INTI
International College Subang
LAUREATE INTERNATIONAL UNIVERSITIES

FINAL
Examination Paper

(COVER PAGE)

Session	:	**January 2015**
Programme	:	Diploma In Business (DIB) Diploma In Finance (DIF) Diploma In Business Administration (DBADI)
Course	:	**STA1101: QUANTITATIVE METHODS** **STA2102: BUSINESS STATISTICS**
Date of Examination	:	March 13, 2015
Time	:	5:00pm – 7:00pm 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. Nor Aliza Binti Mokhtar,** Bark Chee Beng, Wong Chee Beng.

Moderator : Dr. Ch'ng Pei Eng

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

INTI INTERNATIONAL COLLEGE SUBANG

DIPLOMA IN BUSINESS PROGRAMME (DIB)
DIPLOMA IN BUSINESS ADMINISTRATION PROGRAMME (DBADI)
STA1101/2102: QUANTITATIVE METHODS/BUSINESS STATISTICS
FINAL EXAMINATION : JANUARY 2015 SESSION

Instructions: 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) The following table shows a frequency distribution of a sample of 65 customer satisfaction ratings for a consumer product.

Satisfaction Rating	Number of Customers
36 - 38	4
39 - 41	15
42 - 44	25
45 - 47	19
48 - 50	2

Construct a table with relevant columns for the following calculations (3 marks)

Calculate the

(i) mean, (2 marks)

(ii) standard deviation, and (3 marks)

(iii) mode (3 marks)

Draw a cumulative frequency curve (ogive) on a graph paper. (4 marks)

Estimate from the cumulative frequency curve,

(iv) the median (2 marks)

(v) the number of customers who rate between 40-46. (3 marks)

(b) If $P(A|B) = \frac{2}{5}$, $P(B) = \frac{1}{4}$, $P(A) = \frac{1}{3}$, find

(i) $P(B|A)$ (3 marks)

(ii) $P(A \cap B)$ (2 marks)

Question 2

(a) The number of matchsticks not used in a box branded "Tack" is represented by X. The probability distribution of X is as follow

x	0	1	2	3	4	5
$P(X = x)$	$5k$	$3k$	$6k$	$2k$	k	$3k$

(i) Determine the value of the constant k. (2 marks)

(ii) Find $P(X > 3)$ (3 marks)

(iii) Find the expectation and variance of X (5 marks)

(iv) If $Y = 3X - 4$, calculate the standard deviation of Y. (3 marks)

(b) A population consists of three types of Individual: X, Y and Z, in the ratio 3: 2:5. A sample of 5 individuals is chosen from the population. Determine the probability that less than two individuals of type Y have been chosen.

(3 marks)

(c) The number of telephone calls received by an operator from 8.00 a.m. to 8.05a.m. follows a Poisson distribution with an average of four. Find the probability that the operator will receive at most 1call in the same time interval at the following day.

(4 marks)

(d) The following table shows the social networking accounts owned by 280 employees in a company and their frequency of updating data:

Update	**Social Networking Account**	
	Facebook	**Twitter**
Hourly	30	10
Daily	120	30
Weekly	50	40

An employee is selected at random from the company.

(i) Find the probability that the employee owns a Twitter account. (1 mark)

(ii) Find the probability that the employee owns a Facebook account and update it daily. (1 mark)

(iii) If the employee has a Twitter account, what is the probability that it is updated daily? (3 marks)

Question 3

(a) A packing plant fills bags with cement. The weights of the bags of cement can be modelled by a normal distribution with mean 65kg and standard deviation 8 kg.

(i) What is the probability that a randomly selected bag will weigh less than 50 kg? (3 marks)

(ii) What is the probability that a randomly selected bag will weigh between 70 kg and 80kg? (4 marks)

(iii) Determine the weight, to two decimal places, such that 75% of the bags lie below it. (4 marks)

(b) An insurance company selected a sample of 100 auto claim filed with it and investigated those claims carefully. The company found that 15% of those claims were fraudulent.

(i) What is the point estimate of the percentage of all auto claims filed with this company that are fraudulent? (1 mark)

(ii) Construct a symmetrical 99% confidence interval for the percentage of all auto claims filed with this company that are fraudulent. (5 marks)

(c) In a butter-packing plant, the quantity of butter packed in a day using a certain type of machine is normally distributed with mean μ and variance 4. On a particular day, 12 packets of butter were taken at random from this population line and their masses, measured in grams, were:

9.5, 9.5, 11.2, 10.6, 9.9, 11.1, 10.9, 9.8, 10.1, 10.2, 10.9, 11.0

Find a 95% confidence interval for the mean mass produced by this machine. (8 marks)

Question 4

(a) A manufacturer claims that its lamps have a mean lifetime of 5,000 hours. A consumer suspects that the lamps do not last as long as its claimed. He tests a random sample of six lamps and finds that their lifetimes are 4,980, 4,978, 5,005, 4,790, 5,012, 4,823 hours. Assume that the lifetime of lamps manufactured has a normal distribution.

(i) Calculate the sample mean and standard deviation of the lamps lifetime.

(5 marks)

(ii) Calculate a 90% symmetrical confidence interval for the mean lifetime of all the lamps produced by the manufacturer.

(4 marks)

(iii) Test at 1% significance level if whether the consumer's suspect is true, that the mean lifetime is less than 5,000 hours.

(7 marks)

(b) It is believed that in order to reduce the long overdue problem for books borrowed, the penalty amount for the overdue had been increased and redesigned such that the number of prolong overdue will be reduced in long term, in accordance to the following ratio, as suggested by expert in the industry.

Overdue periods (1 to 14 days) : (15 to 30days) : (31 to 90 days) : (91 days and above) = 4:3:2:1

After 12 months of implementation in a public library, the data for the number of overdue according to the periods observed as follow:

Overdue periods (days)	1 to 14	15 to 30	31 to 90	91 and above
Number of days	47	38	23	18

Using χ^2 test, test at 10% significance level whether there is evidence that the observed frequency distribution follow the ratio as suggested by the expert.

(9 marks)

Question 5

(a) 15% of mothers in a country who gave birth last year were under 20 years of age. A sociologist claims that births to mothers under 20 years of age is decreasing. He selects a random sample of 200 births this year and finds that 27 of them are to mothers under 20 years of age.
Test at 1% significance level if the sociologist's claim is true.

(7 marks)

(b) A study is carried out to determine whether there is any significant different in the mean prices of a common type of vegetable sold in 2 states. A random sample of 10 each is withdrawn from the markets from both states and the prices of the vegetable sold (per 100g) are observed in a particular day. The following table shows the prices of a type of vegetable (per 100g) sold in two selected states.

State A	State B
$n_1 = 10$ $\bar{x}_1 = 2.10$ $s_1^2 = 0.32$	$n_2 = 10$ $\bar{x}_2 = 1.70$ $s_2^2 = 0.43$

Assume the prices of the vegetable sold (per 100g) in state A and state B are normally distributed with equal variance. Test if there is any significance in the mean prices of the vegetable sold in both states using α=0.05.

(8 marks)

(c) The following data show the attitude of children in various parts of the country towards a certain brand of tooth paste specially designed for children. The children that been selected have used the brand prior to the survey.

Attitude	North	Central	South
Like	44	22	29
Indifferent	25	57	32
Dislike	16	36	39

Using χ^2 test, test at 5% significance whether the attitude towards the tooth paste brand is independent of geographical area of residence.

(10 marks)

Question 6

(a) A firm produces three items of pine furniture: tables, chairs and beds. Output and prices are given below:

Product	Year 2012		Year 2013	
	Quantity (unit)	Price (RM)	Quantity (unit)	Price (RM)
Tables	200	50	300	60
Chairs	100	80	200	100
Beds	300	100	400	120

(i) Using 2012 as the base, calculate the Paasche quantity index for 2013. Interpret your answer.

(4 marks)

(ii) Using 2012 as the base, calculate the Laspeyres quantity index for 2013. Interpret your answer

(4 marks)

(b) The table below shows the daily income and food expenditure for 7 households.

Income (RM)	35	49	21	39	15	28	25
Food Expenditure (RM)	9	15	7	11	5	8	9

(i) Draw a scatter diagram of food expenditure on income.

(2 marks)

(ii) Calculate the linear regression equation that best fits the data.

(5 marks)

(iii) Draw the least square regression line obtained in part (ii) on the scatter diagram in part (i).

(2 marks)

(iv) What is the strength of correlation that exists between the two variables? Comment on your answer.

(5 marks)

(v) Estimate food expenditure of a household whose daily income is RM30. Is the estimation valid?

(3 marks)

~ The End ~

Normal Distribution

The z value of a value of X is calculated as : $Z = \frac{x - \mu}{\sigma}$

Sampling Distributions of Mean

The z value of a value of $\overline{X}$ is calculated as : $Z = \frac{\overline{X} - \mu}{\sigma_{\overline{x}}}$

Hypothesis Testing

When population variance is known, $z = \frac{\overline{x} - \mu}{\sigma / \sqrt{n}}$

Regression

The regression line equation: $y' = a + bx$

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2} \qquad a = \frac{\sum y}{n} - b\frac{\sum x}{n}$$

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{\left\{n\sum x^2 - \left(\sum x\right)^2\right\}\left\{n\sum y^2 - \left(\sum y\right)^2\right\}}}$$