KISII UNIVERSITY
MAIN CAMPUS
UNIVERSITY EXAMINATIONS
FIRST YEAR EXAMINATIONS FOR THE AWARD OF THE DEGREE OF BACHELOR OF EDUCATION, APPLIED COMPUTER SCIENCE, CHEMISTRY, ACTUARIAL SCIENCE, BIT, MATHEMATICS, PROJCT MGMT, INFORMATION TECHNOLOGY, APPLD STAT, ECON STATS,
SECOND SEMESTER 2019/2020
(MAY-AUGUST 2020)

MATH 141: INTRODUCTORY STATISTICS

STREAM: B Ed.,BSc. Y1S2 **TIME**: 2 HOURS
DAY: **DATE**:

INSTRUCTIONS:

1. ***Do not write anything on this question paper.***
2. ***Answer question ONE and any other TWO questions.***

Question One (Compulsory) (30 Marks)

(a) Define statistics and briefly explain its application in your area of study. (4 marks)

(b) Explain clearly what is meant by a questionnaire and describe the qualities of a good questionnaire. (5 marks)

(c) In a school, 10 absentees were reported in a span of 50 days. Assuming that the number of absentees follows a Poisson distribution, find the probability that there will be 3 or more absentees per day. (4 marks)

(d) The following data represent the market value in shillings for a random sample of 50 shares listed in a stock exchange during the first week of May 2010.

Stock value	0-4	5-9	10-14	15-19	20-24
No. of shares	5	20	13	10	2

(i) Find the mean and standard deviation for the data (6 marks)

(iii) Estimate the median and the modal mark. (4 marks)

(iv) Construct a histogram to represent these data. (3 marks)

(e) Box X contains 2 red balls and 1 blue ball. Box Y contains 3 blue balls and 1 red ball. A coin is tossed. If it falls heads up, box X is selected and a ball is drawn. If it falls tails up, box Y is selected and a ball is drawn. Construct a tree diagram to show this information. Hence find the probability of selecting a red ball. (4 marks)

Question Two (20 Marks)

(a) The table below shows the working days of a week and the respective probabilities that all the workers reported for duty. In this probability distribution, it is known that $E(X) = 3.1$.

X	1	2	3	4	5
$P(X = x)$	0.3	a	0.1	0.2	b

(i) Compute the values of a and b. (2 marks)

(ii) Determine Var(X). (4 marks)

(iii) Compute $P(X < 1)$. (3 marks)

(b) The drying times X, in hours, of a certain brand of writing ink has density

$$f(x) = \begin{cases} \frac{1}{5}x + k, & 0 \leq x \leq 3 \\ 0, & \text{elsewhere} \end{cases}$$

(i) Determine the value of k. (4 marks)

(ii) Calculate $p(1 \leq x \leq 2)$. (3 marks)

(iii) Find the expected value and the variance of the drying time. (4 marks)

Question Three (20 Marks)

(a) For a certain group of 200 taxpayers who get refunds, the average amount of refund are normally distributed with mean \$450 and a standard deviation of \$100.

(i) What percentage of taxpayers receive between \$400 and \$500? (4 marks)

(ii) Suppose someone received \$630. What percentage of taxpayers got better? (3 marks)

(iii) If the government will not refund below \$480, what percentage of the taxpayers would qualify for refund? (3 marks)

(b) The incidence of maternity leave in institutions is such that the workers have a 75% chance of taking it. Find the probability that out of 8 workers

(i) Exactly 2 will take it. (3 marks)

(ii) At least 2 will take it. (4 marks)

(ii) At most 6 will take it. (3 marks)

Question Four (20 Marks)

(a) Distinguish between correlation and regression analysis. (2 marks)

(b) The table below gives the aptitude test scores and productivity indices of 10 teachers selected at random.

Aptitude Scores	60	62	65	70	72	48	53	73	65	82
Productivity Index	68	60	62	80	85	40	52	62	60	81

(i) Obtain a scatter plot for the data and clearly explain the relationship evident from the scatter. (3 marks)

(ii) Compute the Pearson's correlation coefficient between aptitude Scores and productivity Index. Give a clear explanation of the meaning of this value. (9 marks)

(iii) Fit a least squares regression line on the data and estimate the productivity Index of a teacher whose aptitude Score is 92. (6 marks)