(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS
YEAR TWO SEMESTER ONE MAIN EXAMINATIONS

FOR THE DEGREE OF
BACHELOR OF SCIENCE CHEMISTRY

COURSE CODE : STA 210

COURSE TITLE : PROBABILITY AND STATISTICS I

DATE: 21/06/2021 **TIME:** 2:00 P.M – 4:00 P.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (30 MARKS)

a) Explain the following terms (4 marks)

i) Statistics

ii) Probability

iii) kurtosis

iv) Regression analysis

b) Find the Pearson's correlation coefficient between x and y from the table of their values. (6 marks)

x	1	2	3	4	5
y	2	5	3	8	7

c) State the axioms of probability (3 marks)

d) Urn 1 has 2 white and 3 black balls, Urn II has 4 white and 1 black ball and Urn III has 3 white and 4 black balls. An urn is selected at random and a ball drawn at random is found to be white. Find the probability that urn 1 was selected. (3 marks)

e) The class performance in exam in a given term was recorded and the marks tabulated as below.

68	84	75	82	68	90	62	88	76	93
73	79	88	73	60	93	71	59	85	75
61	65	75	87	74	62	95	78	63	72
66	78	82	75	94	77	69	74	68	60
79	62	67	97	78	85	76	65	53	74

i) Construct a frequency distribution table of class size 5 i.e. 50-54, 55-59, … etc. (2 marks)

ii) Compute the arithmetic mean and standard deviation using assumed mean method. (6 marks)

iii) Compute the skewness and kurtosis hence comment on your answer. (6 marks)

QUESTION TWO (20 MARKS)

a) The table below shows the frequency distribution of masses of 100 male students in Kibabii University.

Mass in Kg	Number of students
60-62	5
63-65	18
66-68	42
69-71	27
72-74	8

i) Compute the arithmetic mean for the above distribution using the modal mid-point as the assumed mean. (4 marks)

ii) Calculate the standard deviation of the distribution and comment on your answer. (6 marks)

b) Find the regression lines of y on x given below (7 marks)

X	2.0	5.4	6.9	8.0	9.1
Y	28	50	59	67	74

Hence estimate the value of y when x = 7 (3 marks)

QUESTION THREE (20 MARKS)

a) An incomplete distribution is given below

Variable	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	10	20	?	40	?	25	15

You are given that the median value is 35

i) Find out the missing frequency, given that the total frequency= 170. (4 marks)

ii) Calculate the arithmetic mean and variance of the complete data set. (6 marks)

c) If A and B are any two sets, prove the De Morgan's laws

i) $(A \cup B)^C = A^C \cap B^C$ (2 marks)

ii) $(A \cap B)^C = A^C \cup B^C$ (2 marks)

d) A and B throw alternatively a pair of dice. A wins if he throws 6 before B throws 7 and B wins if he throws7 before A throws 6. Find their respective chances of winning, if A begins. (6 marks)

QUESTION FOUR (20 MARKS)

a) Explain the following terms as used in statistics (2 marks)

i) Discrete data

ii) Continuous data

b) What is the probability that a family of three children will contain; no girl, one girl, two girls, three girls and at least one boy. (6 marks)

c) The weekly rent f 200 tenanted houses are given below

Weekly rent	Number of houses
W kf (x)	(f)
7.5 and under 12.5	12
12.5 and under 17.5	26
17.5 and under 22.5	45
22.5 and under 27.5	60
27.5 and under 32.5	37
32.5 and under 37.5	13
37.5 and under 42.5	5
42.5 and under 47.5	2

i) Draw the histogram and frequency polygon of the above data. (2 marks)

ii) For the above rent, prepare a more than and less than cumulative frequency. (2 marks)

iii) Hence or otherwise calculate the mean, median and mode of the above. (5 marks)

iv) Calculate the standard deviation and a measure of skewness for the frequency distribution above. (3 marks)

QUESTION FIVE (20 MARKS)

a) Compute the spearman's rank correlation coefficient r for the following data. (6 marks)

Person	A	B	C	D	E	F	G	H	I	J
Rank in statistics	9	10	6	5	7	2	4	8	1	3
Rank in income	1	2	3	4	5	6	7	8	9	10

b) The following frequency distribution table shows how first year students performed in STA 210 CAT .

Marks	20-30	30-40	40-50	50-60	60-70	70-80	80-90
N. f students	3	16	32	53	15	10	1

Compute

i) Median (3 marks)

ii) Quartile deviation (3 marks)

iii) Harmonic mean (4 marks)

iv) Geometric mean (4 marks)