UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Faculty of Computer Science and Information Systems

UNIVERSITI TEKNOLOGI MALAYSIA

TEST 2

SUBJECT CODE	**:**	**SCI1013**
SUBJECT	**:**	**DISCRETE STRUCTURE**
TIME	**:**	**2 HOURS (8.00 P.M - 10.00 P.M)**
DATE	**:**	**20 NOVEMBER 2013**

NAME :

MATRIC NO :

COURSE :

SECTION :

LECTURER'S NAME :

INSTRUCTIONS

THE TEST CONTAINS 4 QUESTIONS.

PLEASE ANSWER ALL QUESTIONS IN THE BOOKLET.

Question 1 [8 Marks]

i) How many ways are there to order the letters of the word INDESCREETNESS? (2 marks)

ii) A computer scientist is trying to discover the keyword for a financial account. If the keyword consists only of 10 lower case characters (e.g., 10 characters from among the set: a, b, c, ..., y, z) and no character can be repeated, how many different unique arrangements of characters exist? (1 marks)

iii) There are 12 hospitals in a town. How many different ways can 7 patients are sent to the hospitals so that no 2 patients may be in the same hospital. (1 marks)

iv) 12 identical chairs must be arranged in the following manner:

- The number of students per row has to be at least 3.
- Number of row has to be at least 2.
- Equal number of students has to be seated in a row.

How many different arrangements are possible? (4 marks)

Question 2 [12 Marks]

i) A bagel shop has 3 union bagels, 3 poppy seed bagels, 3 egg bagels, 4 salty bagels and 4 pumpernickel bagels. How many way are there to choose

a) A dozen bagels (1 marks)

b) Seven bagels of egg bagel, pumpernickel bagels and salty bagels with three egg bagels and no more than two salty bagels? (4 marks)

ii) A linear algebra class consists of 10 mathematics majors and 12 computer science majors. A team of 12 has to be selected from this class. Find the number of ways of selecting a team if

a) The team has 6 from each discipline (2 marks)

b) The team has a majority of computer science majors (5 marks)

Question 3 [10 Marks]

Charlie is inspecting chocolates at his chocolate factory. He rejects chocolates that are the wrong size and also those that are the wrong shape. The probability that a chocolate is the **correct size** is p. The probability that a chocolate is the **correct shape** is q. The size and shape of a chocolate are independent events.

i) Complete the probabilities in the table. (3 marks)

Event	Probability
Chocolate is the correct size and the correct shape	
Chocolate is the correct size and the wrong shape	$p(1-q)$
Chocolate is the wrong size and the correct shape	
Chocolate is the wrong size and the wrong shape	

ii) Show clearly that these probabilities have a total of 1. (1 marks)

iii) The probability that a chocolate is both the correct size and the correct shape is 0.765. The probability that a chocolate is the correct size is 0.9. What is the probability that a chocolate is the correct shape, $P(q)$? (1 marks)

iv) If a chocolate is chosen at random, what is the probability it is *correct size or shape*? (2 marks)

v) What is probability getting a chocolate with *correct shape* given that it has *wrong size*? (3 marks)

Question 4 [10 Marks]

In a study of pleas and prison sentences, it is found that 45% of the subjects studied were sent to prison. Among those sent to prison, 40% chose to plead guilty. Among those not sent to prison, 55% chose to plead guilty.

i) If one of the study subjects is randomly selected, find the probability of getting someone who was not sent to prison. (1 marks)

ii) If a study subject is randomly selected and it is then found that the subject entered a guilty plea, find the probability that this person was sent to prison. (3 marks)

iii) If one of the study subjects is randomly selected, it is found that the subject is entered a guilty plea, find the probability that this person was not sent to prison. (3 marks)

iv) If a study subject is randomly selected find the probability of getting someone who was chose to plead guilty. (3 marks)