TEST 2

NAME	
COURSE CODE	DUM 2413 STATISTICS AND PROBABILITY
DURATION	1 HOUR AND 30 MINUTES

QUESTION 1

A low cost hotel owner used three local hotels to provide accommodations for tourists during school holiday season. Based on the past records, there are 20%, 45% and 35% of the tourists are assigned rooms at Hotel A, Hotel B and Hotel C respectively. Also, given that the probabilities of Hotel A, Hotel B and Hotel C experienced the water disruption are 0.02, 0.01 and 0.03, respectively.

(i) Construct a tree diagram based on the information given in the question and determine their associated probabilities, including the intersection probabilities together with the outcomes.

(ii) Based on the answer in **(i)**, determine the probability that a tourist will be assigned a room without water problem?

(iii) Given that the room is without water problem, what is the probability that it is at Hotel B?

QUESTION 2

(a) Mr. Eric interested to form three-digit passcode from the digits 1, 2, 3, 4 and 5.

(i) Determine the total number of three-digit passcode can be formed by Mr. Eric if he refused to repeat the same number.

(ii) How many three-digit passcode can Mr. Eric formed, which the passcode is greater than 300 and repetitions are allowed?

(b) In a lunch set of a restaurant, a customer will be served by one main course, one dessert and one beverage. If a customer orders a lunch set in this restaurant, he or she is allowed to choose one item each from the main course, dessert and beverage from the menu below.

Main Course	Chicken rice	Tomato rice	Fried Rice	Assam Laksa
Dessert	Tiramisu	Pudding	Ice-cream	Cupcake
Beverage	Tea	Coffee	Soft drink	Fruit juice

If Aaron preferred a lunch set in this restaurant, determine

(i) how many different selections are possible as he lunch set?

(ii) the probability that the lunch set orders by Aaron included Tiramisu.

(iii) the probability that the lunch set orders by Aaron included Assam Laksa and Pudding

QUESTION 3

Kurmi is an insurance company, which offered the vehicle insurance policy. Given that a discrete random variable, X represents the number of monthly claims due to physical damage, which follows the probability defined as below.

$$f(x) = \begin{cases} 0.9, & x = 0, \\ \dfrac{\gamma}{x}, & x = 1, 2, 3, 4, 5, 6. \end{cases}$$

where γ is a constant.

(i) Find the value of γ.

(ii) Determine the expected value of X.

QUESTION 4

Suppose that the number of complaints received by a new cleaning service company in the Kuantan area follows a Poisson distribution with an average of 3.3 per month. Determine the number of complaints will be received by the company for any given month is at least 2.

QUESTION 5

A previous conducted by a university researcher show that 55% students do not feel stress during the final examination. Given that a random variable, X represents the number of students who felt stressed during the final examination of a random sample of size twelve.

(i) Determine the distribution of X.

(ii) Find the expected value, variance and standard deviation of X.

(iii) Determine the probability that X is at most 3.

(iv) Determine the probability that X is at least 6.

(v) Determine the probability that X is equal to 7.

QUESTION 6

The study of a food festival show that the probability of a visitor who tasted the food will be infected with food poisoning is 0.0012. By using the Poisson approximation to Binomial distribution, determine the probability that among the 1000 visitors who tasted the food, at most two of them will be infected with food poisoning.

END OF QUESTION PAPER

APPENDIX-TABLE OF FORMULAS

RULES OF PROBABILITY	
Subtraction Rule $P(\mathrm{A}) = 1 - P(\mathrm{A}')$	**Addition Rule** $P(\mathrm{A} \cup \mathrm{B}) = P(\mathrm{A}) + P(\mathrm{B}) - P(\mathrm{A} \cap \mathrm{B})$
Multiplication Rule $P(\mathrm{A} \cap \mathrm{B}) = P(\mathrm{B}) \cdot P(\mathrm{A} \vert \mathrm{B})$	
THEORY OF PROBABILITY	
Independence Event $P(\mathrm{A} \cap \mathrm{B}) = P(\mathrm{A}) \cdot P(\mathrm{B})$	**Conditional Probability** $P(\mathrm{A} \vert \mathrm{B}) = \dfrac{P(\mathrm{A} \cap \mathrm{B})}{P(\mathrm{B})}$
BAYES' THEOREM	
$P(\mathrm{B}_k \vert \mathrm{A}) = \dfrac{P(\mathrm{B}_k) P(\mathrm{A} \vert \mathrm{B}_k)}{\sum_{i=1}^{n} P(\mathrm{B}_i) P(\mathrm{A} \vert \mathrm{B}_i)}$	

MEAN AND VARIANCE OF RANDOM VARIABLE X	
Discrete Probability Distribution	**Continuous Probability Distribution**
Mean, $\mu_X = \sum_{x \in \mathrm{S}} x \cdot f(x)$	Mean, $\mu_X = \int_{-\infty}^{\infty} x \cdot f(x)\, dx$
Variance, $\sigma_X^2 = \left[\sum_{x \in \mathrm{S}} x^2 \cdot f(x) \right] - [\mu_X]^2$	Variance, $\sigma_X^2 = \left[\int_{-\infty}^{\infty} x^2 \cdot f(x)\, dx \right] - [\mu_X]^2$
where $f(x)$ is the value of its probability distribution at x.	where $f(x)$ is the value of its probability density at x.