QUALIFICATION : BACHELOR OF MEDICAL LABORATORY SCIENCES; BACHELOR OF HUMAN NUTRITION; BACHELOR OF SCIENCE IN HEALTH INFORMATION SYSTEMS MANAGEMENT; BACHELOR OF ENVIRONMENTAL HEALTH SCIENCES	
QUALIFICATION CODE: 08BMLS; 08BOHN; 08BOHS; 07BSHM	**LEVEL:** 5
COURSE CODE: HSS511S	**COURSE NAME:** HEALTH SCIENCE STATISTICS
SESSION: JULY 2022	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SUPPLEMENTARY/SECOND OPPORTUNITY QUESTION PAPER	
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INSTRUCTIONS
1. Answer ALL the questions.
2. **Part I** of this question paper entails multiple choice questions. Write down the letter corresponding to the best option for each question.
3. For **Part II**, you are required to write only your final solution on the answer sheet.
4. For **Part III**, you are required to show clearly all the steps used in the calculations.
5. Write clearly and neatly.
6. Number the answers clearly.

PERMISSIBLE MATERIALS

Nonprogrammable scientific calculator

THIS QUESTION PAPER CONSISTS OF 5 PAGES (Including this front page)

PART I: Write down the letter corresponding to the best option for each question.

QUESTION 1 [12 marks]

1.1.   What is an event?   [2]

   A. The sample from a national survey
   B. The space between events A and B
   C. The subset of a sample space
   D. None of the above

1.2.   A parameter refers to   [2]

   A. Calculation made from the population
   B. A measurement that is made from the population
   C. A value observed in the experiment
   D. All of the above.

1.3.   What level of measurement would ethnicity be classified ?   [2]

   A. Nominal
   B. Ordinal
   C. Interval
   D. Ratio

1.4.   Which of the following methods are used in presenting quantitative data?   [2]
   A.   Bar charts, pie charts and Histogram
   B.   Bar charts, pie charts and frequency distribution tables
   C.   Bar charts, Mean, Median, and Mode
   D.   Mean, Median, Mode, Variance, Standard deviation, and Coefficient of Variation

1.5.   If P (A) = 0.10, P (B) = 0.40 and P (A and B) = 0.03, then A and B are: [2]
   A. Statistically dependent events
   B. Statistically independent events
   C. Non-mutually exclusive events
   D. Mutually exclusive events

1.6.   What is the median of the following scores: 7, 3, 0, 1, 6?   [2]

   A. 0   B. 3
   C. 4.5   D. 3.4

Part II [28 MARKS]: Short answer questions. You are required to write down only your final answer on your answer sheet.

QUESTION 2 [28 MARKS]

2.1. Classify each random variable as either discrete or continuous. **[3]**

    2.1.1. The number of assignments submitted by mail.

    2.1.2. The number of stones in a basket.

    2.1.3. The distance I walk to campus.

2.2. The sum of the weight of 10 new-born babies in a hospital A x_1, x_2, x_3, x_4,.., x_{10} is known to be 28kg. The sum of the weight of 10 new-born babies in a hospital B y_1, y_2, y_3, y_4,.., y_{10} is known to be 25kg. Answer the following questions based on this information.

    2.2.1. $\sum_{i=1}^{10}(x_i + 3) =$ _____ **[2]**

    2.2.2. $\sum_{i=1}^{10}(2x_i - 3) =$ _____ **[2]**

    2.2.3. $\bar{Y} =$ _____ **[2]**

    2.2.4. $\sum_{i=1}^{10}(x_i + y_i) =$ _____ **[2]**

2.3. Solve for x and provided your final answer on your answer sheet

    a) $3^{x-1} = 27$ **[3]**

    b) $81^{x^2} = 3^{3x+1}$ **[5]**

    c) $\frac{x+3}{2} + \frac{x-5}{4} = \frac{3}{8}$ **[3]**

    d) $\frac{4}{x+2} \leq \frac{2}{1+x} \leq \frac{6}{x}$ **[6]**

Part III [60 MARKS]: show clearly all the steps used in the calculations

QUESTION 3 [18 MARKS]

3.1.   The issue of health care coverage in Namibia is becoming critical issue in health politics. Assume a large-scale study was undertaken to determine who is and is not covered.

From this study, the following table of joint probabilities was produced.

Age category	Has health insurance	Does not have health insurance
25-34	0.167	0.085
35-44	0.209	0.061
45-54	0.225	0.049
55-64	0.177	0.027

If a person is selected at random, find the following probabilities

3.1.1. What is the probability the person is between 55 and 64 years old or does not have health insurance? **[2]**

3.1.2. If the person is below 55 years of age, what is the probability that he/she has health insurance **[4]**

3.2. Suppose that the four food inspectors at a food factory are supposed to stamp the expiration date on each package of food at the end of the production line. John, who stamps 20% of the packages, fails to stamp the expiration date once in every 200 packages; Tom, who stamps 60% of the packages, fails to stamp the expiration date once in every 100 packages; Jeff, who stamps 15% of the packages, fails to stamp the expiration date once in every 90 packages; and Pat, who stamps 5% of the packages, fails to stamp the expiration date once in every 200 packages.

3.2.1. If a customer picks at random a package of a package, what is the probability that it does not show the expiration date? **[4]**

3.2.2. If a customer complains that her package does not show the expiration date, what is the probability that it was inspected by John **[4]**

3.3. A diagnostic test for cancer is said to be 98% accurate if a person has the disease. Also, if a person does not have cancer, the test will report that he or she does not have it with probability 0.1. Only 0.1% has the disease in question. If a person is chosen at random from the population and diagnostic test indicates that he or she has cancer, what is the probability that he or she does, in fact, have cancer. **[4]**

QUESTION 4[20 Marks]

4.1. A large industrial firm purchase several new food-processors at the end of each year, the exact number depending on the frequency of repairs in the previous year. Suppose that the number of food-processors, X, that are purchased each year has the following probability distribution:

X	0	1	2	3
$p(x)$	0.1	0.3	0.4	0.2

If the cost on new food-processors at the end of this year is given by $12000 - 50X^2$, in Namibia Dollars,

4.1.1. how much can this firm expect to spend on new food-processors at the end of this year? **[4]**

4.1.2. find the variance of the number of food-processors that are purchased for this firm at the end of this year. **[6]**

4.1.3. find the coefficient of variation for the number of food-processors that are purchased for this firm at the end of this year. **[2]**

4.2.

The loaves of rye bread distributed to local stores by a certain bakery have an average length of 30 centimeters and a standard deviation of 2 centimeters. Assuming that the lengths are normally distributed,

4.2.1. what percentage of the loaves are longer than 31.7 centimeters? **[3]**

4.2.2. below what length of rye bread loaf will 15% of the loaves fall? **[5]**

QUESTION 5 [22 MARKS]
Katutura Hospital recently surveyed a sample of employees to determine how far they lived from the Hospital. The results are shown below.

Distance (in Km)	Number of employees
0 up to 5	4
5 up to 10	15
10 up to 15	27
15 up to 20	18
20 up to 25	6

5.1. Compute average distance from employee home to the hospital **[3]**
5.2. Compute the median daily distance. **[4]**
5.3. Compute the modal distance. **[4]**
5.4. Find the minimum distance associated with the 25% of employees living further away from the hospital. **[3]**
5.5. Compute the coefficient of variation of distances. **[8]**

===========End of question paper==========