

**FINAL**  
Examination Paper

(COVER PAGE)

Session : August 2015

Programme : Diploma In Business (DIB)  
Diploma In Information And Communication Technology (DICTN)

Course : STA1101: Quantitative Methods

Date of Examination : December 7, 2015

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) : Mr. Billy Siew Woo Bing, Mr. Bark Chee Beng, Dr. Narinderjit,  
Ms. Nor Aliza Binti Mokhtar, Ms. Hatin Fatimah Hassan,  
Ms. S. M. Elizabethrani Allapan, Mr. Josh Si Chong En,  
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Moderator : Dr. Ng Set Foong

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

DIPLOMA IN INFORMATION AND COMMUNICATIONS TECHNOLOGY (DICTN)  
 DIPLOMA IN BUSINESS (DIB)  
 STA1101: QUANTITATIVE METHODS  
 FINAL EXAMINATION: AUGUST 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 blood sugar level, in milligrams per deciliter (mg/dl), for a sample of 70 patients is shown below.

Blood Sugar Level (mg/dl)	Number of patients
51 – 60	5
61 – 70	8
71 – 80	7
81 – 90	16
91 – 100	23
101 - 110	11

- (i) Calculate for the mean and standard deviation of the blood sugar level(mg/dl) (6 marks)
- (ii) Calculate the median and mode of the blood sugar level(mg/dl) (5 marks)
- (iii) Draw a cumulative frequency curve on graph paper. (4 marks)
- (iv) Using cumulative frequency curve obtained in (iii) above, estimate the value of  $x$  if 20% of the patients whose blood sugar level are  $x$  mg/dl or more. (3 marks)
- (b) A restaurant company receives on average two complaints per week from customer. Assuming that the number of complaints can be modeled by a Poisson distribution.
- (i) Find the probability that it receives two complaints in a week. (3 marks)
- (ii) Find the probability that it receives at least 2 complaints in 2 weeks. (4 marks)

## Question 2

- (a) The following two way table shows the classification on gender and whether or not eating breakfast on regular basis for 500 students in a school.

	Male	Female
Eat breakfast on regular basis	190	110
Do not eat breakfast on regular basis	85	115

If a student is selected at random from the school, what is the probability that

- (i) the student eats breakfast on a regular basis? (2 marks)
- (ii) the student is female given the student does not eat breakfast on regular basis? (3 marks)
- (b) A bag contains 4 white balls, 3 green balls and 5 red balls. Two balls are drawn from the bag without replacement.
- (i) Draw a tree diagram to represent all possible outcomes, with respective probabilities shown on tree. (4 marks)
- (ii) What is the probability that the first ball is green and the second ball is white? (1 mark)
- (iii) What is the probability that both ball are of same colour? (2 marks)
- (iv) If the second ball is red, what is the probability that the first ball is also red? (3 marks)
- (c) The probability distribution of discrete random variable  $X$  is shown in the table below :

$x$	-1	0	3	5
$P(X=x)$	0.13	0.25	$p$	0.30

- (i) Find the value of  $p$ . (1 mark)
- (ii) Calculate  $P(0 < x \leq 5)$  (2 marks)
- (iii) Calculate the mean and variance of  $X$ . (5 marks)
- (iv) Calculate  $\text{Var}(3x + 1)$  (2 marks)

**Question 3**

(a) If  $P(A|B) = 0.4$ ,  $P(B) = 0.2$  and  $P(A) = 0.25$ , find

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

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

(iii)  $P(B|A)$  (2 marks)

(b) On average in a day of production, 10% of products produced in a production line of a factory are defective. Suppose on a particular day, a sample of 50 products are to be selected at random for inspection.

(i) Find the probability that 2 or more products are defective. (4 marks)

(ii) Find the probability that exactly 40 products are NOT defective. (2 marks)

(iii) What is the expected number of defective products in the selected sample? (1 mark)

(c) The following table indicates the age, in years, of all 120 participants in a conference relating to health.

Age	Frequency
15 - 24	11
25 - 34	19
35 - 44	30
45 - 54	45
55 - 64	15

Construct a frequency histogram for the data given. Estimate mode from the graph.

(5 marks)

(d) The mean age of patients in a hospital is 45 years old. A random sample of 100 patients has a mean age of 48.4 years old. Using a population standard deviation of 18 years, test at 5% significance level, whether there is evidence that this statement is incorrect.

(7 marks)

**Question 4**

(a) The heights of students at a local university are normally distributed with a mean of 168 cm and a standard deviation of 8 cm. One of these students is chosen at random.

(i) Find the probability that the height of the student is less than 172 cm. (3 marks)

(ii) Find the probability that the height of the student is between 160 cm and 170 cm. (3 marks)

(iii) Given that 30% of all these students have heights less than H cm, find the value of H, correct to one decimal place. (4 marks)

(b) A type of fruits are packed and sold in 1.5kg packs each. A sample of 12 packs were selected at random and their weights, measured in kilograms, noted. The following results were obtained:

$$\Sigma x = 17.81, \quad \Sigma x^2 = 26.4357$$

(i) Calculate the unbiased estimates of population mean and standard deviation of the weight in packs. (5 marks)

(ii) Find 99% confidence interval for the population mean of weight in packs. (4 marks)

(iii) Assuming the weight of packs follows a normal distribution. Test at 5% significance level, whether the mean weight of the packs is less than 1.5 kg. (6 marks)

**Question 5**

- (a) The sales of 6 salesmen before and after attending a course is presented in the table below:

Salesman	1	2	3	4	5	6
Before	210	235	208	190	172	244
After	190	170	210	188	173	228

Can we conclude that attending the course will increase the sales of the 6 salesmen at 10% significance level?

(10 marks)

- (b) A study was carried out to find out if the response of a new type of medicine is independent of the gender. A sample of 100 patients was randomly chosen, and their responses (positive, neutral, or negative) on the medicine being recorded. A summary of the study is given in the following table.

		Response		
		Positive	Neutral	Negative
Gender	Male	23	19	7
	Female	29	16	6

Test at 5% significance level, whether the response of a new type of medicine is independent of the gender.

(10 marks)

- (c) In the population, IQ scores are normally distributed with a mean of 100 and a standard deviation of 15. If we repeatedly pulled random samples of 25 individuals from the population and measured their IQ, what proportion of those samples would we expect to have a sample mean between 95 and 105?

(5 marks)

**Question 6**

- (a) The marketing director of a shoe company is interested to know the performance of its sales in the sport shoes section in the past 2 years. He collected data on the average prices and the number of pairs of three sport shoes that sold by the company, in year 2011 and 2013.

Type of shoes	Year 2011		Year 2013	
	Price (RM)	Quantity ('000 pairs)	Price (RM)	Quantity ('000 pairs)
Jogging	27.00	330	36.00	400
Badminton	30.00	1400	42.00	1800
Tennis	34.00	990	48.00	1200

- (i) Using 2011 as the base year, calculate the aggregate quantity index for 2013. Interpret your answer. (4 marks)
- (ii) Using 2011 as the base year, calculate the Paasche's price index for 2013. Interpret your answer. (4 marks)
- (b) The Mathematics and English test results for 10 students are given as follows:

Mathematics	1	8	15	18	23	28	33	39	45	45
English	3	14	8	20	19	17	36	26	14	29

- (i) On a graph paper, draw a scatter diagram of the English marks on Mathematics marks. (3 marks)
- (ii) Find the least square regression line equation to estimate English marks from Mathematics marks. (5 marks)
- (iii) Find the coefficient of correlation between the variables. Comment on your answer. (4 marks)
- (iv) Calculate the coefficient of the determinant of the linear model. Comment. (2 marks)
- (v) Estimate the English marks for students who obtained 60 marks in the Mathematics test. Comment on the reliability of the estimation. (3 marks)

