INTI International University & Colleges

FINAL
Examination Paper

(COVER PAGE)

Session	:	April 2016
Programme	:	Diploma in Business (DIB) Diploma in Finance (DIF) Diploma in Information And Communication Technology (DICTN)
Course	:	**STA1101: Quantitative Methods**
Date of Examination	:	27 July, 2016 (Wednesday)
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

Examiner(s)	:	**Si Chong En**, Nor Aliza Binti Mokhtar, Hatin Fatihah Binti Hassan, Dinesh Kumar Govindasamy, S.M. Elizabethrani Allapan, Bark Chee Beng, Billy Siew Woo Bing and Nurul Shamimi Kamaruddin
Moderator	:	Dr Ng Set Foong

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

DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY (DICTN)
DIPLOMA IN BUSINESS (DIB)
DIPLOMA IN FINANCE (DIF)
STA1101: QUANTITATIVE METHODS
FINAL EXAMINATION: APRIL 2016 SESSION

Instruction: 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 amounts of money spent by all 50 customers at a supermarket for a particular day are summarized in the following table.

Amount Spent ($)	Number of Customers
1 – 50	3
51 – 100	6
101 – 150	7
151 – 200	12
201 – 250	14
251 – 300	8

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

Calculate

(i) mean,
(2 marks)

(ii) sample standard deviation, and
(3 marks)

(iii) mode of the above distribution.
(3 marks)

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

Estimate from the cumulative frequency curve,

(iv) the median.
(1 mark)

(v) the number of customers who spent between $120 and $220.
(2 marks)

(vi) the value x, if it is known that 20% of the customers who spent more than $ x.
(3 marks)

(b) A bag contains 5 red pens and 3 blue pens. Two pens are selected at random with no replacement. Let X be the variable "number of red pens obtained". Construct a probability distribution of X.
(5 marks)

Question 2

(a) The table below shows the probability distribution of a discrete random variable X.

x	0	1	2	3
$P(X=x)$	0.4	0.3	a	0.1

(i) Find the value of a.

(1 mark)

(ii) Calculate the mean and variance of X.

(4 marks)

(iii) Find Var($2X$-2).

(2 marks)

(iv) Calculate $P(1 \leq X < 3)$.

(2 marks)

(b) The cars arriving at a petrol station independently and at random, follow a Poisson distribution with mean 2 cars in any 3 minutes periods.

(i) Find the probability that there will be more than 2 cars in next 3 minutes.

(3 marks)

(ii) Find the probability that there will be exactly 5 cars in 5 minutes.

(2 marks)

(c) In the following table, 200 college students are classified according to their sex and also according to whether or not he or she wears glasses.

Sex	Wearing Glasses	Not Wearing Glasses
Male	90	26
Female	64	x

(i) Find the value of x.

(1 mark)

(ii) Find the probability that a student selected is female or he/she is not wearing glasses.

(2 marks)

(iii) Find the probability that a student selected is wearing glasses, given that the student is a male.

(3 marks)

(d) Given that P(A) = 0.3, P(B)=0.4 and P(A|B)=0.2, find

(i) $P(A \cap B)$.

(2 marks)

(ii) $P(\overline{B} \mid A)$.

(3 marks)

Question 3

(a) The following data relate the number of sales made by a company over a number of weeks:

Weekly sales	1 to 10	11 to 20	21 to 30	31 to 40	41 to 50
Number of weeks	2	12	22	10	4

(i) On the graph paper, draw a frequency histogram for the above distribution.
(5 marks)

(ii) Estimate mode of the distribution graphically.
(2 marks)

(iii) Calculate the median.
(3 marks)

(b) The amount dispensed by a water vending machine has a normal distribution with a mean of 205ml and a standard deviation of 5ml. A bottle of water is selected at random.

(i) What is the probability that the bottle contains less than 212ml of water?
(3 marks)

(ii) What is the probability that the bottle contains more than 197.5ml but less than 210ml of water?
(3 marks)

(iii) Thirty percent of the time the water vending machine dispenses less than Yml of water. Find the Y value.
(4 marks)

(c) The probability of a new salesman of a local company will close a sale is 0.2. If a salesman plans to meet 18 customers on a particular day,

(i) What is the expected number of sales that are closed?
(2 marks)

(ii) What is the probability more than two sales are closed?
(3 marks)

Question 4

(a) On a stretch of interstate highway with a speed limit of 55 miles per hour, an unusual number of accidents were being reported. Eight cars were randomly clocked for speed by the state policy. The speeds were :

66 60 59 79 63 71 58 75

(i) Calculate the best unbiased estimate for mean and standard deviation.
(5 marks)

(ii) Construct a 95% confidence interval for the population mean speed of the cars traveling on this stretch of highway.
(5 marks)

(b) A soft drink manufacturer (Brand A) wishes to determine whether there are any differences in the proportion of three different regions (Northern, Central, Southern) in terms of favoritism of its brand compare to another competitor's brand (Brand B). The results of a survey study on favoritism of 160 respondents from northern to southern were as follow:

	Region		
Soft drink manufacturer	Northern	Central	Southern
Brand A	46	23	51
Brand B	18	7	15

Test at 5% significant level, using χ^2 distribution, whether there are any differences in the proportion of three different regions (Northern, Central, Southern) in terms of favoritism of its brand A compared to another competitor's brand (Brand B).

(8 marks)

(c) The diameter of a type of nut produced by a large manufacturing factory is distributed normally with mean μ and variance 0.04mm^2.

(i) Given 13% of the nuts have diameter larger than 1.28mm. Find the value of μ.

(3 marks)

(ii) If a sample size of 10 is taken again, what is the probability that the mean of the sample is large than 1.08mm?

(4 marks)

Question 5

(a) An official of a plastics industry claimed that the industry employed 30% Malaysian female, 5% Indonesian female, 50% Malaysian males, and 15% Indonesian males. To test the claim, an affirmative action committee randomly selected 150 employees and obtained the following results:

Category	Frequency
Malaysian females	40
Indonesian females	15
Malaysian males	80
Indonesian males	15

Test the official's claim at 5% level of significance.

(9 marks)

(b) A statistics instructor thought that a new method of instruction (B) would result in a better understanding of statistics. The instructor tested her 10 students under the current method (A). A statistics test was then given following 4 weeks of instruction (B). The results are as follows:

A	58	63	66	69	70	70	70	76	77	86
B	60	64	67	69	71	72	74	76	75	85

Test at 1% level of significance whether the new method of instruction is effective.

(9 marks)

(c) A plastic has a mean breaking strength of 27 and a standard deviation of 6 pounds per square inch. A new process is developed and will replace the old one, provided that there is substantial evidence that it improves the strength of the product. A random sample of 40 pieces made with the new process gives a sample mean of 30 pounds per square inch. Is there sufficient evidence to suggest that the strength of the product has increased at the 1% level of significance?

(7 marks)

Question 6

(a) The data below relates the weekly maintenance cost ($) to the age (in months) of eight machines of similar type in a manufacturing company.

Machine	1	2	3	4	5	6	7	8
Age	5	10	15	20	30	30	30	50
Cost	190	240	250	300	310	335	300	300

(i) Draw a scatter diagram of 'maintenance cost' on 'the age of machines'.

(2 marks)

(ii) Determine the least square regression equation that can be used to estimate the maintenance cost on the age of machines.

(6 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.

(4 marks)

(v) Calculate the coefficient of determination of the model. Comment on your answer.

(3 marks)

(vi) Estimate the maintenance cost of a 40 years old machines. Comment on the reliability of your prediction.

(2 marks)

(b) The following data give the quantities and costs of materials for the four divisions of a company for two years.

	Quantity (tonnes)		Cost (RM)	
Division	Year 1	Year 2	Year 1	Year 2
A	175	201	1540	1830
B	32	46	1270	1490
C	48	43	2760	2490

(i) Find the Laspeyres weighted quantity index for the materials in year 2 taking year 1 as the base year. Interpret your finding.

(3 marks)

(ii) Find the Paasche weighted price index for materials in year 2, taking year 1 as the base year. Interpret your finding.

(3 marks)

~ The End ~

sta1101(f)/april2016