TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF MATHS & PHYSICS

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN ELECTRICAL & ELECTRONIC ENGINEERING

AMA1151 ENGINEERING MATHEMATICS 2

END OF SEMESTER EXAMINATION

SERIES: APRIL / MAY 2016 SERIES

TIME: 2HRS

DATE: APRIL / MAY 2016

Instructions to Candidates
You should have the following for this examination
-Answer Booklet, examination pass and student IDMathematical table, calculator, no mobile phone
This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.
Do not write on the question paper.

QUESTION ONE

a) Prove the following identities:-
   (i)   Given that $\sin(A+B) - \sin A \cos B + \cos A \sin B$ prove that
          $\sin 3A = 3\sin A - 4\sin 3A$ (6Mks)

   (ii)   In triangle ABC, A=4.73 and $<c=42^0 12'$ calculate the size of angle A (6Mks)

b) Express in polar co-ordinates (-2, -3)   (5Mks)

c) Express $\dfrac{1}{(x+2)(x-1)^2}$ in partial fractions   (6Mks)

d) Simplify $\dfrac{1}{(x^2 - a^2)}$ when x=a cosec ө   (7Mks)

QUESTION TWO

a) A triangle ABC has AB=19cm, AC=16cm and $<ABC = 50^0$. Find the remaining sides and angles.

(8Mks)

b) Find the values of θ between 0^0 and 360^0 that satisfy the equation

$5 = 4\cos^2\theta + 4\sin\theta = 0$ (5Mks)

c) (i) Prove that $\tan\theta + \cos\theta = \sec\theta\csc\theta$ (3Mks)

(ii) In the right angled triangle ABC where C=12, b =5 and a=13 find
sec B and cosec C (5Mks)

QUESTION THREE

a) Differentiate from first principle
$f(x) = 3x^2 + 6x - 3$ (4Mks)

b) Find the gradient of the curve

$X = \dfrac{t}{1 + t}$ $\qquad$ $y = \dfrac{t^2}{1 + t}$ $\qquad$ at the point (½, ½) (5Mks)

c) Differentiate the following expressions
(i) $Y = (x^2 - 3)(x + 1)$ and simplify the result (4Mks)

(ii) $Y = 2^{x}2$ (3Mks)

(iii) $(3x + 2)^4$ (3Mks)

QUESTIONS FOUR

a) If $\dfrac{(2 - j)(3 + j^2)}{3 - j4} =$ $\qquad$ $r(\cos\theta + jSin\theta)$ (4 mks)

Find r

b) (i) Rationalize

$\dfrac{2 - j3}{1 + j2}$ (3mks)

(ii) If $(2 + j3)(3 - j4) = x + jy$ find x and y (3Mks)

c) Given $\cos3\theta + jSin3\theta) = (\cos\theta + jSin\theta)^3$ by demoivers theorem; expand the expression and hence find tan 3θ (4Mks)

(ii) Find the fourth roots of $3 - j4$ (6Mks)

QUESTION FIVE

a) (i) Use the second derivative test to investigate the stationing values of
the function xe^{-x} (5Mks)

(ii) In alternating voltage is given by
$\mu = 20Sin\ 50t$ volts, where t is the time in seconds. Calculate the rate of change of voltage when t
= 0.01s (3Mks)

b) (i) Investigate the stationery values of the function
$f(x) = x^3 - 3x2 + 3x$ and sketch the graphs of $y = f(x)$ (5Mks)

(ii) Express $\dfrac{7x^2 - 18x - 7}{(x - 4)(2x^2 - 6x + 3)}$ in partial functions.   (7Mks)