

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF

SOCI 302: INTRODUCTION TO SOCIAL STATISTICS

STREAMS: Y3S2

TIME: 2 HOURS

DAY/DATE: MONDAY 05/07/2021

8.30 A.M. – 10.30 A.M.

INSTRUCTIONS:

- **Answer question ONE and any other TWO questions.**
- **Use illustrations where appropriate.**

1. (a) Briefly describe the following concepts:
 - (i) Correlational statistics (2 marks)
 - (ii) Probability theory (2 marks)
- (b) Distinguish between:
 - (i) Descriptive statistics and inferential statistics (2 marks)
 - (ii) Discrete variables and continuous variables (2 marks)
- (c) In which scale can you measure the following:
 - (i) The religion of students in your class (1 mark)
 - (ii) Temperature measured on the Celsius scale (1 mark)
- (d) Explain in detail the purpose of a measure of central tendency. (4 marks)
- (e) Draw a negatively skewed distribution and indicate the approximate positions of the mean, the median and the mode on the curve. (4 marks)
- (f) In two factories A and B located in the same industrial area, the average weekly wages and the standard deviations are as follows:

Factory	Average	Standard Deviation	No. of workers
A	34.5	5	476
B	28.5	4.5	524

- (i) Which factory A or B pays out a larger amount as weekly wages? (2 marks)
- (ii) Which factory A or B has greater variability in individual wages? (2 marks)
- (g) Discuss four characteristics for a good or an ideal average. (4 marks)
- (h) Describe the properties of measurement. (4 marks)

2. (a) According to National Population Census of Kenya for 1999, the Kenyan population in terms of age and sex is recorded as follows:

Age	Male	Female	Total
0-4	1911216	1888827	3800043
5-9	1744366	1725292	3468938
10-14	1504044	1485648	2989692
15-19	1177989	1704712	2378696
20-24	989594	1013340	1902934
25-29	782474	847287	1629761
30-34	583173	575651	1159434
35-39	464956	457942	918892
40-44	367934	304244	233178
45-49	235906	293405	574533
50-54	179017	240657	476523
55-59	150496	180055	360172
60-64	113690	167901	318397
65-69	82966	116980	230670
70-74	66600	91212	174175
75+	82210	60476	176280

Draw the histograms to show:

- (a) Age-male distribution (4 marks)
- (b) Age-female distribution (4 marks)
- (b) A study was done to determine the stress levels that students have while taking criminology exams. The stress level was found to be normally distributed with a mean level of 8.2 and a standard deviation of 1.34. What is the probability that in the next criminology exam will have stress levels between 9 and 10? (4 marks)
- (c) If the accident rate at a certain factory is 7.0 and this is a Poisson process. Find the probability that fewer than 3 accidents occur in a year. (4 marks)
- (d) What is the probability that the sum of two dice is 4 given the first die is 2. (4 marks)

- 3.(a) Below is the distribution of persons according to different income groups. Calculate the arithmetic mean. (4 marks)

Income Kshs (100)	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Number of persons	6	8	10	12	7	4	3

- (b) Life of bulbs produced by two factories A and B are given below:

Length of life (in hours)	Factory A (Number of bulbs)	Factory B (Number of bulbs)
550-650	10	8
650-750	22	60
750-850	52	24
850-950	20	16
950-1050	16	12
	120	120

Bulbs from which factory have a more consistent length of life? (8 marks)

- (c) A company makes electric motors. The probability that an electric motor is defective is 0.01. What is the probability that a sample contains?
- (i) Exactly five defective motor. (2 marks)
 - (ii) At most 10-defective motor. (3 marks)
 - (iii) Six or more have burst tyres. (3 marks)
4. (a) The grouped frequency table shows the length of service in years of employees who have been working for a company for at least ten years.

Length of services (x)	10-15	15-20	20-25	25-30	30-40	40-50
Frequency (f)	30	42	23	13	8	4

Calculate:

- (i) Variance of the length of service of these employees. (10 marks)
 - (ii) Standard deviation of the length of service of these employees. (2 marks)
- (b) The following is a frequency table showing the age distribution of members of a surveillance team

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Age	Frequency
16-20	6
21-25	10
26-30	8
31-35	2
36-40	1
Total	27

- (i) Construct a frequency distribution table. (2 marks)
- (ii) Calculate the relative frequencies and percentages for all classes. (2 marks)
- (iii) Construct a histogram and frequency polygon. (4 marks)
5. (a) The following table gives the frequency distribution of 325 workers of a factory, according to their daily wages in a certain year.

Income group (in Kshs)	Number of workers
Below 100	1
100-150	20
150-200	42
200-250	55
250-300	62
300-350	45
350-400	30
400-450	25
450-500	15
500-550	18
550-600	10
600 and above	2
	325

Calculate median wage (5 marks)

- (b) The data below shows the number of traffic crimes recorded at police stations, A and B in one week.

No. of motor vehicles	Toll station A	Toll station B
50-59	15	43
60-69	25	99
70-79	40	54
80-89	108	40
90-99	92	14
100+	20	0

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- (i) By means of Ogives compare the distribution of motor vehicles as recorded at the two stations. (9 marks)
 - (ii) From the Ogives determine the frequency distribution below 60 and 90 traffic crimes for police stations, A and B, respectively. (4 marks)
 - (iii) From the Ogives determine the class limits below 45%. (2 marks)
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