FINAL
ALTERNATIVE ASSESSMENT

(COVER PAGE)

Session	:	**April 2020**
Programme	:	Diploma in Information and Communication Technology (DICTN) Diploma in Information Technology (DITN)
Course	:	**STA1101: Quantitative Methods**
Date of Examination	:	August 6, 2020 (Thursday)
Time	:	4:00pm – 6.30:00pm Reading Time : Nil
Duration	:	2 Hours : 30 Minutes

Special Instructions :

Answer any **FOUR (4)** questions

Materials permitted :

Non-Programmable Calculator

Materials provided :

Nil

Examiner(s)	:	**S.M. Elizabethrani**, Miza Mumtaz and Angeline Tan
Chief Moderator	:	Foo Kai Pin

*This paper consists of **6** printed pages, including the cover page*

DIPLOMA IN COMMUNICATION AND INFORMATION TECHNOLOGY PROGRAMME (DICTN)
DIPLOMA IN INFORMATION TECHNOLOGY PROGRAMME (DITN)
STA 1101: QUANTITATIVE METHOD
FINAL ALTERNATIVE ASSESSMENT: APRIL 2020 SESSION

Instructions: This paper consists of **FOUR (4)** questions. Answer **ALL** questions.

Question 1

(a) Following are the data collected at a ski rental shop on the number of rentals on each of 30 consecutive Saturdays.

44	50	38	96	42	47	40	39	46	50
39	38	40	30	45	49	55	33	50	54
28	39	40	45	52	66	67	47	58	80

Select **10** data randomly from the above data set (mixture of the data from every **rows)** and compute the value of:

(i) mean, (2 marks)

(ii) median, (2 marks)

(iii) standard deviation (3 marks)

(iv) Pearson measure of skewness and comment on the distribution. (3 marks)

(b) A child psychologist is interested in the number of times a newborn baby's crying wakes its mother after midnight. For a random sample of 50 mothers, the following information was obtained. Let x be the number of times a newborn wakes its mother after midnight. For this example, x = 0, 1, 2, 3, 4, 5.

Number of times newborn wakes up after midnight, X	Probability, P(x)
0	0.04
1	0.22
2	0.46
3	0.18
4	0.08
5	0.02

Find the:

(i) mean number of times wakes up. (2 marks)

(ii) variance and standard deviation of the number of times wakes up. (5 marks)

(c) Define the term 'quantitative data'. (1 mark)

(d) A sample of shoppers at a Gurney Plaza was asked the following questions. Identify the type of data (either qualitative or quantitative) each question would produce.

(i) How did you learn about us? (1 mark)

(ii) How much is your annual salary? (1 mark)

(iii) Please rate our staff on the following terms (friendliness, knowledge, professionalism). (1 mark)

(e) A random sample of 100 rates of return on real estate investments were computed and recorded. Assuming that the standard deviation of all rates of return on real estate investments is 2.5% and sample mean is 12. Estimate the mean rate of return on all real estate investments with 95% confidence.

(4 marks)

(Total: 25 marks)

Question 2

(a) The probability that a student selected at random is a male is 0.48, and a student likes statistics is 0.35. The probability of a student selected at random is a female who likes statistics is 0.25.

(i) Construct a contingency table based on the information given above.

(3 marks)

(ii) Find the probability that a student selected at random is a:

(A) male and likes statistics (2 marks)
(B) female and dislikes statistics (2 marks)
(C) male given dislike statistics. (3 marks)

(b) A washing machine breaks down on an average of 3 times per year. Using the Poisson probability distribution formula, find the probability that during the next year this washing machine will have

(i) exactly 2 breakdowns; (2 marks)

(ii) at most one breakdown. (2 marks)

(c) A recent survey shows that 60% of the factory workers willing to work overtime without extra pay as long as they are guaranteed job security and bonus at the end of the year. Fifteen factory workers are randomly selected, find:

(i) The mean and standard deviation of the number of workers who are willing to work overtime without extra pay. (2 marks)

(ii) The probability that at least 13 workers are willing to work overtime without extra pay. (3 marks)

(iii) The probability that 10 workers are unwilling to work overtime without extra pay. (2 marks)

(d) Two dice are rolled, find the probability that the sum is

(i) equal to 4 (2 marks)

(ii) less than 13 (2 marks)

(Total: 25 marks)

Question 3

(a) Students in a primary school are being tested to see how good their fine motor skills are. The teachers need to order some new equipment so they need an idea of the dexterity of the students. Using a standard dexterity test which is normally distributed with a population mean 10, and standard deviation of 2.5 points , if a randomly selected individual takes the test:

(i) Find the probability that the person will make more than 15 points. (3 marks)

(ii) If a random sample of 3 students took the same dexterity test, find the probability that this sample has mean points that is greater than 15 points. (4 marks)

(b) A hospital administration wants to estimate the mean time spent by patients waiting for treatment at the emergency room. The waiting times (in minutes) recorded for a random sample of 35 such patients are given below:

95	31	78	4	44	105	25
12	67	36	46	66	85	18
103	115	28	130	63	10	5
73	40	40	48	36	64	70
36	35	31	54	94	22	81

Randomly select **15** data from the above data set.

(i) Find the mean and standard deviation of the mean time spent by patients waiting for treatment at the emergency room. (4 marks)

(ii) Calculate a symmetric 99% confidence interval for the population mean waiting time. (3 marks)

(iii) Test at 10% significance level if the sample data suggest the average waiting time is more than 48 minutes. (5 marks)

(b) The proportions of blood types O,A,B and AB in the general population of a particular countryare known to be in the ratio 49 : 38 : 9 : 4 respectively. A research team, investigating a small isolated community in the country obtained the following frequencies of blood type.

Blood type	O	A	B	AB
Frequency	87	59	20	4

Test the hypothesis at 5% level of significance that the proportions in this community do not differ significantly from those in the general population.

(6 marks)

(Total: 25 marks)

Question 4

(a) The team manager of Manchester United believes that the number of goals scored by his strikers per season is determined by the number of hours of training per week. He provided data on 5 of these strikers below. Based on the following information:

Player	Time spend in training(hours per week)	Goals per season
1	25	15
2	30	18
3	35	20
4	26	10
5	40	33

(i) Compute the coefficient of correlation and interpret your answer. (4 marks)

(ii) Determine the least square regression equation. (5 marks)

(b) The table below shows the details of the purchases by a small firm of Tasty nibbles Ltd for Christmas party, for the year 1990 and 2000.

	1990		2000	
Drink	price	quantity	price	quantity
Wine	2.50	25	3	30
Beer	4.50	10	6.00	8
soft drinks	0.60	10	0.84	15

Calculate:

(i) a base-weighted price index for 2000, using 1990 as the base year. (4 marks)

(ii) a current-weighted price index for 2000, using 1990 as the base year. (4 marks)

(c) A study was conducted to investigate the effectiveness of hypnotism in reducing pain. Results for randomly selected subjects are shown in the table. The "before" value is matched to an "after" value.

Subject:	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Before	6.6	6.5	9.0	10.3	11.3	8.1	6.3	11.6
After	6.8	2.4	7.4	8.5	8.1	6.1	3.4	2.0

Are the sensory measurements, on average, lower after hypnotism? Test at a 5% significance level.

(8 marks)

(Total: 25 marks)

The End ≈

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