LAIKIPIA UNIVERSITY

UNIVERSITY EXAMINATIONS

1ST SEMESTER 2022/2023 ACADEMIC YEAR

FIRST YEAR EXAMINATION FOR THE DEGREES OF BACHELOR OF SCIENCE (STATISTICS)/BACHELOR OF SCIENCE (ECONOMICS & STATISTICS)/ BACHELOR OF SCIENCE (ICT)/BACHELOR OF SCIENCE (COMPUTER SCIENCE)/BACHELOR OF SCIENCE (GENERAL)

STAT 111: INTRODUCTIONTO PROBABILITY AND STATISTICS I

STREAM: R ***TIME: 2 HRS***

DAY: WED [8.30AM – 10.30AM] ***DATE: 14/12/2022***

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES
PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

INSTRUCTIONS:

i) Answer question one and any other two questions.

ii) All workings must be clearly shown.

iii) Don't write anything on the question paper.

QUESTION ONE (30 Marks)

(a) Distinguish between the census and sampling methods of collecting data and discuss the advantages of each. (4 marks)

(b) The following data are obtained on the interest rate for a sample of money-market funds.

13.4 14.8 14.7 15.1 14.2 12.8 13.5 12.1 14.3 14.8
15.4 14.5 13.9 16.0 13.8 14.9 15.7 14.1 13.3 14.6

Construct a stem-and-leaf diagram (4 marks)

(c) A group of 50 people was asked which of the three newspapers, A, B or C they read. The results showed that 25 read A, 16 read B, 14 read C, 5 read both A and B, 4 read both B and C, 6 read both C and A and 2 read all three;

i. Represent these data on a venn diagram (2 marks)

ii. At least one of the newspapers (2 marks)

iii. Only one of the newspapers (2 marks)

iv. Only A [1 marks]

(d) The scores obtained on a die are given below:

X	1	2	3	4	5	6
Freq	$2f+1$	$5f$	$3f+1$	f	$3f$	$2f$

If the mean is 6.0 find f (4 marks)

(e) The following are marks obtained by students in statistics examinations

24, 13, 28, 15, 25, 29, 15, 46,
9, 10, 17, 22, 23, 17, 16, 32,
11, 12, 18, 20, 13, 27, 18, 22,
20, 14, 26, 14, 19, 19, 40, 31, 37
17, 21, 23, 26, 18, 24, 21, 27,36

(i) Make a frequency distribution table starting with class interval of 5-9, 10-14, …., (4 marks)

(ii) Using the frequency distribution table in (i) above, calculate mean and the modal class. (4 marks)

(f) The average marks of three batches of students having 70, 50 and 30 students respectively are 50, 55 and 45. Find the average marks of all the150 students taken together. (3 marks)

QUESTION TWO (20 Marks)

(a) Define the following terms;

(i) Mutually exclusive

(ii) Independent events

(iii) Random experiment (3 marks)

(b) Two events A and B are independent and are such that $P(A)=x,\ P(B)=x+0.2,\ P(A\cap B)=0.15.$

(i) Find the value of x. For this value of x, find (2 marks)

(ii) $P(A\cup B)$ (2 marks)

(iii) $P(A^c \setminus B^c)$ (2 marks)

(c) The times (in sec) taken by a group of students to solve a puzzle are given below:

Floor area (M^2)	Cumulative frequency
3-7	15
8-12	28
13-17	55
18-22	84
23-27	94
28-32	107

Calculate the:

(i) The frequency of each class

(ii) Mean using coding method

(iii) Median

(iv) Standard deviation using short cut method

(v) Mode (11 marks)

QUESTION THREE (20 Marks)

(a) There was an interest in discovering whether some college students learned to use library more efficiently during the academic year. A library knowledge test was given at the beginning and the end of the semester with the scores denoted by x and y, respectively. The scores of 7 students were as follows:

X	15	19	22	13	24	18	13
Y	21	21	25	19	23	22	18

(i) Find the equation of the regression line for these data. (7 marks)

(ii)Sketch the least squares line and plot the seven points. Does the line appear to provide good fit to the data points? (4 marks)

(iii) Predict the end of semester test score of a student who received 21 on the test at the beginning of the semester. (4 marks)

(iv) Find the value of correlation coefficient r and interpret it. (5 marks)

QUESTION FOUR (20 Marks)

(a) State Bayes' theorem (3 marks)

(b) Two events A and B are such that $P(A \setminus B) = 0.4$, $P(B \setminus A) = 0.25$, $P(A \cap B) = 0.12$.

(i) Calculate the value of $P(B)$ (2 marks)

(ii) Give a reason why A and B are not independent. (2 marks)

(iii) Calculate the value of $P\left(A \cap B^{'}\right)$ (3 marks)

(c) The daily wages of 30 workers on a farm are shown in the following table:

Wages(*Ksh*)	30 – 34	35 – 39	40 – 44	45 – 49	50 – 54	55 – 59
Freq	1	6	10	8	2	3

(i) Draw a cumulative frequency curve (ogive). (10 marks)

(ii) Calculate the: Mean size

(iii) Quartiles

(iv) Median

QUESTION FIVE (20 Marks)

(a) Describe the following methods of sampling;

(i) Simple random sampling

(ii) Stratified sampling (4 marks)

(b) Three missiles are fired at the same target. Their respective probabilities of hitting the target are 0.6, 0.7, and 0.8. Find the probability that

(i) The target is hit

(ii) The target is hit exactly twice. (6 marks)

(c) The pulse rates of 30 company directors were measured before and after exercise.

Before: 110, 93, 81, 75, 73, 73, 48, 53, 69, 69, 66, 111, 105, 93, 90, 50, 57, 64, 90, 111, 91, 70, 70, 51, 79, 93, 105, 51, 66, 93.

After: 117, 81, 77, 108, 130, 69, 77, 84, 84, 86, 95, 125, 96, 104, 104, 137, 143, 70, 80, 131, 145, 106, 130, 109, 137, 75, 104, 75, 97, 80

Draw a stem plot for the data and draw conclusions. (5 marks)

(d) The following data represents the score of 50 students of a test;

35	50	30	40	42	30	60	65	60	55
50	40	45	35	38	30	30	50	45	50
50	60	48	38	92	59	35	55	45	50
43	56	45	40	61	72	49	24	10	95
82	70	69	8	47	64	43	36	58	90

Represent the above data in a grouped frequency distribution table and calculate the mean mark. (5 marks)