the following

1. Excretion :

_____

_____

_____

_____

2. Osmoregulation :

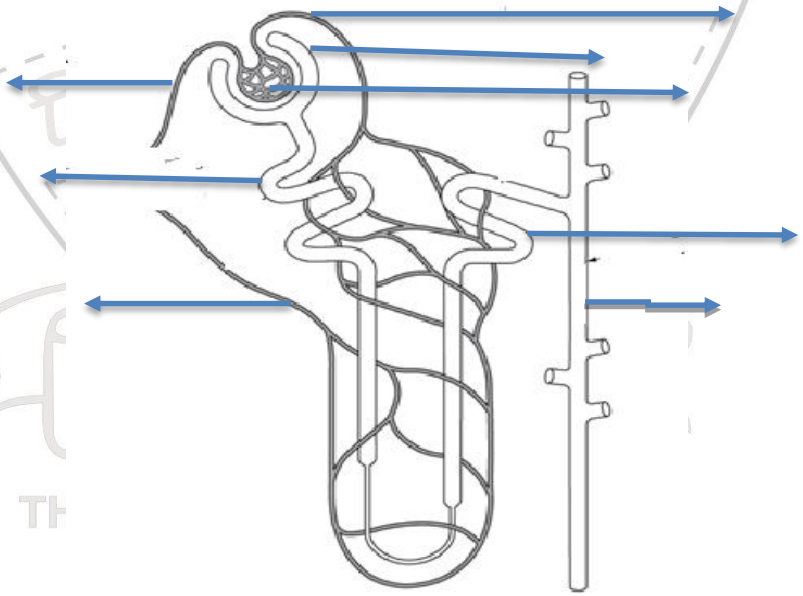
_____

_____

_____

_____

3 Label the following diagram



STRUCTURE OF NEPHRON

4. Write the functions of the following:

a) Glomerulus_____

b) Bowman's capsule_____

c) Collecting duct_____

Give reasons for the following---

a) Re- absorption is an important step in urine formation

_____

_____

_____

_____

b) The amount of water in the urine is variable

_____

_____

_____

_____

5. What are the steps involved in urine formation in human beings.

_____

_____

_____

_____

_____

6. Name two excretory products other than oxygen and carbon dioxide in plants.

7. What happens to the glucose that enters the nephron along with the filtrate?

8. How is urine eliminated in human excretory system?

9. The kidneys perform the essential function of removing waste from the blood and regulate the water fluid levels. Explain.

10. How do the leaves of a plant help in excretion?

VERY SHORT ANSWER QUESTIONS (1 Mark)

1. Fig 1 given below shows the diagram of a kidney and associated structures. The table lists the percentage of certain components found in structures **B** and **C.**

In structure B

Component	Concentration 1%
Urea	0.03
Glucose	0.10
Amino acids	0.05
Salts	0.72
Proteins	8.00

In structure C

Component	Concentration 1%
Urea	**2.00**
Glucose	**0.00**
Amino acids	**0.00**
Salts	**1.50**
Proteins	**0.00**

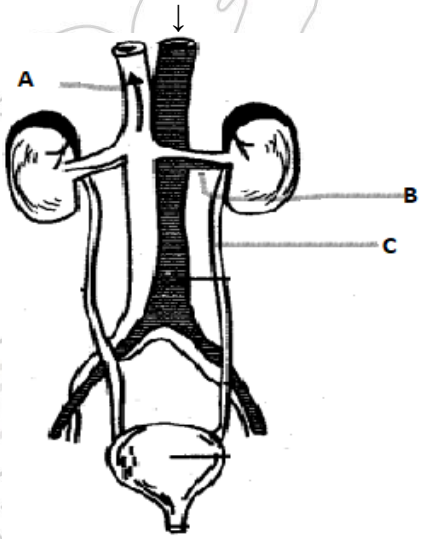


Fig 1

1(a) On the diagram label A, B and C

_____

_____

1(b) Using only the information in the tables, deduce the function of kidneys.

_____

_____

1(c) Name the structural and functional unit of kidneys.

_____

1(d) State the two factors on which the amount of water re-absorbed by the nephron depends on.

_____

_____

MCQs : Excretion

1. Urea is transported by

   a) plasma

   b) blood

   c) RBC

   d) WBC

2. The kidneys resemble the contractile vacuoles of *Amoeba* in

   a) expelling out excess of water

   b) expelling out glucose

   c) expelling out waste material along with water

   d) expelling out salts

3. The function of the mammalian kidney is to excrete

   a) extra salts, urea and excess water

   b) extra urea, excess water and excess amino acids

   c) extra urea, extra carbohydrates and extra water

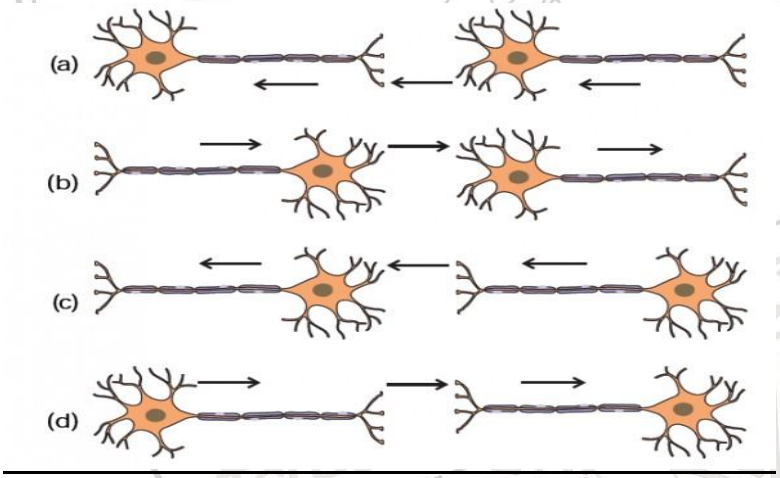
   d) extra urea, extra salts and extra sugar

Chapter 7

CONTROL AND COORDINATION

1. Define a receptor. Give the functions of gustatory and olfactory receptors.

2. a) Identify the correct direction of flow of nerve impulse in the diagram given below.



b) Give 2 differences between synapse and a neuromuscular junction.

3. Define reflex action and reflex arc. What is the importance of reflexes?

4. What provides protection to the brain and spinal cord?

5 What are the components of the Peripheral Nervous System (PNS) and its function?

6 Why are reflex arcs evolved in animals?

7. How does the nervous tissue cause action? Explain

8 Our heart beats without our thinking about it. How?

9. **What is the function of the following phytohormones?**

1	Auxin	
2	Cytokinin	
3	Gibberellin	
4	Absisic Acid	

10. Define the following.

1.Phototropism_____

_____

_____

2. Geotropism :_____

_____

_____

3.Chemotropism:_____

_____

_____

4.Thigmotropism:_____

_____

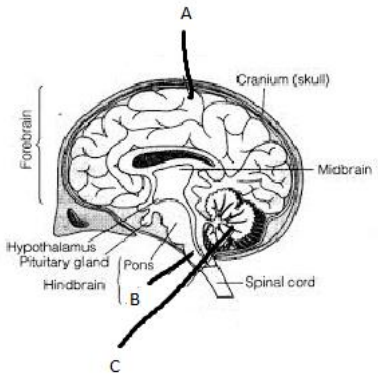
_____

_____

11. Give the function of the following hormones along with diseases/abnormalities caused due to their under secretion and Over secretion respectively of each

Hormone and its Function	Oversecretion	Undersecretion
Insulin		
Thyroxin		
Growth Hormone		

12 Observe the diagram given below and answer the questions that follow



HUMAN BRAIN

Label parts A, B and C and write their functions

_____

_____

_____

13 Give an example of feedback mechanism in human beings.

_____

_____

_____

_____

14. In which part of the brain is the hunger centre located?

_____

Very Short Answer Based Questions (1 mark)

ASSERTION (A) and REASON(R) The following two questions consists of two statements- ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below

a) Both A and R are true and R is the correct explanation for A
b) Both A and R are true and R is not the correct explanation for A
c) A is true but R is false
d) A is false but R is true

Q.1.**ASSERTION (A)**: Insulin regulates blood sugar level.
REASON(R): Insufficient secretion of insulin will cause diabetes.

_____

Q.2. **ASSERTION (A):** Transmission of messages at synapse takes place with the help of chemicals.
REASON (R): Nerve impulse is an electrochemical event

_____

Q.3. Answers to questions 3(a) to 3 (b) are based on information given in the passage and concepts studied.

Epilepsy is a common disorder of the brain. Symptoms include mild loss of concentration to full blown convulsions in which there is a black out and person falls on the floor. The underlying cause of epilepsy is random uncontrolled activity of some cells of the brain. This chaotic activity in sensory and motor nerves causes patients to see and hear variety of strange things and muscles jerk uncontrollably. Neuroscientists have discovered that corpus callosum that connect the cereberal hemispheres is involved in epileptic seizures.

3(a) List two symptoms of epilepsy.

_____

3(b) Name the cells that constitute the central nervous system.

_____

3(c) What are sensory and motor nerves?

_____

_____

3(d) What is the function of cerebral hemispheres?

_____

_____

MCQs : Control and Coordination

1. The cells in our body that can be over a foot long are _____.

   a) muscle cells

   b) nerve cells

   c) bone cells

   d) blood cells

2. The substance that accelerates the growth in the stem is ____.

   a) auxin

   b) cytokinin

   c) enzyme

   d) vitamin

3. Learning is related to _____.

   a) hypothalamus

   b) thalamus

   c) cerebrum

   d) Cerebellum

4. Male hormone is _____.

   a) oestrogen

   b) progesterone

   c) adrenaline

   d) testosterone

5. Endocrine glands are those which pour their secretions into _____.

   a) Blood

   b) Ducts

   c) Sinuses

   d) any of the above

6. In reflex action, the reflex arc is formed by _____.

   a) muscles - receptor - brain

   b) muscles - effector - brain

   c) receptor - spinal cord - muscles

   d) spinal cord - receptor - muscles

7. Auxins are _____.

   a) Vitamins

   b) Enzymes

   c) Proteins

   d) Phyto-hormones

8. The cerebellum is concerned with _____.

   a) Conditioning

   b)Memory

   c) coordination and precision

   d)Intelligence

9. The endocrine gland also known as 'master gland' is _____.

   a) Hypothalamus

   b) Pituitary

   c) Pancreas

d) Adrenal

10. Which of the following acts as both endocrine and exocrine glands?

a) pituitary

b) Adrenal

c) Pancreas

d) Thyroid

11. Cerebral hemispheres are centres of _____.

a) Balance

b) Smell

c) Taste

d) Thinking

12. Adrenaline increases _____.

a) heart rate

b) blood pressure

c) amount of glucose in blood

d) all the above

13 Junction of two neurons is called _____.

a) Synapse

b) end plate

c) Axon

d) Dendrite

14. Growth hormone is produced in _____.

a) hypothalamus

b) Pituitary

c)Pancreas

d)Thyroid

15. An involuntary response to a stimulus is known as _____.

a) Jerking

b) Reflex

c) Conditioning

d) Synapse

16. The CNS consists of _____.

a) Brain

b) spinal cord

c) brain and spinal cord

d) brain, spinal cord and all the nerves

17. Cerebrum is present in the _____.

a) fore brain

b) mid brain

c) hind brain

d) partly in a and b each

18. Cerebellum is situated in _____.

a) fore brain

b) mid brain

c) hind brain

d) partly in a and b

19. Medulla oblongata is situated in _____.

    a) fore brain

    b) mid brain

    c) hind brain

    d) partly in b and c

20. The hormone that speeds up the ripening process is _____.

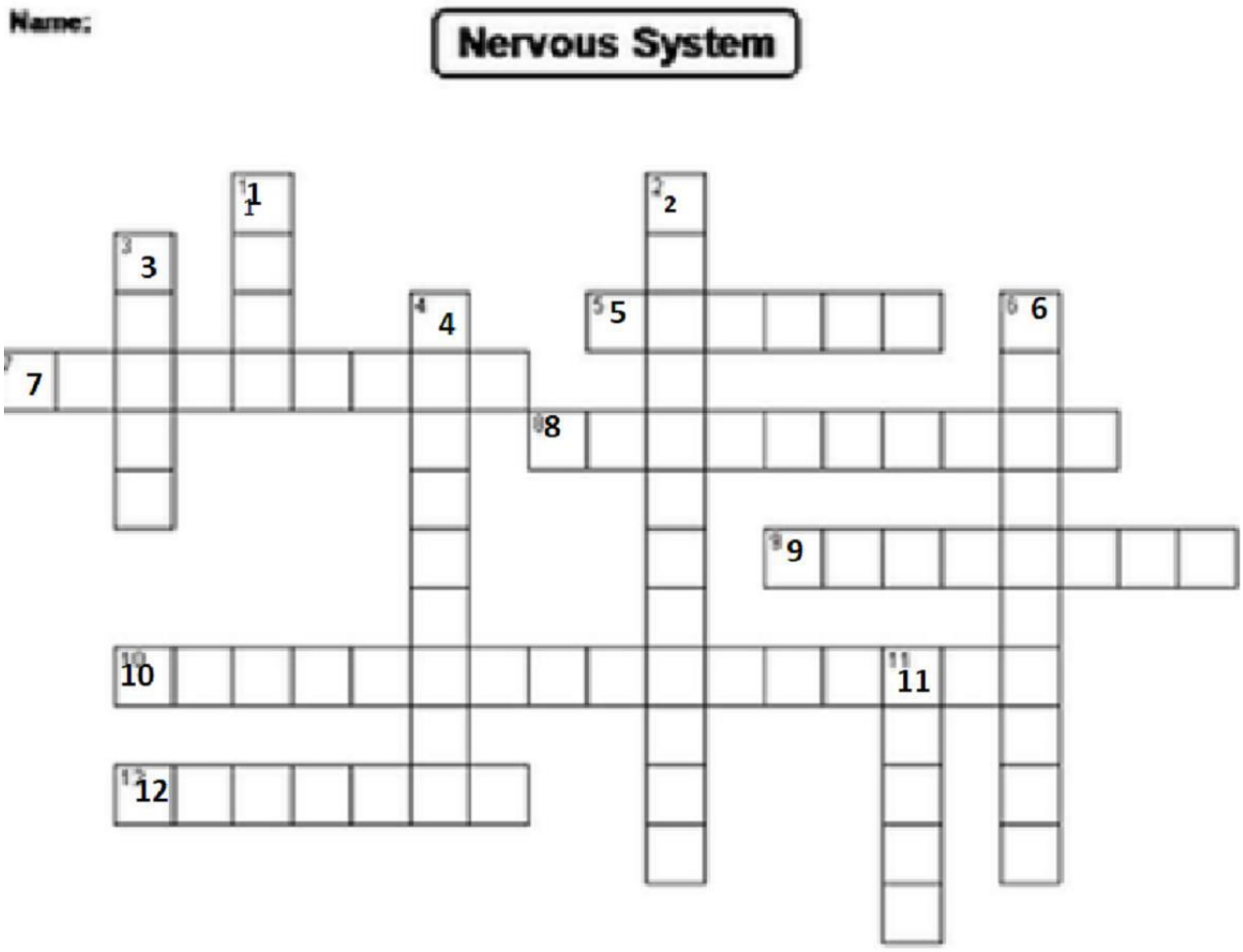
    a) Auxin

    b) gibberellin

    c) cytokinin

    d) Ethylene

CROSSWORD :



ACROSS

5 A cell that carries messages between the brain and other parts of the body
7 The part of the brain connecting it to the spine and controls breathing and heart rate
8 A bundle of nerves enclosed in the spine that connects the body to the brain
9 The largest part of the brain controlling higher order thinking and decision making
10 A bulb at the end of a neuron where neurotransmitter molecules are released to the next cell
12 The space where a signal passes from one nerve cell to another

DOWN

1 The part of a neuron that sends impulses towards other cells
2 An insulating covering surrounding an axon that allows electrical impulses to travel faster
3 The organ that is the main control center of the nervous system
4 Short branches of a neuron that receive impulses from other cells
6 The part of the brain at the back of the skull controlling body movements and balance
11 A collection of neurons that allow impulses to travel through the body

REVISION ASSIGNMENT

TERM 1 **MM : 20**

Q.1 How do unicellular organisms like *Amoeba* remove the metabolic wastes? (1)

Q.2 Name the reserve food in animals. (1)

Q.3 Why is the existence of decomposers essential in the environment? Give two reasons. (1)

Q.4 Define reflex arc (1)

Q.5 Name the hormone that helps to maintain the blood glucose level in human Beings (1)

Q.6 What is the function of the following in the human circulatory system: (2)

i) Valves
ii) Septum
iii) Pulmonary Vein
iv) Vena cava from lower body

Q.7 Define trophic level. Why food chains do not go beyond 3-4 trophic levels? (2)

Q.8 Explain the role of auxin in bending of stem towards sunlight. (2)

Q.9 List three features found in the small intestine that helps it to carry out its function of absorption of digested food. (3)

Q.10 What are the different ways in which glucose is oxidized to provide energy in various organisms? (3)

Q.11 a) Draw labelled diagrams to show different stages of nutrition in *Amoeba*
b) Identify the type of heterotrophic nutrition shown by:
i) Cuscutta ii) Mushroom (3)

Academic Session 2019-20
First Term Examination
Subject - Science
M/3/1

Time : 3hrs **MaximumMarks-80**

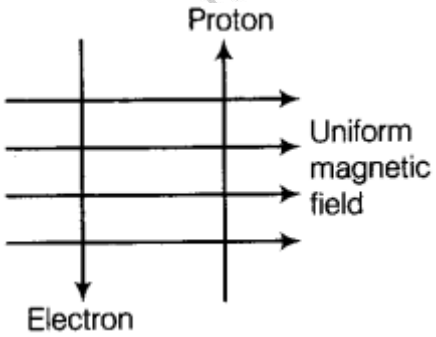
General instructions

- All questions are compulsory.
- The question paper comprises of three sections – A, B and C. You are to attempt all the sections.
- Internal choice is given in sections B and C.
- Question numbers 1 to 10 in section A are multiple choice questions and carry 1 mark each.
- Question numbers 11 and 20 in Section-A are very short answer type questions and carry 1 mark each.
- Question numbers 21 and 30 in Section-B are short answer type questions and carry 3 mark each
- Question numbers 31 and 36 in Section C are long answer type questions and carry 5 mark each
- This paper has **7** printed sides.

SECTION A

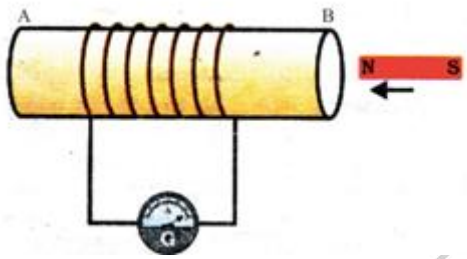
1. The current rating for appliances of high power ratings like geyser and the current rating for low power rating appliances like bulb are 1
   (a) Both 15A
   (b) Both 5A
   (c) 5A and 15A respectively
   (d) 15A and 5A respectively

2. A uniform magnetic field exists in the plane of paper pointing from left to right as shown in the figure. In the field an electron and a proton move as shown. The electron and proton experience forces 1



   (a) Both pointing out of the plane of paper
   (b) Both pointing into the plane of paper
   (c) Pointing into the plane of paper and out of the plane of paper respectively
   (d) Pointing opposite to the direction of magnetic field.

3. In this experimental set up, what happens to the galvanometer and the circuit, when the north pole of the bar magnet is moved towards the end B and then moved away?



(a) Galvanometer deflects, current is induced
(b) Galvanometer shows no deflection, no induced current
(c) Galvanometer deflects in one direction, then changes direction and current is induced
(d) Either (a) or (b)

4. The substance added to neutralise the acidity of soil is 1
(a) Chalk
(b) Quick lime
(c) Slaked lime
(d) All of these

5. Which is the oxidising agent in the following reaction? 1

$CuO + H_2 \rightarrow Cu + H_2O$

(a) CuO
(b) H_2
(c) Cu
(d) H_2O

6. Which of the following properties is not exhibited by ionic compounds 1
(a) Solubility in water
(b) Electrical conductivity in solid state
(c) High melting point
(d) Electrical conductivity in molten state

7. In the given food chain, suppose the amount of energy at the fourth trophic level is 5kJ, what will be the energy available at the producer level? 1

Grass → Grasshopper → Frog → Snake → Hawk

(a) 5kJ
(b) 50 kJ
(c) 500 kJ
(d) 5000 kJ

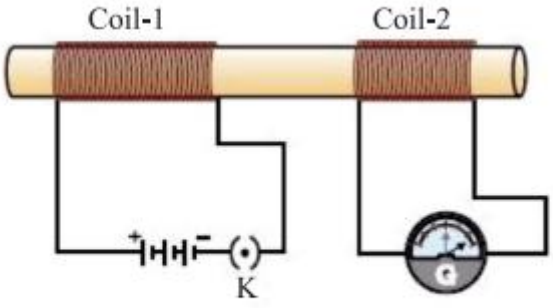
8. Food web is the: 1
(a) Food that a spider collects using its web.
(b) Network of interlinked trophic levels.
(c) Network of interlinked food chains.

(d) None of the above.

9. The human body stores carbohydrates in the form of: 1
(a) Glycogen
(b) Glucose
(c) Sucrose
(d) Maltose

10. Growth of pollen tube towards ovule during fertilization is an example of 1
(a) Phototropism
(b) Geotropism
(c) Chemotropism
(d) Hydrotropism

11. Name the phenomenon that explains the deflection in the galvanometer when the current in the primary coil is turned on or off? 1



Primary Coil **Secondary Coil**

12. A compass needle is placed near a current carrying wire. What happens to the deflection in the needle when 1
(a)Magnitude of electric current in the wire is increased?
(b) The compass needle is displaced away from the wire?

13. Name two safety measures commonly used in electric circuits and appliances. 1

14. Name one metal and a nonmetal which are in liquid state at room temperature. 1

15. Name the acid and the base which form potassium carbonate. 1

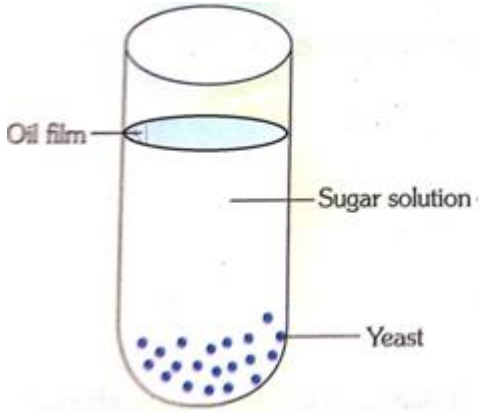
16. What is the formula of the coating formed on silver articles when they get corroded? 1

17. The phenomenon in which non-biodegradable chemicals get accumulated at each trophic level of a food chain is known as _____ 1

18. The process of _____ breaks down large globules of fats into smaller globules. 1

19. Name the products of respiration you expect in the given experimental set 1

up.



20. How is the ozone layer useful to us? 1

SECTION B

21. (i) Name the device used in an electric circuit to change the resistance in the circuit. 3
(ii) Give reasons for the following:-
(a)Tungsten is used for making bulb filaments.
(b)Cord of an electric heater does not glow but the heating element does.

22. What are the causes of overloading? [any two] 3
What is the difference between direct and alternating current?
Mention one important advantage of AC over DC?

OR

Write an activity to show that there is a force exerted on a current carrying conductor when placed in a magnetic field. State the rule to find the direction of this force.

23. What are the disadvantages of series circuit? [3 points] 3

24. Solution A gives pink colour when a drop of phenolphthalein is added to it. Solution B gives red colour when a drop of methyl orange is added to it. What type of solutions are A and B and which one of them have a higher pH value? 3
Name one salt which has pH more than 7 and one salt whose solution has pH less than 7

25. What is observed when a solution of potassium iodide is added to a solution of lead nitrate in a test tube? 3
a)What type of reaction is this?
b)Write a balanced chemical equation to represent the above reaction

26. Account for the following 3
a) Hydrogen gas is not evolved when zinc metal reacts with nitric acid
b) Carbon is not used for reducing aluminium from aluminiumoxide.

c) Metals conduct electricity.

OR

a) Show ionic bonding in calcium chloride.
b) Why does it have high melting point?

27. a. Define ecosystem. 3
b. Give reasons for the following statements:
i. The existence of decomposers is essential for an ecosystem.
ii. Flow of energy in a food chain is unidirectional.

28. a. Name the major driving force which helps in the movement of water in xylem during night. 3
b. List the series of events that lead to inhalation in human beings.

29. Illustrate with the help of a labeled diagram the pathway of response when you accidently touch a hot plate. 3

30. a. State one function of the following parts of the brain: 3
1. Cerebrum
2. Medulla
b. There are limitations to the use of electrical impulses to transmit information within an organism's body. Give two points to justify the given statement.

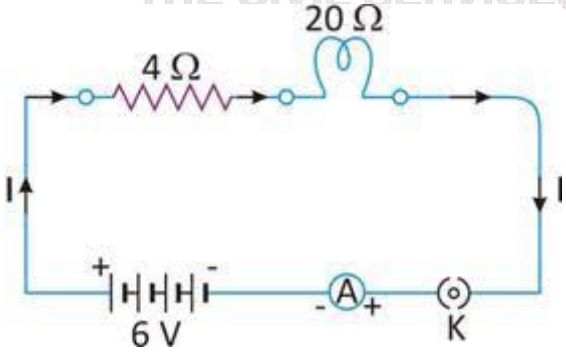
OR

a. Draw the structure of a neuron and label the following:
i. Part which receives information.
ii. Part which transmits the impulse.
b. Explain the functioning of feedback mechanism with help of an example.

SECTION C

31. (a) Three resistors R_1, R_2 and R_3 are connected in parallel and the combination is connected to a cell, voltmeter and key. Draw suitable circuit diagram and obtain an expression for the equivalent resistance of the combination of the resistors. Also find the expression for the equivalent resistance when all the three resistors are of same magnitude, R. 5

(b) Observe the circuit below and answer the questions:-



(i) The current flowing through the circuit.
(ii) The potential difference across the bulb.

OR

(a)Define electric power. An electric device of resistance R is connected across a source of voltage V and draws a current I. Derive an expression for power in terms of current and resistance.
(b)A bulb is rated 110W, 220V. Find the current drawn by it when it is connected to a 220V supply. Find the resistance of the bulb. If the bulb is replaced by a bulb of rating 22W, 220V, will there be any change in the value of current and resistance. Justify your answer.

32. Name a device which converts mechanical energy into electrical energy. Explain its principle and working with a labeled diagram. 5

33. State what happens when a concentrated solution of sodium chloride is electolysed. Name the process? Write the equation of the reaction involved. Name the products obtained in the process . Give one use of each of the product. 5

34. What are amphoteric oxides? Show that zinc oxide is an amphoteric oxide. Write the steps involved in extraction of pure metals in the middle of the reactivity series from their carbonate ores . 5

OR

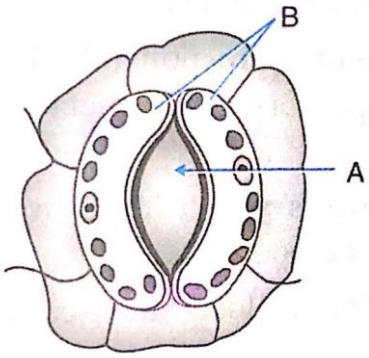
a) Two ores A and B were taken. On heating ore' A' gives CO_2 whereas ore 'B' gives SO_2. What steps will you take to convert them into metals? Give the name and formula of an ore of mercury.

b) A metal 'X 'when dipped in a aqueous solution of aluminiumsulphate shows no reaction whereas when dipped in an aqueous solution of ferrous sulphate , a pale green solution turns colourless . Identify the metal 'X' with reason and write an equation for the reaction.

35. a. State one function of lymph in the human body. 5
b. Leakage of blood from vessels during injury reduces the efficiency of the pumping system. How is the leakage prevented?
c. Draw a neat diagram of human heart and label the following:
A. Vessel which collects deoxygenated blood from the body.
B. An artery which carries deoxygenated blood.
C. A vein which carries oxygenated blood
D. Largest blood vessel of the body.

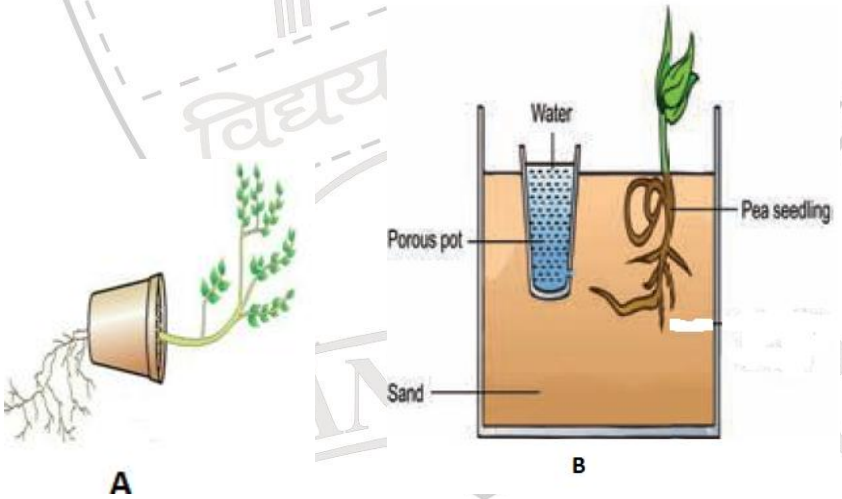
OR

a. The length of small intestine differs in various animals depending on the type of food they eat. Justify.
b. Observe the given diagram and name the parts labeled A and B. Give one function of each of the labeled parts.



c. State two roles of bile in human digestion.

36. a. Why does the leaf of a sensitive plant droop on touching? 5
b. Identify the stimulus and name the tropic movements shown by plants in the given diagrams:



c. Give one function of each of the following plant hormones:
i. Cytokinin
ii. Abscisic acid.

Academic Session 2019-20
First Term Examination
Subject - Science
M/3/2

Time : 3hrs **MaximumMarks-80**

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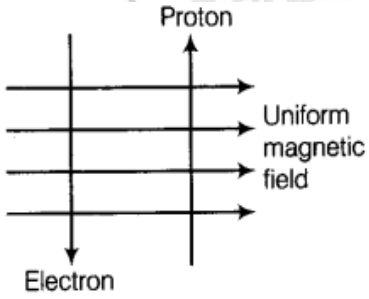
- This paper has **7** printed sides.

SECTION – A

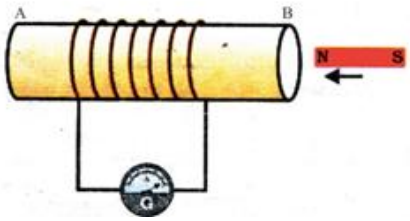
1. A uniform magnetic field exists in the plane of paper pointing from left to right as shown in the figure. In the field an electron and a proton move as shown. The electron and proton experience forces 1



(a) Both pointing out of the plane of paper
(b) Both pointing into the plane of paper
(c) Pointing into the plane of paper and out of the plane of paper respectively
(d) Pointing opposite to the direction of magnetic field.

2. The current rating for appliances of low power ratings like fan and the current rating for high power rating appliances like heater are 1
(a) Both 15A
(b) Both 5A
(c) 5A and 15A respectively
(d) 15A and 5A respectively

3. In this experimental set up, what happens to the galvanometer and the circuit, when the north pole of the bar magnet is moved towards the end B and then moved away? 1



(a) Galvanometer deflects, current is induced
(b) Galvanometer shows no deflection, no induced current
(c) Galvanometer deflects in one direction, then changes direction and current is induced
(d) Either (a) or (b)

4. The salt used to cure indigestion is 1
(a) Caustic soda
(b) Washing soda
(c) Common salt
(d) Baking soda

5. Which is the reducing agent in the following reaction? 1

$CuO + H_2 \rightarrow Cu + H_2O$

(a) CuO
(b) H_2
(c) Cu
(d) H_2O

6. Which of the following properties is not exhibited by ionic compounds 1
(a) Solubility in water
(b) Electrical conductivity in solid state
(c) High melting point
(d) Electrical conductivity in molten state

7. Food chain is the: 1
(a) Food that a spider collects using its web.
(b) Series of organisms at each trophic level.
(c) Network of interlinked food chains.
(d) None of the above.

8. The human body stores carbohydrates in the form of: 1
(a) Glycogen
(b) Glucose
(c) Sucrose
(d) Maltose

9. In the given food chain, suppose the amount of energy at the fourth trophic level is 5kJ, what will be the energy available at the producer level? 1

Grass → Grasshopper → Frog → Snake → Hawk

(a) 5kJ
(b) 50 kJ
(c) 500 kJ
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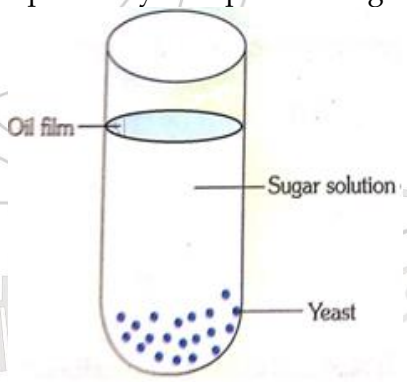
10. Growth of roots towards water is an example of 1
(a) Phototropism
(b) Geotropism
(c) Chemotropism
(d) Hydrotropism

11. The process of _____ breaks down large globules of fats into smaller globules. 1

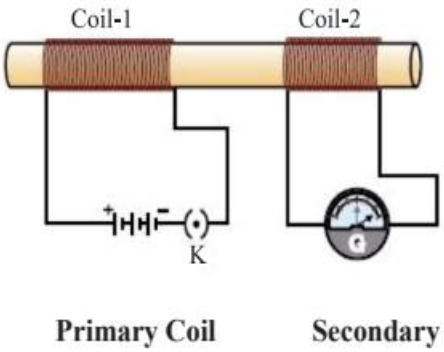
12. Name the products of respiration you expect in the given experimental set up. 1



13. The phenomenon in which non-biodegradable chemicals get accumulated at each trophic level of a food chain is known as _____. 1

14. How is the ozone layer useful to us? 1

15. Name the phenomenon that explains the deflection in the galvanometer when the current in the primary coil is turned on or off? 1



16. Name two safety measures commonly used in electric circuits and appliances. 1

17. A compass needle is placed near a current carrying wire. What happens to the 1

deflection in the needle when
(a)Magnitude of electric current in the wire is decreased?
(b) The compass needle is displaced away from the wire?

18. Name one metal and nonmetal which is lustrous. 1

19. Name the acid and the base which form aluminiumsulphate 1

20. What is the formula of coating formed oncopper articleswhen they get corroded? 1

SECTION B

21. (a) What are the causes of overloading? [any two] 3
(b) What is the difference between direct and alternating current?
(c) Mention one important advantage of AC over DC?

OR

Write an activity to show that there is a force exerted on a current carrying conductor when placed in a magnetic field. State the rule to find the direction of this force.

22. (i) Name the component which regulates current without changing the voltage source. 3

(ii) Give reasons for the following:-
(a) Tungsten is used for making bulb filaments.
(b) Cord of an electric heater does not glow but the heating element does.

23. What are the advantages of parallel circuit? [3 points] 3

24. a. Define ecosystem. 3
b. Give reasons for the following statements:
i. The existence of decomposers is essential for an ecosystem.
ii. Flow of energy in a food chain is unidirectional.

25. a. Name the major driving force which helps in the movement of water in xylem during the day. 3
b. List the series of events that lead to exhalation in human beings.

26. Illustrate with the help of a labeled diagram the pathway of response when you accidently touch a hot plate. 3

27. a. State one function of the following parts of the brain:
i. Cerebrum
ii. Cerebellum
b. There are limitations to the use of electrical impulses to transmit information within an organisms body. Give two points to justify the given statement.

OR

c. Draw the structure of a neuron and label the following:
   i. Part which receives information.
   ii. Part which transmits the impulse.

d. Explain the functioning of feedback mechanism with help of an example.

28. Salt "A "commonly used in Bakery products on heating gets converted into another salt " B", which is itself used to for removal of hardness of water and a gas "C is" evolved. The gas "C" when passed through lime water turns milky. Identify A, B and C and give relevant chemical equations. 3

29. A small amount of quick lime is added to water in a beaker 3
a) Name and define the type of reaction that has taken place.
b) Write a balanced equation for the above reaction .

30. Account for the following 3
a) Calcium starts floating when added to water.
b) Carbon is not used for reducing aluminium from aluminium oxide
c) Sodium is stored under oil.

OR

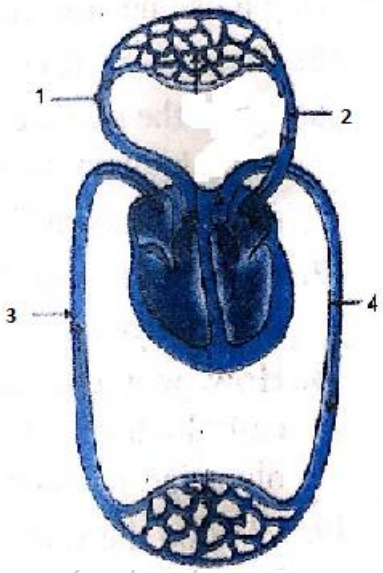
a) Show ionic bonding in Magnesium chloride.
b) Why does it have high melting point?

SECTION – C

31. a. Define excretion. 5
b. Give two factors which help to regulate the amount of water reabsorption from the initial filtrate.
c. Draw a neat diagram of human excretory system and label the following:
   A. Part which forms urine.
   B. Long tube which collects urine from the kidneys.
   C. Part which stores urine until it is passed out of the body.
   D. Part that eliminates urine from urinary bladder.

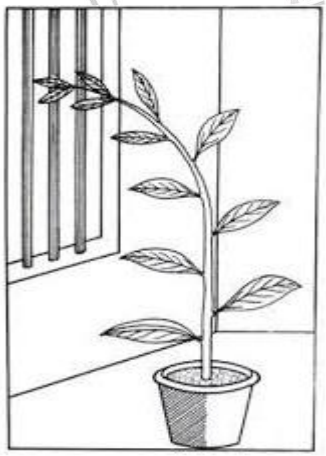
OR

a. Birds and mammals need to have a four chambered heart but amphibians and some reptiles can survive with a three chambered heart. Justify.
b. Observe the given diagram and name the blood vessels labeled 1 to 4.

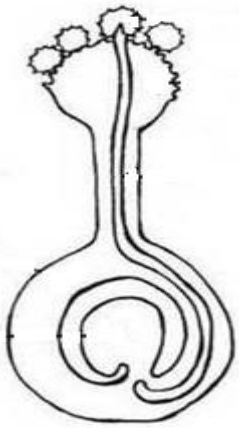


c. State the functions of the following components of transport system:
   i. Blood.
   ii. Lymph

32. a. Why does the heart beat faster in case of emergency situations? Which hormone brings about the above change? 5
b. Identify the stimulus and name the tropic movements shown by plants in the given diagrams:



A



B

c. Give one function of each of the following animal hormones:
   i. Thyroxine.
   ii. Insulin

33. State what happens when a concentrated solution of sodium chloride is electolysed. Name the process? Write the equation of the reaction involved. Name the products obtained in the process. Give one use of each of the product. 5

34. a) What are amphoteric oxides? Show that Aluminium oxide is an amphoteric oxide. 5
b) Write the steps involved in extraction of pure metals in the middle of the reactivity series from their sulphide ores.

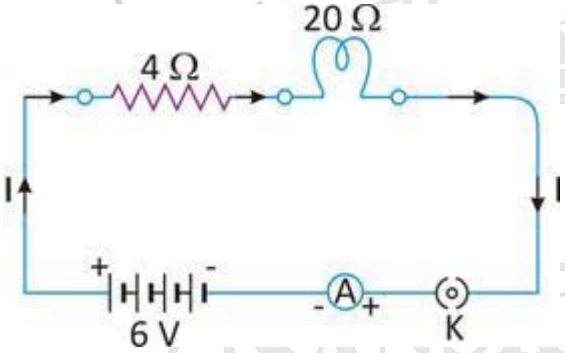
OR

Two ores A and B were taken. On heating ore' A' gives CO_2 whereas ore 'B' gives SO_2. What steps will you take to convert them into metals? Give the name and formula of an ore of mercury.

a) A metal 'X 'when dipped in a aqueous solution of aluminiumsulphate shows no reaction whereas when dipped in an aqueous solution of ferrous sulphate , a pale green solution turns colourless . Identify the metal 'X' with reason and write an equation for the reaction.

35. Name a device which converts electrical energy into mechanical energy. Explain its principle and working with a labeled diagram. 5

36. (a) Three resistors R_1, R_2 and R_3 are connected in parallel and the combination is connected to a cell, voltmeter and key. Draw suitable circuit diagram and obtain an expression for the equivalent resistance of the combination of the resistors. Also find the expression for the equivalent resistance when all the three resistors are of same magnitude, R. 5
(b) Observe the circuit below and answer the questions:-



(i) The current flowing through the circuit.
(ii) The potential difference across the bulb.

OR

(a) Define electric power. An electric device of resistance R is connected across a source of voltage V and draws a current I. Derive an expression for power in terms of current and resistance.
(b) A bulb is rated 110W, 220V. Find the current drawn by it when it is connected to a 220V supply. Find the resistance of the bulb. If the bulb is replaced by a bulb of rating 22W, 220V, will there be any change in the value of current and resistance. Justify your answer.

Chapter 8

HOW DO ORGANISMS REPRODUCE?

1 What is the significance of reproduction?

_____

_____

2 Why DNA copying in reproduction is accompanied with the formation of additional cellular apparatus?

_____

_____

_____

3. Compare asexual & sexual reproduction.

ASEXUAL	SEXUAL

4. What is the cause of variation? Write its significance.

_____

_____

_____

_____

5. What are the advantages of vegetative propagation?

_____

_____

_____

_____

_____

6 Identify the type of asexual reproduction/s seen in the given organisms.

Spirogyra -

Yeast

Penicillin-

Planaria-

Bryophyllum

Rhizopus-

Hydra-

Leishmania

7. What will be the number of chromosomes in the following cells of human body
   i) Muscle cell
   ii) Sperm
   iii) Liver cell
   iv) Egg/ovum

8. Why are testes located outside the abdominal cavity in human males?

_____

_____

9. What are the advantages of internal fertilization in animals?

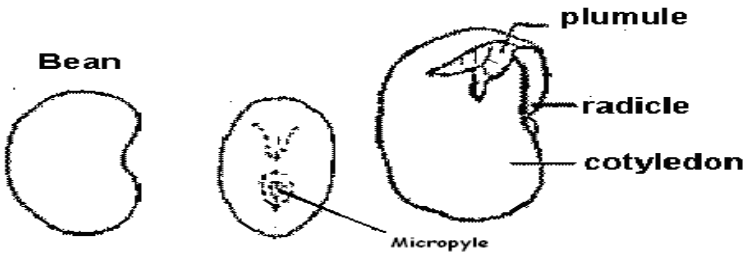
_____

_____

_____

_____

_____



10. Observe the above diagram and write the functions of the labeled parts. Is bean a monocot or a dicot? Why?

_____

_____

_____

_____

_____

11. List the changes that take place in a flower after fertilization.

12. Name two unisexual and two bisexual flowers.

13. Write the full form of STD .Give 2 examples each of STDs caused by bacteria and virus.

14. How do oral pills help in contraception?

15. Draw a neat and well labeled diagram showing pollen germination on stigma. What happens to the ovules and ovary after fertilization?

16 There is an alarming decline in the sex ratio in our society. Comment.

_____

_____

_____

_____

_____

_____

17 Name a permanent method of contraception in males and females.

_____

_____

18 Name the glands / organs that perform dual functions. Indicate their dual functions.

S no	**Organ**	**Function 1**	**Function 2**
1	Pancreas	As Exocrine gland:	As Endocrine gland:
2		Produces gamete - ova	Endocrine Function:
3			**Endocrine Function: Regulates male accessory organs & Secondary sexual characters through production of male sex hormone.**

Very Short Answer Based Questions (1 mark)

ASSERTION (A) and REASON(R) The following two questions consists of two statements- ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below

a) Both A and R are true and R is the correct explanation for A
b) Both A and R are true and R is not the correct explanation for A
c) A is true but R is false
d) A is false but R is true

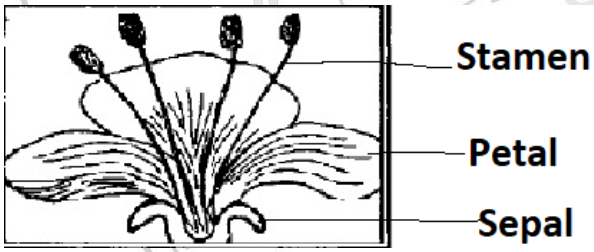
Q.1. **Assertion (A):** In human beings the female produces two types of gametes.
Reason (R): Female has two X chromosomes.

_____

Q.2. **Assertion (A)**: Regeneration is considered an asexual method of reproduction.
Reason (R): It is carried out by specialized cells that have ability to proliferate and form different types of cells and tissues.

_____

Q.3. Observe the diagram of the flower given below and answer the questions.



3(a) Identify the type of flower whether it's unisexual or bisexual.

_____

3(b) What type of pollination will most likely take place in this flower and why?

_____

_____

3(c) What is the significance of pollination for the plant?

_____

_____

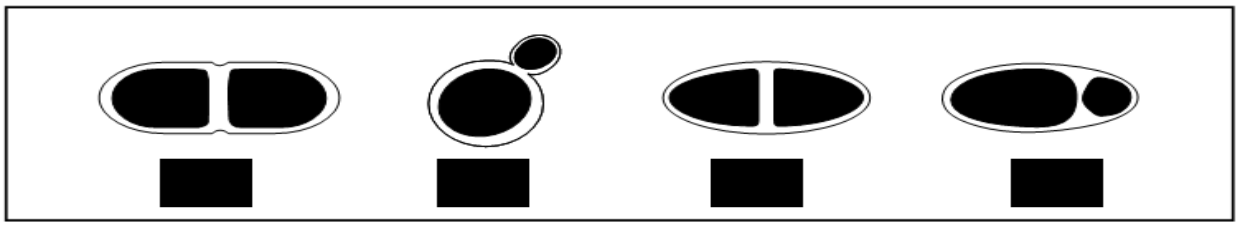
3(d) List two agents of pollination.

_____

MCQs: How do organisms reproduce?

1. The budding in yeast is illustrated by the diagram ABCD

A B C D



(a) A. (b) B. (c) C. (d) D.

2. A student is given a permanent slide showing binary fission in *Amoeba*. The following are the steps in focusing the object under the microscope.

a) Place the slide on the stage; look through the eye piece and adjust the mirror and diaphragm to get even illumination.

b) Look through the eye piece and raise the objective using coarse adjustment until the object is focused.

c) Make the focus sharp with the help of fine adjustment.

d) Look through the eye piece and move the slide until the object is visible.

The proper sequence of steps is

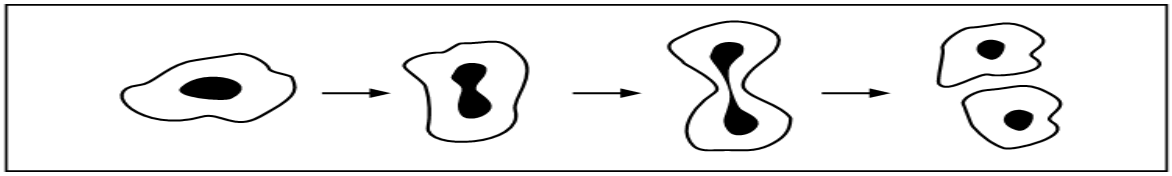
(a) (i), (iii), (iv), (ii).

(b) (ii), (iii), (iv), (i).

(c) (iv), (iii), (ii), (i).

(d) (i), (iv), (ii), (iii).

3.The process represented in the diagram below is the



(a) formation of spores in *Amoeba*.

(b) formation of bud taking place in *Amoeba*.

(c) identical gametes being formed in *Amoeba*.

(d) formation of daughter cells in *Amoeba*.

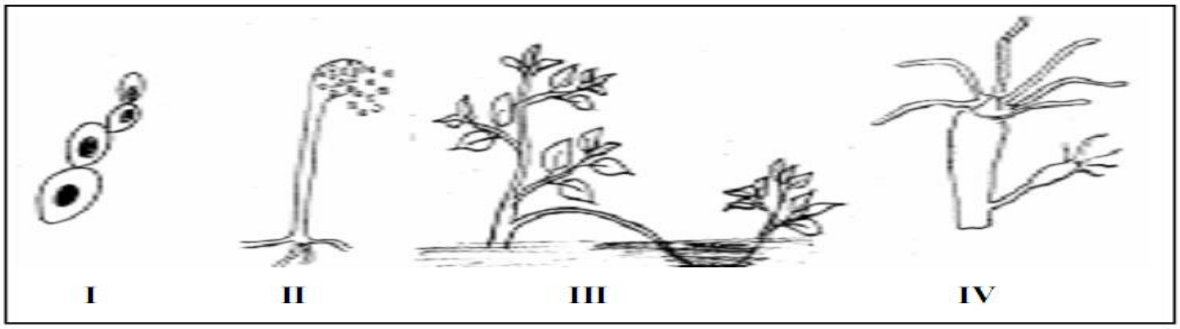
4. Two of the following four figures that illustrate budding are

(a) 1 and 2.

(b) 1 and 3.

(c) 1 and 4.

(d) 2 and 4.



5. Which one of the following is depicted in the sketch of a slide shown below :

a. Binary fission in yeast
b. Budding in yeast
c. Binary fission in *Amoeba*
d. Budding in *Amoeba*

6. Identify the mistake in the following sketch of budding in yeast.

a. Bud is shown to be smaller than parent cell.
b. Nuclei are present in both bud and parental cell.
c. Both parent and bud are shown as single cells.
d. Bud is wrongly labeled.

7. Following diagrams were drawn by four different students on having seen a prepared slide of budding in yeast

The correct diagram is

a. I
b. II
c. III
d. II and IV

8. A slide showing several *Amoeba*e was given to a student and was asked to focus the *Amoeba* undergoing binary fission. What will the student look for to correctly focus on a dividing *Amoeba*?

a) An *Amoeba* with many pseudopodia and a small nucleus.
b) A rounded *Amoeba* with rounded nucleus.
c) An *Amoeba* covered by a cyst and many nuclei
d) An *Amoeba* with elongated nucleus and a constriction in the middle.

CELL DIVISION :THE FUNDAMENTAL PROCESS IN ALL LIFE FORMS

- Cell is the fundamental unit of all life forms.
- An organism is called unicellular if it is made of one cell and multicellular if it is made up of many cells.
- All cells arise from pre-existing cells through a process called cell division.
- Cell division is of two types MITOSIS and MEIOSIS
- MITOSIS is a type of cell division during which one cell divides to give rise to two cells with the same number of chromosomes. It is also called Equational division. In all living organism it occurs during growth, repair and regeneration. In unicellular organisms this type of division is the same as reproduction.
- MEIOSIS is also called reduction division. This type of cell division plays an important role in keeping the chromosome number constant generation after generation. The cell division results in formation of four cells with half the number of chromosomes as the mother cell. For example if mother cell has 4 chromosomes after meiosis it will form four cells with two chromosomes each.
- Each species has a constant number of chromosomes. The organism can contain paired condition of chromosomes. Such organisms are called Diploid and are represented as 2n/2x. Organisms that contain single status of chromosomes are called Haploid n/x.
- In diploid organisms Meiosis occurs at the time of gamete formation so that the male and female gametes contain the haploid number half the chromosome number of chromosomes. During fertilization when these gametes fuse the diploid number of the species is restored.
- The chromosome number for human beings is 46 or 23 pairs. Females contain 22 pairs and 1 pair of XX chromosomes and males contain 22 pairs and XY chromosomes.
- During male and female gamete formation Meiosis occurs in the testis and ovary to form sperms and Ova respectively. All ova contain 22 chromosomes and X chromosome. However 50% sperms contain 22 chromosomes and X chromosome and the other 50% contain 22 chromosomes and Y chromosome.

- A child inherits 23 chromosomes from the mother and 23 chromosomes from the father thus restoring the human diploid chromosome number of 46 (23 pairs).
- The child will always inherit X chromosome from the mother. If it gets Y chromosome from the sperm the sex of the child will be male. On the other hand if it receives another X chromosome from the sperm the child will be a female. It is clear that in human beings the sex of the child is determined by the father. The mother does not pay any role in determining the set of the child.

Chapter 9

HEREDITY AND EVOLUTION

1. Name the molecule that carries the genetic information. What type of changes in the genetic material cause variations?

2. What are the causes of variations in a species that reproduces asexually?

3. Why does sexual reproduction produce more variations?

4. Why is it necessary to have half the number of chromosomes in gametes?

5. Define the following terms:

a) Genes:_____

_____

b) Dominant trait:_____

_____

c) Recessive trait:_____

_____

d) Independent inheritance of traits:_____

_____

e) Acquired traits:_____

_____

f) Genetic drift:_____

_____

g) Natural selection:_____

_____

_____

h) Speciation:_____

_____

i) Artificial selection:_____

_____

j) Gene Flow _____

_____

6. Mendel did not get any plants of medium height when he crossed pure tall plants with pure dwarf plants. What inference can you draw from this observation?

7. Why did Mendel choose pea plants for his experiments on inheritance of characters?

8. Which contrasting characters of pea plant did Mendel choose for his experiments?

9. Two organisms can have the same phenotype but may or may not have the same genotype. Explain taking an example.

10. What is the basis of the evolutionary process?

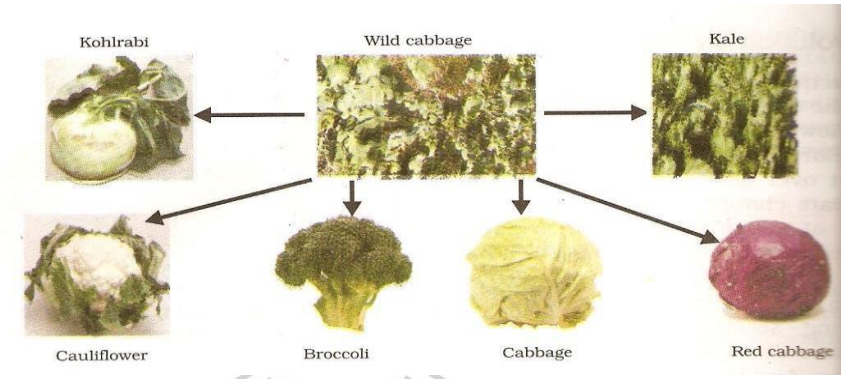
11. Tabulate two differences between inherited and acquired traits. Give an example each.

12. How do homologous and analogous organs point towards evolution?

13. Every living organism is an evolutionary success story. Explain.

14. Write a short on human evolution.

15. During the course of evolution very dissimilar looking structures evolved from a common ancestor. Explain this with the help of example of evolution of the wild cabbage.



16. Black coat colour is dominant over white coat colour in guinea pigs. What kind of offspring would you expect in the F1 generation when a pure black animal is crossed with a pure white animal? If the siblings were crossed, what would the F2 generation be like?

17. In a hybridization experiment **tall pea plants with wrinkled seeds** were crossed with **short pea plants with round seeds.** Find out the phenotype of pea plants in F1 generation.

Also give the phenotypic ratio of the F2 generation obtained by self- pollinating plants of F1 generation. Show the working of the cross to support your answer

18. Name any 3 organs of other animals that are homologous to the human hand.

19. When does the process of gene flow take place?

20. Bacteria have simple body plan as compared to human beings. Does it mean that human beings are far more evolved than bacteria? Justify.

Activity to be performed in Groups of 5 each

Objective: To analyse seed sample of Red Kidney Beans for Mendelian ratio

Requirement : Red kidney Beans, white sheet, Notebook, Pencil

Procedure:
1. Empty the contents of the packet on the sheet provided.
2. Separate the seeds on the basis of size and colour and make separate heaps.
3. Count the number of seeds in each heap.
4. Find out the ratio of seeds.
5. Observation of all groups to be shared and noted in columns given.

Observations:
Present your findings in the form of a table

Groups	Total no. of seeds	No of big and Dark seeds	No. of Big and light seeds	No. of Small size dark seeds	No. of small sized light seeds	Approximate Ratio
I						
II						
III						
IV						
V						
VI						

Conclusion :

Precautions :

Very Short Answer Based Questions (1 mark)

ASSERTION (A) and REASON(R) The following questions consists of two statements- ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below

a) Both A and R are true and R is the correct explanation for A
b) Both A and R are true and R is not the correct explanation for A
c) A is true but R is false
d) A is false but R is true

Q.1. **ASSERTION (A):** Evolution is extremely slow process.
REASON(R): New characters are accumulated in an organisms during its life time.

_____

Q.2**. ASSERTION (A):** Geographical isolation cannot be major factor in speciation of asexually reproducing organism.
REASON(R): Asexually reproducing organisms do not require any other organism for reproduction.

_____

3. Answers to question 3(a) to 3(d) are based on the following passage and concepts studies

Fossils are the remains or traces of ancient life that have been preserved by natural processes, from spectacular skeletons to tiny sea shells. By studying the remains of life and the traces it left behind we can learn a lot about how animals and plants lived and behaved millions of years ago. Usually, when organisms die, their bodies will decompose and be lost. But every once in a while, the body or at least some parts may be in an environment that does not let it decompose completely. If a dead insect gets caught in hot mud, for example, it will not decompose quickly, and the mud will eventually harden and retain the impression of the body parts of the insect.

3(a) What are fossils?

_____

_____

3(b) What are the techniques used to determine the age of fossils?

_____

_____

3(c) How are fossils formed?

_____

_____

_____

3(d) What do they tell us about evolution? (2 points)

_____

_____

MCQs : Heredity and Evolution

1. Alternative forms of a gene are called _____.
a. loci
b. multiples
c. chromosomes
d. alleles

2. Heredity or inheritance of specific traits became clearer due to

a. Lamarck's theory
b. Mendel's work on garden peas
c. Darwinism
d. Neo-Darwinism

3. Which of these is homozygous recessive?
a. Ss
b. ss
c. SS
d. s

4. What will be the genotypic ratio of the cross between Rr and rr?

a. 1:2:1
b. 3:1
c. 1:1
d. 1:1:1

5. What will be the genotypic ratio of the cross between Rr and Rr?

a. 1:1
b. 3:1

c. 1:2:1
d. 1:1:1

6. The offspring resulting from a cross between two pure homozygous recessives would be _____.

a. 50% homozygous recessive and 50% homozygous dominant
b. 75% homozygous recessive and 25% heterozygous dominant
c. 75% homozygous recessive and 25% homozygous dominant
d. 100% homozygous recessive

7. On what cellular structures are genes in eukaryotes carried?

a. Endoplasmic reticulum
b. Nuclear membrane
c. Chromosomes
d. Mitochondria

8. Which of the following sentences is true about the evolutionary process?

a. There is no real 'progress' in the idea of evolution.
b. humans are unique, a totally new type of organism.
c. progress is nature's religion.
d. evolution of life forms was rapid in the beginning ages.

9. In man the chromosome number is 46. How many chromosomes are present in man's muscle cells?
a. 23
b. 46
c. 69
d. variable

10. The component of a chromosome that controls heredity is ____.
a. proteins
b. histones
c. DNA
d. RNA

11. Speciation takes place when variation occurs with
a. mood changes
b. death of an organism
c. changes due to accidents

d. geographical isolation

12. Number of chromosomes in a human male is _____.
a. 23
b. 23 pairs
c. 22 pairs +XY
d. 22 pairs

13. By studying analogous structures we look for _____.
a. similarities in appearance and function but different in structure
b. similarities in appearance bur differences if functions
c. Similarities in organ structure
d Similarities in cell make up

14. Which of the following are not examples of analogous structures?
a. Wings of bat and butterfly
b. Wings of bat and forelimb of cattle
c. Thorn and spine
d. Tendril of *Lathyrus* and tendril of *Gloriosa*

15. Speciation is the evolutionary process by which _____.
a. a new gene pool is formed
b. evolutionary paths of species converge
c. New species are formed
d. Shows up differences in physical traits

16. Evidences of evolutionary relationships are found in _____.
a. atmosphere
b. fossils
c. ocean beds
d. rocks

Chapter 15

OUR ENVIRONMENT

1) Give some examples of biodegradable substances. Why are they called so? How does degradation occur in nature?

2) Define ecosystem.

3) What are the components of the ecosystem?

4) Which among the following are the abiotic components of an ecosystem?
Herbs, sunlight, bacteria, soil, wind, water.

5) Name two man-made ecosystems.

6) What is the role of the producers and decomposers in an ecosystem?

7) Explain the 10% Law with respect to movement of energy in the ecosystem.

8) Why is a food chain never more than 3- 4 trophic levels?

9) Consider the following food chains:

a) Plants → Mice → Snakes → Hawks

b) Plants → Mice → Hawks

If energy available at the producer level in both the food chains is 100J, in which case will hawks get more energy? Justify your answer.

10) Draw a food web of a terrestrial habitat.

11) Why does biological magnification happen?

_____

_____

_____

_____

12) State the causes and effects of ozone depletion.

_____

_____

_____

_____

13) What will be the effect of the extinction of carnivores in a forest ecosystem?

_____

_____

_____

_____

_____

14) How can you help to reduce the problem of waste disposal? Give any two methods.

_____

_____

_____

_____

_____

Very Short Answer Based Questions (1 mark)

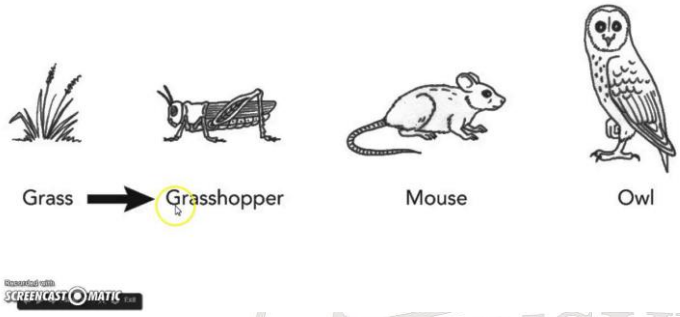
ASSERTION (A) and REASON(R) The following questions consists of two statements- ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below

a) Both A and R are true and R is the correct explanation for A
b) Both A and R are true and R is not the correct explanation for A
c) A is true but R is false
d) A is false but R is true

Q.1. **ASSERTION (A)** : The concentration of a chemical increases as trophic level increases due to biological magnification
REASON (R): DDT is a harmful chemical

_____

Q.2. Answers to questions 2(a) to 2(d) are based on information provided in the picture and concepts studied.



2(a) What is the ultimate source of energy for the earth?

_____

2(b) On the Earth solar energy is trapped by which organisms?

_____

2(c) State the trophic level of Mouse in the above food chain.

_____

2(d) How much energy will be available to the owl in the given food chain if the energy trapped by the plants from the sun is 1000J?

_____

MCQs : Our Environment

1. A natural phenomenon that becomes harmful due to pollution is _____.

a global warming

b ecological balance

c Deforestation

d Desertification

2. The chemical responsible for ozone holes is _____.

a CO_2

b SO_2

c CO

d. CFC

3 Animal dung is _____ waste.

a biodegradable

b non-biodegradable

c Hazardous

d Toxic

4. Which of the following is biodegradable?

a iron nails

b plastic mugs

c Paper plates

d. Donas made of plant leaves

5. Which of the following is non-biodegradable?

a animal bones

b nylon

c tea leaves

d. Kitchen waste

6. In a lake polluted with pesticides, which one of the following will contain the maximum amount of pesticides?

a small fish

b microscopic animals

c big fish

d. water birds

7. Name the process in which a harmful chemical enters the food chain and gets concentrated at each level in the food chain.

a concentration

b biomagnification

c expansion

d Pollution

Chapter 16

SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

1) Why was the Ganga Action Plan started?

2) The presence of coliform bacteria in water is a pointer towards its polluted state. Justify.

3) Why has it become imperative to manage our resources well?

4) What do you mean by sustainable management of resources? Explain two ways by which we can manage our fossil fuels and water.

5) Name some of the biodiversity hotspots of our country.

_____

_____

6) What are the 5R's?

_____

_____

_____

_____

_____

7) Recycling of articles results in wastage of energy and money, therefore, one should practice reuse. Justify.

_____

_____

_____

_____

_____

8) Name any two industries that are dependent on forests?

_____

_____

_____

_____

9) Why is it beneficial to involve local people to take care of the forest resources? Explain with the help of an example.

_____

_____

_____

_____

_____

_____

10) What are the major criticisms against construction of large dams like Sardar Sarovar dam? Explain

11) Name a few traditional methods of water harvesting practiced in various parts of the country.

12) Enlist at least 5 ways by which energy consumption can be reduced.

Very Short Answer Based Questions (1 mark)

ASSERTION (A) and REASON(R) The following questions consists of two statements- ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below

a) Both A and R are true and R is the correct explanation for A
b) Both A and R are true and R is not the correct explanation for A
c) A is true but R is false
d) A is false but R is true

Q.1. **ASSERTION (A):** Different human activities and chemical effluents from industries increase toxicity in River Ganga.

REASON (R): Ganga Action Plan is a project to clean Ganga river

_____

Q.2. **Q.2. Answers to questions 2(a) to 2(d) are based on information provided in the paragraph and concepts studied.**

Forests are 'biodiversity hotspots'. One measure of the biodiversity of an area is the number of species found there. However, the range of different life forms (bacteria, fungi, ferns, flowering plants, nematodes, insects, birds, reptiles and so on) found, is also important. One of the main aims of conservation is to try and preserve the biodiversity we have inherited. We all use various forest produce. But our dependency on forest resources varies. Some of us have access to alternatives, some do not. When we consider the conservation of forests, we need to look at the stakeholders

2 (a) Why are forests 'biodiversity hotspots'?

_____

_____

2(b) What is the main aim of conservation?

_____

_____

2(c) List any 2 stakeholders in the forests.

_____

_____

2(d) Amrita Devi Bishnoi Award has been instituted by the Government of India for what purpose?

_____

_____

MCQs : Sustainable Management of Natural Resources

1. Which one of the following is an example of biotic component of environment?

a. Wind
b. Water
c. vegetation
d. temperature

2. Which of the following is a non- renewable resource?

a. solar Energy
b. hydrocarbon fuel
c. flora and fauna
d. nuclear power

3. Sanctuaries are established to_____.

a. develop commercial tree plantation
b. conduct ecotourism on wildlife
c. protect animals
d. conduct research on Biodiversity

4. Global warming has resulted due to

a. increased emissions of fine particulates from automobiles
b. increased emissions of CO_2 from automobiles
c. Oxides of sulphur and nitrogen
d. lack of rainfall worldwide

REVISION ASSIGNMENT

TERM 2 **MM: 20**

Q .1. Why forests are called biodiversity hotspots? (1)

Q. 2 If the weight of beetles is reduced due to starvation can this change lead to evolution? Give reason. (1)

Q. 3 What do the fossils tell us about the process of evolution? (2 points) (1)

Q.4 What changes are observed in the uterus if fertilization does not take place? (1)

Q.5 State two functions of the ovaries. (1)

Q .6 Classify the following as homologous/ analogous organs and comment on how closely related the two species are in terms of evolution (2)

i) Eyespots of P*lanaria* and human eye
ii) Fore limb of frog and fore limbs of human beings

Q.7 Give two reasons for appearance of variations among the progeny formed by sexual reproduction. (2)

Q.8 List the four stakeholders in forests and their interest (2)

Q.9 A pure bred tall pea plant with round seeds (TTRR) is crossed with a pure bred short pea plant with wrinkled seeds (ttrr).

i) What will be the phenotype of F1 generation?
ii) What will be the phenotypic ratio of the progeny (F2 generation) if F1 hybrids are self- pollinated?
Show the working of the cross (3)

Q.10. List two advantages of the following: (3)

i) Dams
ii) Stored underground water
iii) Watershed management

Q.11 Draw a neat diagram showing germination of pollen tube on the stigma of a flower. (3)

Academic Session: 2019- 20
Practice Examination
Subject - Science
M/3

Time : 2 hrs **MM 55**

General Instructions

- Attempt each section on separate sheet.
- This paper has 6 printed sides.
- Read the questions carefully. Marks will be deducted for not following instructions given in the questions.
- Write question numbers as given in the paper and choose the correct option in the multiple choice questions.

Section A-Physics **MM-18**

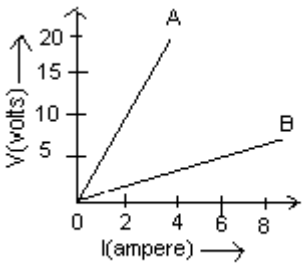
Q1. A virtual image is formed by the mirror of an object which is less than the size of the object. Which mirror is it? 1

(a) Concave mirror
(b) Convex mirror
(c) Plane mirror
(d) Both concave and convex mirror

Q2. An electric bulb is rated 100W, 220V. When it is operated at 110V, the power consumed will be 1

(a) 100W
(b) 75W
(c) 50W
(d) 25W

Q3. The V-I graph is shown for A and B. Which one represents the resistors connected in series? Justify your answer. 1



Q4. Why is a voltmeter used in a circuit? How is it different from an ammeter? 1

Q5. If the magnification produced by spherical mirror is -2, identify the type of spherical mirror. Draw and relevant ray diagram and mention the position of the object and image. What is the nature of the image formed 3

Q6. a) What is meant by absolute refractive index? 3
b) What will be the angle of emergence if a ray of light strikes the rectangular glass slab at an angle of 40^0 with normal.
c) Find the refractive index of water if speed of light in vacuum is 3 x 10^8m/s and speed of light in water is 2.25 x 10^8m/s.

Q7. 3

a) Why is tungsten metal selected for making filaments of incandescent lamps?

b) Power of a lamp is 60 W. Find the energy in joules consumed by it in 1 s.
c) Draw a schematic diagram of a circuit consisting of a battery of three cells of 2 V each, a 5 Ω resistor, an 8 Ω resistor and a 12 Ω resistor, an ammeter and a plug key, all connected in series.

Q8. (a) A convex lens of focal length 20cm can produce a magnified real image as well as a magnified virtual image. Is the statement correct? If yes, where shall the object be placed in each case to get the image? If no, justify your answer. 5
(b) A 1m tall object is placed on the principal axis of a convex lens and its 40cm tall image is formed on the screen placed at a distance of 70cm from the object. Find the focal length of the lens. Also mention the position and nature of the image formed.

OR

A student focused the image of a candle flame on a screen using a convex lens. He noted down the following readings:-

Position of the candle = 12cm
Position of the lens = 50cm
Position of the screen = 88cm

(a) Find the focal length of the lens.
(b) Where will the image be formed if he shifts the candle towards the lens at a position of 31cm?
(c) What will be the nature of the image formed if he further shifts the candle towards the lens? Draw the relevant ray diagram.

Section B-Chemistry

MM-18

Q1 Which of the following statements are usually correct for carbon compounds ? These 1

a) Are Good conductors of electricity in molten state.
b) Are Poor conductors of electricity in molten state.

c) Have strong forces of attraction between their molecules .
d) Have low melting and boiling point

a) (i) and (iii)
b) (ii) and (iii)
c) (i) and (iv)
d) (ii) and (iv)

Q2. Oils on treatment with hydrogen in the presence of palladium or nickel catalyst form fats . This is an example of 1
a) Addition reaction
b) Substitution reaction
c) Displacement reaction
d) Oxidation reaction

Q3. $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + Fe$ 1
The above reaction is an example of a
a) Combination reaction
b) Double displacement reaction
c) Decomposition reaction
d) Displacement reaction

Q4. How is Ethenepreparedfrom ethanol ? Give the reaction involved in it . 1

Q5. Name the functional group present in 2
a) $CH_3CH_2CH_2COCH_3$
b) CH_3CH_2CHO

Q6. Translate the following statements into chemical equations and balance them - 2
a) Hydrogen sulphide gas burns in air to give water and sulphur dioxide gas
b) Barium chloride reacts with Aluminiumsulphate to give aluminium chloride and a precipitate of barium sulphate .

Q7. Draw the electron dot structure of 2
a) Water
b) Ethyne

Q8. a) Name the products formed when Ethane burns in air .Write a balanced chemical equation for the reaction . 3
b) Give a test that can be used to differentiate between butter and cooking oil .

Q9. What are hydrophobic and hydrophilic parts in soap ? With the help of diagram , Explain the cleansing action of soap . 3

Q10. Complete and balance the following equations and name the products – 3

a) $CH_3COOH + CH_3CH_2OH \longrightarrow$
b) $CH_3CH_2OH + Na \longrightarrow$
c) $CH_2=CH_2 + H_2 \longrightarrow$

Section C-Biology **MM-19**

Q1. Read the following statements and choose the correct option 1

i. Wings of bird and wings of bat are analogous organs
ii. Fore limb of horse and human arm are homologous organs
iii. Potato and sweet potato are homologous organs

a. i. ii. and iii. are correct
b. i. and iii are correct
c. ii. and iii are correct
d. i. and ii are correct

Q2. Chances of variation is more in: 1
a. Sexual reproduction
b. Asexual reproduction
c. Vegetative reproduction
d. Budding

Q3. State two functions of testes in human males. 1

OR

Why are testes present outside the body of a male?

Q4. Define Genetic drift. 1

Q5. List two factors that could lead to speciation. 1

Q6. a) Give a barrier method and a surgical method for contraception. 3
b) List any two reasons for adopting contraceptive methods

Q7 Tabulate one difference between the following. 3
a. Inherited and acquired traits.
b. Dominant allel and recessive allel.
c. Monohybrid and dihybrid cross.

Q8. a. Name the following parts : 3

i. Organ which produces the hormone estrogen
ii. Site of fertilization.

b. Explain the changes that take place in the uterus :
(i) To receive the zygote.
(ii) When zygote is not formed.

OR

a. Give the role of Vas Deferens in the male reproductive system.
b. Name one sexually transmitted disease caused by:
(i) bacteria
(ii) virus
c. If a female is using copper –T, will it help in protecting her from sexually transmitted diseases? Give reason for your answer.

Q9. a. Genotype of a plant bearing purple flower is PP and one with white flower is pp. When these are crossed. 5
i. What would be the colour of the flowers in F_1 generation?
ii. Give the percentage of the white flower when F_1 plants are self pollinated.
iii. In what ratio would you find PP and Pp in F_2 progeny?

Draw flow chart/Punnett square in support of your answer.

b. In human beings the statistical probability of getting either a male or female child is 50:50. Give a suitable genetic explanation.

OR

a. What are fossils? How are they formed?
b. State any two role of fossils in the study of the process of evolution.
c. List two methods of determining the age of fossils.

PRACTICAL STUDY MATERIAL

INSTRUCTIONS FOR MAKING PRACTICAL FILE

- **Index to be made on first page (Refer to format given below)**
- **Written work to be done on ruled side with a pen**
- **Titles to be written in black ink and rest in blue ink only**
- **All diagrams corresponding to written work to be drawn and labelled on blank pages with pencil only**
- **Each experiment to begin on a fresh page**
- **Note book to be covered with brown paper**
- **Name. Class and Section of the student to be mentioned outside the practical file**

FORMAT FOR INDEX

Experiment No.	Name of Experiment	Date	Teachers Remarks

EXPERIMENT 1

AIM

To prepare temporary mounts of leaf peels to observe stomata and to differentiate between dicot and monocot stomata.

THEORY

In plants, physiological processes such as respiration and photosynthesis involve exchange of gases between plant tissues and the external atmosphere. This occurs through minute microscopic pores called stomata (singular; stoma) present in the leaf. Stoma is an elliptical pore with two kidney shaped guard cells on either side in dicots and dumbel- shaped guard cells in monocots. The guard cells have thin outer and thick inner walls. When guard cells are turgid, the stoma opens and it closes when the guard cells are flaccid.

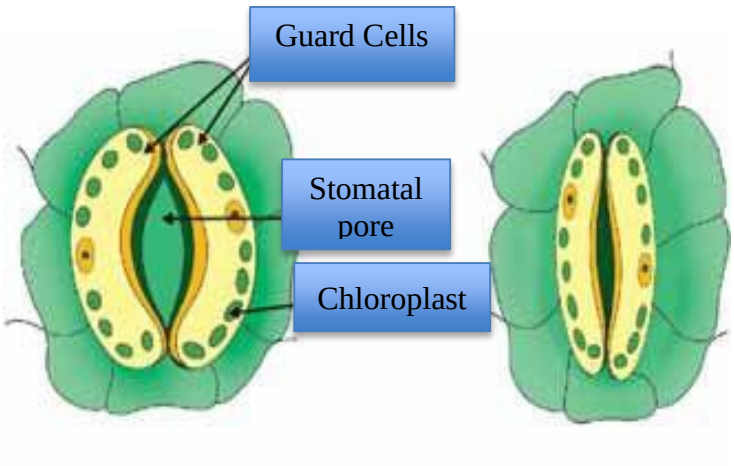
The number, distribution and type of stomata varies in different plants. Within a plant, the number and distribution may vary between the upper and lower surfaces of leaf. However, the type of stomata remains the same in a particular plant species.

MATERIALS REQUIRED

Fresh leaves of a dicot plant (such as Petunia, Dianthus, Solanum) and a monocot plant (such as maize, grass), compound microscope, slide, cover slip, needle, brush, a piece of blotting paper, and a razor blade.

PROCEDURE

1. Remove a peel from the lower surface of a dicot leaf. This can be done by folding or tearing the leaf and pulling out the thin membranous transparent peel.
2. Mount the peel on a slide in a drop of water and stain it in safranin for 1 minute.
3. Add a drop of glycerin and place a cover slip on it. Avoid air bubbles. Blot the excess stain from the slide.
4. Focus the peel under the low power of compound microscope and observe the stomata, guard cells and epidermal cells.
5. Draw the diagram of a stoma and label its parts.
6. Repeat the process with peels removed from a monocot leaf. Record your observations.
7. Following the same procedure, study the stomata of other dicot and monocot plants.



(a) (b)

Fig: (a) An open dicot stoma; and (b) closed dicot stoma

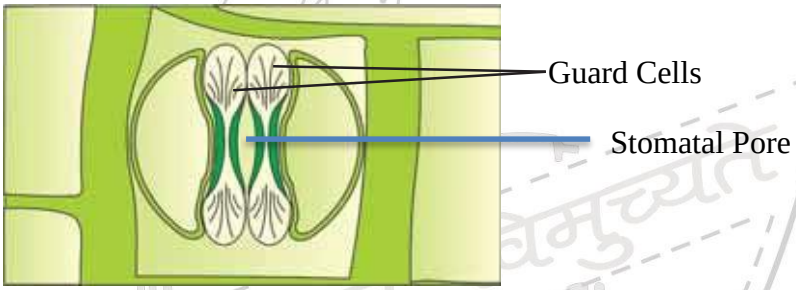


Fig. : An open monocot stoma (grass)

RESULTS AND DISCUSSION

Based on the observation compare the characteristic of the dicot and monocot stomata and draw your conclusion.

- It is found that number, size, and distribution of stomata vary in different plants. In general, the stomata are lesser on the upper surface as compared to that on the lower surface of leaf.
- The stomata are kidney shaped in dicots and dumbell- shaped in monocots.
- Fewer stomata on the upper surface prevent excessive loss of water due to transpiration as this surface is directly exposed to sunlight.
- In aquatic plants stomata are either absent or non-functional. Stomata are absent in roots also.

PRECAUTIONS :

1. The epidermal peel should be taken from a freshly plucked leaf
2. The peel should be mounted in center of the slide
3. The peel should not be allowed to dry
4. Place the cover slip gently to avoid air bubbles
5. Oozing of glycerin should be avoided
6. Do not add too much stain

7. The peel should not be allowed to curl

QUESTIONS

- What is the function of guard cells in stomata?
- Why is the number of stomata greater on the lower surface of a leaf?
- Why are stomata absent in roots?
- What is the shape of guard cells in stoma of grass leaf?
- Do guard cells have rigid or elastic walls? Justify your answer.

EXPERIMENT 2

AIM

To study the liberation of carbon dioxide gas during aerobic respiration.

THEORY

Respiration is a catabolic process wherein food is oxidized to release energy for various life processes. It is of two types, namely (i) aerobic respiration that takes place in the presence of oxygen, and (ii) anaerobic respiration that takes place in the absence of oxygen. In aerobic respiration the breakdown of food (glucose) leads to the release of carbon dioxide gas, water and energy in the form of adenosine triphosphate (ATP). Most organisms that we see around us undergo aerobic respiration. Yeast and certain microorganisms and cells of skeletal muscles in our body undergo anaerobic respiration.

MATERIALS REQUIRED

Germinating gram seeds, KOH solution, petroleum jelly, a conical flask (100 mL), a beaker (250 mL), a single-bore cork, a clean delivery (bent) tube, a small test tube, a piece of thread, and a measuring scale.

PROCEDURE

1. Take about forty germinating seeds in a conical flask.
2. Fix the cork to the mouth of the conical flask and with the help of a thread, suspend the tube containing KOH solution (as shown in Fig).
3. Insert one end of a clean delivery tube in the conical flask through the cork. Dip the other end of the delivery tube in a beaker filled with water as shown in Fig. There will be a rise of water level inside the delivery tube at the end dipped in the water due to capillary action. Mark the position of water level in the tube. This is the initial reading (h) of water level in the delivery tube. (Mark the initial position of water level on the delivery tube with a sketch pen.)
4. Make the conical flask air-tight by applying a thin smear of petroleum jelly so that the gas evolved during the process of respiration by the germinating seeds does not leak out.
5. Keep this set-up undisturbed for about forty five minutes in bright sunlight.
6. Do you find any change in the water level inside the delivery tube after forty five minutes? Does it increase? Note and record the final water level (h2) in the delivery tube. (Mark the final level of water in the delivery tube with a sketch pen.)

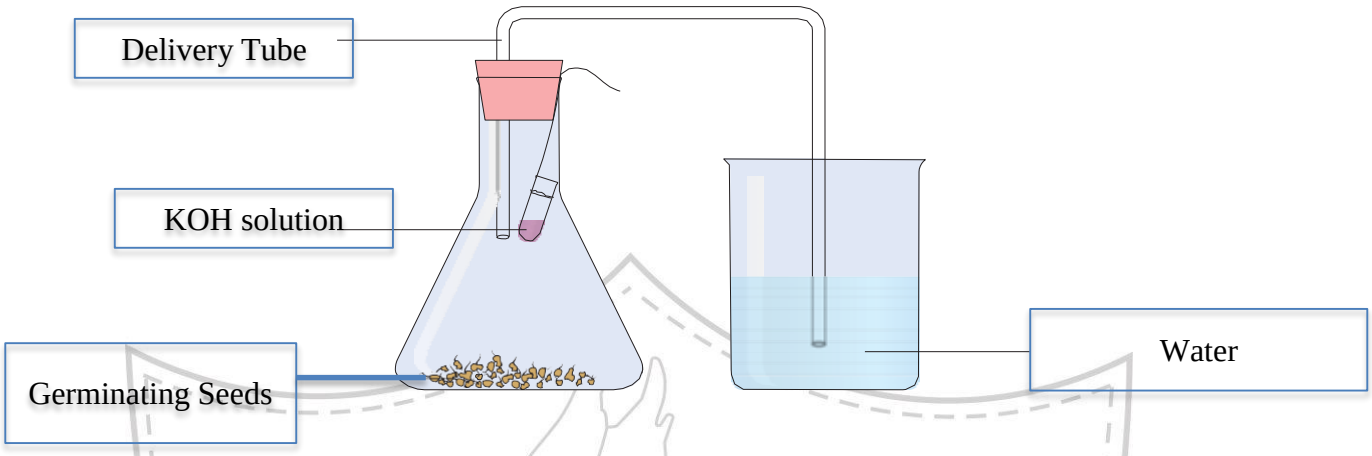


Fig. Production of carbon dioxide gas during respiration in a conical flask

OBSERVATIONS: After sometime the water level rises in the bent tube.

RESULT: The rising of water level indicates that CO2 is produced by germinating seeds. The CO2 produced is absorbed by KOH solution. This creates a partial vacuum in the conical flask. The air from bent tube moves into the conical flask which pulls the water up in the bent tube. Thus the level of water rises in the bent tube.

PRECAUTIONS:

1. All connections should be air tight.
2. Freshly prepared concentrated solution of potassium hydroxide should be used.
3. KOH is corrosive. Handle it carefully.

EXPERIMENT 3

AIM

To study binary fission in *Amoeba* or *Paramecium* and budding in yeast and *Hydra.*

THEORY

Binary fission and budding are forms of asexual reproduction in lower organisms, like bacteria, unicellular protozoans, and a few other animals. In binary fission, the parent cell divides into two daughter cells by amitosis and each daughter cell grows into an adult. The division of nucleus is called amitosis because the stages of a typical mitotic division are not observed in these cells. Budding is commonly seen in yeast and *Hydra*. *Hydra* is a tiny freshwater organism which produces young ones from its body laterally. Yeast is a unicellular organism which produces a chain of cells attached to the parent cell.

MATERIALS REQUIRED

A compound microscope, permanent slides of binary fission in *Amoeba or Paramecium*; budding in yeast and *Hydra*; charts of binary fission and budding.

PROCEDURE

1. Focus the slide under high power of compound microscope.
2. Observe the stages in binary fission and budding
3. Draw diagrams of the stages in binary fission and budding.

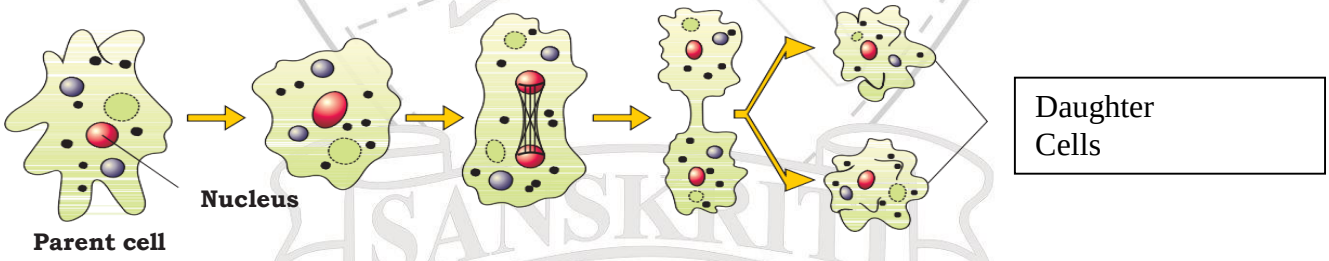
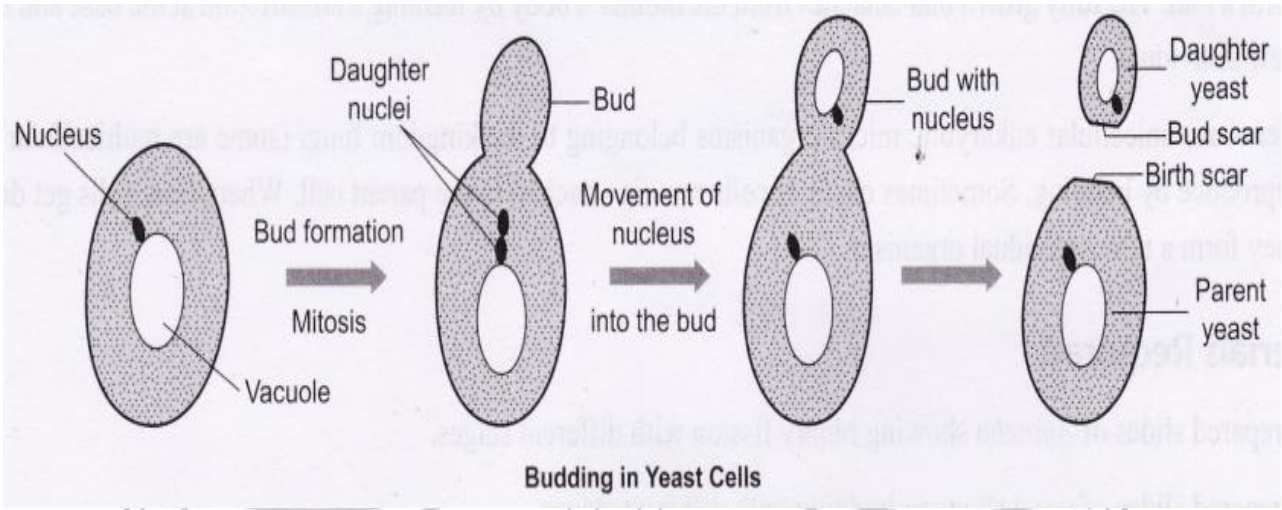
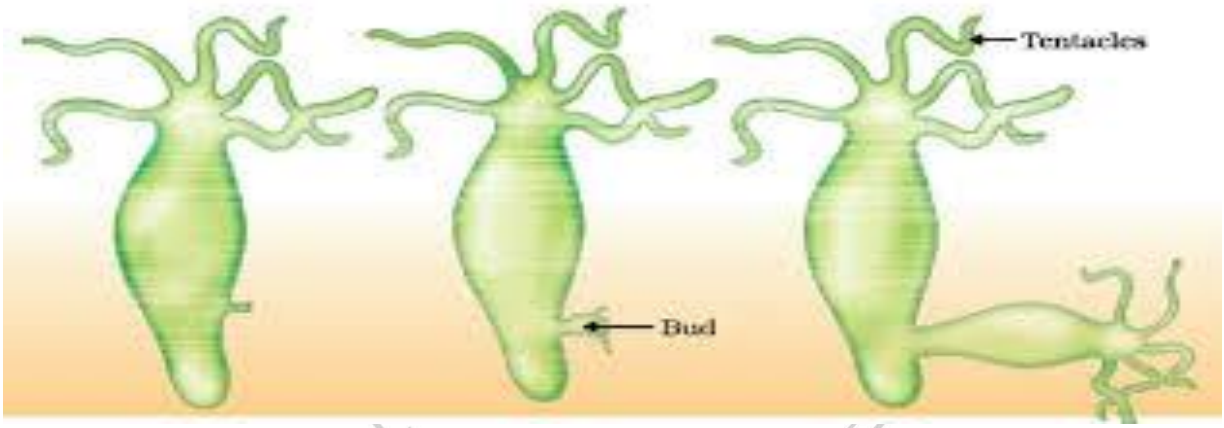


Fig. ***Binary fission in Amoeba***



Budding in Yeast Cells



Budding in *Hydra*

EXPERIMENT 4

IDENTIFICATION OF PARTS OF AN EMBRYO OF DICOT SEED

EXPERIMENT 10

Aim

To identify the different parts of an embryo of a dicot seed (pea, gram or red kidney bean).

Requirements

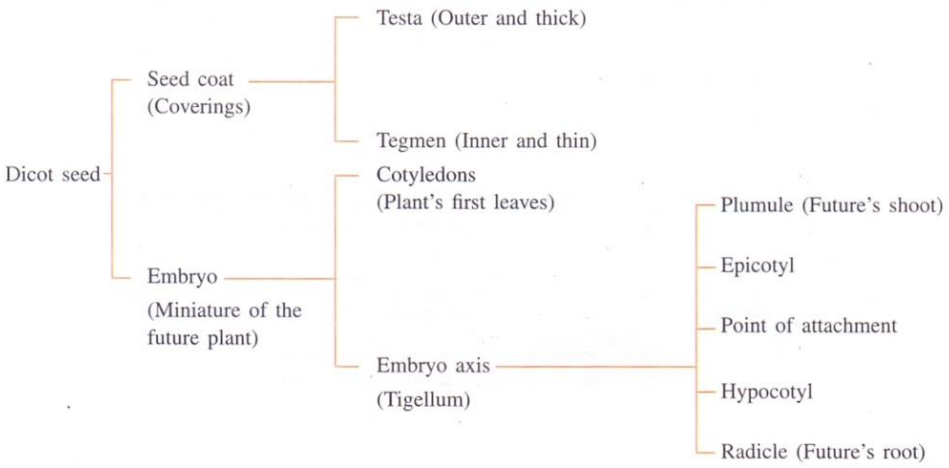
Dicot seeds (Pea, gram or red kidney bean), needle, petri plate, blotting papers.

Basic Principle Involved

Ripened ovule is called seed. This is a final product of sexual reproduction. Seeds are of two types.

(i) Endospermic or albuminous seeds. Examples are monocot plants like wheat, rice and maize.

(ii) Non-Endospermic or exalbuminous seeds. Examples are dicot plants like pea, gram, red kidney bean. Various parts of a dicot seed are shown in the following flow-chart:



Procedure

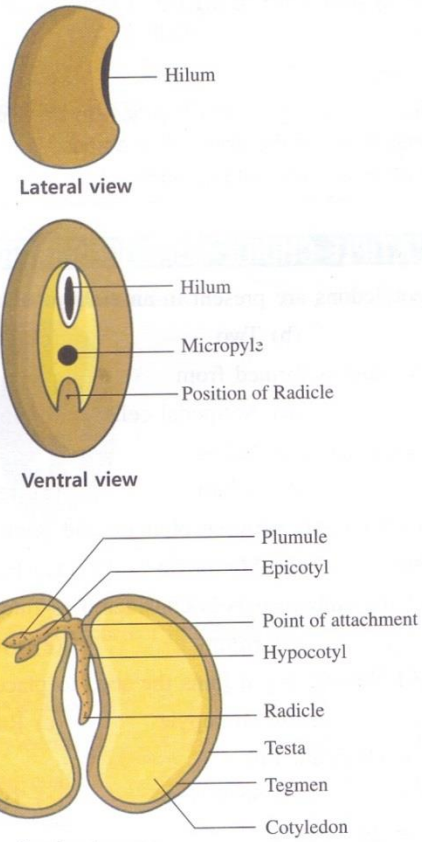
1. Keep the bean seed on wet cotton in petri plate for one day.
2. With the help of the needle, remove the seed coat and display it on wet blotting paper.
3. On removing the seed coat, the embryo of the seed is seen. Gently open the cotyledons and observe the attachment of embryo axis to the cotyledons.
4. Remove the embryo axis from the cotyledons.
5. Display the cotyledons and embryo axis on the blotting paper.

Observations

1. Concave side of red kidney bean seed is darker with a whitish scar called hilum. It is the point where the stalk or funicle of the seed was attached. Hilum may be called as belly button of the seed.
2. Micropyle is a pore on one end of hilum, water enters the seed through this pore during seed germination. This pore can be seen on pressing a soaked seed when a drop of water or air is found to ooze out of it.
3. The seed is covered by a thick outer seed coat called testa and a thin inner transparent tegmen.
4. Embryo has two large cotyledons and one embryo axis or tigellum. Cotyledons are curved and have become large due to storage of food. These become the first leaves of the plant.
5. The upper end of embryo axis is the plumule (future shoot). It has two small folded leaves.
6. The lower end of embryo axis which projects beyond the cotyledons is the radicle (future root).
7. The part of embryo axis between plumule and point of attachment is called epicotyl.
8. The part of embryo axis between radicle and point of attachment is called hypocotyl.

Precautions

- Seeds must be soaked in water before observing its parts.
- The seed coat should be removed gently.



Red kidney bean seed with different views

VIVA VOCE

T. *What is seed?*
S. Ripened ovule is called seed.
T. *How many seed coats are generally present in a seed?*
S. Two, outer one is called testa and inner one is called tegmen.
T. *Name the part of embryo axis which is present between point of attachment and plumule.*
S. Epicotyl.
T. *Name the point where funicle was attached.*
S. Hilum.
T. *Which seed coat is thin and transparent?*
S. Tegmen.
T. *What is embryo?*
S. Embryo is a part of seed, it has two main parts. (a) Cotyledons (b) Embryo axis.
T. *What is a radicle?*
S. It is the lowermost part of embryo axis which is destined to be the root.
T. *What is a plumule?*
S. It is the uppermost part of embryo axis which is destined to be the stem.
T. *Name the part of seed which is present in monocot seeds but generally absent in dicot seeds.*
S. Endosperm.
T. *What are cotyledons?*
S. The cotyledons are the organs which adhere to the embryo axis, called point of attachment. These become the first leaves of the plant. Their purpose is to supply nourishment to the young plant until it is in a condition to make food for itself.

CBSE BOARD SCIENCE PAPER
2019

Series JMS/1 **SET-2**

कोड नं.
Code No. **31/1/2**

रोल नं.
Roll No.

परीक्षार्थी कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।
Candidates must write the Code on the title page of the answer-book.

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **15** हैं।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में **27** प्रश्न हैं।
- **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, प्रश्न का क्रमांक अवश्य लिखें।**
- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।
- Please check that this question paper contains **15** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **27** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

विज्ञान
SCIENCE

निर्धारित समय : 3 घण्टे *अधिकतम अंक : 80*

Time allowed : 3 hours *Maximum marks : 80*

[P.T.O.

सामान्य निर्देश:

(i) इस प्रश्न-पत्र को **पाँच** भागों, **अ, ब, स, द** और **य** में बाँटा गया है। आपको सभी भागों के प्रश्नों के उत्तर लिखने हैं।

(ii) सभी प्रश्न **अनिवार्य** हैं।

(iii) भाग **ब, स, द** और **य** के प्रश्नों में आंतरिक चयन दिया गया है।

(iv) **भाग अ** के प्रश्न संख्या **1** और **2** एक-एक अंक के प्रश्न हैं। इनके उत्तर **एक** शब्द अथवा **एक** वाक्य में देने हैं।

(v) **भाग ब** के प्रश्न संख्या **3** से **5** दो-दो अंकों के प्रश्न हैं। इनके उत्तर लगभग **30** शब्दों में देने हैं।

(vi) **भाग स** के प्रश्न संख्या **6** से **15** तीन-तीन अंकों के प्रश्न हैं। इनके उत्तर लगभग **50** शब्दों में देने हैं।

(vii) **भाग द** के प्रश्न संख्या **16** से **21** पाँच-पाँच अंकों के प्रश्न हैं। इनके उत्तर लगभग **70** शब्दों में देने हैं।

(viii) **भाग य** के प्रश्न संख्या **22** से **27** प्रयोगात्मक कौशल पर आधारित दो-दो अंकों के प्रश्न हैं। इनके संक्षिप्त उत्तर देने हैं।

General Instructions :

(i) *The question paper comprises **five** sections, **A, B, C, D** and **E**. You are to attempt all the sections.*

(ii) *All questions are **compulsory**.*

(iii) *Internal choice is given in sections **B, C, D** and **E**.*

(iv) *Question numbers **1** and **2** in Section-**A** are one mark questions. They are to be answered in **one** word or in **one** sentence.*

(v) *Question numbers **3** to **5** in Section **B** are two-marks questions. These are to be answered in about **30** words each.*

(vi) *Question numbers **6** to **15** in Section **C** are three-marks questions. These are to be answered in about **50** words each.*

(vii) *Question numbers **16** to **21** in Section **D** are five-marks questions. These are to be answered in about **70** words each.*

(viii) *Question numbers **22** to **27** in Section **E** are based on practical skills. Each question is a two marks question. These are to be answered in brief.*

भाग–अ
SECTION-A

1. विद्युतधारा के SI मात्रक का नाम और उसकी परिभाषा लिखिए। 1

Name and define the SI unit of current.

2. बायोगैस के प्रमुख घटक का नाम और उसकी प्रतिशतता लिखिए। 1

Write the name of the main constituent of biogas. Also state its percentage.

भाग–ब
SECTION-B

3. उस तत्व X का नाम, प्रतीक और इलेक्ट्रॉनिक विन्यास लिखिए जिसकी परमाणु संख्या 11 है। 2

अथवा

क्या नीचे दिए गए तत्वों के समूह डॉबेराइनर के त्रिक के रूप में वर्गीकृत किए जा सकते हैं?

(a) Na, Si, Cl (b) Be, Mg, Ca

इन तत्वों के परमाणु द्रव्यमान इस प्रकार हैं:

Be–9; Na–23, Mg–24, Si–28, Cl–35, Ca–40

प्रत्येक प्रकरण में अपने उत्तर की पुष्टि कीजिए।

Write the name, symbol and electronic configuration of an element X whose atomic number is 11.

OR

Can the following groups of elements be classified as Dobereiner's triad:

(a) Na, Si, Cl (b) Be, Mg, Ca

Atomic mass of Be–9; Na–23, Mg–24, Si–28, Cl–35, Ca–40.

Justify your answer in each case.

4. मानव शरीर में O_2 और CO_2 का वहन किस प्रकार होता है? 2

How is O_2 and CO_2 transported in human beings?

5. नेत्र लेंस की संरचना लिखिए तथा मानव नेत्र में पक्ष्माभी पेशियों की भूमिका का उल्लेख कीजिए। 2

Write the structure of eye lens and state the role of ciliary muscles in the human eye.

भाग–स

SECTION-C

6. उन अम्ल एवं क्षारक की पहचान कीजिए जिनसे सोडियम हाइड्रोजन कार्बोनेट बनता है। अपने उत्तर के समर्थन में रासायनिक समीकरण लिखिए। उल्लेख कीजिए कि क्या यह यौगिक अम्लीय अथवा क्षारीय अथवा उदासीन है। इसका pH मान भी लिखिए। 3

Identify the acid and base which form sodium hydrogen carbonate. Write chemical equation in support of your answer. State whether this compound is acidic, basic or neutral. Also write its pH value.

7. तत्वों के समूह की संयोजकता के आधार पर, प्रत्येक के लिए कारण सहित पुष्टि करते हुए, नीचे दिए गए यौगिकों के आण्विक-सूत्र लिखिए: 3

(i) समूह (ग्रुप) 1 के तत्वों का ऑक्साइड

(ii) समूह 13 के तत्वों का हैलाइड

(iii) समूह 2 के तत्व A और समूह 17 के तत्व B के संयोजन से बने यौगिक

Based on the group valency of elements write the molecular formula of the following compounds giving justification for each :

(i) Oxide of first group elements.

(ii) Halide of the elements of group thirteen, and

(iii) Compound formed when an element, A of group 2 combines with an element, B of group seventeen.

8. किसी चायना डिश में 2 g सिल्वर क्लोराइड लेकर उसे कुछ समय के लिए सूर्य के प्रकाश में रखा गया है। इस प्रकरण में आप क्या प्रेक्षण करेंगे? होने वाली रासायनिक अभिक्रिया का संतुलित रासायनिक समीकरण दीजिए। इस रासायनिक अभिक्रिया के प्रकार को पहचानकर लिखिए। 3

अथवा

नीचे दिए गए प्रत्येक प्रकरण में होने वाली अभिक्रिया के प्रकार को पहचानिए और उसके लिए संतुलित रासायनिक समीकरण लिखिए।

(a) जिंक सिल्वर नाइट्रेट से अभिक्रिया करके जिंक नाइट्रेट और सिल्वर बनाता है।

(b) पोटैशियम आयोडाइड लैड नाइट्रेट से अभिक्रिया करके पोटैशियम नाइट्रेट और लैड आयोडाइड बनाता है।

2 g of silver chloride is taken in a china dish and the china dish is placed in sunlight for sometime. What will be your observation in this case ? Write the chemical reaction involved in the form of a balanced chemical equation. Identify the type of chemical reaction.

OR

Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions.

(a) Zinc reacts with silver nitrate to produce zinc nitrate and silver.

(b) Potassium iodide reacts with lead nitrate to produce potassium nitrate and lead iodide.

9. वाष्पोत्सर्जन की परिभाषा लिखिए। इस प्रक्रिया को निदर्शित करने के लिए किसी प्रयोग की अभिकल्पना कीजिए। 3

Define the term transpiration. Design an experiment to demonstrate this process.

10. हॉर्मोन नियमन की पुनर्भरण क्रियाविधि क्या है? इस परिघटना की व्याख्या इंसुलिन का उदाहरण लेकर कीजिए। 3

What is feedback mechanism of hormonic regulation. Take the example of insulin to explain this phenomenon.

11. पादप हॉर्मोन क्या होते हैं? निम्नलिखित के लिए उत्तरदायी पादप हॉर्मोन के नाम लिखिए : 3

(i) तने की वृद्धि में सहायक

(ii) कोशिका विभाजन को प्रेरित करना

(iii) वृद्धि का संदमन

(iv) कोशिका की लम्बाई में वृद्धि में सहायक

What are plant hormones ? Name the plant hormones responsible for the following :

(i) Growth of stem

(ii) Promotion of cell division

(iii) Inhibition of growth

(iv) Elongation of cells

12. उस पादप का नाम लिखिए जिसका उपयोग मेंडल ने अपने प्रयोगों में किया था। जब उन्होंने लम्बे और बौने पादपों का संकरण कराया तो उन्हें F_1 और F_2 पीढ़ियों में संततियों के कौन से प्रकार प्राप्त हुए? F_2 पीढ़ी में उन्हें प्राप्त पौधों में अनुपात लिखिए। 3

अथवा

प्रत्येक का एक-एक उदाहरण देते हुए उपार्जित और आनुवंशिक लक्षणों के बीच दो अन्तरों की सूची बनाइए।

17. Name the plant Mendel used for his experiment. What type of progeny was obtained by Mendel in F_1 and F_2 generations when he crossed the tall and short plants? Write the ratio he obtained in F_2 generation plants.

OR

List two differences between acquired traits and inherited traits by giving an example of each.

13. संसाधनों का समान वितरण क्यों होना चाहिए? उन तीन ताकतों की सूची बनाइए जो हमारे संसाधनों के समान वितरण के विरुद्ध कार्य कर सकती है। 3

Why should there be equitable distribution of resources? List three forces that would be working against an equitable distribution of our resources.

14. अपशिष्ट के निपटारे की समस्या को कम करने में हम किस प्रकार सहायता कर सकते हैं? तीन विधियाँ सुझाइए। 3

अथवा

पारितंत्र की परिभाषा लिखिए। किसी पारितंत्र में ऊर्जा-प्रवाह दर्शाने के लिए ब्लॉक आरेख खींचिए।

How can we help in reducing the problem of waste disposal ? Suggest any three methods.

OR

Define an ecosystem. Draw a block diagram to show the flow of energy in an ecosystem.

15. इन्द्रधनुष क्या है? इन्द्रधनुष बनना दर्शाने के लिए नामांकित आरेख खींचिए। 3

What is a rainbow? Draw a labelled diagram to show the formation of a rainbow.

भाग–द
SECTION-D

16. उस यौगिक का नाम और रासायनिक सूत्र लिखिए जो सभी ऐल्कोहॉली पेय पदार्थों का महत्वपूर्ण अवयव है। इसके दो उपयोगों की सूची बनाइए। होने वाली अभिक्रिया का रासायनिक समीकरण तथा उत्पाद का नाम लिखिए जब यह यौगिक – 5

(i) सोडियम धातु से अभिक्रिया करता है।

(ii) गर्म सांद्र सल्फ्यूरिक अम्ल से अभिक्रिया करता है।

अथवा

मैथेन क्या है? इसकी इलेक्ट्रॉन-बिन्दु संरचना खींचिए। इस यौगिक में बनने वाले आबन्धों का प्रकार लिखिए। इस प्रकार के यौगिक

(i) विद्युत के कुचालक तथा

(ii) कम गलनांक और कम क्वथनांक वाले क्यों होते हैं? क्या होता है जब इस यौगिक का ऑक्सीजन में दहन होता है?

Write the chemical formula and name of the compound which is the active ingredient of all alcoholic drinks. List its two uses. Write chemical equation and name of the product formed when this compound reacts with –

(i) sodium metal

(ii) hot concentrated sulphuric acid

OR

What is methane? Draw its electron dot structure. Name the type of bonds formed in this compound. Why are such compounds?

(i) Poor conductors of electricity and

(ii) Have low melting and boiling points? What happens when this compound burns in oxygen?

17. (a) निम्नलिखित अभिक्रियाओं के रासायनिक समीकरण लिखिए : 5

(i) कैल्सियम धातु जल से अभिक्रिया करती है।

(ii) सिनाबार को वायु की उपस्थिति में गर्म किया जाता है।

(iii) मैंगनीज डाइऑक्साइड को ऐलुमिनियम पाउडर के साथ गर्म किया जाता है।

(b) मिश्रधातु क्या हैं? मिश्रधातुओं के दो गुणधर्मों की सूची बनाइए।

(a) Write chemical equations for the following reactions:

(i) Calcium metal reacts with water.

(ii) Cinnabar is heated in the presence of air.

(iii) Manganese dioxide is heated with aluminium powder.

(b) What are alloys ? List two properties of alloys.

18. कोई बिम्ब 30 cm फोकस दूरी के किसी अवतल लेंस से 30 cm दूरी पर स्थित है। 5

(i) लेंस सूत्र का उपयोग करके प्रतिबिम्ब की लेंस से दूरी निर्धारित कीजिए।

(ii) इस प्रकरण में बनने वाले प्रतिबिम्ब के चार अभिलक्षणों (प्रकृति, स्थिति, साइज़, सीधा/उल्टा) की सूची बनाइए।

(iii) भाग (ii) के अपने उत्तर की पुष्टि के लिए नामांकित किरण आरेख खींचिए।

An object is placed at a distance of 30 cm from a concave lens of focal length 30 cm.

(i) Use lens formula to determine the distance of the image from the lens.

(ii) List four characteristics of the image (nature position, size, erect/inverted) in this case.

(iii) Draw a labelled diagram to justify your answer of part (ii)

19. (a) किसी उपयुक्त परिपथ आरेख की सहायता से यह सिद्ध कीजिए कि पार्श्वक्रम में संयोजित प्रतिरोधों के समूह के तुल्य प्रतिरोध का व्युत्क्रम पृथक प्रतिरोधों के व्युत्क्रमों के योग के बराबर होता है।

(b) किसी परिपथ में 12 Ω के दो प्रतिरोधक 6 V की बैटरी के सिरों से पार्श्वक्रम में संयोजित हैं। बैटरी से ली गई धारा ज्ञात कीजिए। 5

अथवा

परिपथ में दर्शाए अनुसार 6 V की किसी बैटरी से 20 Ω प्रतिरोध का कोई विद्युत लैम्प 4 Ω प्रतिरोध के चालक से संयोजित है। निम्नलिखित का मान परिकलित कीजिए:

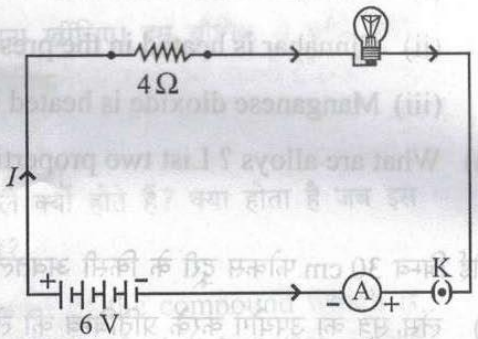
(a) परिपथ का कुल प्रतिरोध,

(b) परिपथ में प्रवाहित धारा,

(c) (i) विद्युत लैम्प और

(ii) चालक के सिरों पर विभवान्तर तथा

(d) लैम्प की शक्ति।



(a) With the help of a suitable circuit diagram prove that the reciprocal of the equivalent resistance of a group of resistances joined in parallel is equal to the sum of the reciprocals of the individual resistances.

(b) In an electric circuit two resistors of 12 Ω each are joined in parallel to a 6 V battery. Find the current drawn from the battery.

OR

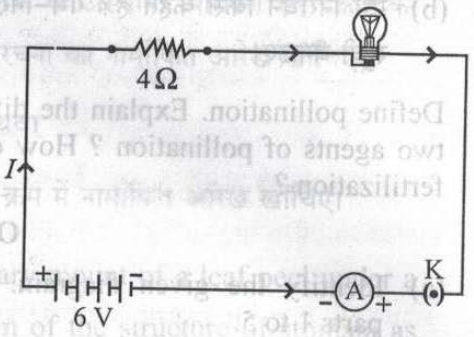
An electric lamp of resistance 20 Ω and a conductor of resistance 4 Ω are connected to a 6 V battery as shown in the circuit. Calculate :

(a) the total resistance of the circuit,

(b) the current through the circuit,

(c) the potential difference across the (i) electric lamp and (ii) conductor, and

(d) power of the lamp.



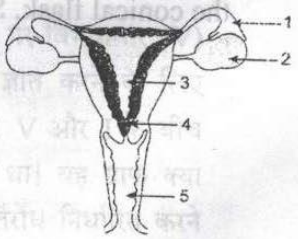
20. परिनालिका किसे कहते हैं? (i) किसी धारावाही परिनालिका और (ii) किसी छड़ चुम्बक की चुम्बकीय क्षेत्र रेखाओं का पैटर्न आरेखित कीजिए। इन दोनों क्षेत्रों के दो विभेदनकारी लक्षणों की सूची बनाइए। 5

What is a solenoid ? Draw the pattern of magnetic field lines of (i) a current carrying solenoid and (ii) a bar magnet. List two distinguishing features between the two fields.

21. परागण की परिभाषा लिखिए। विभिन्न प्रकार के परागणों की व्याख्या कीजिए। परागण के दो एजेण्टों (वाहकों) की सूची बनाइए। उपयुक्त परागण किस प्रकार निषेचन की ओर ले जाने का कारण बनता है? 5

अथवा

(a) दिए गए आरेख को पहचानिए। इसके भाग 1 से 5 तक के नाम लिखिए।

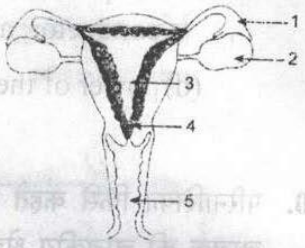


(b) गर्भ निरोधन किसे कहते हैं? गर्भ-निरोधक विधियाँ अपनाने के तीन लाभों की सूची बनाइए।

Define pollination. Explain the different types of pollination. List two agents of pollination ? How does suitable pollination lead to fertilization ?

OR

(a) Identify the given diagram. Name the parts 1 to 5.



(b) What is contraception? List three advantages of adopting contraceptive measures.

भाग–य
SECTION-E

22. "श्वसन की अवधि में CO_2 निकलती है" इस प्रयोग की प्रायोगिक व्यवस्था में उस पदार्थ का नाम लिखिए जिसे शंक्वाकार फ्लास्क में बन्द छोटी परखनली में लिया जाता है। इस पदार्थ का कार्य और इसके उपयोग के परिणाम का उल्लेख कीजिए। 2

In the experimental set up to show that "CO_2 is given out during respiration", name the substance taken in the small test tube kept in the conical flask. State its function and the consequence of its use.

23. कोई छात्र किसी सूक्ष्मदर्शी में पत्ती के छिलके के अस्थायी आरोपण का प्रेक्षण कर रहा है। सूक्ष्मदर्शी में दिए अनुसार रंध्र की संरचना का नामांकित आरेख खींचिए। 2

अथवा

हाइड्रा में मुकुलन को दर्शाने के लिए उचित क्रम में नामांकित आरेख खींचिए।

A student is observing the temporary mount of a leaf peel under a microscope. Draw labelled diagram of the structure of stomata as seen under the microscope.

OR

Draw a labelled diagram in proper sequence to show budding in hydra.

24. उन चार सावधानियों की सूची बनाइए जिनका पालन किसी छात्र को, उस समय करना चाहिए जब वह दिए गए उत्तल लेंस की फोकस दूरी किसी दूरस्थ बिम्ब के प्रतिबिम्ब को किसी पर्दे पर प्राप्त करके निर्धारित करता है। 2

List four precautions which a student should observe while determining the focal length of a given convex lens by obtaining image of a distant object on a screen.

25. किसी प्रतिरोधक से प्रवाहित धारा (I) पर उस प्रतिरोधक के सिरों पर विभवान्तर (V) की निर्भरता का अध्ययन करते समय प्रतिरोधक का प्रतिरोध ज्ञात करने के लिए किसी छात्र ने धारा के विभिन्न मानों के लिए 5 पाठ्यांक लेकर V और I के बीच ग्राफ खींचा। यह ग्राफ मूल बिन्दु से गुजरने वाली सरल रेखा था। यह ग्राफ क्या सूचित करता है? इस ग्राफ का उपयोग करके प्रतिरोधक का प्रतिरोध निर्धारित करने की विधि लिखिए। 2

अथवा

उस स्थिति में आप किसी छात्र को क्या सुझाव देंगे जब वह यह पाता है कि परिपथ खुला होने पर भी अमीटर और वोल्टमीटर के संकेतक/सुइयां इनके पैमानों पर अंकित शून्य चिह्नों के संपाती नहीं हैं? प्रयोगशाला में अतिरिक्त अमीटर/ वोल्टमीटर उपलब्ध नहीं हैं।

While studying the dependence of potential difference (V) across a resistor on the current (I) passing through it, in order to determine the resistance of the resistor, a student took 5 readings for different values of current and plotted a graph between V and I. He got a straight line graph passing through the origin. What does the straight line signify? Write the method of determining resistance of the resister using this graph.

OR

What would you suggest to a student if while performing an experiment he finds that the pointer/needle of the ammeter and voltmeter do not coincide with the zero marks on the scales when circuit is open? No extra ammeter/voltmeter is available in the laboratory.

26. तीन परखनलियों A, B और C में क्रमश: तीन विभिन्न द्रव–आसुत जल, भूजल और आसुत जल जिसमें एक चुटकी कैल्सियम सल्फेट घुला है, लिए गए हैं। प्रत्येक परखनली में समान मात्रा में साबुन का विलयन मिलाकर भलीभांति हिलाया गया है। इनमें से किस परखनली में झाग की लम्बाई अधिकतम होगी? अपने उत्तर की पुष्टि कीजिए। 2

In three test tubes A, B, and C, three different liquids namely, distilled water, underground water and distilled water in which a pinch of calcium sulphate is dissolved, respectively are taken. Equal amount of soap solution is added to each test tube and the contents are shaken. In which test tube will the length of the foam (lather) be longest ? Justify your answer.

27. दो परखनलियों A और B जिनमें क्रमशः तनु HCl और NaOH विलयन भरे हैं, में नीले लिटमस का विलयन मिलाया गया है। इनमें से किस परखनली में रंग में परिवर्तन दिखाई देगा? इस रंग परिवर्तन का उल्लेख कीजिए और इसका कारण दीजिए। 2

अथवा

किसी स्वच्छ और शुष्क परखनली, जिसमें 1 g सोडियम कार्बोनेट लिया गया है, 2mL तनु हाइड्रोक्लोरिक अम्ल मिलाने पर आप क्या प्रेक्षण करते हैं? होने वाली अभिक्रिया का रासायनिक समीकरण लिखिए।

Blue litmus solution is added to two test tubes A and B containing dilute HCl and NaOH solution respectively. In which test tube a colour change will be observed? State the colour change and give its reason.

OR

What is observed when 2 mL of dilute hydrochloric acid is added to 1 g of sodium carbonate taken in a clean and dry test tube? Write chemical equation for the reaction involved.

31/1/2

SET 31/ 1 / 2

Q. No	Value Point/Expected Answer	Value	Total Marks
	SECTION-A		
1.	• Ampere • Flow of 1 coulomb of charge per second / 1 ampere = $\frac{1coulomb}{1second}$	½ ½	1
2.	• Methane • 75%	½ ½	1
	SECTION-B		
3.	Name – sodium Symbol – Na Electronic configuration – 2, 8, 1 **OR** (a) Na, Si, Cl – The properties of these three elements are not similar to each other, so no Doberieneir's triads. (b) Be, Mg, Ca – The properties are similar to each other, so it is Dobereiner's triad. / Atomic mass of Mg = $\frac{Atomic\ mass\ of\ Be + Atomic\ mass\ of\ Ca}{2}$ $= \frac{9+40}{2} + \frac{49}{2} = 24.5$	½ ½ 1 1 1	2
4.	O_2 is carried by haemoglobin of red blood corpuscles / cells. CO_2 is carried by plasma of the blood.	1 1	2
5.	Structure – Fibrous, jelly like structure Role – To change the curvature of eye lens / to change the focal length of eye lens.	1 1	2
	SECTION-C		
6.	• Acid – H_2CO_3 Base - NaOH • $NaOH + H_2CO_3 \rightarrow NaHCO_3 + H_2O$	½ ½ 1	

	• Compound is basic in nature. pH value – ranges between 7 and 10	½ ½	3
7.	i. A_2O – Valency of group one is 1 and of oxygen is 2 ii. AX_3 – Valency of group 13 is 3 and of halogen is 1 iii. AB_2- Valency of element A of group 2 is 2 and of element B of group seventeen is 1.	½+½ ½+½ ½+½	3
8.	• White silver chloride turns grey in sunlight • $2AgCl \xrightarrow{Sunlight} 2Ag + Cl_2$ • Decomposition reaction / Photolytic decomposition OR a) Displacement reaction $Zn + 2AgNO_3 \longrightarrow Zn(NO_3)_2 + 2Ag$ b) Double displacement reaction $2KI + Pb(NO_3)_2 \longrightarrow PbI_2 + 2KNO_3$ (deduct ½ mark for non balanced equation)	1 1 1 ½ 1 ½ 1	3
9.	Transpiration – Loss of water in vapour form through the surface of leaf / stomata of leaf / aerial parts of the plant. Experiment setup : • Take a potted plant and water it. • Cover the plant / branch with a transparent plastic sheet. • Place it in bright sunlight for half an hour. • Moisture in the form of droplets is observed inside the plastic sheet.	1 ½ x 4	3
10.	Feedback mechanism – Mechanism by which the amount of any chemical increases or decreases resulting in secretion of the related hormone. Example – when sugar level rises, insulin secretion increases. when sugar level falls, insulin secretion reduces.	1 1 1	3
11.	Plant hormones – Chemical substances which help the plant to coordinate growth and development i) Auxins/ Gibberellins ii) Cytokinins iii) Abscisic Acid / ABA iv) Auxins/ Gibberellins	1 ½ x4	3

<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>12.</td><td>

- Pea Plant / Garden pea / Pisum sativum
- F_1 – All tall; F_2- Tall and short
- Ratio – Tall : Short
3 : 1 / 1:2:1

OR

<table>
<tr><th>Acquired Traits</th><th>Inherited Traits</th></tr>
<tr><td>1. These traits are not transferred from one generation to the next generation</td><td>1. These traits are transferred from one generation to the next</td></tr>
<tr><td>2. They do not bring about change in DNA
Example: Acquiring any skill</td><td>2. They bring about changes in DNA
Example: Eye colour</td></tr>
</table>

(or any other relevant point and example)

</td><td>1
½ + ½
1

1
1
1</td><td>3</td></tr>
<tr><td>13.</td><td>

- Need for equitable distribution of resources :
So that all and not just a handful of rich and powerful people benefit from the development of these resources / all living beings have a birthright to the available resources.
- Forces against equitable distribution of resources :
1) Industrialists who work for their own benefit / profit.
2) When environmental laws / rules are not implemented properly.
3) Mismanagement in the distribution of natural resources or any other relevant answer.

(Or any other relevant point)
(Any two points)

</td><td>1

1+1</td><td>3</td></tr>
<tr><td>14.</td><td>

Segregation of waste; Recycling; Composting: Reducing the use of non – biodegradable material: Reuse (Any Three)

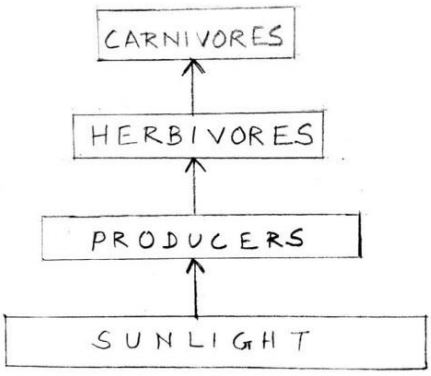
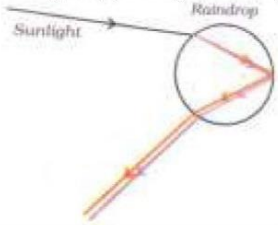
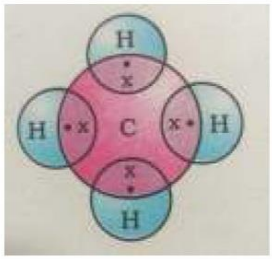
OR

The system where all the living organisms in an area together interact with the non – living constituents of the environment.

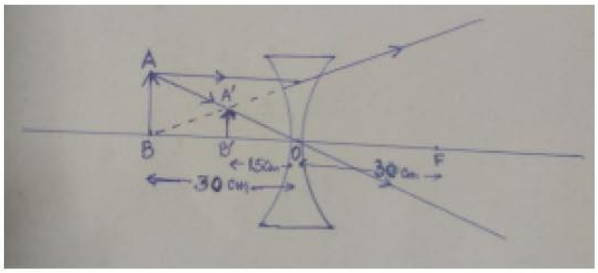
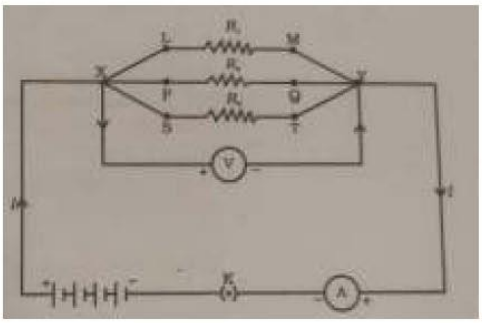
</td><td>1x3

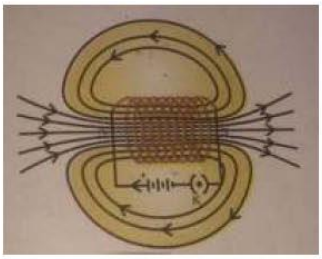
1</td><td></td></tr>
</table>

31/1/2

		2	3
15.	Rainbow – A natural spectrum of sunlight appearing in the sky after a rain shower 	1 2	 3
16.	**SECTION - C** • C_2H_5OH, Ethanol/Ethyl alcohol • Good solvent; used in medicines (Any other) i) $2C_2H_5OH + 2\ Na \rightarrow 2C_2H_5ONa + H_2$ Sodium ethoxide ii) $C_2H_5OH \xrightarrow[443\ K]{\text{Hot Conc. } H_2SO_4} CH_2=CH_2 + H_2O$ Ethene OR • CH_4/Simplest hydrocarbon 	½ + ½ ½ + ½ 1 ½ 1 ½ ½ 1	

	• Covalent bonds i) No ions or charged particles are formed ii) Due to weak covalent bonds • Carbon dioxide and water are produced/ $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$	½ 1 1 1	5
17. (a)	i) $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$ ii) $2HgS + 3O_2 \xrightarrow{Heat} 2HgO + 2SO_2$ iii) $3MnO_2 + 4Al \rightarrow 2Al_2O_3 + 3Mn$ (b) Alloys are homogeneous mixture of two or more metals or a metal and a non metal Properties : Alloys are stronger / harder / have low melting point / more resistant to corrosion / some are magnetic in nature. (Any two)	1 1 1 1 ½+½	5
18.	u = –30 cm f = –30cm v = ? m = ? $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ $\therefore \frac{1}{v} = \frac{1}{f} + \frac{1}{u}$ $= \frac{1}{(-30cm)} + \frac{1}{(-30cm)}$ $\frac{1}{v} = -\frac{1}{30} - \frac{1}{30}$ $= \frac{-2}{30}$ $\therefore v = -15cm$ $m = \frac{v}{u}$ $= \frac{(-15cm)}{(-30cm)} = -\frac{1}{2}$ (ii) Nature – virtual Position – 15cm away from the lens, on the same side as the object Size – diminished Erect / inverted – erect	½ 1 ½ ½ ½ ½ ½	

	(iii)  	1	5
19.	a)  From figure: $I = I_1+I_2+I_3$ $I_1 = \frac{V}{R_1}$, $I_2 = \frac{V}{R_2}$, $I_3 = \frac{V}{R_3}$ $\therefore \frac{V}{R_P} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$ $\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ b) $R_1 = R_2 = 12\ \Omega$ V= 6 V $\frac{1}{Rp} = \frac{1}{R1} + \frac{1}{R2} = \frac{1}{12} + \frac{1}{12}$ $\therefore$ $R_p = 6\ \Omega$ $I = \frac{V}{Rp} = \frac{6v}{6v} = 1\text{A}$ OR a) $R = R_1 + R_2$ $= 20\ \Omega + 4\ \Omega = 24\ \Omega$	1 1 1 1 ½ ½ 1	

	b) $I = \frac{V}{R}$ $= \frac{6V}{24\Omega} = 0.25$ A c) (i) For electric lamp: V = IR $= \frac{6}{24}$ x 20 = 5 V (ii) For Conductor: V = IR $= \frac{6}{24}$ x 4 = 1 V d) P= VI = 5 V x $\frac{6}{24}$A = 1.25 W	1 1 1 1	5
20.	• A coil of many turns of insulated copper wire wrapped closely in the shape of a cylinder • (i)  ii)	1 1 1	

<table>
<tr>
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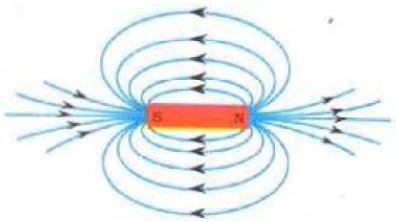
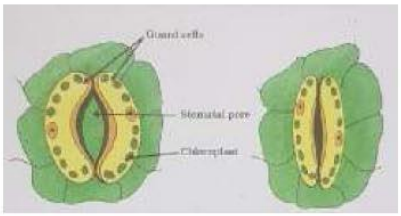
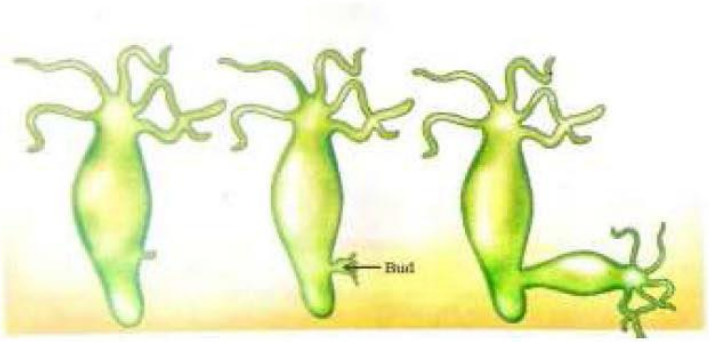


• Distinguishing features –
<table>
<tr><th>Solenoid</th><th>Bar Magnet</th></tr>
<tr><td>1)Field disappear on stopping the current</td><td>1) No effect of current on field.</td></tr>
<tr><td>2) Strength of the field can be changed by changing the current</td><td>2) Strength cannot be changed</td></tr>
<tr><td>3) Direction can be reversed by changing the direction of current through it.</td><td>3) Direction is fixed and cannot be reversed.</td></tr>
</table>
(Any two features)
</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>21.</td>
<td>
• Pollination – Transfer of pollen from anther / stamen to stigma of the flower
• Type of Pollination –
a) Self pollination – Transfer of pollen from anther / stamen to stigma occurs in the same flower
b) Cross pollination – Pollen is transferred from anther / stamen of one flower to stigma of another flower
• Agents of pollination – Wind, Water, Insects and Animals (any 2)
• A tube grows out of the pollen grain and travels through the style, to reach the female germ cell in the ovary to cause fertilization
OR
(a)
• Female reproductive system
• Name of parts –
1: Fallopian tube/Oviduct
2: Ovary
3: Uterus
4: Cervix
5: Vagina
(b)
• Method to avoid pregnancy
• Advantages
- Proper gap between two pregnancies
- Avoiding unwanted pregnancy
- Keeping population under control
</td>
<td>
1
½ + ½
½ + ½
½ + ½
1
½
½ x 5
½
½ x 3
</td>
<td>5</td>
</tr>
</table>

22.	• Substance taken: KOH • Function: It absorbs CO_2 produced by the germinating seeds Consequence: The water level rises in the test tube dipped in the beaker / partial vacuum is created.	½ ½ 1	 2
23.	 (Any one diagram with any two labellings) **OR** •  Drawing in proper sequence Labelling – Bud	1 ½ x 2 1 1	 2
24.	Precautions: 1) Lens should be held in vertical position with its faces parallel to the screen 2) Clear and sharpest image should be obtained by adjusting the position of lens 3) Three observations should be taken at least. 4) Base of lens, screen and measuring scale should be in straight line (or any other)	 ½ x 4	 2
25.	• Potential difference (V) is directly proportional to current (I) or V∝I • Method: Finding slope of the graph OR • Measure the zero error • Value of zero error should be adjusted to the observed values	1 1 1 1	

			2
26.	• In test tube A • As distilled water contains no salts	1 1	2
27.	• Test Tube A • It changes the colour from blue to red Hydrochloric acid turns blue litmus red. OR • Brisk effervescence is produced • $Na_2CO_3 + 2HCl \longrightarrow 2\ NaCl + H_2O + CO_2$	½ ½ 1 1 1	2

CBSE BOARD SCIENCE PAPER
2020

Series JBB/1 SET-2

कोड नं.
Code No. 31/1/2

रोल नं.
Roll No.

परीक्षार्थी कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।
Candidates must write the Code on the title page of the answer-book.

नोट	Note
(I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **15** हैं।	(I) Please check that this question paper contains **15** printed pages.
(II) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।	(II) Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
(III) कृपया जाँच कर लें कि इस प्रश्न-पत्र में **30** प्रश्न हैं।	(III) Please check that this question paper contains **30** questions.
(IV) **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।**	(IV) **Please write down the Serial Number of the question in the answer-book before attempting it.**
(V) इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका में कोई उत्तर नहीं लिखेंगे।	(V) 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

विज्ञान

SCIENCE

निर्धारित समय : 3 घण्टे *अधिकतम अंक : 80*
Time allowed : 3 hours *Maximum marks : 80*

सामान्य निर्देश:

निम्नलिखित निर्देशों को बहुत सावधानी से पढ़िए और उनका पालन कीजिए:

(i) प्रश्न-पत्र तीन खंडों में विभाजित किया गया है - क, ख एवं ग। इस प्रश्न-पत्र में प्रश्नों की संख्या 30 है। सभी प्रश्न अनिवार्य हैं।

(ii) खंड क के सभी प्रश्न / उनके भाग (संख्या 1 से 14 तक) एक-एक अंक के हैं। इन प्रश्नों में बहुविकल्पीय प्रश्न, अतिलघुत्तरीय प्रश्न तथा अभिकथन-कारण प्रकार के प्रश्नों को सम्मिलित किया गया है। इन प्रश्नों के उत्तर **1 शब्द** अथवा **1 वाक्य** में दिए जाने चाहिए।

(iii) खंड ख में प्रश्न संख्या 15 से 24 तक लघुत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न 3 अंक का है। प्रत्येक प्रश्न का उत्तर लगभग 50 से 60 शब्दों से अधिक नहीं होना चाहिए।

(iv) खंड ग में प्रश्न संख्या 25 से 30 तक दीर्घ उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न 5 अंक का है। प्रत्येक प्रश्न का उत्तर लगभग 80 से 90 शब्दों से अधिक नहीं होना चाहिए।

(v) उत्तर संक्षिप्त तथा बिन्दुवार होना चाहिए और साथ ही उपरोक्त शब्द-सीमा का यथासंभव पालन किया जाना चाहिए।

(vi) प्रश्न-पत्र में समग्र पर कोई विकल्प नहीं है। तथापि प्रत्येक खंड में कुछ प्रश्नों में आंतरिक विकल्प दिए गए हैं। ऐसे प्रश्नों में से **केवल एक ही विकल्प का उत्तर** लिखिए।

(vii) इसके अतिरिक्त, आवश्यकतानुसार, प्रत्येक खंड और प्रश्न के साथ यथोचित निर्देश दिए गए हैं।

खंड - क

1. प्रोपेनोन में उपस्थित प्रकार्यात्मक समूह का नाम लिखिए। 1

2. किसी कुण्डली में चुम्बकीय क्षेत्र रेखाओं में परिवर्तन के कारण उसमें प्रेरित विद्युत धारा प्रवाहित होती है। इस मूल परिघटना का नाम लिखिए। 1

नीचे दिए गए अनुच्छेद और पढ़ी गयीं संबंधित संकल्पनाओं की व्याख्या के आधार पर प्रश्न संख्या 3(a) से 3(d) तथा 4(a) से 4(d) के उत्तर दीजिए :

3. मानव जनसंख्या की वृद्धि करता साइज़ सभी लोगों की चिन्ता का विषय है। किसी समष्टि में जीवन दर और मृत्यु दर उसके साइज़ को निर्धारित करते हैं। जनन वह प्रक्रिया है जिसके द्वारा जीव अपनी समष्टि की वृद्धि करते हैं। जनन के लिए लैंगिक परिपक्वता आनुक्रमिक होती है और यह तब होती है जब सामान्य शरीर में वृद्धि हो रही होती है। किसी सीमा तक लैंगिक परिपक्वता का यह अर्थ नहीं होता कि शरीर अथवा मस्तिष्क लैंगिक क्रिया अथवा बच्चे उत्पन्न करने योग्य हो गया है। समष्टि के साइज़ को नियंत्रित करने के लिए मानव द्वारा विभिन्न गर्भनिरोधक युक्तियाँ उपयोग की जा रही हैं।

(a) लड़के एवं लड़कियों में लैंगिक परिपक्वता के दो सामान्य लक्षणों की सूची बनाइए। 1

(b) अविवेचित मादा भ्रूण हत्या का क्या परिणाम होता है? 1

(c) गर्भ-निरोधन की कौन सी विधि शरीर का हॉर्मोनी-संतुलन परिवर्तित कर देती है? 1

(d) समष्टि (जनसंख्या) के साइज़ को निर्धारित करने वाले दो कारक लिखिए। 1

General Instructions :

Read the following instructions very carefully and strictly follow them:

(i) *Question paper comprises* ***three*** *sections – **A**, **B** and **C**. There are **30** questions in the question paper. All questions are compulsory.*

(ii) ***Section A*** *– question no. 1 to 14 – all questions or part thereof are of one mark each. These questions comprises multiple choice questions (MCQ), very short answer (VSA), and Assertion-Reason type questions. Answer to these questions should be given in* ***one word*** *or* ***one sentence.***

(iii) ***Section B*** *– question no. 15 to 24 are short answer type questions, carrying 3 marks each. Answer to these questions should not exceed 50 to 60 words.*

(iv) ***Section C*** *– question no. 25 to 30 are long answer type questions, carrying 5 marks each. Answer to these questions should not exceed 80 to 90 words.*

(v) *Answer should be brief and to the point. Also the above mentioned word limit be adhered to as far as possible.*

(vi) *There is no overall choice in the question paper. However, an internal choice has been provided in some questions in each Section. Only one of the choices in such questions have to be attempted.*

(vii) *In addition to this, separate instructions are given with each section and question, wherever necessary.*

SECTION – A

1. Name the functional group present in propanone. 1

2. The change in magnetic field lines in a coil is the cause of induced electric current in it. Name the underlying phenomenon. 1

Answer question numbers 3(a) to 3(d) and 4(a) to 4(d) on the basis of your understanding of the following paragraphs and the related studied concepts.

3. The growing size of the human population is a cause of concern for all people. The rate of birth and death in a given population will determine its size. Reproduction is the process by which organisms increase their population. The process of sexual maturation for reproduction is gradual and takes place while general body growth is still going on. Some degree of sexual maturation does not necessarily mean that the mind or body is ready for sexual acts or for having and bringing up children. Various contraceptive devices are being used by human beings to control the size of population.

(a) List two common signs of sexual maturation in boys and girls. 1

(b) What is the result of reckless female foeticide ? 1

(c) Which contraceptive method changes the hormonal balance of the body ? 1

(d) Write two factors that determine the size of a population. 1

P.T.O.

4. मानव शरीर पाँच महत्वपूर्ण घटकों से मिलकर बना है जिनमें से जल एक प्रमुख घटक है। प्रत्येक मानव के लिए भोजन एवं पेयजल आवश्यक है। भोजन कृषि द्वारा पौधों से प्राप्त होता है। अधिक उपज प्राप्त करने के लिए खेतों में पीड़कनाशियों का बड़े पैमाने पर उपयोग किया जा रहा है। इन पीड़कनाशियों को पौधे मृदा से जल एवं खनिजों के साथ अवशोषित कर लेते हैं तथा जलाशयों से यही पीड़कनाशी जलीय पादपों और जीवों के शरीरों में पहुँच जाते हैं। चूंकि यह पीड़कनाशी जैव निम्नीकरणीय नहीं हैं अत: यह रसायन प्रत्येक पोषी स्तर पर क्रमिक रूप से संचित होते जाते हैं। इन रसायनों की अधिकतम सांद्रता हमारे शरीरों में संचित हो जाती है और हमारे मस्तिष्क और शरीर को अत्यधिक प्रभावित करती है।

(a) मानवों के शरीर में पीड़कनाशियों की सांद्रता अधिकतम क्यों पायी जाती है? 1

(b) कोई ऐसी विधि लिखिए जिसका अनुप्रयोग करके हम पीड़कनाशियों का भोजन द्वारा अपने शरीर में प्रवेश कुछ सीमा तक कम कर सकते हैं। 1

(c) किसी आहार-शृंखला के विभिन्न चरण निरूपित करते हैं :

(a) आहार जाल (b) पोषी स्तर
(c) पारितंत्र (d) जैव आवर्धन 1

(d) किसी पारितंत्र में प्रचालित विभिन्न आहार-शृंखलाओं के संदर्भ में मानव है, कोई :

(a) उपभोक्ता (b) उत्पादक
(c) उत्पादक एवं उपभोक्ता (d) उत्पादक और अपमार्जक 1

5. आयरन की भाप के साथ अभिक्रिया करने पर प्राप्त यौगिक है/हैं :

(a) Fe_2O_3 (b) Fe_3O_4
(c) FeO (d) Fe_2O_3 और Fe_3O_4 1

अथवा

कोई तत्त्व 'X' O_2 से अभिक्रिया करके उच्च गलनांक वाला यौगिक निर्मित करता है। यह यौगिक जल में विलेय है। तत्त्व 'X' हो सकता है :

(a) आयरन (b) कैल्सियम
(c) कार्बन (d) सिलिकॉन 1

6. परावर्तन के नियम लागू होते हैं :

(a) केवल समतल दर्पणों पर (b) केवल अवतल दर्पणों पर
(c) केवल उत्तल दर्पणों पर (d) सभी परावर्तक पृष्ठों पर 1

अथवा

जब किसी बिम्ब को किसी अवतल दर्पण के फोकस और ध्रुव के बीच रखा जाता है, तो उसका प्रतिबिम्ब दर्पण के पीछे बनता है। यह प्रतिबिम्ब होता है :

(a) वास्तविक (b) उल्टा
(c) आभासी और उल्टा (d) आभासी और सीधा 1

4. Human body is made up of five important components, of which water is the main component. Food as well as potable water are essential for every human being. The food is obtained from plants through agriculture. Pesticides are being used extensively for a high yield in the fields. These pesticides are absorbed by the plants from the soil along with water and minerals and from the water bodies these pesticides are taken up by the aquatic animals and plants. As these chemicals are not biodegradable, they get accumulated progressively at each trophic level. The maximum concentration of these chemicals gets accumulated in our bodies and greatly affects the health of our mind and body.

(a) Why is the maximum concentration of pesticides found in human beings ? 1

(b) Give one method which could be applied to reduce our intake of pesticides through food to some extent. 1

(c) Various steps in a food chain represent :

(a) Food web (b) Trophic level

(c) Ecosystem (d) Biomagnification 1

(d) With regard to various food chains operating in an ecosystem, man is a :

(a) Consumer (b) Producer

(c) Producer and consumer (d) Producer and decomposer 1

5. The compound obtained on reaction of iron with steam is/are :

(a) Fe_2O_3 (b) Fe_3O_4

(c) FeO (d) Fe_2O_3 and Fe_3O_4 1

OR

An element 'X' reacts with O_2 to give a compound with a high melting point. This compound is also soluble in water. The element 'X' is likely to be :

(a) iron (b) calcium

(c) carbon (d) silicon 1

6. The laws of reflection hold true for :

(a) plane mirrors only (b) concave mirrors only

(c) convex mirrors only (d) all reflecting surfaces 1

OR

When an object is kept within the focus of a concave mirror, an enlarged image is formed behind the mirror. This image is :

(a) real (b) inverted

(c) virtual and inverted (d) virtual and erect 1

7. लघुपथन के समय परिपथ में विद्युत धारा :

(a) निरन्तर विचरण करती है। (b) परिवर्तित नहीं होती।

(c) अत्यन्त कम हो जाती है। (d) अत्यधिक बढ़ जाती है। 1

अथवा

100 W और 40 W के दो बल्ब श्रेणी में संयोजित हैं। 100 W के बल्ब से 1 A धारा प्रवाहित हो रही है। 40 W के बल्ब से प्रवाहित धारा का मान होगा :

(a) 0.4 A (b) 0.6 A

(c) 0.8 A (d) 1 A 1

8. प्लास्टर ऑफ पेरिस का रासायनिक सूत्र है :

(a) $CaSO_4 . 2H_2O$ (b) $CaSO_4 . H_2O$

(c) $CaSO_4 . \frac{1}{2}H_2O$ (d) $2CaSO_4 . H_2O$ 1

9. किसी द्विविस्थापन अभिक्रिया जैसे सोडियम सल्फेट विलयन और बेरियम क्लोराइड विलयन के बीच अभिक्रिया में :

(A) परमाणुओं का आदान-प्रदान होता है। (B) आयनों का आदान-प्रदान होता है।

(C) कोई अवक्षेप बनता है। (D) कोई अविलेय लवण बनता है।

सही विकल्प है :

(a) (B) और (D) (b) (A) और (C)

(c) केवल (B) (d) (B), (C) और (D) 1

10. बेकिंग सोडा निम्नलिखित में से किसका मिश्रण होता है?

(a) सोडियम कार्बोनेट और एसीटिक अम्ल

(b) सोडियम कार्बोनेट और टार्टरिक अम्ल

(c) सोडियम हाइड्रोजन कार्बोनेट और टार्टरिक अम्ल

(d) सोडियम हाइड्रोजन कार्बोनेट और एसीटिक अम्ल 1

11. किसी पारितंत्र में किसी एक पोषी स्तर से अगले पोषी स्तर को स्थानान्तरित 10% उपलब्ध ऊर्जा किस रूप में होती है :

(a) ऊष्मीय ऊर्जा (b) रासायनिक ऊर्जा

(c) यांत्रिक ऊर्जा (d) प्रकाश ऊर्जा 1

12. मृदा की उर्वरता उसकी किस योग्यता/सामर्थ्य द्वारा निर्धारित होती है :

(a) कार्बनिक पदार्थ को अपक्षयित करना (b) कार्बनिक पदार्थ को थामे रखना

(c) पानी को थामे रखना (d) जीवन का भरण-पोषण करना 1

7. At the time of short circuit, the electric current in the circuit :
   (a) vary continuously (b) does not change
   (c) reduces substantially (d) increases heavily 1

OR

Two bulbs of 100 W and 40 W are connected in series. The current through the 100 W bulb is 1 A. The current through the 40 W bulb will be :
   (a) 0.4 A (b) 0.6 A
   (c) 0.8 A (d) 1 A 1

8. The chemical formula for plaster of Paris is :
   (a) $CaSO_4 . 2 H_2O$
   (b) $CaSO_4 . H_2O$
   (c) $CaSO_4 . \frac{1}{2} H_2O$
   (d) $2 CaSO_4 . H_2O$ 1

9. In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution :
   (A) exchange of atoms takes place
   (B) exchange of ions takes place
   (C) a precipitate is produced
   (D) an insoluble salt is produced

   The correct option is :
   (a) (B) and (D) (b) (A) and (C)
   (c) only (B) (d) (B), (C) and (D) 1

10. Baking soda is a mixture of :
   (a) Sodium carbonate and acetic acid
   (b) Sodium carbonate and tartaric acid
   (c) Sodium hydrogen carbonate and tartaric acid
   (d) Sodium hydrogen carbonate and acetic acid 1

11. In an ecosystem, 10% of energy available for transfer from one trophic level to the next is in the form of :
   (a) heat energy (b) chemical energy
   (c) mechanical energy (d) light energy 1

12. Soil fertility is determined by its ability to :
   (a) Decay organic matter (b) Hold organic matter
   (c) Hold water (d) Support life 1

प्रश्न संख्या 13 और 14 के लिए दो कथन दिए गए ... दूसरे को कारण (R) द्वारा अंकित किया गया है। इन प्रश्नों के सही उत्तर नीचे दिए गए ... (a), (b), (c) और (d) में से चुनकर दीजिए।

(a) A और R दोनों सही हैं और R अभिकथन की सही व्याख्या करता है।

(b) A और R दोनों सही हैं परन्तु R अभिकथन की सही व्याख्या नहीं करता है।

(c) A सही है परन्तु R गलत है।

(d) A गलत है परन्तु R सही है।

13. **अभिकथन (A) :** एल्कोहॉलों की किसी समजातीय श्रेणी में दूसरे सदस्य का सूत्र C_2H_5OH तथा तीसरे सदस्य का सूत्र C_3H_7OH है।
कारण (R) : किसी समजातीय श्रेणी के दो क्रमागत सदस्यों के आण्विक द्रव्यमानों में 144 का अन्तर होता है। 1

14. **अभिकथन (A) :** नाभिकीय विखण्डन की प्रक्रिया में उत्पन्न नाभिकीय ऊर्जा का परिमाण इतना विशाल होता है कि यूरेनियम के एक परमाणु के विखण्डन में जो ऊर्जा उत्पन्न होती है वह कोयले के किसी कार्बन परमाणु के दहन से उत्पन्न ऊर्जा की तुलना में 1 करोड़ गुनी अधिक होती है।
कारण (R) : यूरेनियम जैसे भारी परमाणु के नाभिक से जब निम्न ऊर्जा का कोई न्यूट्रॉन बमबारी करता है तो वह हल्के नाभिकों में टूट जाता है। इस अभिक्रिया में मूल नाभिक तथा उत्पाद नाभिकों के द्रव्यमानों का अन्तर विशाल ऊर्जा में परिवर्तित हो जाता है। 1

खंड–ख

15. जंग लगना किसे कहते हैं? लोहे पर जंग लगने की परिस्थितियों की जाँच के लिए किसी क्रियाकलाप का नामांकित आरेख सहित वर्णन कीजिए। 3

16. समजात संरचनाएँ क्या होती हैं? कोई उदाहरण दीजिए। क्या यह आवश्यक है कि समजात संरचनाओं के पूर्वज सदैव ही समान हों? अपने उत्तर की पुष्टि कीजिए। 3

17. कोलॉइडी कण टिण्डल प्रभाव क्यों दर्शाते हैं? ऐसे चार उदाहरण दीजिए जिनमें टिण्डल प्रभाव दिखाई देता है। 3

अथवा

काँच के स्लैब और काँच के प्रिज़्म के बीच विभेदन कीजिए। क्या होता है जब (i) एकवर्णी प्रकाश, (ii) श्वेत प्रकाश का कोई पतला किरण पुंज किसी (a) काँच के स्लैब और (b) काँच के प्रिज़्म से गुजरता है ? 3

18. नामांकित आरेख खींचकर (i) सूर्योदय एवं सूर्यास्त के समय सूर्य का रक्ताभ प्रतीत होना तथा (ii) दोपहर के समय जब सूर्य सिर के ठीक ऊपर होता है, सूर्य का श्वेत प्रतीत होना दर्शाइए। 3

For question numbers **13** and **14**, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of the Assertion.

(b) Both A and R are true but R is not the correct explanation of the Assertion.

(c) A is true but R is false.

(d) A is false but R is true.

13. **Assertion (A) :** In a homologous series of alcohols, the formula for the second member is C_2H_5OH and the third member is C_3H_7OH.
Reason (R) : The difference between the molecular masses of the two consecutive members of a homologous series is 144. 1

14. **Assertion (A) :** In the process of nuclear fission, the amount of nuclear energy generated by the fission of an atom of uranium is so tremendous that it produces 10 million times the energy produced by the combustion of an atom of carbon from coal.
Reason (R) : The nucleus of a heavy atom such as uranium, when bombarded with low energy neutrons, splits apart into lighter nuclei. The mass difference between the original nucleus and the product nuclei gets converted to tremendous energy. 1

SECTION – B

15. What is 'rusting'? Describe with a labelled diagram an activity to investigate the conditions under which iron rusts. 3

16. What are homologous structures? Give an example. Is it necessary that homologous structures always have a common ancestor. Justify your answer. 3

17. Why is Tyndall effect shown by colloidal particles? State four instances of observing the Tyndall effect. 3

OR

Differentiate between a glass slab and a glass prism. What happens when a narrow beam of (i) a monochromatic light, and (ii) white light passes through (a) glass slab and (b) glass prism? 3

18. Draw a labelled diagram to show (i) reddish appearance of the sun at the sunrise or the sunset and (ii) white appearance of the sun at noon when it is overhead. 3

19. (a) तालिका के रूप में द्विखण्डन और बहुखण्डन के बीच दो अंतरों को सूचीबद्ध कीजिए।

(b) क्या होता है जब स्याइरोगाइरा फिलामेंट महत्त्वपूर्ण लम्बाई प्राप्त करता है? 3

20. क्लोर-क्षार प्रक्रिया के महत्त्वपूर्ण उत्पादों की सूची बनाइए। इनमें से प्रत्येक उत्पाद का एक महत्त्वपूर्ण उपयोग लिखिए। 3

अथवा

सोडियम कार्बोनेट से धोने का सोडा किस प्रकार बनाया जाता है? इसका रासायनिक समीकरण लिखिए। इस लवण के प्रकार का उल्लेख कीजिए। यह जल की जिस प्रकार की कठोरता को दूर करता है, उसका नाम लिखिए। 3

21. किसी परखनली में 3mL एथेनॉल लेकर उसे जल-ऊष्मक में धीरे-धीरे गर्म किया गया। इस विलयन में 5% क्षारीय पोटैशियम परमैंगनेट विलयन को पहले बूंद-बूंद करके और फिर आधिक्य में मिलाया गया।

(i) $KMnO_4$ का 5% विलयन किस प्रकार बनाया जाता है?

(ii) इस अभिक्रिया में क्षारीय पोटैशियम परमैंगनेट की भूमिका का उल्लेख कीजिए। इसे आधिक्य में मिलाने पर क्या होता है?

(iii) इस अभिक्रिया का रासायनिक समीकरण लिखिए। 3

22. कोई गिलहरी आतंक की परिस्थिति में है। वह अपने शरीर को लड़ने के लिए अथवा वहाँ से भागने के लिए तैयार करती है। उसके शरीर में तत्काल होने वाले परिवर्तनों का उल्लेख कीजिए जिससे कि वह गिलहरी लड़ अथवा भाग सके। 3

अथवा

बहुकोशिकीय जीवों की कोशिकाओं के बीच संचार के साधन के रूप में विद्युत आवेग की तुलना में रासायनिक संचरण बेहतर क्यों होता है? 3

23. (a) किसी चालक से प्रवाहित विद्युत धारा और उसके सिरों पर अनुप्रयुक्त विभवान्तर में संबंध का उल्लेख कीजिए। इस संबंध को दर्शाने के लिए ग्राफ भी खींचिए।

(b) उस चालक का प्रतिरोध ज्ञात कीजिए जिसके सिरों पर यदि विभवान्तर 1.4 V है, तो उससे 0.35 A विद्युत धारा प्रवाहित होती है। 3

24. (a) जूल के तापन नियम के लिए गणितीय व्यंजक लिखिए।

(b) दो घण्टे में 40 V विभवान्तर से 96000 कूलॉम आवेश को स्थानान्तरित करने में उत्पन्न ऊष्मा परिकलित कीजिए। 3

19. (a) List in tabular form two differences between binary fission and multiple fission.

(b) What happens when a mature Spirogyra filament attains considerable length. 3

20. List the important products of the Chlor-alkali process. Write one important use of each. 3

OR

How is washing soda prepared from sodium carbonate? Give its chemical equation. State the type of this salt. Name the type of hardness of water which can be removed by it? 3

21. 3 mL of ethanol is taken in a test tube and warmed gently in a water bath. A 5% solution of alkaline potassium permanganate is added first drop by drop to this solution, then in excess.

(i) How is 5% solution of $KMnO_4$ prepared?

(ii) State the role of alkaline potassium permanganate in this reaction. What happens on adding it in excess?

(iii) Write chemical equation of this reaction. 3

22. A squirrel is in a scary situation. Its body has to prepare for either fighting or running away. State the immediate changes that take place in its body so that the squirrel is able to either fight or run? 3

OR

Why is chemical communication better than electrical impulses as a means of communication between cells in a multi-cellular organism? 3

23. (a) State the relation correlating the electric current flowing in a conductor and the voltage applied across it. Also draw a graph to show this relationship.

(b) Find the resistance of a conductor if the electric current flowing through it is 0.35 A when the potential difference across it is 1.4 V. 3

24. (a) Write the mathematical expression for Joule's law of heating.

(b) Compute the heat generated while transferring 96000 coulomb of charge in two hours through a potential difference of 40 V. 3

SECTION – C

25. (a) What is thermit process ? Where is this process used? Write balanced chemical equation for the reaction involved.

(b) Where does the metal aluminium, used in the process, occurs in the reactivity series of metals?

(c) Name the substances that are getting oxidised and reduced in the process. 5

26. (a) What is an electromagnet ? List any two uses.

(b) Draw a labelled diagram to show how an electromagnet is made.

(c) State the purpose of soft iron core used in making an electromagnet.

(d) List two ways of increasing the strength of an electromagnet if the material of the electromagnet is fixed. 5

27. Draw a ray diagram in each of the following cases to show the formation of image, when the object is placed :

(i) between optical centre and principal focus of a convex lens.

(ii) anywhere in front of a concave lens.

(iii) at 2F of a convex lens.

State the signs and values of magnifications in the above mentioned cases (i) and (ii). 5

OR

An object 4.0 cm in size, is placed 25.0 cm in front of a concave mirror of focal length 15.0 cm.

(i) At what distance from the mirror should a screen be placed in order to obtain a sharp image?

(ii) Find the size of the image.

(iii) Draw a ray diagram to show the formation of image in this case. 5

28. (a) What is genetics ?

(b) What are genes? Where are the genes located?

(c) State and define three factors responsible for the rise of a new species. 5

खंड-ग

25. (a) थर्मिट प्रक्रिया किसे कहते हैं? इस प्रक्रिया का उपयोग कहाँ किया जाता है? इसमें होने वाली रासायनिक अभिक्रिया का संतुलित रासायनिक समीकरण लिखिए।
(b) इस प्रक्रिया में उपयोग होने वाली धातु, ऐलुमिनियम का धातुओं की सक्रियता श्रेणी में स्थान कहाँ पर है?
(c) इस प्रक्रिया में उपचयित तथा अपचयित होने वाले पदार्थों के नाम लिखिए। 5

26. (a) विद्युत्-चुम्बक क्या होता है? इसके कोई दो उपयोग लिखिए।
(b) विद्युत्-चुम्बक कैसे बनाया जाता है? इसे दर्शाने के लिए नामांकित आरेख खींचिए।
(c) विद्युत्-चुम्बक बनाने में नर्म लौह क्रोड का उपयोग किए जाने के उद्देश्य का उल्लेख कीजिए।
(d) यदि किसी विद्युत्-चुम्बक का पदार्थ निश्चित है तो उस विद्युत्-चुम्बक की प्रबलता में वृद्धि करने के दो उपाय लिखिए। 5

27. नीचे दिए प्रत्येक प्रकरण में प्रतिबिम्ब बनना दर्शाने के लिए किरण आरेख खींचिए :
(i) जब बिम्ब किसी उत्तल लेंस के प्रकाशिक केन्द्र और मुख्य फोकस के बीच स्थित है।
(ii) जब बिम्ब किसी अवतल लेंस के सामने कहीं पर भी स्थित है।
(iii) जब बिम्ब किसी उत्तल लेंस के 2F पर स्थित है।
उपरोक्त प्रकरणों (i) और (ii) में आवर्धनों के चिह्नों और मानों का उल्लेख कीजिए। 5

अथवा

4.0 cm साइज़ का कोई बिम्ब 15.0 cm फोकस दूरी के किसी अवतल दर्पण के सामने 25.0 cm दूरी पर स्थित है।
(i) इस दर्पण के सामने किसी पर्दे को कितनी दूरी पर रखा जाए ताकि उस पर बिम्ब का तीक्ष्ण प्रतिबिम्ब बने।
(ii) बनने वाले प्रतिबिम्ब का साइज़ ज्ञात कीजिए।
(iii) इस प्रकरण में प्रतिबिम्ब बनना दर्शाने के लिए किरण आरेख खींचिए। 5

28. (a) आनुवंशिकी किसे कहते हैं?
(b) जीन क्या हैं? ये कहाँ स्थित होते हैं?
(c) किसी नई स्पीशीज़ के बनने के लिए उत्तरदायी तीन कारकों के नाम और उनकी परिभाषा लिखिए। 5

29. आधुनिक आवर्त सारणी में कुछ तत्वों की स्थितियाँ नीचे दर्शाए अनुसार हैं।

समूह → / आवर्त ↓	1	2	3 से 12	13	14	15	16	17	18
1	G								H
2	A			1			B		C
3		D			E				F

उपरोक्त सारणी का उपयोग करके निम्नलिखित प्रश्नों के उत्तर प्रत्येक प्रकरण में कारण देकर दीजिए :

(i) कौन सा तत्त्व केवल सहसंयोजी यौगिक बनाएगा?

(ii) कौन सा तत्त्व संयोजकता 2 की अधातु है?

(iii) कौन सा तत्त्व संयोजकता 2 की धातु है?

(iv) H, C और F में से किसका परमाणु साइज़ सबसे बड़ा है?

(v) H, C और F किस परिवार के सदस्य हैं? 5

अथवा

परमाणु साइज़ की परिभाषा दीजिए। इसकी माप का मात्रक लिखिए। आधुनिक आवर्त सारणी में किसी समूह और किसी आवर्त में परमाणु त्रिज्याओं में क्या प्रवृत्ति पायी जाती है और ऐसा क्यों है? 5

30. (a) जलीय जीवों और स्थलीय जीवों की सांस लेने की दरों में अन्तर क्यों होता है? व्याख्या कीजिए।

(b) मानव श्वसन-तंत्र का आरेख खींचिए और उस पर ग्रसनी, श्वासनली, फुफ्फुस, डायाफ्राम् तथा कूपिका कोश का नामांकन कीजिए। 5

अथवा

(a) मानव उत्सर्जन तंत्र का निर्माण करने वाले अंगों के नाम लिखिए।

(b) मानव शरीर में मूत्र किस प्रकार बनता है, का संक्षेप में वर्णन कीजिए। 5

29. The position of certain elements in the Modern Periodic Table are shown below.

Group → / Period ↓	1	2	3 to 12	13	14	15	16	17	18
1	G								H
2	A			I			B		C
3		D			E				F

Using the above table answer the following questions giving reasons in each case :

(i) Which element will form only covalent compounds?

(ii) Which element is a non-metal with valency 2 ?

(iii) Which element is a metal with valency 2 ?

(iv) Out of H, C and F which has largest atomic size?

(v) To which family does H, C and F belong? 5

OR

Define atomic size. Give its unit of measurement. In the modern periodic table what trend is observed in the atomic radius in a group and a period and why is it so? 5

30. (a) Why is there a difference in the rate of breathing between aquatic organisms and terrestrial organisms? Explain.

(b) Draw a diagram of human respiratory system and label – pharynx, trachea, lungs, diaphragm and alveolar sac on it. 5

OR

(a) Name the organs that form the excretory system in human beings.

(b) Describe in brief how urine is produced in human body. 5