UNIVERSITY OF ESWATINI

Final Examination Paper

Programme: Bachelor of Science in Agronomy, Year 2

Course Code:	**CPR 204/308**
Title of Paper:	**Pedology**
Time Allowed:	**2 hours**
Instructions:	**Answer** FOUR **questions. Question 1 is compulsory & any other three.**

Do Not Open This Question until Permission has been granted by the Invigilator

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Question 1:

i. Data in Tables 1 and 2 shows the morphology, physical and chemical properties of a soil classified as **OxicTropudalf** in Luyengo, campus. Which Order will you place this soil type in the USDA Soil Taxonomy? Give reason(s). (2 marks)

ii. What is the temperature regime of this soil type? (2 marks)

iii. Is the **soil** matured genetically or young? Give reasons for your answer. (5 marks)

iv. Calculate the sand contents (%), the base saturation (%) in Table 2. Provide your answer in a table (12 marks)

v. The soil is highly weathered; state how you would manage this soil type for cultivation of maize. (4 marks).

Table 1: Morphological properties of an OxicTropudalf, Luyengo, Campus

Horizon	Depth (cm)	Colour	Mottles	Texture	Structure	Consistency	Clay skin	Rock fragments
A1	0-12	7.5YR3/2	none	SL	Crumbs	Friable	none	none
A2	12-30	5YR5/4	none	GCL	Angular blocky	Medium friable	none	none
B1	30-45	5YR4/4	none	GCL	Angular blocky	Medium friable	Yes	none
B2t	45-75	5YR4/6	none	SCL	Angular blocky	Medium friable	Yes	none
B22t	75-105	5YR4/6	none	C	Angular blocky	Medium friable	Yes	none
B3t	105-153	5YR4/6	none	CL	Angular blocky	Medium friable	Yes	none

SL= sandy loam; GCL= Gravelly clay; SCL = sandy clay loam; C = clay

Table 2: Physical and chemical properties of an OxicTropudalf, Luyengo, Campus

		---------- % ----------					---------- cmol/kg ----------				
Horizon	Depth (cm)	Sand	Silt	Clay	Org. C	pHw	Ca^{2+}	Mg^{2+}	K^{+}	Na^{+}	CEC
A1	0-12		10	18	1.90	4.4	1.20	1.10	0.16	0.09	6.50
A2	12-30		10	28	1.20	4.1	0.70	1.10	0.10	0.07	7.30
B1	30-45		7	42	0.90	4.2	0.80	0.50	0.07	0.07	8.80
B2t	45-75		7	43	0.70	4.1	0.70	0.90	0.07	0.07	8.10
B22t	75-105		5	46	0.50	4.1	0.80	0.70	0.07	0.06	6.80
B3t	105-153		6	46	0.50	4.1	0.60	0.70	0.05	0.13	6.30

pHw= pH in water; CEC= cation exchange capacity; Org.C = organic carbon

[25 Marks]

Question 2:

a. What is soil?

b. Write short notes on the following:

(i) soil forming processes,

(ii) Dissolution

(iii) hydrolysis,

(iv) Oxidation-reduction processes in soils.

[25 Marks]

Question 3:

What is the difference between technical and natural soil classification?

Below are five soil orders of the USDA Soil Taxonomy. Briefly describe each of these soil orders in terms of their diagnostic properties that can be used to separate them at the highest category level:

(i) Alfisols

(ii) Oxisols

(iii) Inceptisols

(iv) Entisol

Question 4:

[25 Marks]

a. What are the basic properties that were used to define soil "sets" of Swaziland?

b. Listed below are some soil sets of Swaziland after Murdoch, (1968). Briefly describe the properties of these soil sets and identify at least three limitations that can make the soil not suitable for the cultivation of sugarcane.

(i) "S-set"soils

(ii) "B-set" soils

(iii) "Z-set" soils

(iv) "Q-set" soils

[25 Marks]

55

Question 5.

In a freshly excavated profile pit (1.5m). Describe:

(i) How you will describe the soil morphologically. Mention properties that you will use for this purpose.

(ii) How you collect soil samples for laboratory analysis

(iii) How you will prepare the soil samples for physical and chemical analysis in the laboratory.

[25 Marks]

---------- **END OF PAPER** ----------