SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide In Act No. 29 of 1995)

Higher National Diploma in Information Technology

First Year, Second Semester Examination – 2017

HNDIT1214 / IT12142 – Statistics for IT

Instructions for Candidates:
Answer four (04) questions only.
Non programmable calculators are allowed.

No. of questions : 05
No. of pages : 04
Time : Two (02) hours

01.

(i). a) What is meant by statistics? **(2 Marks)**

b) What are the importance of statistics? State two (02). **(2 Marks)**

(ii). A student carried out a survey to find out people's opinions on attending sports events in his local area. He stood outside the local sports stadium and asked a random sample of people about their opinions on attending sports events as they entered the stadium.

a) Is the data that the student collects primary or secondary? Justify your answer. **(2 Marks)**

b) Give two reasons why this sample may be bias. **(2 Marks)**

c) Make two (02) suggestions to improve the accuracy of his survey. **(2 Marks)**

(iii). Highest recorded temperatures (°F) for 50 selected cities for various periods are as follows:

118	115	114	113	112	111	110	110	109	108
108	107	107	107	106	106	106	106	105	105
105	105	104	104	104	104	103	103	103	102
102	102	102	102	102	102	102	101	101	100
100	99	99	99	98	98	98	97	93	90

Using the above data,

a) Construct a frequency distribution starting from multiple of 10 and by selecting class width as 5. **(5 Marks)**

b) Represent the above data in a histogram. **(6 Marks)**

(iv). Express each of the following in sigma notation.

a) $2 + 5 + 8 + 11 + 14$ **(2 Marks)**

b) $(x_1 - \mu)^2 + (x_2 - \mu)^2 + (x_3 - \mu)^2 + (x_4 - \mu)^2$ **(2 Marks)**

(Total 25 Marks)

02.

(i). The following table represents the monthly household income (in Rs.1000) for 20 interview respondents. (Relative frequency = frequency / total number)

Income (x)	Relative frequency
$0 < x \leq 5$	0.15
$5 < x \leq 10$	0.05
$10 < x \leq 15$	0.40
$15 < x \leq 20$	0.30
$20 < x \leq 25$	0.10

a) Redraft the above data in the form of a grouped frequency distribution. **(4 Marks)**

b) For the data in part a) calculate the following:

a. Mean **(3 Marks)**

b. Mode **(3 Marks)**

c. Quartile deviation **(6 Marks)**

(ii). a) Find x and y so that the ordered data set has a mean of 42 and a median of 35.

$$17 , 22 , 26 , 29 , 34 , x , 42 , 67 , 70 , y$$ **(4 Marks)**

b) The mean and standard deviation of 20 items were calculated by a student as 40 and 10 respectively. But while calculating them an item 15 was misread as 50. Find the correct mean and standard deviation. **(5 Marks)**

(Total 25 Marks)

03.

(i). Define the following terms:

a) Permutations **(2 Marks)**

b) Combinations **(2 Marks)**

(ii). Show that ${}^{n}C_{r} - {}^{n}C_{n-r} = 0$ **(4 Marks)**

(iii). Using the digits 1, 2, 3 and 5, how many 4 digit numbers can be formed if

a) The first digit must be 1 and repetition of the digits is allowed? **(2 Marks)**

b) The first digit must be 1 and repetition of the digits is not allowed? **(2 Marks)**

c) The number must be divisible by 2 and repetition is not allowed? **(3 Marks)**

(iv). In a certain country, the car number plate is formed by 4 digits from the digits 1, 2, 3, 4, 5, 6, 7, 8 and 9 followed by 3 letters from the alphabet. How many number plates can be formed if neither the digits nor the letters are repeated? **(5 Marks)**

(v). To buy a computer system, a customer can choose one of 4 monitors, one of 2 keyboards, one of 4 computers and one of 3 printers. Determine the number of possible systems that a customer can choose from. **(5 Marks)**

(Total 25 Marks)

04.

(i). Define the following terms:

a) Experiment
b) Independent event
c) Mutually exclusive event **(6 Marks)**

(ii). A committee of 5 people is to be formed randomly from a group of 10 women and 6 men. Find the probability that the committee has

a) 3 women and 2 men. **(3 Marks)**
b) 5 women. **(3 Marks)**
c) at least 3 women. **(4 Marks)**

(iii). In a factory, three machines, J, K and L, are used to make biscuits.
Machine J makes 25% of the biscuits.
Machine K makes 45% of the biscuits.
The rest of the biscuits are made by machine L.
It is known that 2% of the biscuits made by machine J are broken. 3% of the biscuits made by machine K are broken and 5% of the biscuits made by machine L are broken.

a) Draw a tree diagram to illustrate all the possible outcomes and associated probabilities. **(2 Marks)**

A biscuit is selected at random.

b) Calculate the probability that the biscuit is being made by machine J and is not broken. **(2 Marks)**
c) Calculate the probability that the biscuit is broken. **(2 Marks)**
d) Given that the biscuit is broken, find the probability that it was not made by machine K. **(3 Marks)**

(Total 25 Marks)

05.

(i). State two (02) properties of a discrete probability distribution. **(2 Marks)**

(ii). A discrete random variable has the following probability distribution.

x	0	1	2	3	4	5
$P(x)$	0.1	0.1	0.2	0.2	0.3	0.1

a) Verify that $P(x)$ is a probability distribution. **(2 Marks)**

b) Find the following:

a. P ($2 \leq x \leq 4$) **(2 Marks)**

b. Expected value **(3 Marks)**

c. Variance **(4 Marks)**

(iii). The average number of accidents at a level-crossing in every year is 5. Calculate the probability that there are exactly 3 accidents there in this year. **(3Marks)**

(iv). The download time of a resource web page is normally distributed with a mean of 6.5 seconds and a standard deviation of 2.3 seconds.

a) What proportion of page downloads take less than 5 seconds? **(3 Marks)**

b) What is the probability that the download time will be between 4 and 10 seconds? **(3 Marks)**

c) How many seconds will it take for 35% of the download to be completed? **(3 Marks)**

(Total 25 Marks)