CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

THIRD YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN INDUSTRIAL CHEMISTRY

CHIN 371: RESEARCH METHODS

STREAMS:BSC Y3S2 **TIME: 2 HOURS**

DAY/DATE: THURSDAY 08/07/2021 **5.00 P.M – 7.00 P.M**

INSTRUCTIONS:

Answer question one and any other two questions

Use of calculators and statistical tables is allowed

Do not write anything on the question paper

QUESTION ONE (30 MARKS)

(a) Explain the following terms as used in sampling and experimental design:

(i) Sampling frame [1 mark]

(ii) Sampling error [1 mark]

(iii) Treatment [1 mark]

(iv) Factor [1 mark]

(v) Replication [1 mark]

(b) (i) Outline the four purposes of research. [4 marks]

(ii) With an aid of a diagram, describe the research process. [5 marks]

(iii) Describe the steps in hypothesis testing. [4 marks]

(c) (i) Describe quasi experimental design. [4 marks]

(ii) Describe correlational research design. [4 marks]

(d) Briefly explain the relationship between an independent variable and dependent variable with help of an example. [4 marks]

QUESTION TWO (20 MARKS)

(a) Explain any two probabilities and two non probabilistic sampling techniques. [8 marks]

(b) Explain the two principles that ensures ethical issues in research are addressed appropriately. [4 marks]

(c) Sampling of shipment of a liquid in drums for percentage purity was carried out and the following data obtained:

Drum	1	2	3	4	5	6	7	8	9	10
Sample 1	96.37	97.50	95.75	97.09	97.31	95.85	96.46	94.62	96.41	95.44
Sample 2	96.46	96.36	96.05	97.38	96.78	95.75	95.44	96.16	96.26	96.46

At a 5% of significance, determine if the two samples are significantly different. [8 marks]

QUESTION THREE (20 MARKS)

(a) Using the following data:

(i) Fit a regression model [8 marks]

(ii) Obtain a correlation coefficient [4 marks]

X	1	2	3	4	5	6	7
Y	5	8	11	15	20	25	29

(b) Discuss the main features of conceptual frameworks. [8 marks]

QUESTION FOUR (20 MARKS)

An experiment was set up in a 5 x 5 Latin Square Design (LSD) with the blocking being due to operators and type of materials (values in the parenthesis indicate the response value for given treatment):

	Materials				
Operators	A[24]	B[18]	C[18]	D[26]	E[22]
	B[20]	C[24]	D[38]	E[31]	A[30]
	C[19]	D[30]	E[26]	A[26]	B[20]
	D[24]	E[27]	A[27]	B[23]	C[29]
	E[24]	A[36]	B[21]	C[22]	D[31]

Carry out an analysis of variance and interpret the result. Use $\alpha = 0.05$
