TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MEDICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MEDICAL ENGINEERING

AMA2151: ENGINEERING MATHEMATICS II

END OF SEMESTER EXAMINATION

SERIES: APRIL 2016

TIME: 2HOURS

DATE: 9May2016

<u>**Instructions to Candidates**</u>
You should have the following for this examination
-*Answer Booklet, examination pass and student ID*
This paper consists of **FIVE** questions. Attemptquestion ONE (Compulsory) and any other TWO questions.
Do not write on the question paper.

Question ONE

a)
   i) Differentiate from the first principle $y = x^3$
   ii) Determine $\int \frac{1}{\sqrt{a^2 - x^2}}$ (10 marks)

b) Express the roots of $(-10 + j2)^{\frac{-3}{6}}$ in polar form (10 marks)

c)
   i. Determine the logarithmic form for $sinh^{-1} x$
   ii. Using the series expansion for $\cosh x$, evaluate $\cosh 2.8$ correct to five significant figures
   (10 marks)

Question TWO

a) Solve the equation $2.6 coshx + 5.1 sinh = 8.73$ correct to four decimal places
   (6 marks)

b) Determine the series for $cosh\frac{\theta}{2} - \sinh 2\theta$ (8 marks)

c) Evaluate $\sinh x = 3$ correct to three decimal places   (6 marks)

Question THREE

a) The parametric equations for a hyperbola are $x = 2\sec\theta, \ y = \tan\theta$. Evaluate
  i. $\frac{dy}{dx}$
  ii. $\frac{d^2y}{dx^2}$ taking $\theta = 1 \ rad$ (10 marks)
b) Determine the derivative for the following
  i. $y = \frac{\sin x}{\cos x}$
  ii. $y = \frac{(3x-1)\cos 2x}{e^{2x}}$ (10 marks)

Question FOUR

a) Evaluate $\int_0^{\frac{\pi}{4}} 4\cos^4\theta \ d\theta$ (10 marks)
b) Determine $\int \frac{3x^2+18x+3}{3x^2+5x-2}$ (10 marks)

Question FIVE

a) Given an alternating voltage of 240V, 50Hz connected across an impedance of $(60 - j100)\Omega$ determine
  i.   resistance
  ii. capacitance
  iii. impedance
  iv. phase angle
  v.   current flowing   (10 marks)
b) i) express $\frac{(6+j)(2-j)}{(4+3j)(1-2j)}$ in the form $a + jb$
  ii) convert $7 < -145°$ into rectangle form
  iii) express $\frac{(2+j)^2}{3-j}$ in the form $r(\cos\theta + j\sin\theta)$ (10 marks)