PENINSULA COLLEGE GEORGETOWN DK266-03(P)

FINAL EXAMINATION

Semester	:	**JANUARY 2026 SEMESTER**
Programme Name	:	**DIPLOMA IN LOGISTIC MANAGEMENT** **DIPLOMA IN BUSINESS STUDIES** **MICRO-AWARD IN DIPLOMA IN BUSINESS STUDIES** **MICRO-AWARD IN DIPLOMA IN LOGISTICS MANAGEMENT**
Course Code & Name	:	**DBMT3013 BUSINESS MATHEMATICS** **DBMT3013 MICRO-CREDENTIAL IN 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. The profits of a grocery shop over the 10-year period of 2009-2018 are given in Table 1.

Year	Profit (RM)
2009	15 000
2010	24 000
2011	22 000
2012	20 000
2013	21 000
2014	23 000
2015	28 000
2016	31 000
2017	30 000
2018	34 000

Table 1: Grocery shop's profit

a) Using data in Table 1, develop a **table** to compute t, tY, t^2, ΣY, Σt, ΣtY and Σt^2, where t represents the coded time (years starting from 1). (13 marks)

b) Based on the computed value, determine the linear trend equation of the form $\boldsymbol{Y = a + bt}$ (5 marks)

c) **Plot** the time series graph on graph paper showing the production trend for the ten years and include the trend line. (7 marks)

Total: [25 marks]

2. a) Simple interest and compound interest are used to solve the following five financial situations. Find the required value for each scenario using the appropriate formula.

i) Scenario 1: A grocery shop owner borrows RM20,000 from a bank to renovate his shop. The bank charges 7% per annum of simple interest for 2 years.
Calculate the **total amount** the owner must repay at the end of 2 years. (3 marks)

ii) Scenario 2: A customer deposits RM15,000 in a bank offering 5% per annum compounded annually for 3 years.
Calculate the **compound amount** at the end of 3 years. (3 marks)

iii) Scenario 3: A trader borrowed RM12,000 for 8 months. At the end of the period, he repaid RM12,800.
Calculate the simple interest **rate** per annum charged by the bank. (3 marks)

iv) Scenarios 4: A small café invests RM10,000 at 6% per annum compounded quarterly for 2 years.
Calculate the **compound amount** at the end of 2 years. (3 marks)

2. v) Scenarios 5: An entrepreneur has RM8,000 to invest in for 3 years.

- Bank A offers 5% simple interest per annum.
- Bank B offers 5% per annum compound annually.

Determine **which investment** gives a higher return. (3 marks)

b) The sum of the first n terms of the progression 36,34,32, … is 0. Find $\boldsymbol{n}$ and the **tenth term.** (5 marks)

c) The sum of the first twelve terms of an arithmetic sequence is 1, 188. If the sixth term is 89, find $\boldsymbol{a}$, the **common difference** and the **fifteenth term**. (5 marks)

Total: [25 marks]

3. The retail company is considering investing in three products. Below, they have gathered the following data on the prices and quantities of the products sold over the last three years:

Year	Price Product A	Quantity Product A	Price Product B	Quantity Product B	Price Product C	Quantity Product C
2020	15	120	20	100	10	150
2021	18	130	22	110	12	140
2022	20	140	25	120	15	160

Table 2: Prices and quantities of selected three product

a) **Using 2020 as the base year**, calculate the **Paasche Price Index** for 2021 and 2022, and interpret the results in the context of the investment decisions. (18 marks)

b) **Using 2020 as the base year**, and the Paasche Price in **Q3(a)**, calculate the **Value Index** for the years 2022. (7 marks)

Total: [25 marks]

4. ABC Electronics Sdn. Bhd., a leading supplier of consumer electronics, is evaluating its current pricing and cost structure to improve profitability and operational efficiency.

The company's current data is as follows:

- Selling price per unit: RM200
- Variable cost per unit: RM120
- Monthly fixed costs: RM250,000

a) Calculate the company's monthly contribution margin per unit, contribution margin ratio, and break-even point in units and in RM for the current operations. (10 marks)

b) In 2024, ABC Electronics plans to introduce a new "Smart Home Expansion" product line that will result in a **reduction** of monthly fixed costs by RM30,000. However, the introduction of the new product line will also **increase** the variable cost per unit by RM15 due to higher production complexities.

Using financial mathematical techniques, calculate the new break-even point (in units and RM) after implementing the new product line. Compare them with break-even point (BEP) calculated based on **Q4(a).** (10 marks)

4. c) Determine the fixed costs and variable costs in the context of ABC Electronics and provide **THREE (3)** examples of each both cost above in relation to the company's operations. (5 marks)

Total: [25 marks]

- END OF QUESTIONS -

FORMULAE LIST

Financial Mathematics

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

$$T_n = a_1 + (n-1)d$$

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

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

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

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

$$Accumulates\ depreciation = Annual\ depreciation\ \times Numbers\ of\ years$$

$$Book\ Value, BV = Cost - Accumulated\ Depreciation$$

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

$$Interest, I = Prt$$

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

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

Times Series

$$y = a + bt$$

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

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

Break Even Analysis

$$Total\ Revenue, TR = SP \times Q$$

$$Total\ Cost, TC = FC + VC$$

$$Contribution\ Margin, CM = SP - VC$$

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

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

$$Break - even\ Point\ , BEP(Price) = \frac{FC}{CMR}\ \boldsymbol{or}\ BEP(unit) \times SP$$

$$Profit = TR - TC$$

Index Number

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

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

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

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

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

$$Aggregate\ of\ Quantity\ Index = \frac{\sum Q_1}{\sum Q_0} \times 100$$

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

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

Decision Analysis

$$Weighted\ average = \alpha(maximum\ in\ row) + (1 - \alpha)(minimum\ in\ row)$$

- END OF FORMULAE LIST -