

FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI
SCHOOL OF ENGINEERING & ENGINEERING TECHNOLOGY
2019/2020 HARMATTAN SEMESTER EXAMS
EST 411: FOOD INSTRUMENTAL ANALYSIS

TIME: 3HRS

INSTRUCTIONS: Answer five questions with at least (1) questions from each section

SECTION A

Question 1

- a) Write extensively on mass spectrometry with emphasis on the basic components and uses in food analysis (15mks).
b) Outline the uses of flame photometer in food analysis (5mks)

Question 2

- a) Write briefly on Nuclear magnetic resonance and outline the areas employed in food analysis (10mks)
b) Describe the principle of Florescence spectroscopy and state the area employed in food analysis. (10mks)

Question 3

- a) Outline the various areas where Isotope -rotio mass spectrometry (IR-MS) has been employed in food analysis. (6mks)
b) Classify the IR- region of the electromagnetic spectrum and specify their wavelengths. (6mks)
c) Distinguish between stretching and bending as properties exhibited by molecules on absorption of radiation. (4mks)
d) State the specific uses of the following spectrophotometric methods in food analysis. (4mks)
i) MIR (mid infrared) ii) NIR (near infrared)

SECTION B

Question 4

- (a) Briefly explain three (3) problems associated with the analysis of every part of a food material rather than a fraction of the food. (6mks)
(b) List six problems that could be encountered as a food analyst in the preparation of samples for analysis. (6mks)
(c) What is the difference between hydrometer and hygrometer? (4 mks)
(d) State four uses of hydrometer in food processing industries. (4 mks)

Question 5

- (a) Briefly explain five uses of refractometer in wine making industries. (4 mks)
(b) What is the relationship between refractometers and refractive index (4 mks)
(c) Explain the prnciple of Refractometer in the context of liquid substances. (5mks)
(d) State how you can determine the concentration of a dissolved solute using a refractometer. (7 mks)

SECTION C

Question 6

- (a) Define Chromatography and state the basic components involved in chromatographic separation. (4mks)
(b) Differentiate between planar and column chromatographic techniques and give two examples of each (6mks).
(c) Explain the principle of paper chromatography (8mks)
(d) What do you understand by the retention factor (2mks).

Question 7

- (a) Highlight the critical refining properties of a chromatographic process (5mks)
(b) Mention the two major categories of chromatographic bed shape technique and give their examples. (5mks).
(c) What are the advantages of thin layer chromatography (TLC) over paper chromatography (6 marks)
(c) Why is flame ionization detector (FID) preferred to other detectors in gas chromatography (4 marks)