

The Open University of Sri Lanka
Faculty of Natural Sciences
B.Sc/ B. Ed Degree Programme



Department	: Mathematics
Level	: 3
Name of the Examination	: Final Examination
Course Title and - Code	: Basic Statistics - ADU3201/ADU3218
Academic Year	: 2020/21
Date	: 06/12/2021
Time	: 9.30 a.m – 11.30 a.m
Duration	: 2 hours

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of 6 questions in 5 pages.
3. Answer 4 questions only. All questions carry equal marks.
4. Answer for each question should commence from a new page.
6. Involvement in any activity that is considered as an exam offense will lead to punishment
7. Use **blue** or **black** ink to answer the questions.
8. Clearly state your index number in your answer script

Question 01

A group of students has carried out a study to identify the factors affecting the unemployment rate in a country. They have collected the information on the following variables.

V_1 : Number of unemployed persons

V_2 : Level of education (1: below G.C.E.(O/L); 2: G.C.E.(O/L); 3: G.C.E.(A/L) or above)

V_3 : Having at least one professional qualification (No ; Yes)

V_4 : family monthly income (in rupees)

V_5 : Gender (0 - Male ; 1- Female)

- (i) Classify the variables as qualitative or quantitative.
- (ii) Classify the quantitative variables as discrete or continuous.
- (iii) Classify the data as nominal, ordinal, interval or ratio.

A result of the data analysis of the “Labour Force Survey-2010 in Sri Lanka” is given below.

Level of education	Unemployment rate	
	Male	Female
Below G.C.E.(O/L)	2.0	4.2
G.C.E.(O/L)	5.6	9.6
G.C.E.(A/L) or above	8.0	16.7

(Note: Unemployment rate is the number of unemployed persons as a percentage of the Labour Force)

- (iv) Construct a suitable graph that can be used to examine how the unemployment rate varies with gender and level of qualification.
- (v) Clearly state all the findings from the graphical summary constructed in part (iv).

Question 2

Vehicles coming to a 4 way junction must go in one of three directions: left, right or straight on. Police officer conducted a survey of vehicles coming from the north. It showed that 40% turn left, 25% turn right and the rest go straight. Assume the drivers of the vehicles choose direction independently of each other.

- (i) Draw a tree diagram to show the possible outcomes for the next two vehicles coming from the north.
- (ii) Using the above diagram, find the probability that
 - a) Both vehicles turn left
 - b) One vehicle turns right and the other goes straight
 - c) Both vehicles go in different directions.
- (iii) One day, 2800 vehicles come to the junction from the north. How many of these would you expect to turn right?

Question 3

A shop sells three different brands of computers, say A , B and C . Past records indicate that 50% of its computer sales are brand A , 30 % are brand B and 20 % are brand C . Each manufacturer offers a one-year warranty on parts and labor. It is known that 25% of brand A require warranty repair work, whereas the corresponding percentages for brands B and C are 20 % and 10% respectively.

- (i) Find the probability that a randomly selected buyer has bought a brand A computer that will need repair while under warranty?
- (ii) Find the probability that a randomly selected buyer has a computer that will need repair under warranty?
- (iii) If a customer returns to the store with a computer that needs warranty repair, find the probability that it is a brand A computer?
- (iv) If a customer returns to the store with a computer that needs warranty repair, find the probability that it is a brand B or a brand C computer?

Question 4

- (i) Three coins are tossed and the total number of heads in each toss is observed. Let A be the event that at least one head appears, and B be the event that all coins turn up 'heads' or all turn up 'tails'.
- Write down the sample space S .
 - Write down the elements in each of the events A and B .
 - Find the $P(A)$, $P(B)$ and $P(A \cap B)$.
 - Are A and B mutually exclusive? Justify your answer.
- (ii) A manager of a company wishes to issue each employee an identity card with one English letter followed by two digits.
- How many different ID cards could be made?
 - What is the probability that a randomly selected identity card will have the same two numbers?
 - What is the probability that a randomly selected identity card will have first number greater than the second number?

Question 5

The accompanying table shows the frequencies for the number of hours spent watching TV per day for a sample of children at age 5 years computed from the data collected in a study to investigate the television viewing habits of children in Sri Lanka..

TV hours per day	Number of children
0 - 2	34
3 - 5	46
6 - 8	62
9 - 11	40
12 - 14	26

- (i) Find an estimate for the average number of hours spent to watch TV by a randomly chosen child.
- (ii) Find the median of the data.
- (iii) Based on the two measures computed in parts (i) and (ii), what can you say about the shape of the distribution of the data?
- (iv) Find the relative cumulative frequency corresponding to the third class interval and explain what it measures in relation to this study.
- (v) Estimate the percentage of children who watch TV more than 10 hours per day.

Question 6

According to the past records, the total number of drivers who are caught with no valid driving license at an inspection point on a given day, X , follows the probability mass function given below.

x	0	1	2	3	4	5
$P(X=x)$	0.12	0.18	m	0.25	0.20	0.05

- (i) Find the value of m .
- (ii) Compute the expected value of X and interpret it in relation to this study.
- (iii) Calculate the standard deviation of X .
- (iv) Find the probability that at least two drivers are caught at the inspection point with no valid driving license on a randomly chosen day.
- (v) Find the probability that X takes a value greater than 2 but less than or equal to 4.
