

FINAL EXAMINATION

Semester	:	MAY 2024 SEMESTER
Programme Name	:	DIPLOMA IN LOGISTIC MANAGEMENT DIPLOMA IN BUSINESS STUDIES
Course Code & Name	:	DBMT3013 BUSINESS MATHEMATICS
Duration	:	3 HOURS

INSTRUCTIONS TO CANDIDATES:

1. Please read the instructions given in the question paper **CAREFULLY**.
2. The question paper consists of **FOUR (4)** questions.
3. Answer **ALL** questions in the question paper.
4. Answers to the questions are to be written into the examination booklet.
5. Electronic dictionaries, lecture notes, files or any unauthorised materials except writing equipment are strictly prohibited.

This question paper must be submitted along with all used and/or unused rough papers and/ or graph papers (if any). Candidates are **NOT ALLOWED** to take any examination paper(s) used or unused out of the examination hall.

WARNING:

The Examination Board of Peninsula College Georgetown regards cheating as a very serious offence and will not hesitate to mete out the appropriate punitive actions according to the severity of the offence committed, and in accordance with the clauses stipulated in the Students' Handbook, up to and including expulsion from Peninsula College Georgetown.

(This booklet contains 6 printed pages including this page)

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE ALLOWED TO DO SO

Answer **ALL** questions on the separate sheet provided. **[100 marks]**

1. a) An Arithmetic progression is given by $\frac{y}{2}, y, \frac{3y}{2}, 2y, \dots$
- i) Find the S_{24} in terms of y . (8 marks)
- ii) If the S_{24} is 30, compute the value of y . (4 marks)
- b) In the case of Allianz Corporation, an investment of RM30,000 was made in a vehicle maintenance. This maintenance is projected to have a useful life of four years, with an estimated salvage value of RM9,000 at the end of the four-year period. Using the **straight-line depreciation method**:
- i) Calculate the annual depreciation. (4 marks)
- ii) From **Q1(b)(i)**, find the accumulated depreciation for 7 years. (4 marks)
- iii) If the depreciation rate is 20%, by using **declining balance method** compute the accumulated depreciation at the end of 9 years. (5 marks)
- Total: [25 marks]

2. a) The following table represents the prices and quantity of four types of vegetables in the year 2020 and 2023.

Brand	Year 2020		Year 2023	
	Price (RM)	Quantity	Price (RM)	Quantity
Carrots	12.00	3	16.00	15
Cabbages	17.00	9	21.00	30
Tomatoes	13.00	13	18.00	45
Spinach	23.00	24	28.00	60

Construct the Laspeyres's index for year 2023. (10 marks)

- b) Based on the following linear programming, determine the maximum value of objective by using graphic method.
Maximize

$$3x + 5y$$

Subject to:

$$2x + 8y \leq 100$$

$$x, y \geq 0$$

(15 marks)
Total: [25 marks]

3. a) Over the last six years, the electricity rates in RM have experienced significant changes.

Year	Rates (RM)
2019	19
2020	23
2021	48
2022	60
2023	75
2024	90

- i) Develop a table to compute $t, tY, t^2, \sum Y, \sum t, \sum tY$ and $\sum t^2$.
(where $t = \text{time}$).

(13 marks)

- ii) Based on **Q3(a)(i)**, identify the least-squares trend line equation.

(6 marks)

- b) The following table represents the prices of four types of books in the year 1997, 1998, 1999 and 2000.

Types	1997	1998	2000	2021
Chemistry	10.00	12.00	14.00	16.00
Physics	17.00	20.00	28.00	35.00
Biology	15.00	25.00	32.00	40.00
Mathematics	23.00	28.00	30.00	39.00

Find the aggregate price index for year 1997 by using 1998 as base period.

(6 marks)

Total: [25 marks]

4. a) Greenfield Company sells backpacks with a selling price of RM850 and a variable cost of RM170 per unit. The company's fixed monthly expenses are RM15,000 throughout the year.

- i) Greenfield Company increases its selling price by 10% while keeping the variable cost per unit constant. Calculate the new monthly break-even point in units.

(6 marks)

- ii) Greenfield Company is considering lowering its variable cost per unit by RM100. By using original selling price, calculate the new monthly break-even point in both units and RM.

(9 marks)

- b) Data below presents the details of Tom's strategy for purchasing equipment for his hiking trip with friends. It outlines his plan and the results based on different stores.

Plan	Price of Item (RM)			
	Store A	Store B	Store C	Store D
Buy Backpack 10L	450	600	590	345
Buy Backpack 15L	500	1250	350	2500
Buy Backpack 20L	1000	1352	1800	780
Buy Backpack 25L	1250	2000	900	1300

Applying each of the decision criterion, which backpack should Tom's order for her birthday party?

i) Maximax Criterion (5 marks)

ii) Maximin Criterion (5 marks)

Total: [25 marks]

- END OF QUESTIONS -

FORMULAE LIST

Financial Mathematics

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$

$$\text{Term} = T_n = ar^{n-1}$$

$$\text{Sum of infinity, } S_\infty = \frac{a}{1-r}$$

$$\text{Annual Depreciation} = \frac{C - \text{Salvage Value}}{\text{Useful Life}}$$

$$\text{Depreciation Rate, } r = \frac{100}{\text{Useful life}}$$

$$\text{Accumulates depreciation} = \text{Annual depreciation} \times \text{Numbers of years}$$

$$\text{Book Value, } BV = \text{Cost} - \text{Accumulated Depreciation}$$

$$\text{Book Value, } BV = C(1 - r)^n$$

$$\text{Interest, } I = Prt$$

$$\text{Simple interest, } A = P(1 + rt)$$

$$\text{Compounded Amount, } A = P\left(1 + \frac{r}{n}\right)^{nt}$$

Times Series

$$b = \frac{\sum tY - \sum Y\left(\frac{\sum t}{n}\right)}{\sum t^2 - \frac{(\sum t)^2}{n}}$$

$$a = \frac{\sum Y}{n} - b\left(\frac{\sum t}{n}\right)$$

Break Even Analysis

$$\text{Total Revenue, } TR = P \times Q$$

$$\text{Total Cost, } TC = FC + VC$$

$$\text{Contribution Margin, } CM = P - VC$$

$$\text{Contribution Margin Ratio, } CMR = \frac{P - VC}{P} \times 100\%$$

$$\text{Break - even Point, } BEP(\text{Unit}) = \frac{FC}{CM}$$

$$\text{Break - even Point, } BEP(\text{Price}) = \frac{FC}{CMR} = BEP(\text{unit}) \times P$$

$$\text{Profit} = TR - TC$$

Index Number

$$\text{Price Index, } I = \frac{P_1}{P_0} \times 100$$

$$\text{Average of Price Index} = \frac{\sum \frac{P_1}{P_0} \times 100}{k}$$

$$\text{Aggregate of Price Index} = \sum \frac{P_1}{P_0} \times 100$$

$$\text{Quantity Index, } I = \frac{q_1}{q_0} \times 100$$

$$\text{Average of Quantity Index, } I = \frac{\sum \frac{q_1}{q_0} \times 100}{k}$$

$$\text{Aggregate of Quantity Index} = \sum \frac{q_1}{q_0} \times 100$$

$$\text{Paasche's index} = \frac{\sum P_1 Q_1}{\sum P_0 Q_1} \times 100$$

$$\text{Laspeyres's index} = \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times 100$$

- END OF FORMULAE LIST -