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FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI,  
SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY.  
DEPARTMENT OF SOIL SCIENCE AND TECHNOLOGY.  
2018/ 2019 SESSION RAIN SEMESTER EXAMINATION:  
COURSE CODE: SST 504: Units :2

COURSE TITLE: SOIL AND PLANT ANALYSES  
INSTRUCTIONS: ANSWER ANY (4) QUESTIONS.  
TIME:2 HOURS. DATE: 24TH October 2019

- 1 (a) Give five (5) reasons why soils are studied (2<sup>1/2</sup> marks).  
(b) Outline five (5) characteristics of good sampling equipments (2<sup>1/2</sup> marks)  
(c) In profile studies, certain vital information about the site is needed. Outline the information (5 marks).  
State the important of soil profile studies (5 marks).
  - 2 (a) Using appropriate equations where necessary, describe the digestion and distillation stages of the Kjeldahl's method of nitrogen determination. 5 marks  
(b) What is the significance of the determination of Delta pH in the study of acidic soils S.East Nigeria.(3 marks)  
(c) Briefly explain theories and limitations of the determination of cation exchange capacity of soils by leaching method using neutral ammonium acetate, sodium chloride and 95 % ethanol solutions as reagents (7 marks).
  - 3 (a) What is a plant analysis (2 marks).  
(b) State the uses of the result of plant analyses in the field of agronomy (3 marks).  
(c) Describe wet digestion method or the dry ashing method of extraction of elements in plant samples (5 marks).  
(d) Using the wet digestion and dry ashing methods, what are the precautions to be taken and why are the necessary (5 marks)
  - 4 (a) A metal core sampler with height of 5 cm was forced into a clayey soil and was removed gently. Afterwards, soil was dried in an oven for 24 hours. The diameter of the core sampler is 5 cm and the oven dried weight of the soil is 81.1g. Calculate the bulk density of the soil (5 marks).  
(b) Outline and briefly explain how soil properties influence plant growth ( 10 marks)
  - 5 (a) Explain the principle of operation of U-V spectrophotometer (4 marks).  
(b) State  
i. Beer's law (ii) Lambert's law (iii)Beer Lambert's law (1 mark each= 3 marks).  
(b) Define spectrophotometry and explain its application in soil/ plant analyses (7 marks)
- flame photometric analysis.
- 6 (a) Explain the processes you can use in the laboratory to determine the amount of phosphorus (P) in dried plant sample (4 marks)  
(b) Mr Obeji, a final year student in Soil Science Department digested 0.0565g of maize plant using dry ashing method. Following good laboratory procedure, he made up the sample to 50 cm<sup>3</sup> in a volumetric flask and carried out a U-V spectrophotometric analyses for P. From the following data he obtained. calculate the % P in the maize sample 10 marks.

Concentration of standard P (ppm)	0.2	0.40	0.60	0.80	1.00	maize sample
Absorbance	0.019	0.041	0.059	0.080	0.101	0.074 x 10df