



UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023**

- COURSE NAME : STATISTICS FOR FOOD TECHNOLOGISTS
- COURSE CODE : BWD 11303
- PROGRAMME CODE : BWD
- EXAMINATION DATE : JULY/ AUGUST 2023
- DURATION : 3 HOURS
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 Open book
 Closed book
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

- Q1** The Americans ate an average of 25.7 pounds of confectionary products each last year and spent an average of \$61.50 per person. The standard deviation for consumption is 3.75 pounds and the standard deviation for the amount spent is \$5.89.
- (a) Write the sampling distribution for confectionary consumption and spending per person.
(1 mark)
- (b) Find the probability that the sample means of confectionary consumption was greater than 27 pounds for a random sample of 40 American consumers.
(3 marks)
- (c) Find the probability that the sample mean for confectionary spending is between \$60.00 and \$63.50 for a random sample of 50 American consumers.
(6 marks)
- Q2** Poisson distribution was used to model the number of researchers referred to the food laboratory with the rate of 6 researchers per month.
- (a) Write the probability distribution for the above situation.
(1 mark)
- (b) Calculate the probability that exactly 10 researchers are referred to the food laboratory in two months.
(4 marks)
- (c) Calculate the probability that between five and nine researchers are referred to the food laboratory in two weeks.
(5 marks)
- Q3** The number of calories contained in a sample of selection sandwiches in a fast-food restaurant is shown below.
- | | | | | | |
|-----|-----|-----|-----|-----|-----|
| 390 | 405 | 580 | 300 | 320 | 540 |
| 225 | 720 | 470 | 560 | 535 | 660 |
- Calculate the 95% confidence interval of the mean calories contained in the sandwiches.
(7 marks)

- Q4** A food inspector examined 20 jars of peanut butter in a hypermarket. He obtained the following percentages of impurities for brands A and B in **Table Q4.1**.

Table Q4.1: The percentages of impurities for brands A and B

| Brands | Percentages of impurities | | | | | | | | | |
|--------|---------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| A | 2.3 | 1.9 | 2.8 | 2.3 | 3.6 | 1.4 | 1.8 | 2.1 | 3.2 | 2.0 |
| B | 1.5 | 2.6 | 3.1 | 1.9 | 2.6 | 2.8 | 3.4 | 2.3 | 2.5 | 2.1 |

Given that the population variances are equal for both brands of peanut butter, construct the confidence interval for the difference between means impurities for brands A and B at 0.05 level of significance.

(13 marks)

- Q5** The calories contained in half-cup servings of randomly selected flavors of ice cream from two brands are listed in **Table Q5.1**. Determine whether there is sufficient evidence to conclude that the mean calories differ between the two brands at the 0.05 level of significance. Assume that the variances of the population are unknown but not equal.

Table Q5.1: Calories contained in ice cream from brands Y and Y

| Brand | Calories | | | | | | | |
|-------|----------|-----|-----|-----|-----|-----|-----|-----|
| X | 330 | 300 | 310 | 350 | 270 | 380 | 310 | 300 |
| Y | 280 | 310 | 300 | 370 | 250 | 300 | 290 | 310 |

(12 marks)

- Q6** Ten individuals went on a low-fat diet for 12 weeks to lower their cholesterol. Examine whether their cholesterol levels were significantly lowered. Use a 0.1 level of significance to test the ratio of the variance before and after a low-fat diet by referring to **Table Q6.1**.

Table Q6.1: Cholesterol level before and after a low-fat diet

| | Before | After |
|---------------------------|--------|-------|
| Sample size | 11 | 11 |
| Sample standard deviation | 71.92 | 70.53 |

(8 marks)

- Q7** Experimental design is a statistical area of study that focuses on creating and analysing experiments. This field is heavily employed in a variety of disciplines, such as agriculture, medicine, biology, marketing research, and industrial production.

- (a) Explain **FIVE (5)** commonly used principles or terms in experimental design.

(10 marks)

- (b) A researcher wants to determine whether there is a significant difference in the yield of three types of cotton seed (A, B, C) planted in three different farm plots labelled as 1, 2 and 3. The experiment was conducted in three replications.
- (i) Illustrate the arrangement experiment organized in a completely randomised design (CRD).
(5 marks)
 - (ii) Explain **TWO (2)** appropriate analysis methods to assess the cotton seed yield after planting.
(2 marks)
 - (iii) Interpret **THREE (3)** advantages of conducting completely randomised design (CRD) in the cotton planting experiment.
(3 marks)

- END OF QUESTIONS -