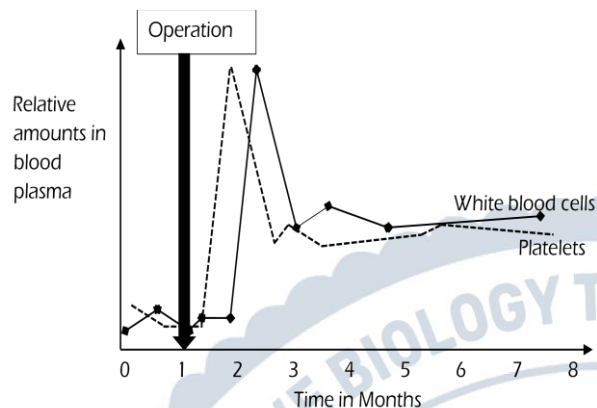


TOPIC 1: CELLS AND LEVELS OF CELLULAR ORGANIZATION

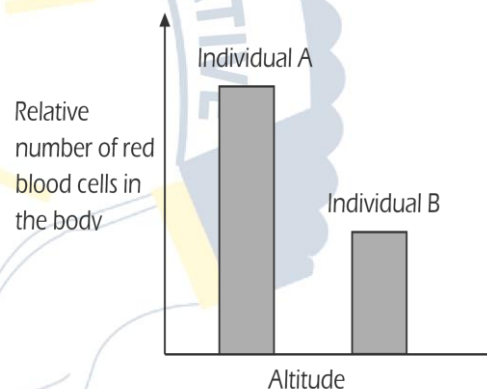
1. A graph below shows the number of platelet and white blood cell counts over the patient's hospital course after a surgical operation. Use it to answer questions that follow.



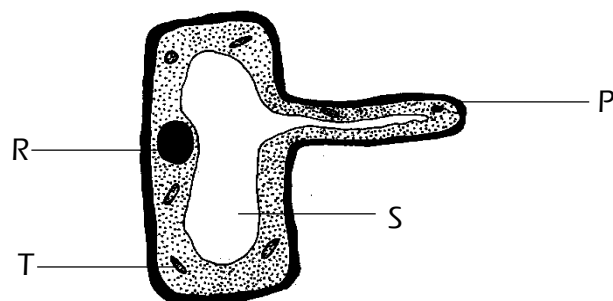
- Explain the trends of the following blood components immediately after operation.
 - Platelets (05marks)
 - White blood cells. (06marks)
- Mention the differences in the unique structures of white blood cells from other animal cells. (03marks)
- How are white blood cells adapted to their function? (06marks)

2. a) State the part of the body from where red blood cells are produced and broken down. (02marks)
b) The number of red blood cells in blood varies according to altitude. The relative abundance of red blood cells in blood of two different individuals one at low altitude and another at high altitude were analyzed and plotted on the bar chart below. Use the bar chart to answer questions that follow.

- Identify the altitudes of the different individuals A and B. (01mark)
 - State the reason for your answers in b) (i) above. (02marks)
 - What name is given to the phenomenon that occurs in the change of number of red blood cells to individuals at high altitudes? State the purpose of this process. (03marks)
 - Apart from the changes in red blood cell count, state other physiological processes that occur in individuals that inhabit high altitudes. (04marks)
- c) Explain how red blood cells achieve the following in their function.
- Increased surface area. (03marks)
 - Attachment of gases. (02marks)
 - Increased rate of diffusion. (05marks)



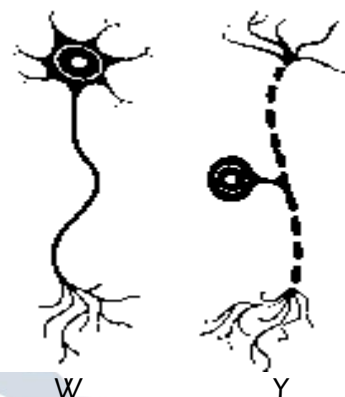
3. The figure below shows a root hair cell. Use it to answer questions that follow.



- Name the parts labelled P to T. (02marks)
 - State the function of each part labelled on the above cell. (04marks)
- Explain how water and mineral salts enter the root hair cell. (07marks)
- How is the cell adapted to absorb water and mineral salts? (04m)

4. The figure below shows two types of neurons found in the nervous system of the mammalian body. Use the figure to answer questions that follow.

- a) (i) Identify the type of each neuron labelled W and Y (01mark)
- (ii) Use diagram Y on the figure to label the parts of the neuron. (03marks)
- (iii) What do all neurons have and do in common? (02marks)
- b) What is the function of each neuron? (02marks)
- c) State the structural differences between the two neurons. (05marks)
- d) How are neurons adapted to perform their functions? (05marks)

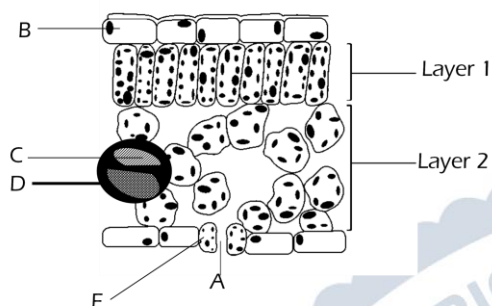


TOPIC 2: CLASSIFICATION OF LIVING THINGS

5. a) State any three characteristics of bacteria (03marks)
- b) Describe the economic importance of bacteria in nature. (10marks)
6. a) Compare fungi and plants. (05marks)
- b) Discuss the diverse role of fungi in nature (05marks)
- c) State how fungi achieve the following life processes. (04marks)
- (i) Feeding (06marks)
- (ii) Reproduction
7. a) Compare the structure of monocotyledonous and dicotyledonous plants. (06marks)
- b) How are monocotyledonous plants adapted to survive on land environment? (08marks)
- c) Explain the role of plants to aquatic organisms. (06marks)
8. a) State three characteristic features of arthropods (03marks)
- b) Giving an example in each case, state five classes under phylum arthropoda (05marks)
- c) Insects are said to be the most successful organisms on earth. State any five reasons to justify this statement (06marks)
- d) Explain the economic importance of insects (10marks)
9. a) Which three special external features exist on all insects? (02marks)
- b) Explain the location and attachment of the following structures on insects. (03marks)
- (i) Spiracles (03marks)
- (ii) Wings (02marks)
- (iii) Legs (07marks)
- c) How are the structures on different insects enable them to survive in nature?
10. a) Compare the lifecycle of a housefly and cockroach. (07marks)
- b) Explain how the different types of bees in the hive arise during their reproduction. (05marks)
- c) Some insects have long lifecycles relative to others, state the significance of each condition. (04marks)
- d) Land habitats are characterized by hot and dry weathers while water systems are well known for low oxygen levels. How are insects with their life cycles on land and in water overcome these challenges. (04marks)

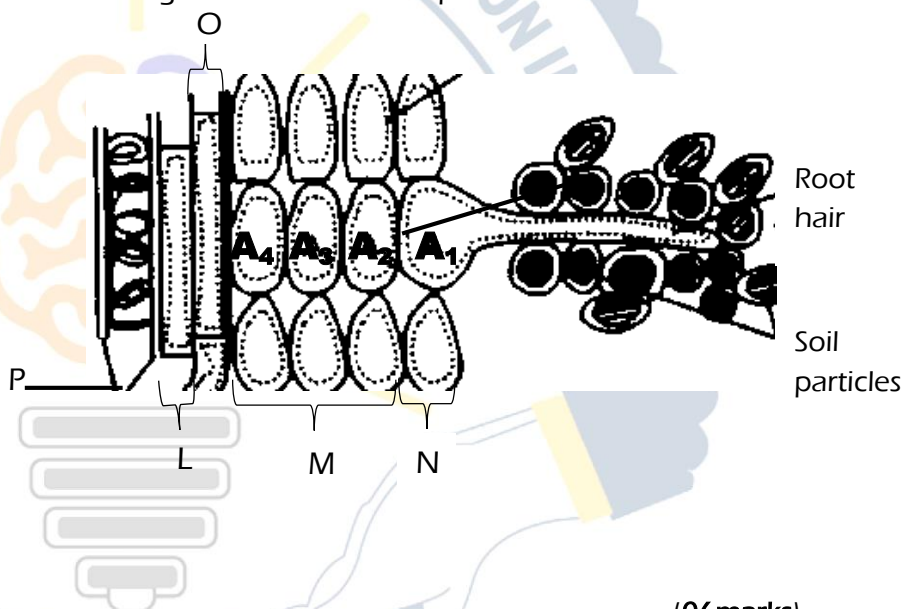
TOPIC 4: FLOWERING PLANTS

11. a) State the primary functions of leaves on plant (03marks)
b) The figure below shows the section through the internal structure of a dicotyledonous leaf. Use it to answer questions that follow.



- (i) Name the cells labeled B to E. (02marks)
(ii) Describe the structure of cells present in the layers 1 and 2. (03marks)
(iii) State the function of the cells labelled B and E. (02marks)
(iv) Explain the variation and size in structure A in plants of different habitats. (02marks)
c) Describe the adaptations of leaves to their function. (04marks)
d) How are leaves modified to perform other functions? (04marks)

12. a) Describe the structure of root system of dicotyledonous plants. (03marks)
b) The figure below shows a transverse section through a root of a certain plant.



- (i) Name layers labelled L to O. State the function of the cells that make up each layer. (04marks)
(ii) Name cell P and describe how water travels from cell A1 to cell P. (05marks)
c) How are cells of the parts labelled P are adapted to their function? (04marks)
d) Mention the function of different root modifications. (04marks)
13. a) Draw the cross section of stems of;
(i) Dicotyledonous plant
(ii) Monocotyledonous plant (06marks)
b) (i) State the differences in structure of stems you have drawn in a) (i) and (ii) above. (03marks)
(ii) How are cells of the cambium adapted to their function? (02marks)
c) Compare the structure of the root and stem of a dicotyledonous plant. (05marks)
d) With examples, describe the different modifications of stems in different plants. (04marks)
14. a) Distinguish between self-pollination and cross pollination (04 marks)
b) State the adaptations of flowers to;
(i) Insect pollination
(ii) Wind pollination (08 marks)
c) Describe the features of a flower that prevent self-pollination in plants (05 marks)

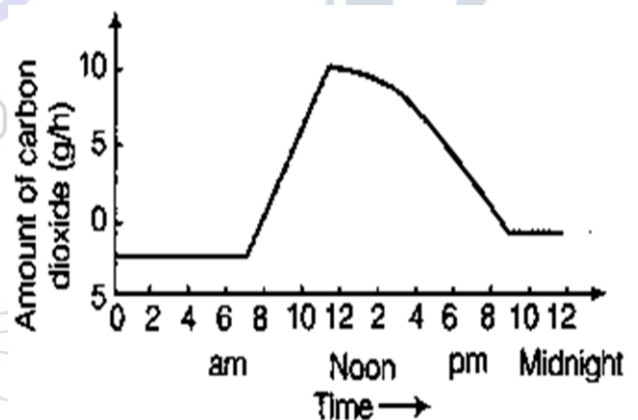
TOPIC 5: SOIL

15. a) Explain the various roles of soil in nature. (07marks)
b) Mention the human activities that lead to reduced soil fertility. (08marks)
c) How does soil that has reduced its productivity restore its fertility. (05marks)
16. a) Discuss the processes that lead to addition and loss of nitrogen in to the soil. (10marks)
b) Explain the role of organisms in the recycling of nutrients in the soil. (06marks)
c) How do plants incorporate nitrates in the soil into their cells? (04marks)
17. a) Describe an experiment you would carry out in the laboratory to determine the percentage composition of the following components of soil.
i. Air (06marks)
ii. Water. (07marks)
a. To calculate the percentage contents of humus in the soil sample, the equipment used for this experiment is a beam balance. The measurements of the soil experiment: weight of crucible + soil=25.66g. weight of crucible alone=15.92g. weight of crucible + soil without water=25.17g. weight of crucible + red hot soil = 20.62g. Determine the percentage of humus in the soil sample. (04marks)
b. How is good soil aeration important to organisms in the soil. (03marks)
18. a) State the significance of different soil components. (12marks)
a. Describe the variations in the physical properties of the three soil types. (08marks)

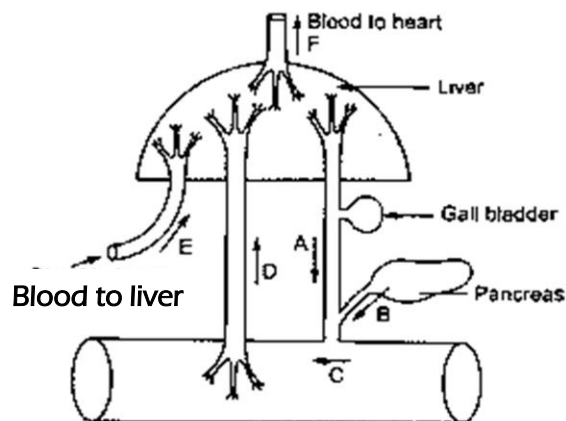
TOPIC 6: NUTRITION IN ORGANISMS

19. The graph below shows how the amount of carbon dioxide taken in by a plant varies through a 24-hour period. Use it to answer questions that follow.

- a) At what time of the day:
(i) Does photosynthesis start (01mark)
(ii) Was photosynthesis greatest (01mark)
- b) (i) Draw another line on the graph that shows how the amount of oxygen would vary throughout the day. (01mark)
(ii) Explain the shape of both graph. (06marks)
- c) (i) How do plants obtain carbon dioxide. (03marks)
(ii) What happens to this carbon dioxide in plants. (05marks)
- d) What other factors could affect the rate of photosynthesis? (03marks)



20. The diagram below shows how materials get to and from the liver. The routes they take are labeled as A, B, C, D, E and F. Use the figure given to answer questions that follow.



- Name the following parts.:
 - Blood vessels D, E and F
 - Structures A, B and C.
- State the difference in structure and composition of blood in blood vessels E and D.
 - Explain the variation of substances in blood vessels F from those in blood vessel D.
- State the role of the substances that pass through structures A and B.
- Outline the digestive functions of the liver.

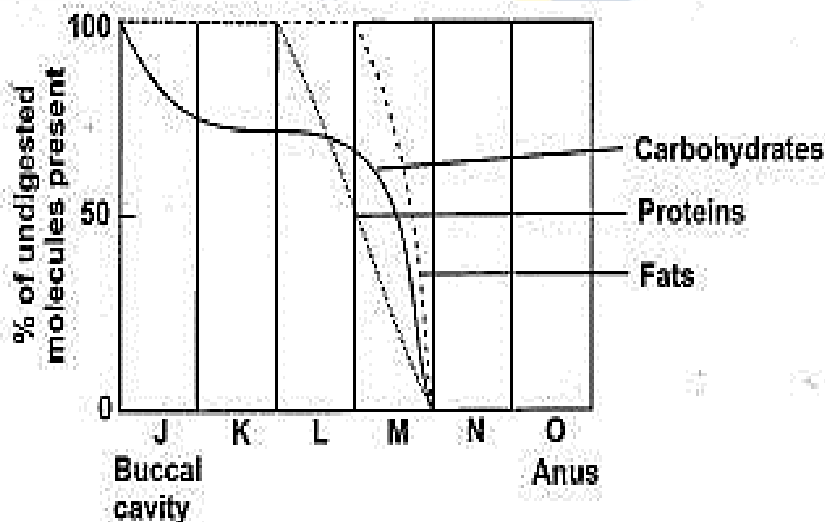
21. An investigation was carried out on blood glucose levels with respect to the number of hours since eating proteins and also after eating carbohydrates. The results were tabulated as follows. Use the information in the table to answer questions that follow.

Time elapsed since eating (hours)	Blood glucose levels (mg of glucose/dm ³ of blood)	
	Protein	Carbohydrates
0	910	910
1.5	936	1000
1.0	988	1100
1.5	1063	1000
2.0	1100	910
2.5	1063	890
3.0	988	888

- Represent the above information on the same graph.
- Explain the changes in blood glucose level after the meal of:
 - Carbohydrates
 - Proteins
- Explain the likely consequence of eating large amounts of carbohydrates at night.
- Discuss the digestion of proteins in the gut.

22. The graph below shows digestion of carbohydrates, proteins and fats as food moves along the different parts of the alimentary canal from J to O.

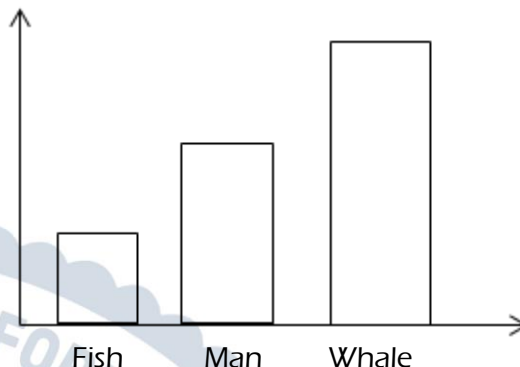
- With reasons from the graph, identify the parts of the alimentary canal represented by letters J to M.
- Explain the observed changes in the carbohydrate along the alimentary canal.
- Compare the percentage of fats and protein molecules present along the alimentary canal.
- Explain how the body deals with excess absorbed food nutrients.
 - How is the structure labelled M adapted to its function.



TOPIC 7: TRANSPORT IN ORGANISMS

23. The graph below shows the amount of oxygen carried in 100cm³ of blood for fish, man, whale.

- Describe the differences in the amount of oxygen carried per 100cm³ of blood. (03marks)
- Explain the differences in the amount of oxygen carried in
 - Fish
 - Man
 - Whale
 (09marks)
- Briefly explain how excitement can lead to increased heartbeat. (05marks)
- Identify any four organs that work together to make up the circulatory system. (03marks)



24. Irish potato cylinders were each made with same length and diameter. Each cylinder was weighed and each weighed 6.2g. Three cylinders were placed in three solutions of different concentrations while one was put in a test tube without any solution. The results are as shown below.

Test tube	Concentration of solution in (Moll ⁻¹)	Initial weight (g)	Final weight (g)	Change in weight (g)	Percentage change in weight (%)
A	0.0		7.2		
B	0.3		6.2		
C	1		5.8		
D	Empty test tube		6.0		

- Complete table above by filling in the initial weight, change in weight and percentage change in weight. (06marks)
- Explain the results in test tubes:
 - A
 - B
 - C
 - D
 (14marks)

- Discuss the relevance of diffusion and osmosis in the survival of organisms (08marks)
- Explain why an amoeba does not require specialized transport systems whereas man require (07marks)

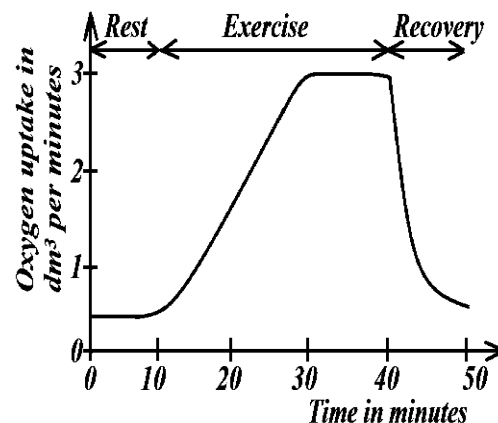
- What is transpiration? (01mark)
- Explain four factors affecting rate of transpiration. (06marks)
- Give 3 advantages and disadvantages of transpiration. (06marks)
- How are plants adapted to prevent excessive transpiration? (03marks)

TOPIC 8: CELLULAR RESPIRATION

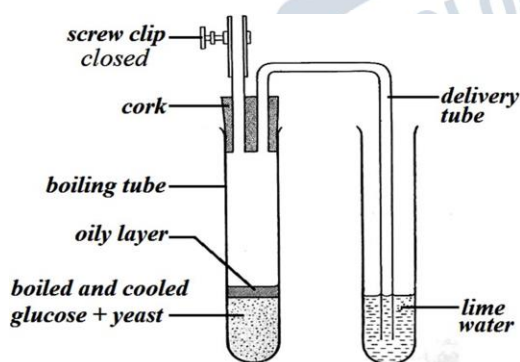
- Compare the following processes in organisms.
 - aerobic respiration and anaerobic respiration (06marks)
 - respiration and photosynthesis. (08marks)
- Describe the roles played by each processes in a) (ii) in the organisms they exist. (06marks)

28. The graph below shows the volume of oxygen taken by human before, during and after exercise per minute.

- Explain the changes in the oxygen uptake during:
 - Exercise (05marks)
 - Recovery (03marks)
- (i) Explain why the ventilation rate increases during exercise. (03marks)
(ii) Suggest why the person's heart rate also changes during exercise. (03marks)
- State the major type of respiration taking place during:
 - Resting
 - Exercise
 - Recovery (03marks)
- Explain why a person continues to breathe heavily for sometimes after exercise has stopped. (03marks)



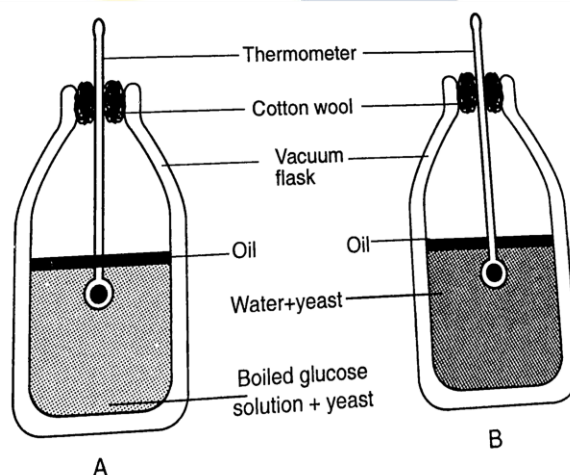
29. The figure below shows an experimental setup to investigate a physiological process in the yeast cell.



- State the:
 - Aim of the experiment (01mark)
 - Process taking place (01mark)
- What is the importance of?
 - boiling glucose solution (01mark)
 - adding oily layer (01mark)
- State what was observed in the test tube containing the limewater. (01mark)
 - Explain your stated observation in c) (i) above. (02marks)
- State **three** industrial uses of the physiological process stated in (a) (ii) in nature. (03marks)

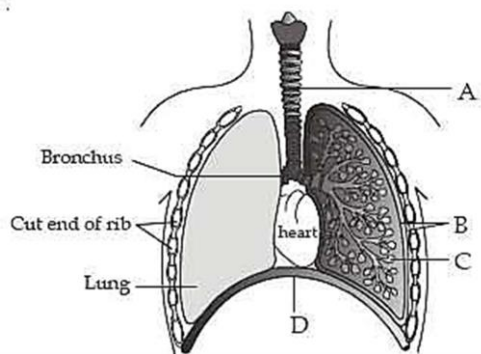
30. A set-up for an experiment to investigate respiration is shown below. Use the figure below to answer questions that follow.

- What aspect of respiration is being investigated? (01mark)
- State which one of the flasks A and B is (i) experiment and (ii) the control (02marks)
 - State the role of oil in the setup. (01mark)
 - State the differences of the observed in flasks A and B. (06marks)
- Explain why glucose was boiled? (02marks)
 - Why was glucose cooled before yeast was added. (02marks)
- Explain the application of the above experiment in daily life. (06marks)



TOPIC 9: BREATHING AND GASEOUS EXCHANGE

31. The diagram below represents a part of the thoracic region of a human being.

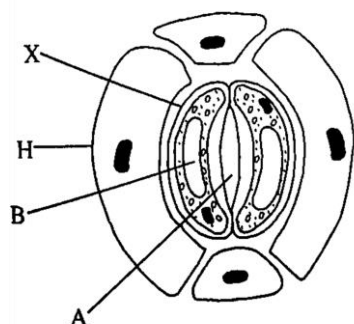


- Name the parts labelled A, B, C and D. (02marks)
- (i) How does the structure labeled B and D bring about inhalation? (06marks)
(ii) How is the part labelled K adapted to its function? (05marks)
- Describe the process by which oxygen in the structure labelled C reaches blood in the blood capillaries. (05marks)
- Explain the significance of gaseous exchange. (02marks)

32. a) Differentiate the following terms

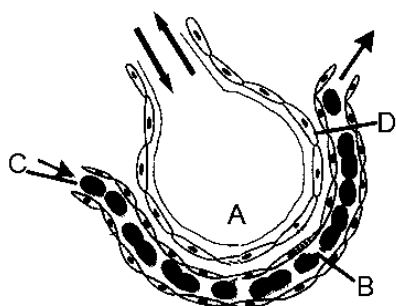
- External respiration and breathing. (01mark)
 - Internal respiration and cellular respiration. (01mark)
- (i) Respiratory surfaces generally need to be large in relation to the size of the organism. Explain why this is so. (02marks)
(ii) Explain why the absence of respiratory system in amoeba unlike in multicellular organisms like mammals. (03marks)
(iii) State the diversity of respiratory surfaces in organisms. (05marks)
 - Give reasons why the trachea is never a respiratory surface. (04marks)
 - (i) State the immediate effect that happens to a fish when removed from water. (01mark)
(ii) Explain how amphibians can utilize land and water habitats at all stages of their development. (03marks)

33. Examine the diagram below and answer the questions that follow. Use it to answer questions that follow.



- (i) Name the structures labelled A and B and the cell labelled H. (03marks)
(ii) Give the adaptations of the cell labelled X. (04marks)
- Describe how carbon dioxide enters the following plants.
(i) Terrestrial plants (03marks)
(ii) Aquatic plants. (04marks)
- Explain how aquatic plants are adapted to gaseous exchange in water. (04marks)
- b) What is the advantage to plants of being able to control the opening and closing of stomata. (03marks)

34. The figure below shows a small part of human lung, where exchange of gases takes place. Use it to answer questions that follow.



- (i) Name the parts labelled A to D. (02marks)
(ii) Mention three adaptations that suit part labelled D to perform its function. (03marks)
- (i) Explain the mechanism involved and the pathway taken by oxygen from part A to the liver cells in humans (06marks)
(ii) How is carbon dioxide in the body produced and excreted in humans? (05marks)
- Explain the variation in the percentage composition of gases in expired air and inspired air. (04marks)

TOPIC 10: HOMEOSTASIS AND THERMOREGULATION

35. a) Explain the meaning of term homeostasis. (02marks)
b) How is homeostasis significant in mammals. (05marks)
c) Explain the body regulates the following components in blood
(i) glucose levels. (08marks)
(ii) amino acids. (05marks)

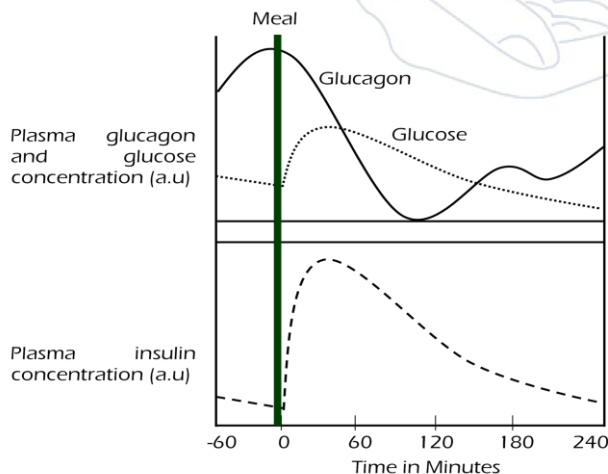
36. a) Giving examples, explain the categories of animals basing on the source of their body heat. (04marks)
b) Explain the role of the following during thermoregulation.
(i) Erector pili muscle (06marks)
(ii) Sweat glands. (05marks)
c) Mention the adaptations of desert mammals to prevent overheating. (05marks)

37. Some students used a model to demonstrate the effect of sweating and insulation on human body temperature. Three round bottomed flasks A, B and C were filled with hot water. The temperature of water in the flasks was taken at the start of the experiment and then at 10 minutes interval. The surface of flask A was continuously wiped with a piece of cotton wool soaked in ethanol. Flask C was covered all around with cotton wool. The results obtained are shown in the table below.

Time in minutes	Temperature in flask (°C)		
	A	B	C
0	85	85	85
10	50	68	78
20	35	56	75
30	29	45	72
40	25	40	71
50	21	36	70
60	19	33	69

- a) On the same axes, plot graphs of temperature of water in the flasks against time. (07marks)
b) (i) At what rate was the water cooling in flask A? (02marks)
(ii) Why was flask B included in the setup? (01mark)
(iii) Account for the rate of cooling in flask A and C. (04marks)
(iv) State two processes of heat loss in flask B. (02marks)
c) What would the insulation used in flask C comparable to in birds and in mammals? (02marks)
d) Name the structures in the human body that detects
(i) External temperature changes. (01mark)
(ii) Internal temperature changes. (01mark)

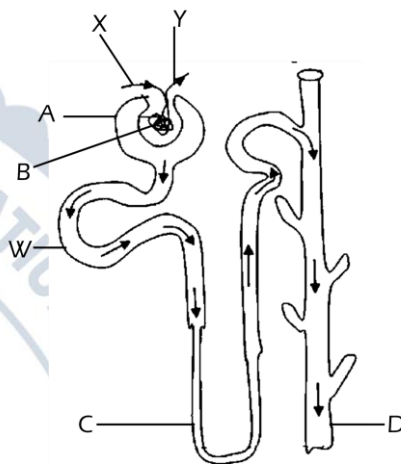
38. The figure below shows the changes in the concentration of plasma hormones glucagon and insulin, and plasma glucose before and after a meal. Use the figure to answer questions that follow.



- a) Name the organ of the body that produces the two hormones in to plasma. (01mark)
b) Explain the changes in plasma concentration of the following after a meal
(i) Glucose (04marks)
(ii) Insulin hormone (05marks)
(iii) Glucagon hormone (05marks)
c) (i) Name the disease that results when the above mention organ fails to secrete enough insulin hormone in to blood. (01mark)
(ii) Mention the symptom of the above disease. (01mark)
(iii) Explain how the symptom come about in individuals. (03marks)

TOPIC 11: EXCRETION AND OSMOREGULATION

39. a) Differentiate between excretion and osmoregulation. (01mark)
b) Explain the significance of:
(i) Excretion. (03marks)
(ii) Osmoregulation (02marks)
c) (i) State the diversity of excretory organs in different groups of animals. (05marks)
(ii) Account for the absence of an elaborate excretory system in plants. (06marks)
40. The diagram below illustrates a nephron from mammalian kidney. Use it to answer questions that follow.
- a) (i) Name the parts labelled A, B, C and D. (02marks)
(ii) Describe fully what happens at A. (05marks)
(ii) State three substances that are completely reabsorbed in the part labelled W in a normal human being, and one substance reabsorbed at C. (02marks)
b) (i) Identify blood vessels X and Y. (01mark)
(ii) Name one substance whose concentration is much higher in blood vessel X as compared to blood vessel Y. (01mark)
(iii) Name the components of blood that do not enter the renal tubule in mammals. (01mark)
c) Explain how does the part labelled C of a camel differ from that of a hippo. (05marks)
d) How is part labelled B adapted to its function? (03marks)
41. a) List all the relevant structures responsible in osmoregulation in man. (02marks)
b) How are the above structures correlate to regulate constant water levels in blood of man. (08marks)
c) Explain the following phenomena in man:
(i) frequent urination on cold days. (03marks)
(ii) feeling thirst after an exercise. (04marks)
d) Explain what would happen if vasopressin is not released in to blood. (03marks)



TOPIC 12: LOCOMOTION AND SUPPORT IN ORGANISMS

42. a) Through the structure of fore limb of man, describe the pentadactyl limb plan. (03marks)
b) Giving an example in each case, describe the different types of skeletons in organisms. (06marks)
c) State any five functions of the skeleton in mammals (05marks)
43. a) What are the advantages of flight over other forms of locomotion? (05marks)
b) Compare the structures and the process involved during flight in insects and birds. (09marks)
c) How are birds adapted to flight? (06marks)
44. a) Describe fully how birds achieve active flight. (07marks)
b) State the ways through which birds achieve the following during locomotion:
(i) Safe landing (03marks)
(ii) Reduce weight. (04marks)
(iii) Reduce air resistance (03marks)
c) Explain the role of feathers birds during flight. (03marks)

TOPIC 13: COORDINATION AND IRRITABILITY IN PLANTS AND ANIMALS

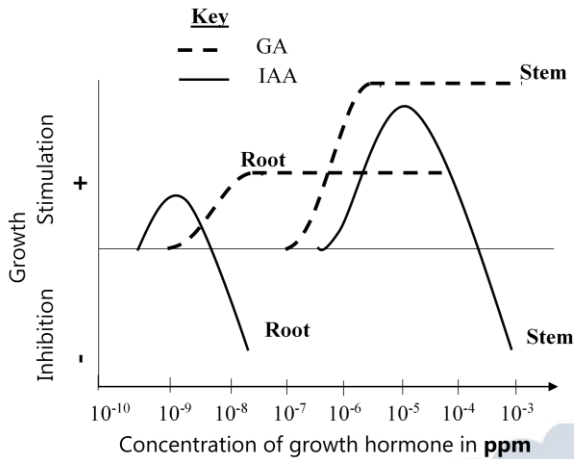
45. In an experiment to investigate the effect of light on the size of the pupil of a human eye, two individuals A and B were subjected to different amounts of illumination, and their pupil size recorded in the table below. However, individual B later closes the eyes, at the shaded region in the table, due to too much light. Use the information provided in the table below to answer questions that follow.

Luminance (arbitrary units)	Pupil size (mm)	
	Individual A	Individual B
10^{-6}	7.9	8.0
10^{-4}	7.5	7.4
10^{-2}	6.1	6.2
10^0	4.0	3.9
10^{+2}	2.5	2.5
10^{+4}	2.1	7.9
10^{+6}	2.0	7.9
10^{+8}	2.0	7.9

- a) Using the same axes, represent the above information on a graph paper. (08marks)
- b) Compare pupil size for the two individuals. (05marks)
- c) Explain the graph for the two individuals. (05marks)
- d) Account for the pupil size in diurnal and nocturnal organism. (02marks)

46. a) Discuss the role of neurons in the nervous system. (06marks)
- b) How are neurons adapted to perform their functions? (05marks)
- c) Define a reflex action (07marks)
- d) Describe the sequence of events that occur leading to the withdrawal of a hand from a hot objects
47. a) Explain how the secretions of pituitary gland suggest it as a “master gland”. (08marks)
- b) Indicate how improper functioning of the thyroid gland leads to the that following.
- (i) Gigantism (04marks)
- (ii) Cretinism (03marks)
- c) Discuss the role of the pancreas as:
- (i) An endocrine gland. (03marks)
- (ii) An exocrine gland (02marks)

48. Plant growth is regulated by plant growth hormones such as Auxins and gibberellins (GA). One of the most common synthetic Auxin is Indole Acetic Acid (IAA). In the investigation to determine the effect of these substances on embryo development, shoots and roots of a mustard family plant, *Arabidopsis thaliana* were injected with varying concentrations of these plant growth hormones separately and the results were recorded and later presented on the graph below. Use the graph to answer questions that follow.

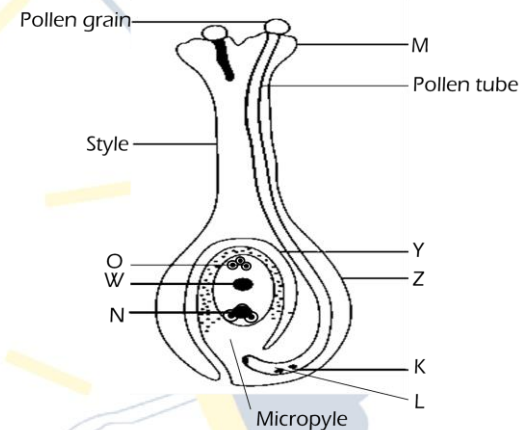


- Compare the effect GA and IAA on the stem and root. (09marks)
- Explain the effect of IAA on roots and stem. (04marks)
- From the graph, what conclusions can you draw on the effect of IAA and GA on roots and stem. (03marks)
- Explain how auxins function as weed killers. (02marks)
 - Besides the above role, mention other uses of plant hormones. (02marks)

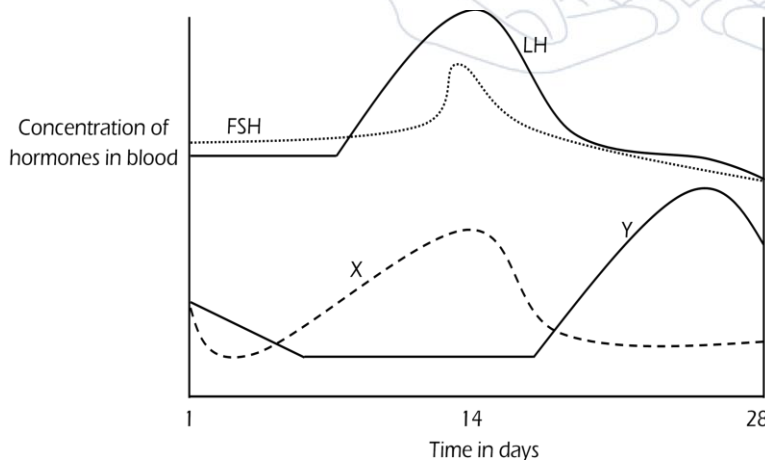
TOPIC 14: REPRODUCTION IN ORGANISMS

49. The figure below shows a cross section through the female part of a flower.

- Name the structures labelled W, N, and Y and state what they develop in to after fertilization. (06marks)
- Identify cells K and L and state their function during fertilization in plants. (04marks)
 - State the function of the pollen tube. (02marks)
 - What happens to antipodal cells after fertilization? (01mark)
- If the diploid number in cells of this plant is 36. What is the chromosome number in cells of the structure formed from W and N after fertilization? Explain your answer. (04marks)
- How is double fertilization important to flowering plants? (03marks)



50. The graph shows the concentration of sexual hormones in a female menstrual cycle. Use the graph to answer questions that follow.



- Name the hormones whose concentrations are represented by curve X and Y. (02marks)
- Explain the trend in the concentration of hormone X and Y during the menstrual cycle. (08marks)
- What is the role of a high concentration of follicle stimulating hormone. (01mark)
 - State why luteinizing hormone rises at the 14th day. (01mark)
 - State the fertile, safe and unsafe periods during the menstrual cycle. (03marks)
- Explain what would happen to the concentration of the following hormones if that woman conceives. (02marks)

**COMPREHENSIVE BIOLOGY TRANSFORMATION INITIATIVE NOVEL ORDINARY LEVEL SEMINAR HELD AT
BISHOP CIPRIANO – KIHANGIRE SENIOR SECONDARY SCHOOL – LUZIRA - BBIINA ON 24TH JUNE 2023**

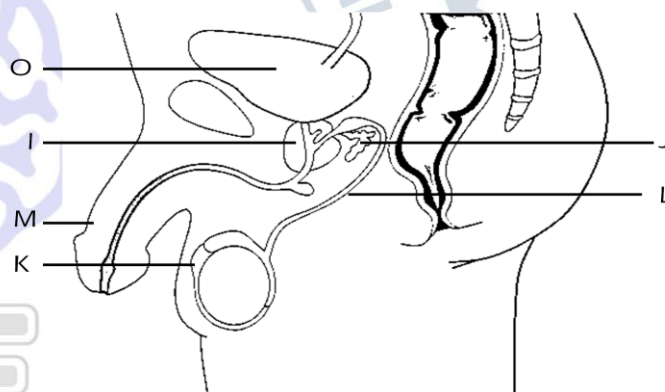
51. The hormone human chorionic gonadotrophin (HCG) is released from the embryo walls after fertilization. The effect of HCG is to prevent the degeneration of the corpus luteum. The table below shows changes in the concentration of HCG and progesterone in blood during the first 36 weeks of pregnancy.

Time in weeks	Concentration of HCG (arbitrary units)	Concentration of progesterone (arbitrary units)
0	0	7
2	3	7
4	15	8
8	60	9
12	45	10
16	24	11
20	12	13
24	10	15
28	10	20
32	14	30
36	12	55

- Plot a graph on the graph paper graph of concentration of HCG and progesterone produced in to blood against time. (08marks)
- What is the concentration of HCG and progesterone in week 11? (02marks)
 - When are the two hormones equal in concentration? (02marks)
 - Account for the changes in HCG concentration during the first 20 weeks of pregnancy. (03marks)
- State two hormones that are secreted towards the end of regency and give their function. (04marks)
- What is the role of testosterone in a human male? (01mark)

52. The diagram below shows the male reproductive organs. Use it to answer questions that follow.

- Name the parts I, J, K, L, M and O. (03marks)
 - What is the function of each part labeled on the diagram? (02marks)
- What are the advantages of internal fertilization? (05marks)
- How are the following structures suited to their function?
 - K. (03marks)
 - M. (05marks)
- On the diagram below, label the structure that is mainly shared by both the urinary system and reproductive system in mammals. (02marks)



TOPIC 15: CELL DIVISION, GENETICS AND VARIATION IN ORGANISMS

- Give relevant examples in each case, explain the difference between the following words:
 - Gene and alleles
 - Genotype and phenotype
 - Homozygous genotype and heterozygous genotype. (06marks)
 - Two women gave birth in the same hospital on the same afternoon. Their babies were taken away and then brought back to them one hour later. One of the women was worried that she had been given the wrong baby. She asked for blood tests to be carried out. The hospital found that she was group A and her husband was group O. The other mother was group AB and her husband was group A. the woman with blood group A had been given the baby with blood group O. The woman with group AB was given the baby with blood group B. use genetic diagrams to determine whether the women had been given the right babies. (08marks)
 - Explain two factors that determine the blood groups in man. (06marks)
- Using examples, distinguish between each of these pairs of terms:
 - Genetic variation and environmental variation

**COMPREHENSIVE BIOLOGY TRANSFORMATION INITIATIVE NOVEL ORDINARY LEVEL SEMINAR HELD AT
BISHOP CIPRIANO – KIHANGIRE SENIOR SECONDARY SCHOOL – LUZIRA - BBIINA ON 24TH JUNE 2023**

(ii) Continuous variation and discontinuous variation

(04marks)

- b) There are variations in the way human ears are naturally joined to the head namely the free ear lobes and attached ear lobes. The results of a survey of the ear lobes of some students are shown in the table below.

- (i) Explain three conclusions about the variation of ear lobe attachment on the body from the above results. **(05marks)**
- (ii) Calculate the approximate ratio of free to attached ear lobes in this group. **(04marks)**
- (iii) Explain how this ratio might help in understanding the way in which the attachment of ear lobes is inherited. **(03marks)**
- (iv) Apart from ear lobe attachment in animals, mention four in each case, other characteristics that are inherited by a similar principle in animals and in plants. **(04marks)**

Age/years	Number of students with the free earlobe		Number of students with attached ear lobes	
	Male	Female	Male	Female
12	11	12	4	2
13	9	14	3	5
14	10	8	4	3
15	13	10	2	5

55. a) State examples of cells in plants and animals that are haploid and diploid. **(04marks)**

- b) Describe the location and structure of a chromosome during the following stages of cell division.

(i) Interphase

(02marks)

(ii) Prophase

(03marks)

- c) Compare the following stages in mitotic and meiotic I cell divisions.

(i) Prophase

(03marks)

(ii) Anaphase

(03marks)

- d) Explain the effect for occurrence of meiosis and mitosis in the following organisms.

(i) Plants

(03marks)

(ii) Animals

(02marks)

56. a) Giving examples, explain the following terms used in genetics.

(i) Sex linked characteristics

(ii) Codominance

(iii) Incomplete dominance.

(06marks)

- b) In Dalmatian dogs, the allele for black-spots is dominant to the allele for liver-spots. If a breeder has a black-spotted dog, how can he or she find out whether it is homozygous or heterozygous for this characteristic? Use genetic diagrams to explain your answer. **(08marks)**

- c)(i) A man who is red-green colour-blind marries a woman with normal vision. They have three sons and two daughters. One of the sons is red-green colour blind. All the other children have normal colour vision. Draw a genetic diagram to suggest an explanation for this. **(04marks)**

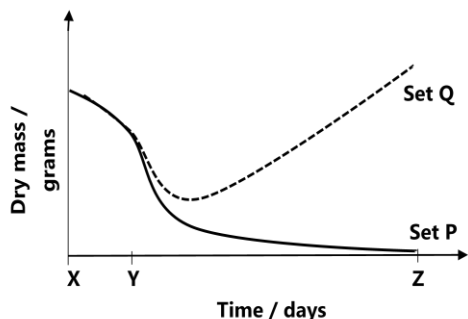
- (ii) What is the chance that the couple's next child will be a colour-blind boy? **(02marks)**

TOPIC 16: GROWTH AND DEVELOPMENT

57. On planting, some seeds fail to germinate. Explain why? State the significance of this process to plants and how can a farmer prevent it from taking place. **(20marks)**

58. a) Explain how growth differs from development? **(02marks)**

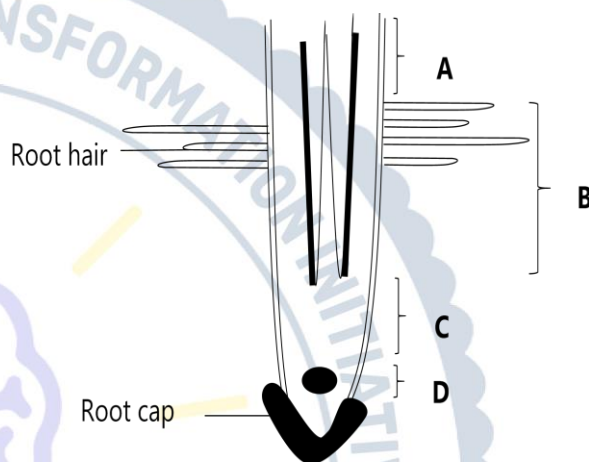
- b) Explain the procedures that are followed to determine the dry mass of an organism. State the usefulness of dry mass to measure growth of an organism other than its fresh mass. What are the setbacks of using dry mass over fresh mass? **(08marks)**



- c) Figure below shows changes in mass of sets of pea seeds as they germinate and grow in to seedlings, after germination set B was growth in the dark and set Q in the light.
- Why is mass measured as dry mass? (01mark)
 - Explain the changes in dry mass between days X and Y in both sets of seedling. (04marks)
 - Explain why there is a difference in the dry mass of set P and Q between day Y and Z. (05marks)

59. a) The figure below shows the longitudinal section through a dicot root. Read it carefully and use it to answer questions that follow.

- By naming the regions, describe the processes that occur in each region. (04marks)
 - Explain the difference in the process that occurs in region D and that occurring in the cambium of woody dicot stems. How are the cells in these two regions similar? (03marks)
- b) (i) With the aid of labelled diagram, describe the precise location of the hypocotyl and epicotyl in a seed. Mention the role of each structure during germination of the plant seeds. (05marks)
- (ii) Describe the structure of an embryo in a seed. Precisely state what happens to the embryo during germination. (04marks)
- (iii) Explain two processes through which water enters the seed during germination. State the fate of water during germination. (04marks)



TOPIC 17: ECOLOGY

60. a) Differentiate between a food web and food chain. (02marks)
- b) (i) Mention the principles involved when constructing a food web. (03marks)
- (ii) Construct food web using the list of the organisms below. (03marks)

Owl
snake

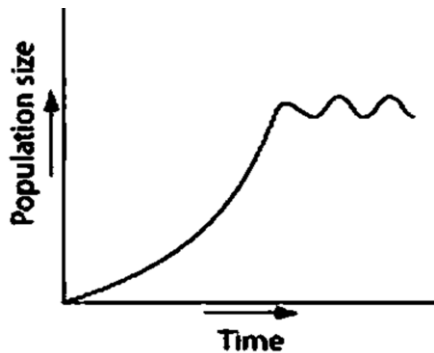
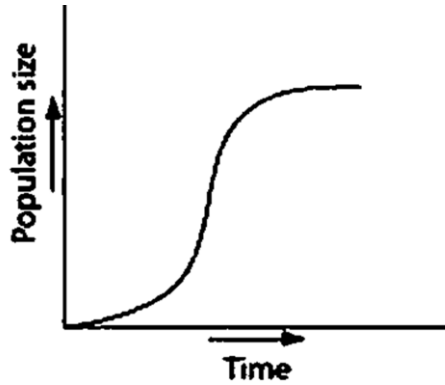
bird
grass

fox
Mouse

rabbit
frog

hawk
grasshopper

- (iii) What would happen if the hawks and grass were removed from the food web. (04marks)
- c) (i) Giving examples, describe the trophic levels that exist in an ecosystem. (05marks)
- (ii) State the role of decomposers in nature. (03marks)
61. a) (i) Giving examples in areas of occurrence, state how primary succession differs from secondary succession in community ecological studies. (04marks)
- (ii) state the sequence of plants that occurs during each type of succession in the community. (02marks)



b) The figure below shows two different graphs. Use the graphs to answer questions that follow.

(i) Explain the meaning of the word “carrying capacity” of an ecosystem. (02marks)

(ii) Using the above graphs, how can you determine the carrying capacity of each community (03marks)

(iii) Explain the fluctuations of organisms at the carrying capacity. (05marks)

c) Describe the significance of a climax community to other organisms. (04marks)

62. a) Define the following terms

(i) Population. (01mark)

(ii) Population density. (01mark)

b) Using examples of organisms studied, explain how the following methods in ecology are used to determine the population density of those organisms

i. Capture-mark-recapture method (05marks)

ii. Quadrat method (04marks)

c) (i) After random sampling, 200 penguins are captured, tagged and released. A month later, 100 untagged and 20 tagged penguins are captured. Use the Lincoln index to estimate the total penguin population. (02marks)

(ii) These results were obtained from a random study of a meadow, counting the number of dandelions. Random coordinates were generated ten times.

Quadrat number	1	2	3	4	5	6	7	8	9	10
Dandelion count	4	5	2	0	1	5	3	2	5	3

Work out a calculation that estimates the total number of dandelions in the meadow. (03marks)

d) Explain the precautions used in capture-mark-recapture method. (04marks)

63. a) Describe the different causes of water pollution

(i) (03marks)

a) Describe the ways how the effect of water pollution can be minimized. (04marks)

END

Thank you for loving CBTI

~~Journey mercies~~