SECTION A (50 Marks)

ANSWER **ALL** QUESTIONS

Question 1

a) **Directions: For each question, there are four alternatives A, B, C and D. Choose the correct alternative and circle it. Do not circle more than ONE alternative. If there are more than one circled, NO score will be awarded.** **[25]**

i. A cell observed under a microscope was found to have a capsule along with a cell-wall and ribosome. Name the cell.

A plant cell
B animal cell
C eukaryotic cell
D prokaryotic cell

ii. $$2H_2O \xrightarrow[\text{(Chlorophyll)}]{\text{(Light Energy)}} 4H^+ + 4e^- + O_2$$

The above reaction is essential for the production of glucose by green plants. Name the reaction taking place.

A photolysis
B photosynthesis
C photorespiration
D photophosphorylation

iii. The digestive system processes food into usable and unusable materials. The usable materials are absorbed by the cells and unusable materials are stored in the

A liver.
B pancreas.
C small intestine.
D large intestine.

iv. Growing of leguminous plants increases soil fertility. Name the organism present in the root nodules that makes the soil fertile.

A bacillus bacteria
B rhizobium bacteria
C streptomyces bacteria
D streptococcus bacteria

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v. According to the WHO, the modern concept of family planning includes

I Advice on sterility.
II Genetic counselling.
III Advice on natality rate.
IV Advice on menstrual cycle.

A II.
B III.
C I and II.
D II and III.

vi. Which one of the following is the correct monohybrid genotypic ratio in F_2 generation?

A 2:2:1`
B 2:1:2
C 1:2:2
D 1:2:1

vii. A man is diagonised with the following symptoms: excessive urination, feeling of thirst and dehydration. What is he suffering from?

A over secretion of vasopressin
B over secretion of aldosterone
C under secretion of vasopressin
D under secretion of aldosterone

viii. Bhutan has one of the most important biological diversities in the world. Diversity of Bhutan includes

I marine biodiversity
II terrestrial biodiversity
III desert biodiversity
IV aquatic biodiversity

A I and IV.
B II and III.
C III and IV.
D II and IV.

ix. The hormonal contraceptive which prevents unwanted pregnancy within 72 hours is

A contraceptive pills.
B birth control patch.
C vaginal ring.
D I-Pill.

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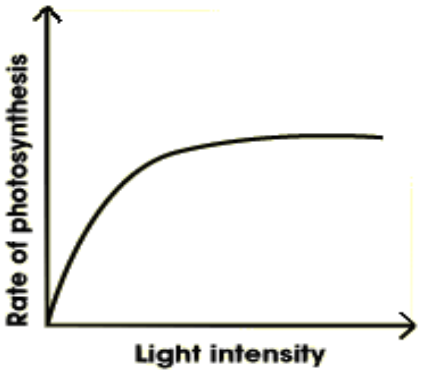
x. Osmosis is significant to the plant in many ways. Which of the following physiological activities in the plant shows the significance of osmosis?

A production of glucose in the leaf cells
B absorption of minerals by roots
C closing and opening of stomata
D formation of buds

xi. The graph given below shows the effect of light intensity on the rate of photosynthesis. The rate of photosynthesis becomes stable at a certain point. At this point the rate of photosynthesis can be increased by



A increasing the temperature and decreasing carbon dioxide.
B decreasing the temperature and increasing carbon dioxide.
C increasing the both temperature and carbon dioxide.
D decreasing the both temperature and carbon dioxide.

xii. Some viruses which infect bacterial cells are known as

A Bacteriophage.
B Retrovirus.
C Bacillus.
D Vibrio.

xiii. A man bleeds profusely when his hand is cut. He is suffering from

A polycythemia.
B xeropthalmia.
C haemophilia.
D sickle celled anaemia.

xiv. A dog immediately runs away on seeing a man bending down. What caused it to run away?

A conditioned reflex
B inborn reflex
C natural reflex
D innate reflex

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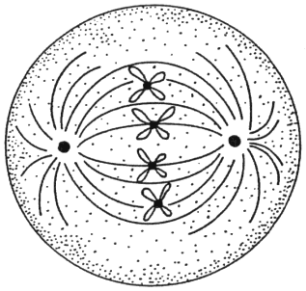
xv. Every organism is associated with each other in an ecosystem. Which of the pair below best shows commensalism?

A algae and fungi
B cattle and egrets
C sea anemone and hermit crab
D rhizobium bacteria and leguminous plant

xvi. Study the diagram below showing mitosis cell division. Identify its correct phase.



A Interphase
B Telophase
C Prophase
D Metaphase

xvii. A local pickle making firm uses salt to prevent from bacterial spoilage. Salt prevents bacterial growth due to

A turgidity.
B exosmosis.
C endosmosis.
D deplasmolysis.

xviii. Photosynthesis is a chemical process in plants which produces food for all living beings using raw materials. Which raw material for this process is produced by human activity?

A carbon dioxide
B glucose
C oxygen
D water

xix. A plant cell was kept in a solution hypertonic to its cell sap. What will be the condition of the cell after 30 minutes?

A B C D

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xx. Four students volunteered to donate their blood to a patient with the blood group A. They had the following blood groups:

Student 1 - A group
Student 2 - B group
Student 3 - AB group
Student 4 - O group

Which of the student can possibly donate blood to the patient?

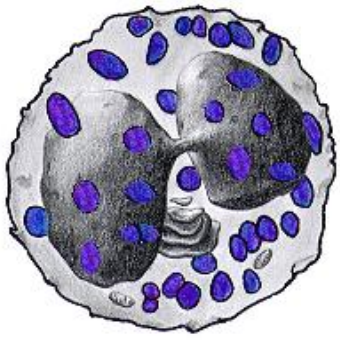
A Only student 3
B Students 2 and 3
C Students 1 and 4
D Only student 2

xxi. A random survey conducted in a village found that most of the people were infected with different types of STIs. What advice can you give them?

I. Use of contraceptives especially barrier methods
II. Isolate the infected person
III. Abstinence from sex
IV. Drink clean water

A I and II
B II and III
C III and IV
D I and III

xxii. Pema observed a type of white blood cell under a microscope. She saw the cell had a nucleus containing large granules as shown below. The cell is a



A neutrophil.
B eosinophil.
C basophil.
D monocyte.

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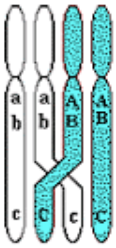
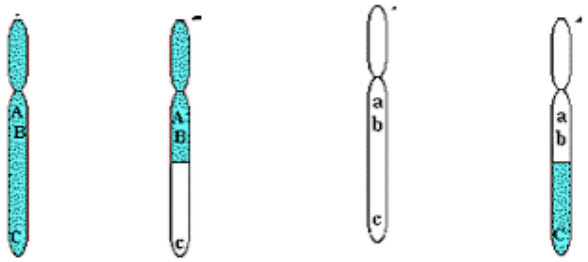
xxiii. A pair of homologous chromosome undergoes crossing over. Identify the most appropriate result of mixing of the genetic materials.

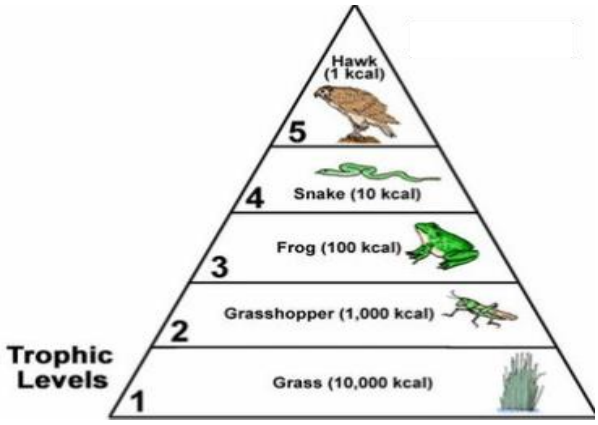


Crossing Over



A I
B II
C III
D II and IV

xxiv. Which is the correct matching pair of trophic level in the following food chain?



A Producer ⟹ Secondary consumer ⟹ Tertiary consumer ⟹ Quaternary consumer ⟹ Primary consumer

B Quaternary consumer ⟹ Secondary consumer ⟹ Primary consumer Tertiary consumer ⟹ Producer

C Producer ⟹ Primary consumer ⟹ Secondary consumer ⟹ Tertiary consumer ⟹ Quaternary consumer

D Quaternary consumer ⟹ Tertiary consumer ⟹ Secondary consumer Producer ⟹ Primary consumer

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xxv. People having low pH level in their stomach are advised not to take acidic food. They are given one of the following substances to raise their pH level to an optimum. Which is the substance?

A antiseptics
B antibiotics
C antipyretics
D antacids

b) Fill in the blanks. **[5]**

i.	Narrow, hollow elongated cells of xylem tissue _____.	
ii.	It is a complex fluid containing water, electrolytes, acid, cholesterol, phospholipids and bilirubin that flows into the duodenum of small intestine. The statement describes _____.	
iii.	Type 1 diabetic patient has to regularly inject_____.	
iv.	The structure in bacteria is used in genetic engineering to carry new genes into other organisms is _____.	
v.	Vultures, crows and hyenas feed on dead organisms, so they are called _____.	

c) Match each item under Column A with the item in Column B. Rewrite the correct pairs by writing the alphabet against the number in the space provided. **[5]**

Column A		Column B	
i.	Sympathetic division	a.	mitosis
ii.	Binary fission	b.	thylakoid
iii.	Light reaction	c.	oxygen debt
iv.	Anaerobic respiration	d.	involuntary
v.	Replicative division	e.	bacteria
		f.	virus

i.	
ii.	
iii.	
iv. `	
v.	

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d) Use the jumbled letters to correct the following statements by changing only the underlined words. Unjumble the words to form the answers. **[5]**

nioratavi	gobletai	uslohmoogo	tauphsorto	negse

i. Any difference between individual organisms or groups of organisms of any species is called <u>inheritance.</u>

ii. The association between a fungi and an algae is an example of <u>facultative.</u>

iii. Organisms containing chlorophyll are called <u>heterotrophs</u> because they can prepare their own food.

iv. Chromosomes which are physically alike in shape, length and position of their centromere are called <u>sex</u> chromosomes.

v. The section of DNA which carry information that help a cell to grow, survive and reproduce is called as <u>RNA</u>.

i.	
ii.	
iii.	
iv.	
v.	

e) Answer the following questions.

i. Patients with tuberculosis are isolated from the rest of the patients and kept in TB ward. Why? Give **ONE** reason. [1]

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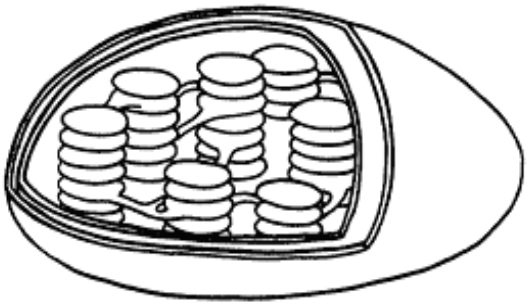
ii. Given below is a cell structure which helps in the physiological process in plants. Study the diagram and answer the following questions.



1. Name the structure. [½]

2. Is the structure necessary for the survival of bacteria and fungi? Justify. [1½]

iii. Antibiotics is used for the treatment of typhoid. Why? [1]

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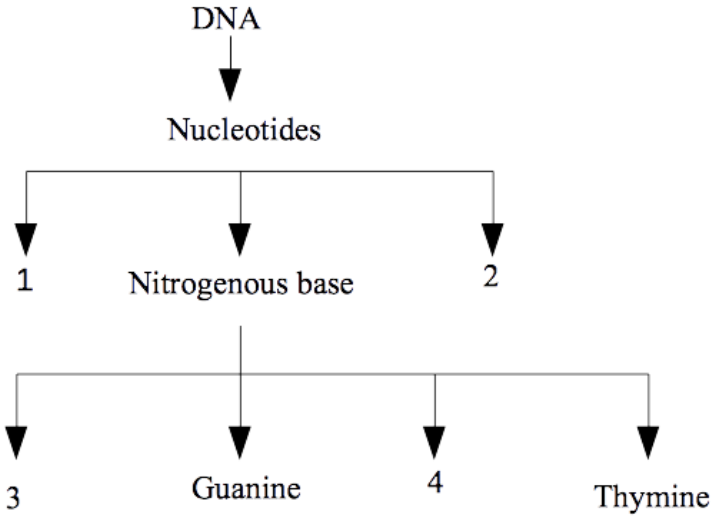
iv. Study the flow chart of DNA given below and name 1, 2, 3 and 4. [2]



1.	
2.	
3.	
4.	

v. Identify the following organisms from the given food chain and write their names against characteristics. [2]

Grass → Rat → Snake → Hawk → Bacteria

	Character	**Organism**	
	Herbivore		
	Tertiary Consumer		
	Decomposer		
	Secondary Consumer		

vi. If a heterozygous dominant tall pea plant is crossed with a homozygous recessive dwarf pea plant, illustrate the types of offspring produced with the help of punnet square. [1]

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vii. Read each statement given below and name either the process or the substance.

1. A mixture of thick pulpy mass formed after 2 to 3 hours of churning the food in the stomach. [½]

2. A medical procedure to purify the blood of a patient whose kidney is not functioning normally. [½]

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SECTION B (50 Marks)

ATTEMPT ANY **FIVE** QUESTIONS

Question 2

a) A cell from an onion is more advanced than a cell of streptococcus. Why? [1]

b) Meiosis is more important than mitosis. Do you agree? Give at least **ONE** reason to support your answer. [1]

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c) Most people prefer to use plant growth promoters over plant growth inhibitors. Why? [1]

d) Saliva plays a very important role in digestion. If a person has to undergo a surgery on the salivary gland, which **TWO** functions related to digestion of food cannot be performed? [2]

e) Food ultimately gets digested in the small intestine. Name the products formed after the digestion of rice and egg white. [2]

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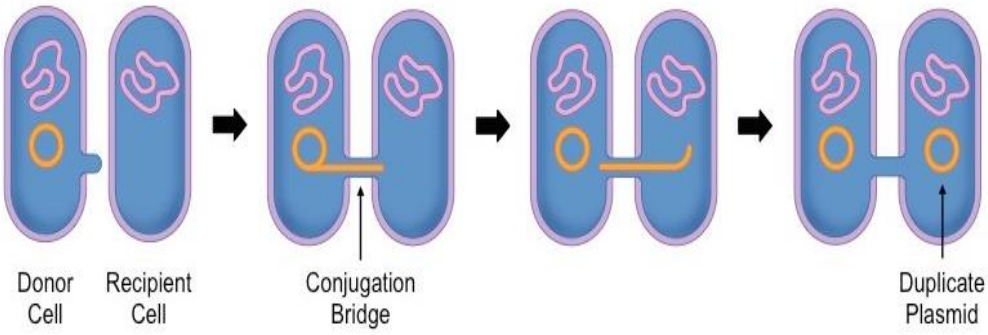
f) State the functions of the following:

i. Sensory neuron [½]

ii. Motor neuron [½]

iii. Which organs in our body have interneurons? [1]

g) Refer the diagram given below and answer the questions that follow.



i. Name the mode of asexual reproduction. [½]

ii. Name the type of organism shown in the above diagram. [½]

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Question 3

a) Answer the following questions.

i. The gender of a child depends on a father's chromosomes. Explain. [1]

ii. A group of dogs were exposed to radiation. Their offsprings were found to have undergone mutation. Can radiation be the cause for mutation? Justify your answer with **ONE** reason. [1]

b) The musk deer population was found to have decreased drastically in an ecosystem. As a forest officer, what advice will you give to the villagers to prevent extinction of animals. [1]

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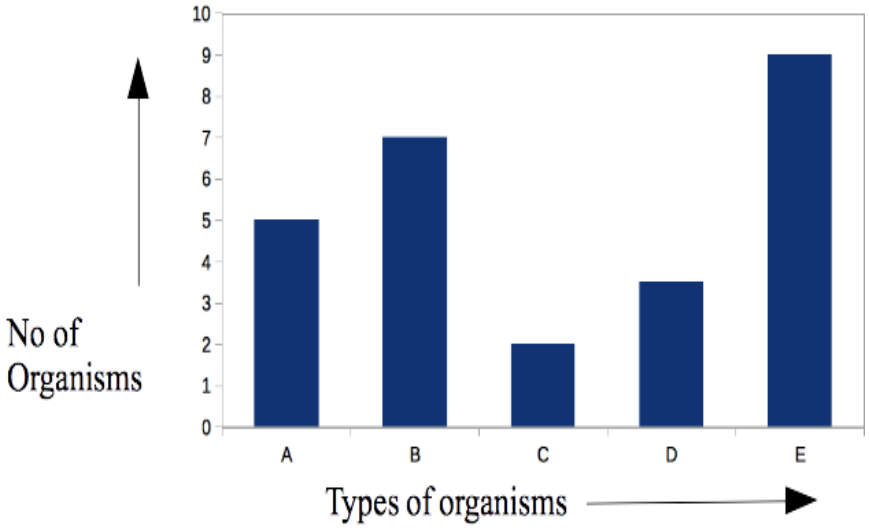
c) Study the graph given below that represents a food chain and answer the following questions.



i. Which bar represents the producer? [1]

ii. Identify tertiary consumer and primary consumer. [1]

iii. What will happen if D is removed from the food chain? [1]

iv. Give an example of a food chain having equal number of trophic levels as shown in the above graph. [2]

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d) Identify the type of isolation based on the descriptions given below. [2]

Geographical isolation Ecological isolation Temporal isolation

i.	Species reproduce in different seasons or at different times of the day.		
ii.	Species occur in the same area but occupy different habitats.		

Question 4

a) Answer the following questions.

i. As you walk through a forest and suddenly step on a snake, how will your body react? Choose from the following. [1]

1. pupil dilates
2. constricts air ways
3. slows heart beat
4. constricts blood vessels
5. stimulates digestion

ii. How is the production of adrenaline related to such reactions. [1]

b) Give an analogy for the following pairs. [1]

i.	Bacteria: Bacteriology: Fungi: _____.	
ii.	Gram –ve bacteria: Stains pink: Gram + bacteria: _____.	

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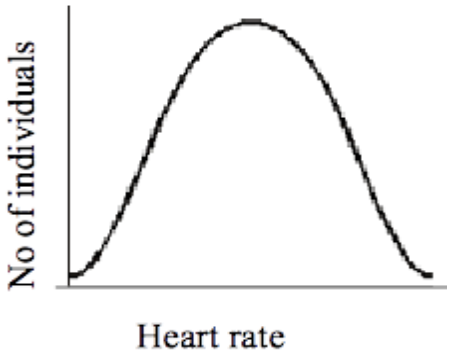
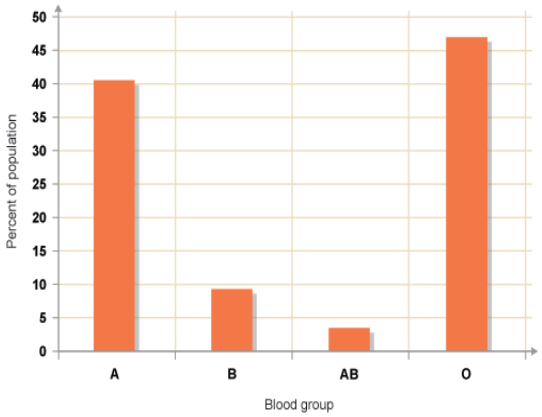
c) Refer the graphs to answer the following questions.

Continuous variation



Discontinuous variation



i. Explain the above graphs. [1]

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ii. Give **TWO** examples for each type of variations. [1]

iii. Draw a graph to depict the example of discontinuous variation mentioned in question ii. [1]

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iv. Draw a bimodal graph for the example of continues variation mentioned in question ii. [1]

d) Parasitism is an interaction between two species in which one organism derives nutrition from the other organism. Name and explain the **TWO** different types of parasitism. [1]

e) Give appropriate terms for the following:

i. Symbiotic association between a fungus and a plant root. [1]

ii. A chemical substance produced against antigen from bacteria or virus. [1]

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Question 5

a) The leaves of a plant kept in a dark room turned pale and yellow. If it is placed in the sun, will it grow properly? Give a reason. [2]

b) Study the diagram of the food items given below and answer the question that follows:

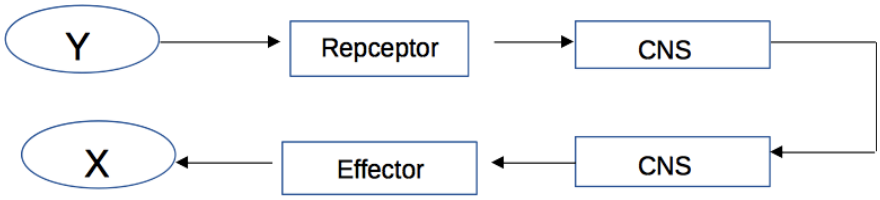
Banana

Biscuits

Glucose D

All the items contains carbohydrate. Which one will you choose to give a football player for instant energy? Why? [1]

c) Study the diagram below and answer the following questions.



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i. What is indicated by letters X and Y? [1]

ii. What does the diagram show? Give an example for the type of action shown in the diagram above. [1]

iii. Which part of the body can act as a: [1]

1.	effector:	
2.	receptor:	

d) Define:

i. Mutation [1]

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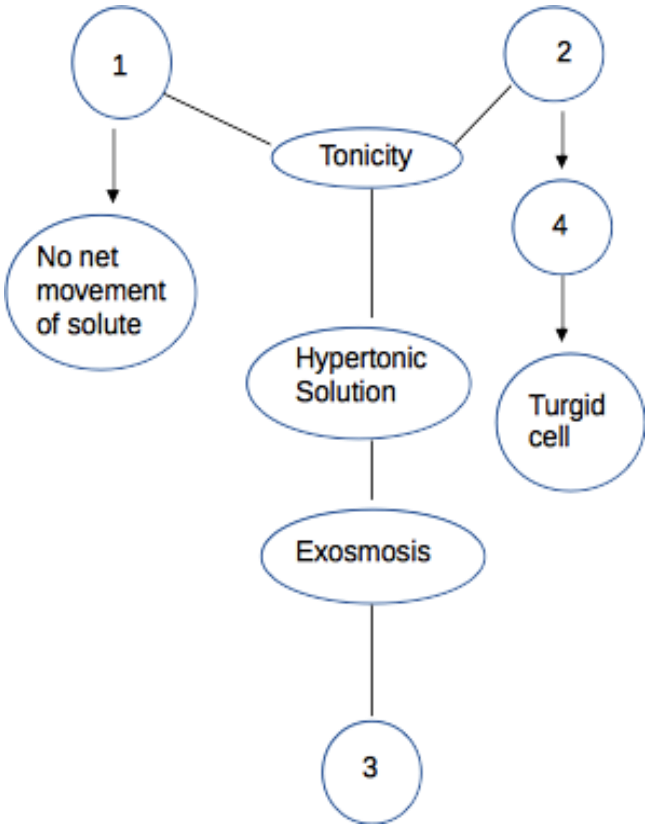
ii. Genetic cross [1]

e) The figure given below shows a concept map of tonicity. Study and complete it. [2]



1.	
2.	
3.	
4.	

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Question 6

a) Answer the following questions.

i. Meiosis is a type of a cell division which occurs in the reproductive organs. It produces haploid cells. Based on this context, answer the following questions. "There won't be continuity of life on earth without meiosis." Why? [1]

ii. "Meiosis results in variation which leads to evolution." Support the statement with **ONE** point. [1]

iii. Which cell division is responsible for healing of wounds? Write **ONE** significance of the cell division you have stated. [1]

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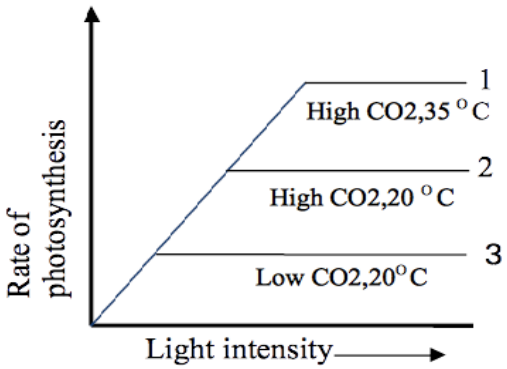
b) Answer the following questions.

i. What is the advantage of using gibberellin in your apple orchard? Mention **TWO** advantages. [1]

ii. Study the given diagram and answer the questions that follow:



Which curve in the graph shows

1. lowest rate of photosynthesis? [1]

2. highest rate of photosynthesis? [1]

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c) Write the full form for the following abbreviations. [1]

i.	DMPA:	
ii.	STIs:	

d) Bacteria can be harmful as well as beneficial

i. Farmers and dairy industries use these micro-organisms for many purposes. Complete the table giving a reason on each. [2]

		Useful bacteria	
1.	Farmer		
2.	Dairy farm		

e) According to a hypothesis, roots absorb large quantities of ions and water due to transpiration. Name the hypothesis. [1]

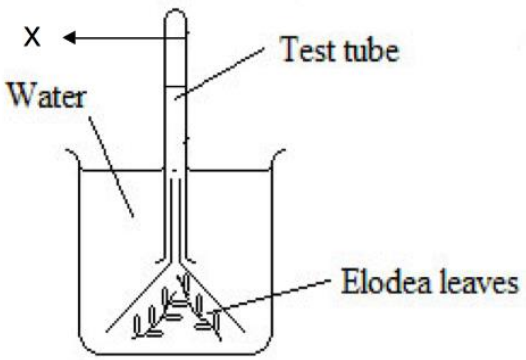
Question 7

a) Leaf of a plant is compared to the kitchen of a house where food is prepared using different raw materials.

i. Give an analogy for the following pairs. [1]

1.	Kitchen – leaf, food - _____	
2.	Spices – Minerals, water pipe - _____	

ii. A student conducted an experiment using elodea (aquatic plant) as given below. [2]



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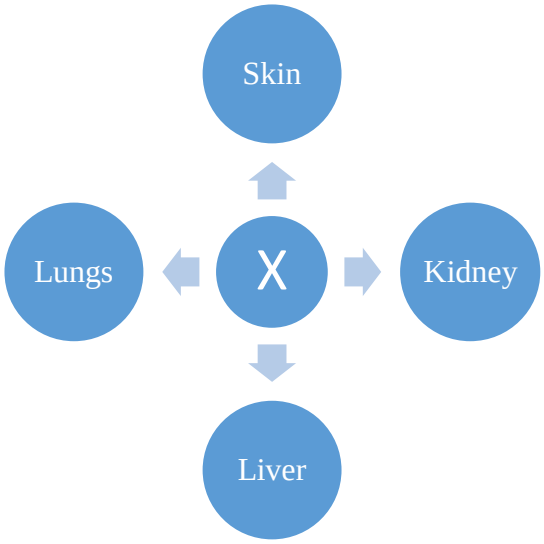
1. Name ‘X’. [½]

2. How is ‘X’ important for living organisms? [½]

3. What is the role of light in the experiment? [½]

4. Name the physiological process. [½]

b) Study the concept map given below and answer the questions that follow:



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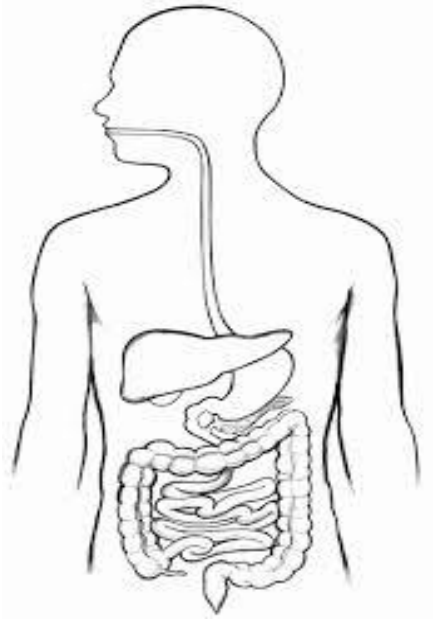
i. What does X represent? [1]

ii. How does the skin help to remove waste? [1]

c) Tashi dipped the ends of the stem cuttings of a rose in a substance to initiate rooting. Name the substance used. [1]

d) Study the diagram below and answer the questions that follow.



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i. Identify and mark the part on the diagram where:

1. maltose is converted to glucose. Label it 'M'. [1]

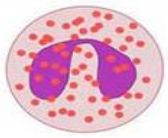
2. bile is produced. Label it 'B'. [1]

ii. Name the parts concerned with the following: [1]

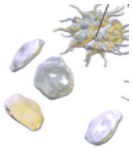
1. Production of HCl
2. Secretion of trypsinogen

1.	
2.	

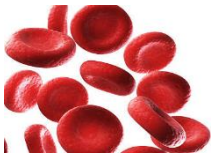
e) Given below are the diagrams of blood cells. Study them carefully and answer the questions that follow:



A



B



C

i. Which cell is a lymphocyte? Why? [1]

ii. Haemoglobin is a respiratory pigment. In which cell is it present? [½]

iii. What is the function of cell B? [½]

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