UTM | Faculty of Computing

UNIVERSITI TEKNOLOGI MALAYSIA

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TEST 2

SEMESTER I 2018/2019

SUBJECT CODE	: SCSI1013
SUBJECT NAME	: DISCRETE STRUCTURE
TIME	: 2 HOURS (8.30 AM – 10.30 AM)
DATE	: 16 NOVEMBER 2018

INSTRUCTIONS TO THE STUDENTS:

Answer all questions in the answer booklet.

NAME	
IC NO	
SECTION	
LECTURER	

(This question paper consist of 4 pages including this pages)

QUESTION 1 **[10 Marks]**

(i) Ricky is going for a winter holiday and thinking of dressing warm for the winter. He will be layering three shirts over each other, and two pairs of socks. If he has twenty shirts to choose from, along with twelve different kinds of socks, how many ways can he layer up? (3 marks)

(ii) There are 4 red cups, 5 blue cups and 3 yellow cups. In how many ways can you arrange these so that each yellow cup is in between two blue cups? (4 marks)

(iii) A company has 7 software engineers and 5 civil engineers. In how many ways can they be seated in a row so that no two of the civil engineers will sit together? (3 marks)

QUESTION 2 **[15 Marks]**

(i) How many bit strings of length 8 either start with a 1 bit or end with the two bits 00? (4 marks)

(ii) There are 12 intermediate stations between two places A and B. Find the number of ways in which a train can be made to stop at 4 of these intermediate stations so that no two stopping stations are consecutive? (2 marks)

(iii) A cricket club in University of ABC is organizing a cricket tournament. Each team should plays one match with every other team.

   (a) Find the number of matches in this tournament if there are 7 teams registered for the tournament. (2 marks)

   (b) If the tournament should have 45 matches, find the number of teams that need to register in this tournament. (3 marks)

   Hint: $^nC_r = \dfrac{n!}{r!(n-r)!} = \dfrac{n(n-1)(n-2)(n-3)\ldots(1)}{r!(n-r)(n-r-1)\ldots(1)}$

(iv) In a small village, there are 25 families, of which 18 families have at most 2 children. In a rural development programme 16 families are to be chosen for assistance, of which at least 14 families must have at most 2 children. In how many ways can the choice be made? (4 marks)

QUESTION 3 [12 Marks]

(i) A theatre performs 7 plays in one season. Five women are each cast in 3 of the plays. Show that some play has at least 3 women in its cast. (3 marks)

(ii) There are 50 baskets of apples. Each basket contains no more than 14 apples. Show that there are at least 4 baskets containing the same number of apples. (3 marks)

(iii) A bowl contains 10 red marble and 10 blue marbles. A girl selects marbles at random without replacement.

(a) How many marbles must she select to be sure of getting 3 marbles of the same colour? (4 marks)

(b) What is the least number of marbles must she select to be sure of getting at least 3 blue marbles?

(2 marks)

QUESTION 4 [13 Marks]

(i) In a group of 40 people, 10 are healthy and every person of the remaining 30 has either high blood pressure, a high level of cholesterol or both. If 15 have high blood pressure and 25 have high level of cholesterol,

(a) how many people have both high blood pressure and a high level of cholesterol?

(2 marks)

(b) If a person is randomly selected from this group, what is the probability that he or she,

    i. has both high blood pressure and a high level of cholesterol?   (1 mark)

    ii. has either high blood pressure or a high level of cholesterol?   (3 marks)

(ii) In a batch, there are 68% C programmers, and 38% are Java and C programmers. If a selected programmer is a C programmer, what is the probability that he or she is also Java programmer?   (3 marks)

(iii) University of DEF Sports Club surveyed a representative sample of students from year 1 to year 4 to find out what their three favorite sports were at university. They collected 500 surveys and found that football was chosen as a favorite sport by 360 students. Badminton was chosen as a favorite by 240 students. And basketball was the next top favorite with 200 votes. The club wants to know the probability of a student choosing football, badminton, and basketball as their favorite sports.   (4 marks)

QUESTION 5   [10 Marks]

Sherry Outdoor is a company which actively organizing outdoor events in the desert. The company is organizing a camping event tomorrow at Paradise Desert. In recent years, it has rained only 5 days each year. Unfortunately, the weatherman has predicted rain for tomorrow. When it actually rains, the weatherman correctly forecasts rain 90% of the time. When it doesn't rain, he incorrectly forecasts rain 10% of the time. What is the probability that it will rain on the day of the camping event as predicted by the weatherman?   (10 marks)

Note: Do your calculation in 3 decimal points

** End of Questions **
Good Luck!