(45

(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER

MAIN EXAMINATION

FOR THE DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY

COURSE CODE: STA 114

COURSE TITLE: PROBABILITY AND STATISTICS 1

DATE: 17/05/2022 **TIME:** 9:00 AM - 11:00 AM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

This Paper Consists of 3 Printed Pages. Please Turn Over.

QUESTION ONE (30 MARKS)

a) Explain briefly:

i. The difference between population and sample and state why it is often desirable to take samples? (4marks)

ii. What you understand by a sampling frame? (2mark)

iii. When one would consider using (i.) cluster and (ii) Stratification when sampling from a population? (4marks)

b.) Students were asked how long it took them to travel to college on a particular morning. A cumulative frequency distribution was formed.

Time taken (minutes	Cumulative frequency
< 5	28
< 10	45
< 15	81
< 20	143
< 25	280
< 30	349
< 35	374
< 40	395
< 45	400

i. Draw a cumulative frequency curve and estimate median and interquartile range (5marks)

ii. Using the curve, estimate how many students took less than 18 minutes (1mark)

iii. Taking equal class interval of 0 -, 5 -, 10 -, ... construct a frequency distribution and draw a histogram (7marks)

c. Using Diagrams, write shorts notes on correlation (7 marks)

QUESTION TWO (20 MARKS)

a. Statistics is a numerical statement of facts in any department of inquiry placed in relation to each other. Explain (12marks)

b. The marks of 500 candidates in an examination are normally distributed with mean of 45 marks and standard deviation of 20 marks.

i. Given that the pass mark is 41, estimate the number of candidates who passed the examination (3marks)

ii. If 5% of the candidates obtained a distinction by scoring x marks or more, estimate the value of x (3marks)

iii. Estimate the interquartile range of the distribution (2marks)

QUESTION THREE (20 MARKS)

a. Thirty random observations are taken from each of the following distributions and samples mean calculated. Find, in each case the probability that the sample mean exceeds 5.

i. X is the number of telephone call made in an evening to ac counseling service, where X ~ Po (4.5) (4marks)

ii. X is the number of heads obtained when an unbiased coin is tossed nine times (3marks)

iii. X is distributed uniformly throughout the range $2 \leq X \leq 7$ (3marks)

b. Discuss the role of statistics as used in different fields. (10marks)

QUESTION FOUR (20 MARKS)

a.) Define regression analysis and state its assumptions (4marks)

b.) Outline the importance of a scatter plot (3marks)

c.) An old film is treated with a chemical in order to improve the contrast. Preliminary tests – on nine samples drawn from a segment of the film produced the produced results.

Sample	A	B	C	D	E	F	G	H	I
x	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
y	49	60	66	62	72	64	89	90	96

The quantity x is a measure of the amount of chemical applied and Y is the contrast index, which takes values between 0 no contrast and 100 (maximum contrast)

i. Plot a scatter plot diagram to illustrate the data (5marks)

ii. It is subsequently discovered that one of film was damaged and produced on incorrect result. State which sample you think this was (1mark)

iii. Ignoring the incorrect sample, calculate the product moment correlation coefficient

$\sum x^2 = 83.75, \sum y = 584, \sum x = 23.5, \sum y^2 = 44622, \sum xy = 1883, n = 8$ (3marks)

iv. The line of regression of y on x has equation $y = a + bx$. Calculate the values of a and b, each correct to 3 significant figures (4marks)

QUESTION FIVE (20 MARKS)

The height of X cm, of each man in a random sample of 200 men living in Mombasa was measured. The following results were obtained: $\sum X = 35{,}050$, $\sum x^2 = 6163109$

a) Calculate unbiased estimates of the mean and variance of the heights of men living in Mombasa (12marks)

b) Determine an appropriate 90% confidence interval for the mean height of men living in Mombasa and name the theorem that you have assumed (8marks)