

## End Topic Questions – Soil

### SECTION A – Multiple Choice Questions

- Humus is provided from dead plants and animals by the action of
  - Bacteria and fungi
  - Water and acid
  - Saprophytes and herbivores
  - Rotting and decaying
- Ammonia compounds are changed to nitrates by
  - Nitrobacter
  - Nitrosomonas
  - Azobacter
  - Lightening
- A  $500\text{ cm}^3$  beaker was filled firmly with soil.  $400\text{ cm}^3$  of water was poured into a large measuring cylinder. The final volume of soil and water was noted. If the soil contained 30% by volume of air, the final volume of soil and water was...
  - $900\text{ cm}^3$
  - $470\text{ cm}^3$
  - $370\text{ cm}^3$
  - $750\text{ cm}^3$
- Which of the following is the effect of disposal of plastic materials in the soil?
  - Improves soil drainage
  - Improves soil texture
  - Decreases soil drainage
  - Decreases soil organisms

*Use the information below to answer question 5 – 7. Three funnels P, Q and R were plugged with glass at their bases and were filled to the same level with sand, loam and clay soil respectively. Then  $500\text{ cm}^3$  of water was added to each of these funnels. The filtrates were as follows: P  $450\text{ cm}^3$ , Q  $300\text{ cm}^3$  and R  $400\text{ cm}^3$ .*

- What is the percentage of water retained in the loam soil?
  - 20%
  - 40%
  - 10%
  - 50%
- Which soil sample drains faster?
  - P
  - Q
  - R
  - P and R
- What is the percentage of water retained in P?
  - 20%
  - 40%
  - 10%
  - 50%
- Which of the following represents the diameter of silt particles?
  - $2 - 0.2\text{ mm}$
  - $0.2 - 0.02\text{ mm}$
  - $0.02 - 0.002\text{ mm}$
  - less than  $0.002\text{ mm}$
- The following results were obtained in an experiment to determine the amount of water in a soil sample:
  - Mass of crucible (evaporation basin) = 25g
  - Mass of crucible + soil = 50g
  - Mass of crucible + soil after heating = 45g
 The percentage of water in the soil sample was
  - 20%
  - 55%
  - 79%
  - 80%

10. The least effective environmental factor in soil formation is  
A. wind                      B. light                      C. water                      D. heat
11. A student heated strongly a dry sample of soil to a constant mass. The loss of mass in the soil is due to  
A. loss of mineral salts.                      C. escape of air.  
B. loss of water.                      D. destruction of humus
12. The least effective environmental factor in soil formation  
A. wind.                      B. water                      C. Light                      D. heat
13. A soil sample characterized by good aeration, high drainage, low capillarity and loose particles is  
A. clay.                      B. loam.                      C. sand.                      D. laterite.
14. Which one of the following farming practices does not promote soil fertility?  
A. Strip cropping                      B. Monoculture                      C. Crop rotation                      D. Mulching
15. The type of soil with minute air spaces and high water retention capacity is  
A. Sand                      B. Silt                      C. Clay                      D. Loam
16. In an experiment to determine the percentage of air in a soil sample, the following results were obtained.  
Volume of soil added to measuring cylinder =  $40 \text{ cm}^3$ .  
Volume of water added to measuring cylinder =  $40 \text{ cm}^3$ .  
Volume of soil and water after stirring =  $75 \text{ cm}^3$ .  
The percentage of air in the soil was?  
A. 6.7.                      B. 5.0.                      C. 12.5.                      D. 53.3.
17. What is the percentage of humus in soil if the following results were obtained in an experiment:
- Mass of empty crucible = 22g
  - Mass of soil + crucible before drying = 50g
  - Mass of soil + crucible after drying = 46g
  - Mass of soil + crucible after heating to red hot = 44g
- A. 2.00%                      B. 7.14%                      C. 4.00%                      D. 8.33%
18. Humus is produced from dead plants and animals by action of  
A. saprophytes                      C. Bacteria and fungi  
B. rotting and decaying                      D. saprophytes and herbivores
19. Lime may be added to a soil in order to:  
A. Counteract acidity                      C. Act as a general fertilizer  
B. Add mineral salts                      D. Add nitrogen
20. Which of the following is the best advantage of crop rotation?



- A. Bacteria and fungi  
B. Water and acids  
C. Saprophytes and herbivores  
D. Rotting and decaying
32. One would know that there is no more humus left in a soil sample when  
A. No more water vapour given off  
B. No more smoke given off  
C. No further change in weight  
D. All soil is burnt
33. Which of the following is a function of the nodule bacteria in legumes?  
A. Oxidation of ammonium compounds to nitrites  
B. Conversion of free nitrogen to nitrogen compounds  
C. Conversion of nitrates to nitrites  
D. Oxidation of ammonium compounds to nitrates
34. Nitrogen fixation refers to:  
A. Change of nitrates to nitrites  
B. Conversion of nitrites to nitrates  
C. Conversion of nitrogen to nitrates  
D. Utilization of salts containing nitrogen
35. Flocculation of soil means:  
A. Digging the soil deep  
B. Spreading manure over soil surface  
C. Adding lime to the soil to form large clay particles  
D. Adding to peat to soil to make the soil more acidic
36. A very sandy soil has each of the following features except:  
A. Good drainage  
B. Large particles  
C. More porous  
D. A lumpy texture
37. Which of the following is the least important function of humus in the soil?  
A. Improving aeration  
B. Water retention  
C. Prevention of soil erosion  
D. Increasing soil fertility
38. What do the *Rhizobium* bacteria gain in their association with leguminous plants?  
A. Air  
B. Heat  
C. Shelter  
D. Nitrates
39. Which type of soil has the following properties?  
(i) Heavy to cultivate      (ii) High water retention      (iii) High capillarity  
A. Sandy loam      B. Loam      C. Sand      D. Clay
40. Clay soil is usually water logged due to:  
A. Too much water  
B. Poor drainage  
C. Small pores  
D. Higher force of capillarity
41. Which of the following will not increase the amount of carbon dioxide in the atmosphere?  
A. Respiration      B. Photosynthesis      C. Combustion      D. Deforestation

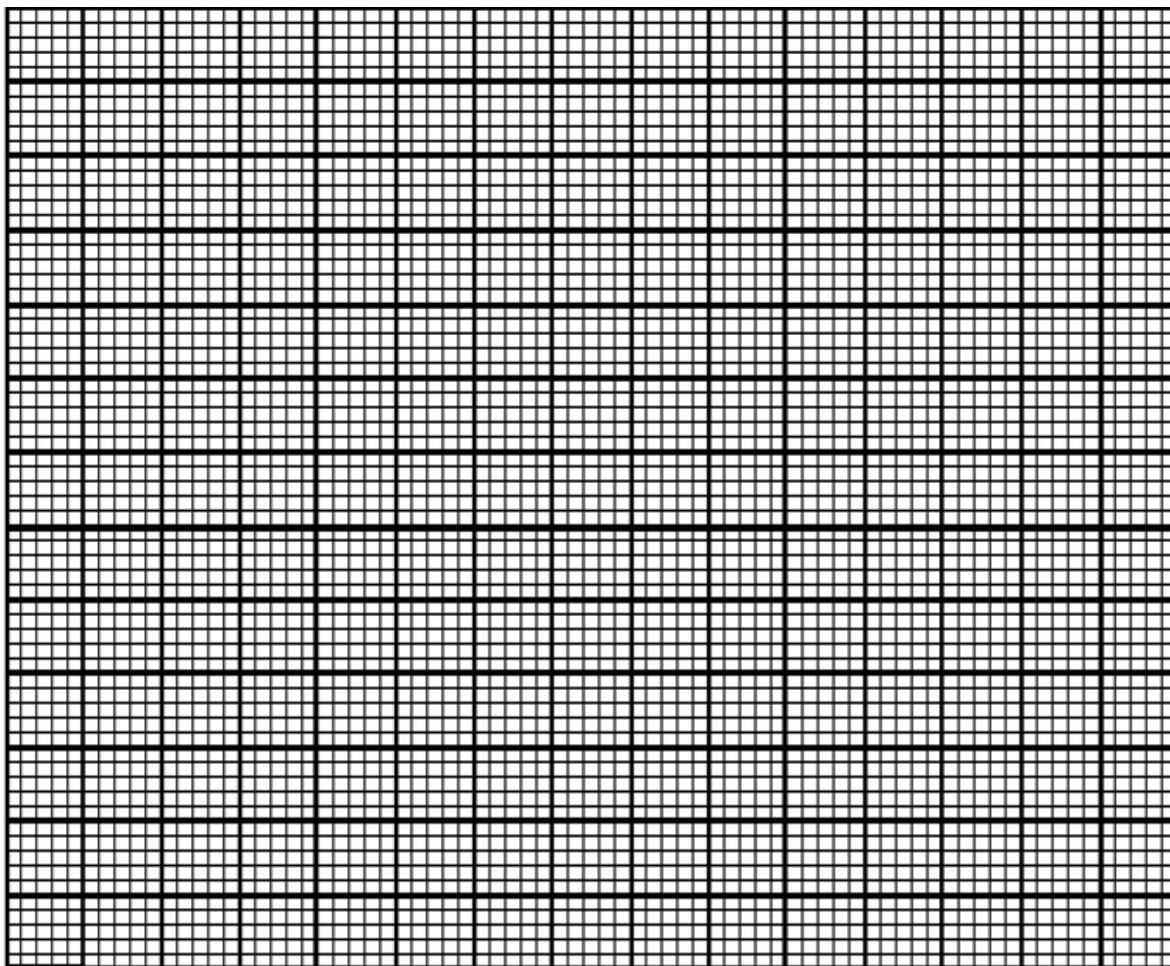
## SECTION B – Structured Questions

42. The table below shows the results of an experiment on soil.

Two glass tubes of equal diameter were filled with equal volumes of dry soil samples **A** and **B**, and one end of each tube was placed in water. The experiment was observed at intervals over a period eight hours.

Time in hours	Height reached by water in cm	
	Soil sample A	Soil sample B
0	0	0
0.5	15	5
1.0	25	15
2.0	28	32
4.0	30	41
6.0	30	46
8.0	30	48

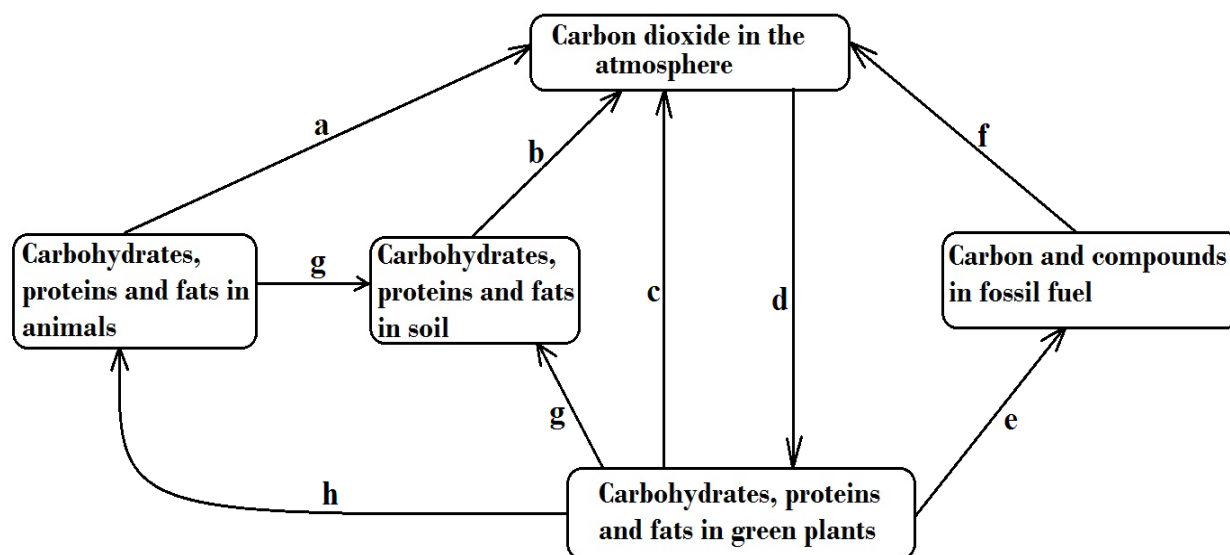
- (a) Plot a graph of height reached by water in the two soil samples against time on same axes. (07 marks)



- (b) What was the aim of the experiment? (01 mark)
- (c) From the graph explain the difference in height reached by water in the two soil samples between:
- (i). 0 and 2 hours (04 marks)
  - (ii). 2 and 8 hours (04 marks)
- (d) State with a reason, which soil has more plant nutrients? (02 marks)
- (e) Explain how the physical properties of soil sample **B** can be improved. (02 marks)
- (f) Name **two** other physical properties of soil sample **B**. (02 marks)

43. (a). What is **soil conservation**? (02 marks)
- (b). Outline **three** characteristics of a fertile soil (03 marks)
- (c). Describe **five** ways through which soil fertility can be conserved. (05 marks)

44. The figure below represents the carbon cycle.

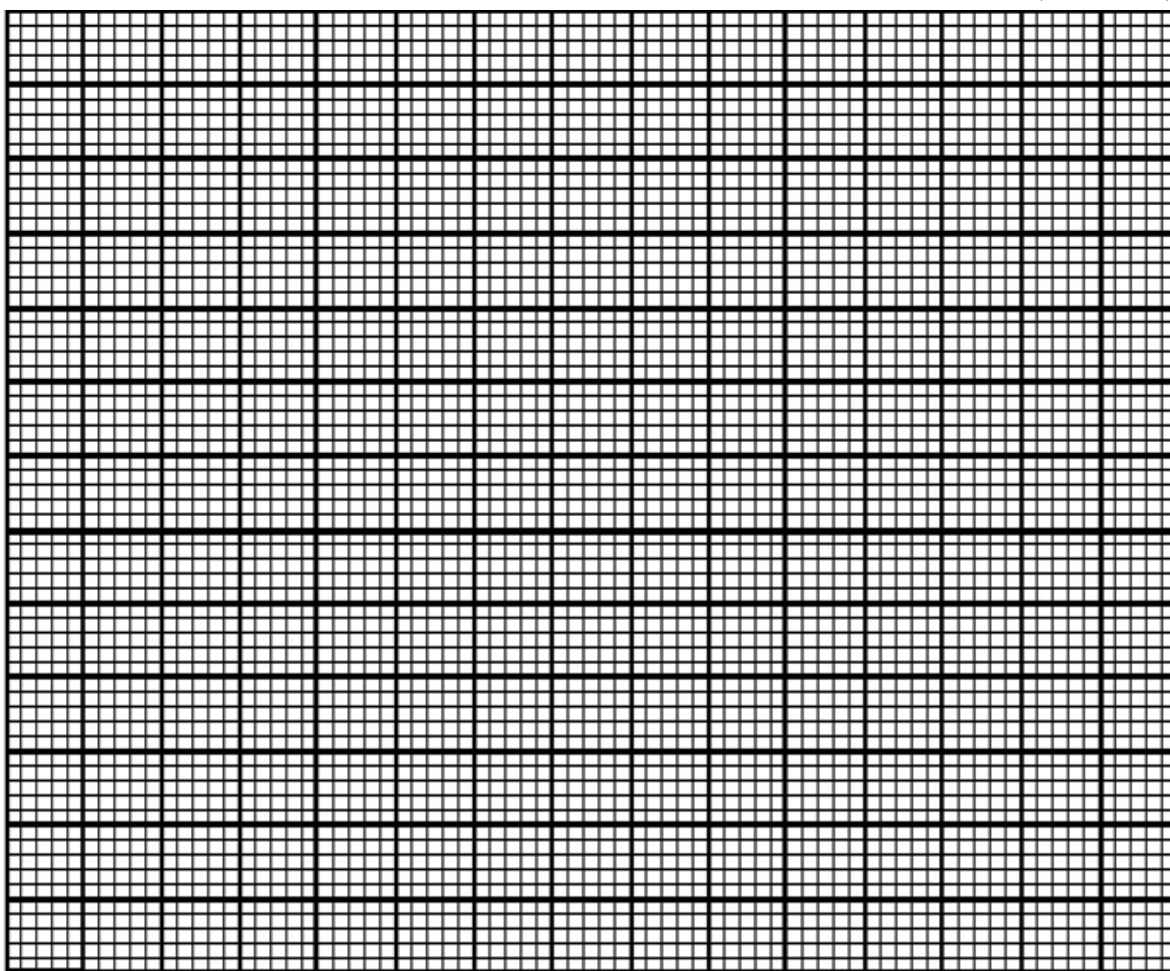


- (a). Name the processes labelled **a**, **c**, **f** and **g**. (02 marks)
  - (b). State **one** physical factor that promotes process **b**. (01 mark)
  - (c). Give **two** uses of process **d** to animals. (02 marks)
  - (d). Describe one way in which process **e** may be harmful. (02 marks)
  - (e).
    - (i). Suggest **one** human activity that tends to lower the level of carbon dioxide in the atmosphere. (01 mark)
    - (ii). Explain how the activity suggested in (e) (i) lowers the level of carbon dioxide in the atmosphere. (02 marks)
45. An experiment was carried out to determine the volume of water that was drained through each of soil sample **X** and **Y** at different time intervals. The results obtained are shown in the table below. Study the data carefully and answer the questions that follow.

Time in seconds	Volume of water drained through soil sample in cm <sup>3</sup>	
	X	Y
10	4	8
20	7	13
30	9	18
40	11	24
50	12	33
60	12	40
70	12	42
80	12	42

(a). Using the same axes, plot a suitable graph to represent the above data.

(09 marks)



(b). From the graph, state the differences in drainage in the two soil samples. (02)

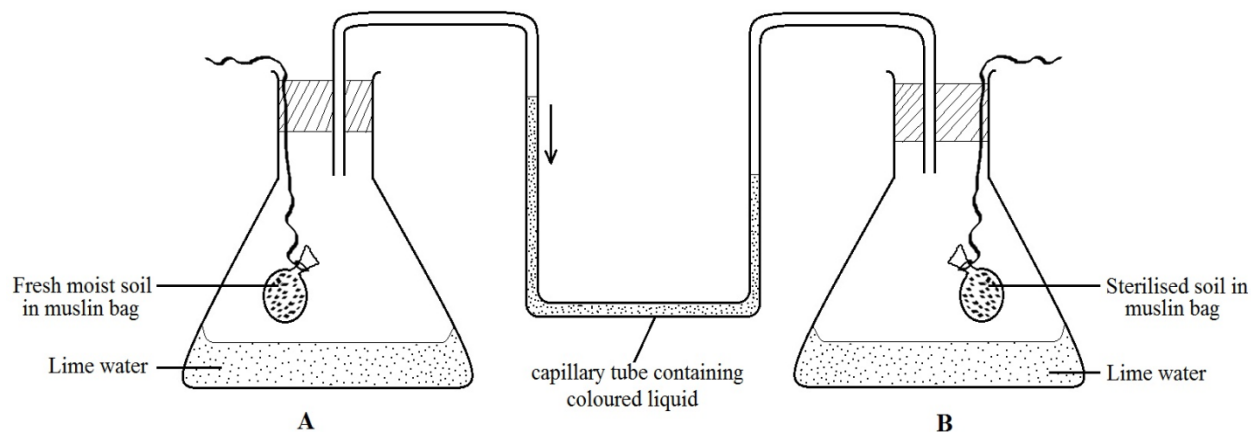
(c). Explain the differences in the rate drainage stated in (b) above. (0 2 marks)

(d). Calculate the rate of drainage at 40 seconds for each soil sample. (03 marks)

(c). (i). If 100cm<sup>3</sup> of water was added to each soil sample, calculate the amount of water retained by each soil sample X and Y. (02 marks)

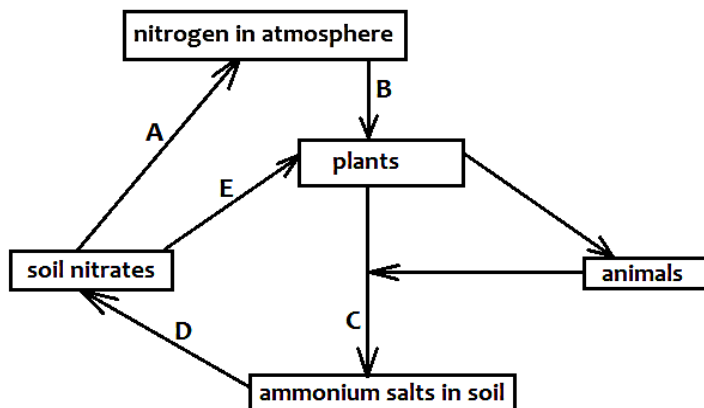
(ii). Explain the significance of your results in (c) (i) above to the farmer. (02)

46. The apparatus below was set up by a student. Study it carefully and answer the questions that follow.



- (a). What was the:
- aim of the experiment. (01 mark)
  - use of the lime water in the setup (01 mark)
- (b). State what would be observed in each flask if the experiment was left to continue for 24 hours. Explain your observations. (04 marks)
- (c). Explain why was:
- the soil in the flask B was sterilised (01 mark)
  - coloured liquid level in the capillary tube dropped. (02 marks)
- (d). State one role played by the soil component being investigated in this experiment? (01 marks)
47. (a). What is **soil fertility**? (01 mark)
- (b). Give **three** advantages and **two** disadvantages of mulching. (05 marks)
- (c). State **four** ways by which soil loses its fertility. (04 marks)

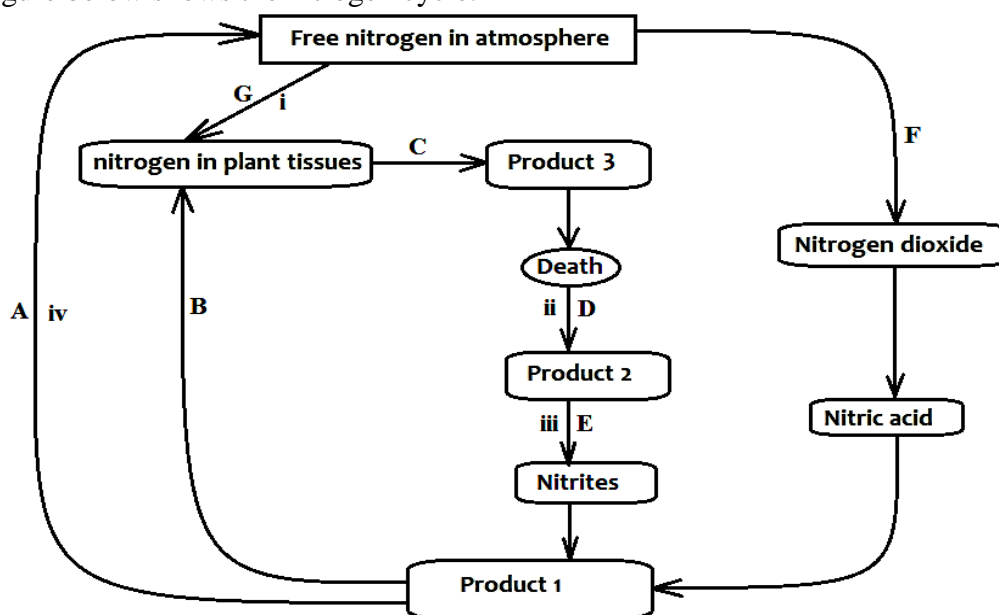
48. The figure below shows the nitrogen cycle.



- (a). Name the processes taking place at A, B, C, D and E. (05 marks)
- (b). (i). How is the process at B useful to plants? (02 marks)
- (ii). What organisms are responsible for the process at C. (01 mark)
- (c). State the importance of the process at A in the cycle. (02 marks)



49. The figure below shows the nitrogen cycle.



- Name the processes taking place at **A** to **G**. (03½ marks)
- Name the products **1**, **2** and **3**. (01½ marks)
- Give the general names of the bacteria represented by **i** to **iv**. (02 marks)
- List **4** different ways in which nitrogen may be lost from the soil. (02 marks)
- Explain why water logged soils are usually deficient in nitrates. (02 marks)

### SECTION C – Essay Questions

- Define the term **weathering** (01 mark)
  - State **three** types of weathering (03 marks)
  - Describe how the following leads to soil formation: (11 marks)
    - Oxygen
    - Water
    - Temperature
    - Plant roots
- Explain how the following in a soil type affect the soil's suitability for plant growth;
  - Small size of soil particles (08 marks)
  - Large size of soil particles (07 marks)
- Give the importance to the plants of each of the soil components that make up a fertile soil (06 marks)
  - Describe an experiment to show loam soil drains faster than clay soil. (07 marks)
  - State **three** difference between the properties of sand and clay, apart from the one mentioned in (b) above. (03 marks)
- Describe an experiment you would carryout determine the amount of water and amount of humus present in the garden soil. (08 marks)
  - Explain why **humus** and **water** are important to the growth of plants (03 marks)

- (c). The following shows hypothetical results from an experiment to determine the water and humus content of a garden soil:
- Weight of a crucible = 27g
  - Weight of a crucible + soil = 52g
  - Weight of a crucible + soil after drying to constant weight = 45g
  - Weight of a crucible + soil after heating to red-hot = 41g
- Calculate the percentage of:
- (i) Water in the soil. (02 marks)
  - (ii) Humus content in the soil. (02 marks)
- 54.** (a). Describe the activities which:
- (i) Add carbon dioxide to the atmosphere (04 marks)
  - (ii) Remove carbon dioxide from the atmosphere (06 marks)
- (b). How does human interference affect the balance of carbon dioxide in nature? (05 marks)
- 55.** (a). 290 gm of a fertile soil was taken from a garden and was placed in an oven at  $105^{\circ}\text{C}$  for 24 hours. The soil was cooled and weighed 218 gm after 24 hours.
- (i) What is the percentage loss in the weight of the soil? (02 marks)
  - (ii) What is the reason for loss in weight of the soil? (02 marks)
- (b). In what ways may man's activities:
- (i) Improve the quality of the soil? (05 marks)
  - (ii) Degrade the quality of soil? (06 marks)
- 56.** (a). What is soil erosion? (01 mark)
- (b). State various types of soil erosion (02 marks)
- (c). Explain how man's activities may lead to soil erosion. (06 marks)
- (d). What advice would you give to the farmers to reduce soil erosion (06 marks)
- 57.** (a). State two importance of each the following in soil: (08 marks)
- i. Air                      ii. Water                      iii. Humus                      iv. Organism
- (b). Describe an experiment you would carry out to compare drainage in two soil samples (07 marks)
- 58.** (a). Describe an experiment to compare capillarity of two soil samples. (07 marks)
- (b). To  $30\text{cm}^3$  of soil,  $50\text{cm}^3$  of water was added. The mixture was stirred and the final volume was  $69\text{cm}^3$ . Calculate the percentage of air in the soil. (2½ marks)
- (c). The following are the main components of the carbon cycle: carbon dioxide in the atmosphere, fungi/bacteria, plants and animals. Use these components to draw the carbon cycle and name the processes involved in the cycle. (03 marks)
- (d). The main components of nitrogen cycle are: nitrogen in the air, nitrogen in plants, nitrogen in animals, nitrogen in soil as nitrites and nitrates. Draw the nitrogen cycle using the above components and show the processes involved. (2½ marks)