

ARTHUR LEWIS COMMUNITY COLLEGE
ACADEMIC YEAR (2024/2025) - SEMESTER TWO
END OF SEMESTER EXAMINATION
ALTERNATE

COURSE CODE : MAT216
COURSE TITLE : Calculus IIa
LECTURER(S) : John Estephane
DATE :
TIME :
DURATION : 2 Hours
STUDENT ID # : _____

GENERAL INFORMATION AND INSTRUCTIONS

- Students must sign **IN** and **OUT** on the examination class list.

Write your ID number on the question paper.

INSTRUCTIONS:

This examination consists of seven (7) questions. You are required to answer **ALL** questions in the spaces provided.

Please write in **BLACK** or **BLUE** pen. **NO WRITING IN PENCIL.**

SHOW ALL NECESSARY WORKING.

ONLY NON-PROGRAMMABLE CALCULATORS ARE PERMITTED

Question	Max. score	Student's mark	Moderated Mark
1	8		
2	7		
3	7		
4	9		
5	9		
6	9		
7	11		
TOTAL	60		

Instruction: Answer the following questions in the space provided.

1. Find the first three non-zero terms in the Mac Lauren Series for

(a) $e^x \sin x$

[4]

(b) $\tan x$

[4]

2. Answer the following questions on the hyperbolic functions

(a) Solve for $7 \sinh x + 20 \cosh x = 24$

[7]

3. Answer the following questions on inverse trigonometric functions

(a) Find an expression for $\sin(\arccos x)$

[4]

(b) Hence evaluate $\sin\left(\arccos\frac{1}{3}\right)$

[3]

4. Given that $x^2 + y^2 = 49$

(a) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$

[4]

(b) Find the equation of the tangent to the circle $x^2 + y^2 = 49$ at the point (2,3) [5]

5. Evaluate the following integrals.

(a) Show that $\int \tan^4 \theta \sec^2 \theta \, d\theta = \frac{\tan^5 \theta}{5} + C$ [4]

(b) $\int_0^\pi x \cos(x^2) dx$

[5]

6. The variable x and y are defined parametrically in terms of the variable t . It is known that $x = 2t^3$ and that $\frac{dy}{dx} = 2t + 4t^3$

- (a) Find an expression for $\frac{dx}{dt}$ in terms of t .

[5]

(b) Given that $y = 10$ and $t = 1$, find an expression for y in terms of t [4]

7. Solve using partial fractions. $\int_{-1}^0 \frac{w^2+7w}{(w+2)(w-1)(w-4)} dw$ [11]

END OF EXAMINATION