

FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI
 SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY
 DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY
 2019/2020 HARMATTAN SEMESTER EXAMINATION

FST 407: PRINCIPLES OF FOOD QUALITY MANAGEMENT & EXPERIMENTAL DESIGN
 INSTRUCTION: ANSWER FIVE (5) QUESTIONS, AT LEAST ONE (1) QUESTION
 FROM EACH SECTION. TIME ALLOWED: 3HOURS

SECTION A

QUESTION ONE

- a.) Define the term Food Quality Management. (2 marks)
 b. The data in Table 1 is the sensory scores of a cured meat product.

Table 1: Cured Meat Product

Curing method	Curing Ingredient Conc. (%m/v)	Curing Ingredients (CI)	
		CIA	CIB
CMA	0	3.0	3.0
	5	3.5	3.7
	10	4.2	4.3
CMB	0	3.0	3.0
	5	4.8	3.8
	10	3.5	4.0

- i.) Give an appropriate title for this experiment. (2 marks)
 ii.) State the null and alternative hypothesis (2 marks)
 iii.) Using the analysis of variance (ANOVA), establish whether there is significant difference among the samples. (5 marks)
 iv.) Separate the means and determine which factors are significantly different from the other (5 marks)
 v.) Summarize the means in a table using the necessary superscripts. (2 marks)
 vi.) Comment freely on the results in terms of the importance, meaning and implications of such outcomes from the standpoint of economics and technology. (2 marks)

QUESTION TWO

- a.) Briefly explain the importance of using statistical analysis in the interpretation of experimental data (2 marks)
 b.) The data in Table 2 is the result of an experiment designed to study the blue value index of yam flour processed from tubers steeped in different chemical solutions at different concentration.

Table 2: The blue value index (ppm) of yam flour as affected by steeping solution type (SST) and steeping solution concentration (SSC)

SSC (% m/v)	SST			
	SCB	SCL	SCT	SUC
0	70	70	68	67
5	67	68	67	65
10	65	67	65	64
30	63	64	63	62

- i.) State the type of design used in this experiment. (2 marks)
 ii.) State the null and alternative hypothesis (2 marks)
 iii.) Perform an ANOVA on the above table. (6 marks)
 iv.) Separate the means and determine which factors are significantly different from the other (5 marks)
 v.) Give your professional advice as a Food Quality Control Authority. (3 marks)

SECTION B

QUESTION THREE

- a) Define the following
- i.) Quality Control (QC) (4 marks)
 - ii.) Quality Assurance (QA) (8 marks)
- b.) List and briefly explain the three (3) main aspects of Quality Control (3 marks)
- c.) State three (3) salient differences between QC and QA (2 marks)
- d.) What do you understand by Inspection? (3 marks)
- e.) State three (3) reasons each for the producer and buyer/consumer why inspection is important. (3 marks)

QUESTION FOUR

- a.) What is a control chart? (2 marks)
- b.) Enumerate four (4) objectives of a quality control chart (4 marks)
- c.) Briefly explain with an example the two (2) types of process variation (6 marks)
- d.) Write short notes on any four (4) of the following terms (8 marks)
- i.) Type I error
 - ii.) Type II error
 - iii.) Out-of-Control process
 - iv.) In-Control Process
- v.) Process Predictability

QUESTION FIVE

- a.) Define Sampling. (2 marks)
- b.) State three (3) advantages and disadvantages of Sampling. (3 marks)
- c.) Differentiate between variable data and attribute data. (4 marks)
- d.) What are the significance of X-bar Charts, R-Charts and P-Charts? (3 marks)
- e.) The Table below shows the hourly determination of the pH of a beverage produced in a factory.

Table 3: Titratable acidity (TA) samples collected hourly

Sample	TA Level (%)		
	1	5.8	6.2
2	6.4	6.9	5.3
3	5.8	5.2	5.5
4	5.7	6.4	5.0
5	6.5	5.7	6.7
6	5.2	5.2	5.8
7	5.1	5.2	5.6
8	5.8	6.0	6.2

- i.) Make an X-bar chart and R chart from the Table above. (6 marks)
- ii.) Based on the control chart you drew, suggest whether or not the process is in control. (2 mark)