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:APRIL2016

TIME:2HOURS

DATE:9May2016

Instructions to Candidates

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 $2.6coshx + 5.1sinh = 8.73$ 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 $x = 2sec\theta,\ \ y = \tan\theta$. 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 $r(cos\theta + jsin\theta)$ (10 marks)