CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATION
RESIT/SUPPLEMENTARY / SPECIAL EXAMINATIONS
EXAMINATION FOR THE AWARD OF BACHELOR OF ARTS IN ECONOMIC & SOCIOLOGY

SOCI 353: SOCIAL STATISTICS I

STREAMS: **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 03/11/2021   **11.30 A.M - 1.30 P.M.**

INSTRUCTIONS:
  i. *Answers question ONE and any other TWO questions*
  ii. *Use illustrations where appropriate*

1. a) Briefly describe the following concepts:

    i.   Statistical significance testing   (2 marks)

    ii. Probability theory   (2 marks)

b) Distinguish between:

    i.   statistics and statistic   (2 Marks)

    ii. Discrete variable and continuous variable   (2 marks)

c) In which scale can you measure the following:

    i.   The religion of students in your class   (2 marks)

    ii. Temperature measured on the Celsius scale   (2 marks)

d) Explain in detail the purpose of a measure of central tendency.   (4 marks)

e) Depict a negatively skewed distribution graphically and indicate the approximate

positions of the mean, the median and the mode on the curve   (2 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) Identify four characteristics of an ideal average   (4 marks)

h) Identify the properties of a binomial experiment   (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 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 at your neat exam you 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 that 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) Following is the distribution of persons according to different income groups. Calculate arithmetic mean. (4 marks)

Income Rs(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

The bulbs of which factory are more consistent from the point of view of length of life?

(8 marks)

c) A biased die is thrown thirty times and the number of sixes seen is eight. If the die is thrown a further twelve times, find:

  i.   The probability that a six will occur exactly twice (3 marks)

  ii.   The expected number of sixes (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. (8 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 netball team

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

i) Construct a frequency distribution table (3 marks)

ii) Calculate the relative frequencies and percentages for all classes (3 marks)

iii) construct a histogram and frequency polygon (4 marks)

5. a) A farmer grew carrots using special soil. She Harvested fifty of the them and measured their lengths (to the nearest mm) and the results are in the table below:

Length (mm)	Frequency
150 - 154	5
155 - 159	2
160 - 164	6
165 - 169	8
170 - 174	9
175 - 179	11
180 - 184	6
185 - 189	3

Find the   (i) Mean (4 marks)

           (ii) Mode (4 marks)

c) Recorded as shown in the table. The shortest waiting time was 1.5mins and the longest time was 9.5 mins.

Waiting time, t (minutes)	Frequency (f)
$0 < t \leq 1$	0
$1 < t \leq 2$	4
$2 < t \leq 3$	23
$3 < t \leq 4$	43
$4 < t \leq 5$	58
$5 < t \leq 6$	37
$7 < t \leq 8$	11
$8 < t \leq 9$	0
$9 < t \leq 10$	1

i.	Construct a cumulative frequency table	(3 marks)
ii.	Draw a cumulative frequency curve	(4 marks)
iii.	Give an estimate of the median waiting time	(3 marks)
iv.	Find the 60th percentile	(2 marks)

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