# TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## UNIVERSITY EXAMINATION FOR:

DIPLOMA IN TECHNOLOGY IN ELECTRICAL AND ELECTRONIC ENGINEERING

AMA 2151: ENGINEERING MATHS II.

END OF SEMESTER EXAMINATION (SUPPLEMENTARY)

**SERIES:** AUGUST, 2019

**TIME:** 2 HOURS

**DATE:** AUGUST, 2019

**Instructions to Candidates**

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

This paper consists of FIVE questions. Answer Question ONE and any TWO.

**Do not write on the question paper.**

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**Question ONE**

(a) If $x = tan\left(\frac{\pi}{4} + \frac{\theta}{2}\right)$

(i) Find $e^{x}$ *and* $e^{-x}$

(ii) Hence show that $sinhx = tan\theta$ **[10 marks]**

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(b) Given $y = x^{5}sin2xcos4x$, evaluate $\frac{dy}{dx}$ **[4 marks]**

(c) Evaluate $\int e^{3x}sinx\,dx$ [3 **marks]**

(d) Determine $\lim_{x-0}(\frac{x-sinx}{x^2})$ **[3 marks]**

(e) Find the points of inflection on the graph of the function

$$y = 3x^5\text{-}55x^4 + x + 4$$ [**10 marks]**

Type equation here.

**Question TWO**

(a) Evaluate $\int \frac{7x+8}{2x^2+11x+5}\,dx$ **[8 marks]**

(b) Sketch and find the area bounded by $y = 5 + 4x - x^2$ the x- axis and the ordinates x=1 and x=4 **[8 marks]**

(c) Prove that $\sin\theta = 3sinh\theta + 4sinh\theta$ **[4 marks]**

**Question THREE**

**(a)** Differentiate $y = \frac{1}{((2X^2-X+7)^2)}$ **[5 marks]**

(b) Evaluate $\int_4^9 \frac{\sqrt{x}}{(30--)}$ **[9 marks]**

(c) Find (i) $\lim_{x-3}(\frac{x-3}{x^2-9})$

(ii) $\lim_{x-3}\frac{x^3+3x^2-x-3}{x^2+x-6}$ **[6 marks]**

**Question FOUR**

(a) Find $\frac{dy}{dx}$ given $y = \frac{\sqrt{((x^2+1)^3)}}{\sqrt[3]{((x^3 1)^4)}}$ **[10 marks]**

(b) Find $\int sinh^2 x dx$ **[4 marks]**

(c) $y = sin\theta - sin^3\theta$ , $x = cos^3\theta$

Find (i) $\frac{dy}{dx}$

(ii) $\frac{d^2y}{dx^2}$ **[6 marks]**

**Question FIVE**

(a) Find $\lim_{x-1} \frac{1-x+\ln x}{1+cos\pi x}$ **[5 marks]**

(b). Find $\int x\sqrt{x^2+1}\, dx$ **[7 marks]**

(c) Solve for real values of x: $3cosh2x = 3 + sinh2x$ **[5 marks]**

(d) Given that $y = \ln(3 - 4cosx)$. Find $\frac{dy}{dx}$ **[3 marks]**