SIR ARTHUR LEWIS COMMUNITY COLLEGE

ACADEMIC YEAR (2024/2025) – SEMESTER TWO

END OF SEMESTER EXAMINATION

COURSE CODE	:	**MAT216**
COURSE TITLE	:	**Calculus IIa**
LECTURER(S)	:	**John Estephane**
DATE	:	**May 7, 2025**
TIME	:	**9 a.m.**
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**		

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

Instruction: Answer the following questions in the space provided.

1. (i) Give the values of the following

   a. $arc\sin\left(\frac{1}{2}\right)$ [1]

   b. $\cos\left(\cos^{-1}\frac{\sqrt{3}}{2}\right)$ [1]

   c. $\arccos\left(\sin\frac{\pi}{6}\right)$ [1]

   (ii) Find the value of sin (arc cos x) [3]

   (iii) Hence, evaluate $\sin\left(\text{arc}\cos\frac{2}{3}\right)$ [2]

2. Solve the following equation giving your answers in terms of natural logarithms

$$2\cosh 2x + 3\cosh x = 8$$

[7]

3. Find the Taylor series for f(x) centered at the given value of a. Give the first four non – zero terms

(a) $f(x) = \sin x\,, \quad a = \frac{\pi}{6}$ [7]

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4. A curve is defined implicitly by $x^3 - 2xy + y^2 = 13$

   a. Find $\frac{dy}{dx}$ [5]

   b. Hence, find the equation of the normal to the curve at the point $P(-2,3)$ [4]

5. Given that a curve C is defined parametrically as

$$x = 3t^2 + 1 \qquad y = t^3 - 2t^2$$

(a) Find $\frac{dy}{dx}$ in terms of t. [4]

(b) show that $\frac{d^2y}{dx^2} = \frac{1}{12t}$ [5]

6. Find the following integrals

   a. $\int \sin^{10} x \cos x \, dx$ [4]

   b. Find $\int x \sin(x^2)$by using $u = x^2$ [5]

7. Given that $f(x) = \frac{1}{x^2(x-1)} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x-1}$

i. Find the values of A, B and C [5]

ii. Hence find $\int f(x)\, dx$ [6]

END OF EXAMINATION