INTI International University & Colleges

FINAL
Examination Paper

(COVER PAGE)

Session	:	**January 2016**
Programme	:	Diploma In Business (DIB)
Course	:	**STA1101: Quantitative Methods**
Date of Examination	:	March 10, 2016 (Thursday)
Time	:	8.00am – 10.00am Reading Time : Nil
Duration	:	2 Hours

Special Instructions :

Answer any **FOUR (4)** questions.

Materials permitted :
Non-Programmable Calculator

Materials provided :
Formula Booklet 2 and Graph Paper

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Moderator : Dr. Ng Set Foong

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

DIPLOMA IN BUSINESS (DIB)
STA1101: QUANTITATIVE METHODS
FINAL EXAMINATION: JANUARY 2016 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 table below shows the number of lessons of 60 people required before passing their driving test.

Number of lessons	Frequency
6 - 10	5
11 - 15	18
16 - 20	25
21 - 25	10
26 - 30	2

(i) Calculate the mean and standard deviation of the number of lessons required before passing driving test.

(6 marks)

(ii) Calculate the median and mode of the number of lessons required before passing driving test.

(5 marks)

(iii) Draw a cumulative frequency polygon on graph paper.

(5 marks)

(iv) If a driving school targeted a passing rate of at least 90% of their students first time enrolled, what is the minimum lessons must each of their students take? Use the graph from (iii) to estimate.

(4 marks)

(b) A coin and a die are thrown together.

(i) Draw a tree diagram on the outcome. (3 marks)

(ii) Find the probability of obtaining a head and a number greater than 4.

(2 marks)

Question 2

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

X	1	2	3	4
$P(X=x)$	$4p$	$3p$	p	$2p$

where p is a constant.

(i) Determine the value of p. (2 marks)

(ii) Find $P(1<X\leq 3)$. (2 marks)

(iii) Calculate the mean and variance of X. (4 marks)

(iv) If $Y=4X+4$, find $E(Y)$ and $Var(Y)$. (4 marks)

(b) The safety supervisor at a large manufacturing plant believes the mean number of industrial accidents per month is 4 and it follows a Poisson distribution. Assuming there are 4 working weeks per month.

(i) What is the probability that the number of industrial accidents per month is at most 2? (3 marks)

(ii) What is the probability that the number of accidents in a week is less than 2? (3 marks)

(c) A market research company has studied the quality of after sales service provided by 100 electrical retailers in a region. The findings are summarized below:

Retailers	Good Service	Poor Service
High street chain retailers	40	24
Independent retailers	26	10

If a retailer is selected at random, what is the probability that the retailer

(i) gives poor service? (1 mark)

(ii) is a high street chain or gives good service? (3 marks)

(iii) gives poor service given that the selected retailer is part of a high street chain? (3 marks)

Question 3

(a) For a certain type of computers, the length of time between charges of the battery is normally distributed with a mean of 55 hours and a standard deviation of 8 hours.

(i) What is the probability that one of this type of computers randomly identified has length of time between 40 to 60 hours?

(3 marks)

(ii) Five of this type of computers randomly picked, and what is the probability that their mean length of time is between 45 to 60 hours?

(3 marks)

(iii) If 5% of the computer length time between charges meets the minimum superior long lasting length time between charges requirements, what is the minimum standard?

(4 marks)

(b) The rate of internet users among the urban and rural areas believed to be different. However, it is not certain. Thus, a local internet service provider company decided to carry out a simple research into this matter. They randomly select the residents from both areas, and ask if the residents regularly, occasionally or rarely (or never) use the internet service over the past three months. The information collected and summarized as in the below table.

Area	Frequency of Using Internet Service		
	Regularly	Occasionally	Rarely or Never
Rural	49	53	18
Urban	131	17	2

Test at 5% significant level, using $\chi 2$ distribution, determine if there is any significant different pertaining to the frequency of internet usage and the area where the residents reside.

(11 marks)

(c) In a sample of 230 students enrolled on a particular subject, 8 of them will eventually withdraw before the final. Thus, find the 90% confidence interval for the proportion of all students who will withdraw for that subject.

(4 marks)

Question 4

(a) The battery standby duration (in hours) of a new cell phone model is known to be normally distributed. Ten pieces of such new cell phone model supplied from manufacturer are randomly chosen and the actual standby duration being recorded as follow :

48.2	47.8	45.6	47.2	49.3
51.2	44.2	45.4	49.2	43.6

(i) Calculate the unbiased estimates of population mean and variance of battery standby duration (in hours) of new cell phone model.

(5 marks)

(ii) Find 95% confidence interval for the mean population of battery standby duration (in hours) of new cell phone model.

(4 marks)

(iii) If manufacturer claimed that this new cell phone model has the mean battery standby duration at least 48 hours. Test at 5% significance level if this claim is true.

(7 marks)

(iv) Assuming the standard deviation of the population is known, where $\sigma = 1.4$ hours. Test at 5% significance level if the claim in (iii) is true.

(5 marks)

(b) Events A and B are such that $\mathrm{P}(A) = \frac{5}{12}, \mathrm{P}(A|\overline{B}) = \frac{7}{12}, \mathrm{P}(A \cap B) = \frac{1}{8}$. Find $\mathrm{P}(B)$.

(4 marks)

Question 5

(a) Steven, a production supervisor at a beverage company, wants to be sure that the XYZ can is filled with an average of 16 ounces of product. A sample of 36 cans shows that a sample means of 15.7 ounces and standard deviation 0.2 ounces.
Test at 1% significance level, whether the mean content of the cans is significantly different from 16 ounce?

(7 marks)

(b) A bank compares two plans for promoting the amount charged to their credit card by their customers. At the end of the year, the sample statistics on the amount charged by customers for each plan are compiled as follows:

Plan A	Plan B
$n_1 = 150$	$n_2 = 150$
$\bar{x}_1 = \$1987$	$\bar{x}_2 = \$2056$
$s_1 = \$392$	$s_2 = \$413$

Test if there is any significance difference between the mean amount charged by the two groups of customers using α=0.05.

(8 marks)

(c) The following table shows the results of a study in which independent random samples of workers, from three parts of a country, and their feeling towards their own economic well-being.

		Geographical Region		
		North	Central	South
Economic conditions	Good	87	73	66
	No Good	113	77	84

Using χ^2 test, test at 5% significance whether there is a significant association between geographical region and economic condition.

(10 marks)

Question 6

(a) A firm produces three items of clothing: t-shirt, trousers and jacket. Output and prices are given below:

Product	Year 2012		Year 2013	
	Quantity (unit)	Price (RM)	Quantity (unit)	Price (RM)
T-shirts	200	50	300	60
Trousers	100	80	200	100
Jacket	300	100	400	120

(i) Using 2012 as the base, calculate the Paasche price 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) Sales of products (in RM) for the past 6 months are shown below.

Month	1	2	3	4	5	6
Sales	152	128	183	148	166	179

(i) Draw a scatter diagram of the data.

(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 the sales in July. Comment on the reliability of your prediction.

(3 marks)

~ THE END ~