

**FINAL EXAMINATION****BACHELOR IN COMPUTER SCIENCE (HONOURS)**

COURSE	: MATHEMATICS FOR COMPUTER SCIENCES
COURSE CODE	: PPM1020
DURATION	: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

1. This question paper consists of **FOUR (4)** questions.
2. Answer ALL questions in the Answer Booklet provided.
3. Please check to make sure that this examination pack consists of:
 - i. The Question Paper
 - ii. An Answer Booklet
 - iii. Appendix 1(1), 1(2), 1(3), 1(4) and 2
4. Do not bring any material into the examination hall. Electronic calculators are allowed.
5. Please write your answer using permanent ink.

MYKAD/ PASSPORT NO. : _____

ID. NO. : _____

LECTURER : _____

SECTION : _____

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO

This question paper consists of 5 printed pages including the front page

QUESTION 1

- a. Differentiate the following functions with respect to x .
- i. $f(x) = 5 \sin x + 3x^2 - e^{5x} + \ln 2x$ (2 marks)
- ii. $g(x) = \sin 3x^2 - \cos 5x^6$ (2 marks)
- b. Find the derivative function $f(x) = (x + 3)(x - 1)(x + 2)$ with respect to x using product rule. (5 marks)
- c. Given the curve $f(x) = 2x^3 + 6x^2 - 1$.
- i. Calculate the turning points. (4 marks)
- ii. Sketch the graph and plot the turning points. (3 marks)
- iii. Identify the maximum and minimum points. (2 marks)
- d. Integrate the following functions with respect to x .
- i. $\int (8x^3 - 9x^2 + 7) dx$ (2 marks)
- ii. $\int \frac{2}{x-5} dx$ (2 marks)
- iii. $\int (4e^{2x} + \sin 3x) dx$ (2 marks)
- (Total: 24 marks)

QUESTION 2

The prices of one box of pens and one box of pencils are RM6 and RM3 respectively. A stationery shop owner, Amir, buys x boxes of pens and y boxes of pencils on the following conditions:

The number of boxes of pens is not less than the number of boxes of pencils.
Amir buys not more than 60 boxes of stationery in total.
Amir spends at least RM180 on all the stationery.

- a. Write all the inequalities that represent the above situations. (7 marks)
 - b. Construct and shade the region of feasible solutions. (8 marks)
- (Total: 15 marks)

QUESTION 3

- a. In 2022, the price of a notebook was RM4.00. In 2025, the price increased to RM5.20. Using 2022 as the base year, calculate the price relative index for 2025. Interpret your answer. (4 marks)
- b. A stationery shop wants to study the change in prices of selected items. The quantities purchased and prices in 2024 and 2025 are shown in Table 1. Calculate the weighted aggregate price index for the year 2025, using 2024 as the base year. Interpret your answer.

Table 1

Types of items	Quantity	Price	
		2024	2025
Pen	10	RM1.20	RM1.50
Notebook	6	RM3.50	RM4.20
Eraser	12	RM0.80	RM1.00

(7 marks)

- c. A supermarket sells three products: rice, cooking oil, and eggs. The quantities sold and prices in the base year (2023) and the current year (2024) are shown in Table 2.

Table 2

Products	Quantity		Price	
	2023	2024	2023	2024
Rice	200 kg	220 kg	RM4.00	RM4.60
Cooking Oil	120 bottles	140 bottles	RM6.50	RM7.20
Eggs	300 trays	320 trays	RM8.00	RM9.00

Calculate the Laspeyres Price Index for 2024 using 2023 as the base year. Explain your answer.

(7 marks)

(Total: 18 marks)

QUESTION 4

- a. A bag contains 52 coloured marbles: 13 red, 13 blue, 13 green and 13 yellow. If you randomly draw one marble from the bag, what is the probability of
- i. selecting a green marble? (3 marks)
 - ii. selecting a marble that is not yellow? (4 marks)
- b. In the library, there are 30 books on a shelf. Eight of them are fiction, twelve are non-fiction and the remaining are biographies. If a book is selected at random, what is the probability that it is either fiction or biography book, given that the two events are mutually exclusive? (3 marks)
- c. A factory produces electric motors and the lifetime of these motors follows a normal distribution. The mean is 1,000 hours and a standard deviation is 100 hours. If a motor is selected at random, find the probability that its lifetime
- i. exceeds 950 hours. (6 marks)
 - ii. is between 980 hours and 1,040 hours. (7 marks)

(Total: 23 marks)

(TOTAL: 80 MARKS)

END OF QUESTION PAPER

APPENDIX 1(1)

THE DERIVATIVES OF A FUNCTION

a. The Derivatives of functions

$$1. \frac{d}{dx}(x^n) = nx^{n-1}$$

$$2. \frac{d}{dx}[f(x)]^n = n[f(x)]^{n-1} \cdot f'(x)$$

$$3. \frac{d}{dx}(e^{f(x)}) = e^{f(x)} \cdot f'(x)$$

$$4. \frac{d}{dx} \ln(f(x)) = \frac{1}{f(x)} \cdot f'(x)$$

$$5. \frac{d}{dx} \sin x = \cos x$$

$$6. \frac{d}{dx} \cos x = -\sin x$$

$$7. \frac{d}{dx} \tan x = \sec^2 x$$

b. Techniques of differentiation

$$1. \text{ Derivatives of sum and difference} \\ \frac{d}{dx}[f(x) \pm g(x)] = \frac{d}{dx}f(x) \pm \frac{d}{dx}g(x)$$

$$2. \text{ The Product Rule} \\ \frac{dy}{dx} = uv' + vu'$$

$$3. \text{ The Quotient Rule} \\ \frac{dy}{dx} = \frac{vu' - uv'}{v^2}$$

$$4. \text{ The Chain Rule} \\ f'(x) = n \cdot [f(x)]^{n-1} \cdot f'(x)$$

APPENDIX 1(2)

THE INTEGRALS OF A FUNCTION

a. The Indefinite Integrals of functions

$$1. \int k \, dx = kx + c$$

$$2. \int x^n \, dx = \frac{x^{n+1}}{n+1} + c$$

$$3. \int e^{f(x)} \, dx = \frac{e^{f(x)}}{f'(x)} + c$$

$$4. \int [f(x) \pm g(x)] \, dx = \int f(x) \, dx \pm \int g(x) \, dx$$

$$5. \int \frac{1}{ax+b} \, dx = \frac{\ln|ax+b|}{a} + c$$

$$6. \int \cos ax \, dx = \frac{\sin ax}{a} + c$$

$$7. \int \sin ax \, dx = -\frac{\cos ax}{a} + c$$

$$8. \int \sec^2 ax \, dx = \frac{\tan ax}{a} + c$$

b. The Definitie Integrals of functions

$$\int_a^b f(x) \, dx = F(b) - F(a)$$

APPENDIX 1(3)

SIMPLE RELATIVE INDEX

- a. Simple Relative Price Index

$$I = \frac{P_t}{P_0} \times 100$$

- b. Simple Relative Quantity Index

$$I = \frac{q_t}{q_0} \times 100$$

WEIGHTED INDEX

- a. Weighted Price Index

$$I = \frac{\sum w p_t}{\sum w p_0} \times 100$$

- b. Weighted Quantity Index

$$I = \frac{\sum w q_t}{\sum w q_0} \times 100$$

LASPEYRES' INDEX

- a. Laspeyres' Price Index

$$I = \frac{\sum p_t q_0}{\sum p_0 q_0} \times 100$$

- b. Laspeyres' Quantity Index

$$I = \frac{\sum q_t p_0}{\sum q_0 p_0} \times 100$$

PAASCHE'S INDEX

- a. Paasche's Price Index

$$I = \frac{\sum p_t q_t}{\sum p_0 q_t} \times 100$$

- b. Paasche's Quantity Index

$$I = \frac{\sum q_t p_t}{\sum q_0 p_t} \times 100$$

APPENDIX 1(4)

PROBABILITY

1. Addition rule:

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$P(A \cup B) = P(A) + P(B)$ if and only if A and B are mutually exclusive events

2. Multiplication rule:

$$P(A \cap B) = P(B) \cdot P(A|B)$$

$P(A \cap B) = P(A) \cdot P(B)$ if and only if A and B are independent events

NORMAL DISTRIBUTION

$$Z = \frac{X - \mu}{\sigma}$$

Normal Distribution Table

NORMAL DISTRIBUTION

Eg: $P(0 \leq z \leq 1.24) = 0.3925$

[illegible]