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ONLINE FINAL EXAMINATION**

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**COURSE NAME : INTRODUCTION TO STATISTICS  
COURSE CODE : DSM1063  
EXAMINATION : DECEMBER 2021  
DURATION : 3 HOURS**

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**INSTRUCTION TO CANDIDATES**

1. This examination paper consists of **TWO (2)** parts: PART A (10 Marks)  
PART B (30 Marks)
2. Please refer to the detailed instructions in this question paper.
3. Answer ALL questions in the answer sheet which is A4 size paper (or other paper with the consent of the relevant lecturer).
4. Write your details as follows in the upper left corner for each answer sheet:
  - i. Student Full Name
  - ii. Identification Card (I/C) No.
  - iii. Class Section
  - iv. Course Code
  - v. Course Name
  - vi. Lecturer Name
5. Each answer sheet must have a page number written at the bottom right corner.
6. Answers should be **neat and clear in handwritten form**.

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**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO**

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*This examination paper consists of **10** printed pages including front page*

**PART A**

This part contains of **TWO (2)** questions.

Answer ALL questions in Answer Booklet.

**QUESTION 1**

The number of statistics books sold in a week by 12 bookstores at town C is as follows.

11	23	12	15	22	10
16	15	7	12	26	14

- a) Find the mean and the mode.

(3 marks)

- b) By comparing the mean and the mode in (a), determine the shape of the distribution for the above data.

(1 mark)

**QUESTION 2**

The following frequency table shows the weight of 60 obese workers in Company A.

<b>Weight (kg)</b>	<b>Number of Workers</b>
90-94	2
95-99	5
100-104	12
105-109	17
110-114	14
115-119	6
120-124	3
125-129	1

- a) Calculate the mean and standard deviation.  
(4 marks)
- b) Given the mean and standard deviation for the weight of 50 workers in Company B are 64.4kg and 6.25kg, respectively. Determine which company worker's weight distribution is more dispersed.  
(2 marks)

**[10 MARKS]**

**PART B**

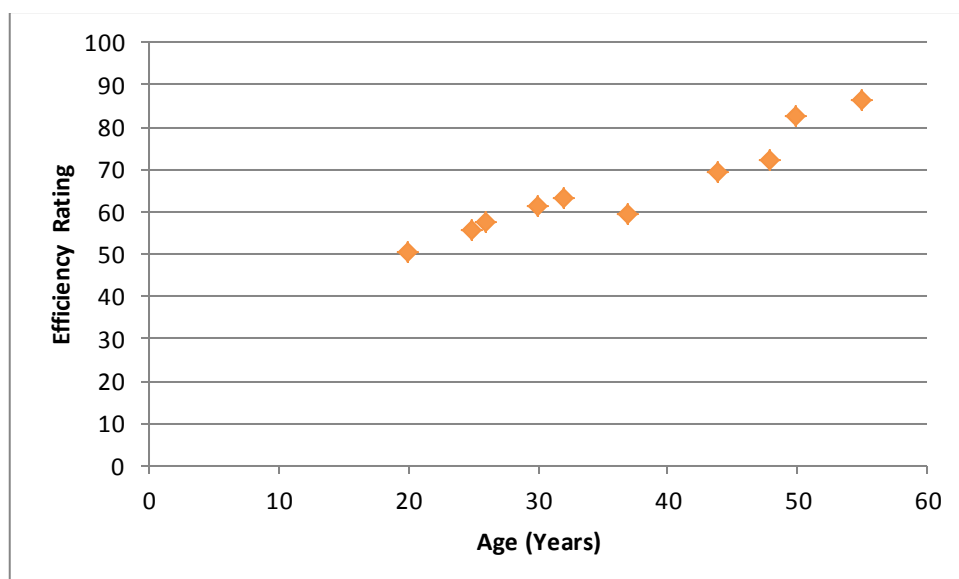
This part contains of **THREE (3)** questions.

Answer ALL questions in Answer Booklet.

**QUESTION 1**

The table below shows the age and efficiency rating of the workers in R&S Company.

Age (years)	Efficiency Rating
30	61
32	63
25	55
44	69
48	72
50	82
26	57
55	86
20	50
37	59



- a) Based on the scatter diagram above, briefly describe the relationship between the age and efficiency rating of the workers.  
(1 mark)
- b) Calculate the Pearson's Product Moment Correlation coefficient.  
(3 marks)
- c) Find the linear regression equation using the least square method.  
(3 marks)
- d) Explain the meaning of the slope coefficient obtained in (c).  
(1 mark)
- e) Estimate the efficiency rating for a worker who is 46 years old.  
(2 marks)

**QUESTION 2**

B&G restaurant requires four main ingredients for its black paper sauce. The following table shows the average price and quantity purchased for each ingredient required for a week in years 2018 and 2019.

Ingredient	2018		2019	
	Price (RM)	Quantity (kg)	Price (RM)	Quantity (kg)
<b>A</b>	5.00	500	6.00	450
<b>B</b>	7.00	375	8.00	400
<b>C</b>	6.00	300	5.00	400
<b>D</b>	9.00	200	10.00	300

Using the year 2018 as the base year, calculate:

- the simple aggregate price index in 2019 and explain the meaning.  
(3 marks)
- the Laspeyres' price index for the year 2019 and interpret the value obtained.  
(4 marks)
- the Paasche's quantity index for the year 2019.  
(3 marks)

**QUESTION 3**

The following table shows the sales (in RM'000) of a stationery item by a company from the year 2018 to 2020.

Year	Quarter			
	1	2	3	4
2018	61	54	36	48
2019	75	42	40	45
2020	83	48	44	56

- a) Find the trend values for the sales using the moving average method (Correct to three decimal places).

(4 marks)

- b) The seasonal indices for the Quarter 1, 2, 3 and 4 are given below:

Quarter	1	2	3	4
Seasonal Index (%)	151.437	X	74.474	89.457

Find the seasonal index of the Quarter 2 marked as **X** and comment on the value obtained.

(2 marks)

- c) By using the value of the seasonal index in (b), forecast the sales for the Quarter 2 of 2021.

(4 marks)

**[30 MARKS]**

**END OF QUESTION PAPER**

## APPENDIX 1

## Sample Measurements

1. Mean

$$\bar{x} = \frac{\sum x}{n} \quad \text{or} \quad \bar{x} = \frac{\sum fx}{n}$$

2. Median

$$\tilde{x} = L_m + \left[ \frac{\frac{\sum f}{2} - \sum f_{m-1}}{f_m} \right] \times C$$

3. Mode

$$\hat{x} = L_{mo} + \left[ \frac{\Delta_1}{\Delta_1 + \Delta_2} \right] \times C$$

4. Standard Deviation,

$$s = \sqrt{\frac{1}{n-1} \left( \sum fx^2 - \frac{(\sum fx)^2}{n} \right)}$$

5. Coefficient of Variation

$$CV = \frac{s}{\bar{x}} \times 100$$

Where:

- n : total frequency
- $L_m$  : lower boundary of median class
- $L_{mo}$  : lower boundary of modal class
- $\sum f_{m-1}$  : Cumulative frequency for the classes before the median class
- $f_m$  : median class frequency
- $\Delta_1$  : (modal class frequency) – (frequency for the class before the modal class)
- $\Delta_2$  : (modal class frequency) – (frequency for the class after the modal class)
- C : class size



## Correlation and Regression

### 1. Pearson's Product Moment Correlation Coefficient

$$r = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sqrt{\left[ \sum x^2 - \frac{(\sum x)^2}{n} \right] \left[ \sum y^2 - \frac{(\sum y)^2}{n} \right]}}$$

### 2. The least-square regression line, $y = a + bx$

$$i. \quad b = \frac{(\sum xy) - \left( \frac{(\sum x)(\sum y)}{n} \right)}{\left( \sum x^2 - \frac{(\sum x)^2}{n} \right)}$$

$$ii. \quad a = \frac{\sum y}{n} - b \left( \frac{\sum x}{n} \right)$$

## Index Numbers

$$1. \text{ Laspeyres' price index} = \frac{\sum p_t q_o}{\sum p_o q_o} \times 100$$

$$2. \text{ Paasche's price index} = \frac{\sum p_t q_t}{\sum p_o q_t} \times 100$$

$$3. \text{ Simple Aggregate price index} = \frac{\sum p_t}{\sum p_o} \times 100$$

$$4. \text{ Weighted aggregate price index} = \frac{\sum w p_t}{\sum w p_o} \times 100$$

Where:

$p_o$  : price of the base year

$p_t$  : price of the current year

$q_o$  : quantity of the base year

$q_t$  : quantity of the current year

$w$  : weights

### Time Series Data Analysis

1. Trend Variation Value (TVV)

$$TVV = \frac{T_L - T_1}{n - 1}$$

2. Projected Trend Value (PTV)

$$PTV = T_L + TVV(t)$$

3. Forecasting

$$Forecast = PTV \times \frac{S.I}{100}$$

Where:

$T_L$  : last trend

$T_1$  : first trend

$S.I$  : seasonal index

$n$  : number of trend

$t$  : time