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) Express $\frac{(1+j)(2+j)}{3+j}$ in the form $a + jb$ (10 marks)

b) Differentiate the following

i. $y = x^4 e^{3x} \tan x$

ii. $y = \frac{\cos x}{\sin x}$ (10 marks)

c) Determine

i. $\int xlnx\, dx$

ii. $\int_0^{\pi} (e^x - 2\sin x) dx$ (10 marks)

Question TWO

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

b)Determine the magnitude and directions of the resultant of three coplanar forces acting at a point given that force A is 10N acting at 45^o from the positive horizontal axis, force B is 87N acting at 120^o from the

positive horizontal axis and force C is 15N acting at 210^{o} from the positive horizontal axis. (10 marks)

Question THREE

a) Given that $x^2 + y^2 + 2x - 6x + 5 = 0$ determine,

i. $\frac{dy}{dx}$

ii. $\frac{d^2y}{dx^2}$ taking $x = 3$ and $y = 2$ (10 marks)

b) 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)

Question FOUR

Solve the following equations

a) $\int \frac{x}{3x^2+2}dx$

b) $\int e^{3x}\sin x\ dx$

c) $\int \frac{3x^2+18x+3}{3x^2+5x-2}dx$ (20 marks)

Question FIVE

a) Differentiate from the first principle $y = \sin x$ (10 marks)

b) .i)$\int \frac{x^2}{(x-2)(x^2+1)}dx$

ii) Differentiate $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (10 marks)