00115

THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF HEALTH SCIENCES
DEPARTMENT OF BASIC SCIENCES
ACADEMIC YEAR 2024/2025 – SEMESTER 01
BACHELOR OF PHARMACY HONOURS
BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS
BSU4230 – BASIC STATISTICS – LEVEL 04
FINAL EXAMINATION
DURATION: 2 HOURS

DATE: 30th April 2025 TIME: 9.30 am – 11.30 am

INDEX NO: .....

IMPORTANT INSTRUCTIONS / INFORMATION TO CANDIDATES

- This question paper consists of **05 pages** with **04 Essay Questions**:
- **Essay Questions – (A total of 200 marks):** There are 04 essay questions. Write answers in the answer books provided.
- Answer **ALL** questions.
- Write your **Index Number** in the space provided.
- Do NOT bring in on person or have in possession unauthorized materials, including mobile phones and other electronic devices, or violate any other examination rules.
- Do NOT remove any page/part of this question paper from the examination hall.
- **Non-programmable calculators are allowed.**

INDEX NO: .....

Essay Questions

(50 * 4 = 200 Marks)

01.

a) A teacher is analyzing the test scores of 30 students in a mathematics exam. The scores were rounded to the nearest whole number for ease of analysis. The collected scores are:

42, 45, 47, 48, 50, 52, 53, 55, 56, 58, 60, 61, 62, 63, 65, 66, 67, 68, 70, 71, 72, 73, 75, 76, 78, 80, 82, 85, 87, 89

The following table categorizes the scores into intervals. There are missing values in the table.

Score Range	Frequency (f)	Mid-point (x)	$f * x$
40 - 49	L	Q	V
50 - 59	M	R	W
60 - 69	N	S	X
70 - 79	O	T	Y
80 - 89	P	U	Z

i. Determine the values for the letters L-Z given in the above table. **(15 marks)**

ii. Calculate the mean test score of this grouped data. **(7 marks)**

b) A public health study was conducted on 250 individuals to examine the factors influencing hypertension (high blood pressure) management. The study collected data on various patient characteristics and their association with blood pressure. The variables investigated were:

1. Systolic Blood Pressure (mmHg) – The pressure in the arteries when the heart beats.
2. Age Group (Below 30 years, 31 to 50 years, above 50 years)
3. Gender (Male, Female, Other)
4. Body Mass Index (BMI) (kg/m^2) – A measure of body fat based on height and weight.
5. Years Since Hypertension Diagnosis – The number of years the patient has had hypertension.

6. Smoking Status (Non-smoker, Occasional smoker, Regular smoker)
7. Daily Sodium Intake (mg) – The amount of salt consumed per day.
8. Exercise Frequency Per Week – The number of days per week the patient exercises.

i. Identify the scale of measurement (nominal, ordinal, interval, or ratio) for each of the eight study variables. **(16 marks)**

ii. Determine whether each variable is qualitative or quantitative and categorize all eight variables accordingly. Among the quantitative variables, further classify them as either discrete or continuous. **(12 marks)**

02.

a) A physical education teacher recorded the number of push-ups completed by 20 students during a fitness test. The recorded numbers are as follows:

22, 18, 25, 30, 27, 24, 29, 21, 26, 28, 23, 19, 31, 32, 20, 22, 30, 25, 27, 26

i. Calculate the Median, Mode, First Quartile (Q1), Third Quartile (Q3), and Interquartile Range (IQR) of the given data set. **(10 marks)**

ii. Create a box plot to graphically display the distribution of push-ups completed by students. **(10 marks)**

b) A researcher is interested in studying the blood pressure levels of a community and decides to sample individuals based on their age. They divide the population into different age groups (e.g., 20-30 years, 31-40 years) and randomly select individuals from each age group to form a sample.

i. Identify the sampling technique employed by the researcher. Justify your choice by explaining why this method would be suitable for the study. **(8 marks)**

ii. Explain the difference between simple random sampling (SRS) and systematic sampling, giving an example to illustrate the methods. **(12 marks)**

iii. Explain the importance of sampling in research and how it helps researchers draw conclusions about population. **(10 marks)**

03. Researchers are evaluating the effectiveness of a new cardiac rehabilitation program on patients recovering from heart surgery. The study follows 50 patients over a 12-month period to assess survival outcomes and calculate survival probabilities using life table analysis.

Interval since start of treatments (months)	No. of alive at the start of treatment	Deaths during interval	No. loss to follow-up	No. of persons at risk	Risk of dying during interval	Chance of surviving during interval	Cumulative chance of survival
1	50	3	1				
2	46	4	0				
3	42	5	2				
4	35	6	3				
5	26	7	1				
6	18	3	2				
7	13	4	0				
8	9	2	1				
9	6	1	0				
10	5	0	1				
11	4	1	0				
12	3	2	1				

i. Complete the above table. (Copy the above table into your answer sheet.) **(32 marks)**

ii. Draw the survival curve. **(10 marks)**

iii. Calculate the average length of survival. **(8 marks)**

04. A group of researchers is investigating the relationship between smoking habits and lung function among adults in a large urban area. They decided to conduct a survey and collected data from a sample of 500 adults, assessing their smoking status (smoker, non-smoker), age, gender, and lung function (measured by spirometry) at a single point in time.

i. Identify the research design being employed in this study and justify your choice by explaining how this design is most appropriate for this research problem. **(8 marks)**

ii. Briefly explain the main characteristics of 3 quantitative research methods. **(12 marks)**

iii. List the ten sequential steps of a research process, providing an explanation for each step. **(30 marks)**

----------END OF QUESTION PAPER----------