



SS12301 Fundamentals of Soil Science (Compulsory)

Paper info.	Theory Total number of Questions: <u>6</u> Number of Pages: <u>8</u>	INSTRUCTIONS Answer Five (05) questions only in the given space. Strike off the question you did not answer. Only non-programmable calculators are permitted. Mobile phones are NOT permitted. Date: June 16, 2026
Duration	3 (three) Hours	
Index No.		

EXAMINERS' USE ONLY:

First Examiner's Marks						Second Examiner's Marks					
Q1		Q2		Q3		Q1		Q2		Q3	
Q4		Q5				Q4		Q5			

Q 1)

a)

i) What are the main differences between intrusive and extrusive igneous rocks? (10 marks)

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ii) State **two (02)** functions/ roles of soil in ecosystems. (10 marks)

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iii) Why soil is considered as a non-renewable natural resource? (10 marks)

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iv) State **two (02)** techniques that can be used in precise mineral identification. (10 marks)

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v) Name **two (02)** cleavage types and **two (02)** fracture types observed in minerals. (20 marks)

Cleavage:.....

Fracture:.....

b) Write short notes on the following topics.

i) Parent materials and their importance in soil formation.

(20 marks)

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ii) Rock and mineral weathering.

(20 marks)

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Q 2)

a)

i) What is meant by soil texture?

(10 marks)

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ii) State two methods that can be used to determine the soil texture in a laboratory.

(10 marks)

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iii) What is the Law used in calculations for determining the soil texture in the laboratory.

(05 marks)

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iv) The above stated law is based on various assumptions. State **five (05)** of those assumptions and the limitation for each assumption in the real laboratory environment.

(20 marks)

Assumption	Relevance Limitation

b)

i) Define specific surface area (SSA) of soils.

(10 marks)

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ii) Explain briefly the relationship of particle size to the SSA of soils. Use illustrations.

(15 marks)

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iii) Explain briefly the relation of shape of particles to the SSA of soils. Use illustrations.

(15 marks)

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iv) Explain briefly how the SSA relates with “soil texture” considering the relation of size and shape of particles explained in above parts ii) and iii)..

(15 marks)

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Q 3)

- a)** What are the **two (02)** main components in **soil solids**? (10 marks)

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- b)** List **three (03)** function of **humus** in soil. (15 marks)

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- c)** Differentiate **humic** substances from **non-humic** substances. (20 marks)

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- d)** Explain why soil is considered as an **ecosystem**. (25 marks)

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- e)** Explain the role of **fungi** in soil. (30 marks)

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Q 4)**a)****i)** Define "soil colloids"**(10 marks)**

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ii) Why do soil colloids have a large specific surface area ?**(15 marks)**

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iii) Fill the following table by comparing four general types of soil colloids.**(20 marks)**

Colloidal type	Crystalline/ non-crystalline		Composition (Atoms)	Surface Charge	Examples

b)**i)** Which clay minerals are mainly responsible for potassium fixation?**(10 marks)**

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ii) What type of charge is generated by isomorphous substitution? Explain your answer with a suitable example.**(15 marks)**

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iii) Briefly explain structural differences between kaolinite and vermiculite.

(15 marks)

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iv) "A soil can exhibit low active acidity while exhibiting high exchangeable acidity". Explain this phenomenon.

(15 marks)

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Q 5)

a) Name the **five (05)** soil forming/genesis factors.

(10 marks)

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b) Explain briefly how the dry zone soil differs from wet zone soil based on the **active factors** of soil formation.

(20 marks)

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c) **Define** a soil horizon giving its master horizons from surface (top) layers to bottom layers.

(15 marks)

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d) Name **five (05)** diagnostic surface horizons (epi-pedons). (05 marks)

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| 1..... | 2..... |
| 3..... | 4..... |
| 5..... | |

e) State **five (05)** soil orders **found** in Sri Lanka. (10 marks)

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|--------|--------|
| 1..... | 2..... |
| 3..... | 4..... |
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f) Briefly explain the soil order **Vertisols** indicating its distribution, characteristic properties, and the uses. (20 marks)

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g) Identify the soil orders of the USDA classification matching the description given in the table. (20 marks)

Soil description	USDA soil order
Soils located in arid climates	
Extremely weathered tropical soils with silicate clays	
Soils containing permafrost and frost churning	
Grassland Soils	
Soil found in areas associated with volcanic material	

Q 6)

a) Explain briefly the importance of having a soil classification? (10 marks)

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- b) According to the USDA soil classification system, name the **six (06)** hierarchical levels from the highest to the lowest. (10 marks)

1..... 2.....
3..... 4.....
5..... 6.....

- c) Identify the Great Soil Groups of Sri Lanka corresponding to the following soil orders of the USDA classification. (20 marks)

USDA soil order	Great Soil Groups in Sri Lanka
1. Alfisols	
2. Histosols	
3. Ultisols	
4. Entisols	
5. Vertisols	

- d) Name the **model soil** (Great Soil Group) in the wet zone of Sri Lanka. (05 marks)

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- e) Explain briefly the properties of the Great Soil Group you mentioned in **part "d"**. (25 marks)

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- f) How many Agro-ecological regions are available in Sri Lanka? (10 marks)

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- g) Describe how Agro-ecological regions are defined based on rainfall and elevation by giving examples. (20 marks)

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