INTI
International College Subang
LAUREATE INTERNATIONAL UNIVERSITIES

FINAL
Examination Paper

(COVER PAGE)

Session	:	**August 2014**
Programme	:	Diploma In Information And Communication Technology (DICTN/DICTI)
Course	:	**STA1101: QUANTITATIVE METHODS**
Date of Examination	:	December 10, 2014
Time	:	8:00am – 10:00am Reading Time: Nil
Duration	:	2 Hours
Special Instructions	:	

Answer any **FOUR (4)** structured-type questions.

Materials permitted : Non-programmable Calculator

Materials provided : Formula Booklet 2 and Graph paper

Examiner (s) : **Ms. S.M. Elizabethrani,** Fang Yen Yen.

Moderator : Dr. Ng Set Foong

This paper consists of 7 printed pages, including the cover page.

INTI INTERNATIONAL COLLEGE SUBANG

DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY (DICTN)
STA 1101 : QUANTITATIVE METHODS
FINAL EXAMINATION : AUGUST 2014 SESSION

This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Table below shows the frequency distribution on weight for 44 secondary school students. The weights are recorded to the nearest pounds.

Weight(in pounds)	Number of Students
135 – 139	6
140 – 144	4
145 – 149	11
150 – 154	15
155 – 159	8

(i) Construct a cumulative frequency curve (ogive) to represent the above data and estimate the value of median and first quartile. (7 marks)

(ii) Calculate the value of mean. (3 marks)

(iii) Calculate the value of sample variance. (4 marks)

(b) In a pizza takeout restaurant, the following probability distribution was obtained. The random variable x represents the number of toppings for a large pizza.

x	P(x)
0	0.3
1	0.4
2	0.2
3	0.06
4	0.04

(i) Find $P(X < 4)$. (2 marks)
(ii) What is the mean number of toppings for a large pizza? (2 marks)
(iii) What is the variance of the number of toppings for a large pizza? (5 marks)

(c) Classify the colors of automobiles on a used car lot as qualitative data or quantitative data. (2 marks)

Question 2

(a) The following table shows the lists of the smoking habits of a group of college students in one of the private school in Subang Jaya.

	Non-smoker(NS)	Regular Smoker(RS)	Heavy Smoker(HS)
Male(M)	135	46	5
Female(F)	187	21	11

If a student is chosen at random, find the probability of getting,

(i) someone who is a male and regular smoker? (2marks)
(ii) someone who is a regular or heavy smoker? (2 marks)
(iii) someone who is none smoker given that she is a female? (3 marks)
(iv) Are male student and regular smoker independent? (3 marks)

(b) According to government data, the probability that a woman between the ages of 25 and 29 was never married is 40%. In a random survey of 10 women in this age group,

(i) find the probability that at least 8 of them were married. (3 marks)

(ii) find the probability that exactly 5 of them were married. (2 marks)

(iii) Find the value of mean and standard deviation of the number of unmarried women. (4 marks)

(c) An SRS of 100 labourers who use the services of a national temporary employment agency found that in the past year the average number of days worked by these labourers was $\bar{x} = 107$ days, with standard deviation $s = 45$ days. Assume the distribution of the number of days worked in the population of labourers using this employment agency is approximately normal, with mean μ. Are these data show evidence that μ has lowered from the value of 120 days of 5 years ago? Use α=0.05.

(6 marks)

Question 3

(a) The weekly salaries of teachers in one state are normally distributed with a mean of RM490 and a standard deviation of RM45.

(i) What is the probability that a randomly selected teacher earns more than RM525 a week?

(3 marks)

(ii) What is the probability that a randomly selected teacher earns between RM400 and RM525 a week?

(3 marks)

(b) The amount of snowfall falling in a certain mountain range is normally distributed with a mean of 91 inches, and a standard deviation of 10 inches. What is the probability that the mean annual snowfall during 25 randomly picked years will exceed 93.8 inches?

(4 marks)

(c) The table below present counts (in thousands) from the Statistical Abstract of degrees earned in 1996 categorized by the level of the degree and the sex of the recipient.

	Bachelor	Master	Professional	Doctorate
Female	642	227	32	18
Male	522	179	45	27

Use the 0.01 significance level to determine whether there is a relationship between level of degree and sex of the recipient. (10 marks)

(d) For the small supermarket as a whole it is known that the standard deviation of the wages for part-time employees is RM1.50. A random sample of 10 employees of the small supermarket gave a mean wage of RM4.15 per hour. Assuming the same standard deviation, calculate the 95% confidence interval for the average hourly wage for employees of the small branch.

(5 marks)

Question 4

(a) The prices of fish, potatoes and milk and the consumption of these item for a group of customer, for 2005 and 2006 are as follows:

	2005		2006	
	price	quantity	Price	quantity
Fish (per kilo)	$6.50	25	$6.80	30
Potatoes (per kilo)	$2.00	240	$2.20	200
Milk (per litre)	$4.50	200	$4.80	180

(i) Calculate a base-weighted price index for 2006, using 2005 as the base year. (4 marks)

(ii) Calculate a current-weighted price index for 2006, using 2005 as the base year. (4 marks)

(b) The owner of Mercury-BM wants to study the relationship between the age of a car and its selling price. Listed below is a random sample of 10 used cars sold at the dealership last year.

Age (yrs)	Selling price (RM'000)
9	8.1
7	8.6
11	6.1
12	5.5
13	5.0
10	6.0

Let age be the independent variable and selling price be the dependent variable.

(i) Draw a scatter diagram of selling price against age. (4 marks)

(ii) Comment briefly on the relationship between the two variables based on the diagram you obtained in part (a). (2 marks)

(iii) Compute the coefficient of determination and interpret this value. (4 marks)

(iv) Determine the regression equation. (5 marks)

(v) For a used car of 8 years in age, estimate the selling price. (2 marks)

Question 5

(a) As part of a study of corporate employees, the director of Human Resources for BMZ, Inc. wants to compare the distance travelled to work by employees at their office in Town A with the distance for those in Town B. A sample of 40 employees in Town A showed they travel a mean of 380 miles per month with a standard deviation of 30 miles per month. A sample of 50 Town B employees showed they travel a mean of 390 miles per month, with a standard deviation of 26 miles per month. At the 0.05 significance level, is there a difference in the mean number of miles travelled per month between Town A and Town B employees? (7 marks)

(b) Five hundred and ninety people applied to the Bachelor's degrees in Elementary Education program at Florida State College. Of those applicants, 57 were men. Find the 90% confidence interval of the true proportion of men who applied to the program. (5 marks)

(c) A research was done to check whether the new library is fully utilized by students staying around the area. The following table shows the number of hours spent by students who visited the library.

Number of hours	Number of students
1	4
2	7
3	12
4	6
5	5
6	1

(i) Find the mean, median and mode. (5 marks)

(ii) Calculate the standard deviation and coefficient of variation. (5 marks)

(d) The probability distribution of the discrete random variable X is given by

$$P(X = x) = \begin{cases} \dfrac{3x+1}{22} & \text{for } x = 0,1,2,3 \\ 0 & \text{otherwise} \end{cases}$$

Find E(X). (3 marks)

Question 6

(a) An industrial engineer is evaluating a new technique to assemble air compressors. A sample of 8 employees is selected at random and the number of compressors they each produce in one week using the existing procedure is recorded. The same 8 workers are then trained to use the new technique, and the output for one week is then noted. The data are given as follows:

Employee	Output before new technique	Output after new method.
A	80	85
B	88	84
C	76	80
D	90	93
E	74	83
F	70	71
G	81	79
H	83	83

Test at the 0.05 level of significance that there is no difference on the mean output using existing method and new technique. (11 marks)

(b) Recent crime reports indicate that 4.1 motor vehicle thefts occur each minute in a city. Assume that the distribution of thefts per minute can be approximated by the Poisson probability distribution.

(i) Calculate the probability exactly five thefts occur in a minute. (2 marks)

(ii) What is the probability there is at least one theft in a minute? (3 marks)

(iii) What is the mean and standard deviation value? (2 marks)

(c) A six-sided die is rolled 30 times and the numbers 1 to 6 appear as shown in the following frequency distribution. At the 0.10 significance level, can we conclude that the die is fair?

Outcome	Frequency
1	4
2	6
3	2
4	4
5	7
6	7

(7 marks)

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