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) Evaluate the following

i) Cosec 17.92^0 (2Mks)

ii) Sec 49^0 (2mks)

iii) Cot 83^{016} (2Mks)

b) Express $\frac{11x + 12}{(2x+3)(x+2)(x-3)}$ (6Mks)

c) Prove the following identities

i) $I+\tan^2\theta = \sec^2\theta$ (3Mks)

ii) In triangle PQR, QR = 3.5, RP = 4 and PQ = 5. Calculate the size of angle P and hence find the area of the triangle (5Mks)

d) Express (4, -3) in polar coordinates (4Mks)

e) Differentiate from first principles $f(x)=x^2$ and find the value of the gradient of the curve at x=3 (6Mks)

QUESTION TWO

a) Solve the triangle ABC, given $<c=67^0$ a=16.40cm and b=11.80cm (8Mks)

b) Draw up a table of values from which you plot a graph of y=cosɵ and y=sinɵ (4Mks)

c) (i) Prove that $\frac{\sin^3\theta + \sin\theta\cos^2\theta = \tan\theta}{\cos\theta}$ (4Mks)

(ii) Solve for ɵ the equation

$\sin^2\theta - 1.707\sin\theta\cos\theta + 0.707\cos^2\theta = 0$

Where $0 < \theta < 360^0$ (4Mks)

QUESTION THREE

a) (i) Find the cube roots of 1 and show them on argand diagram (6Mks)

b) (i) With aid of a diagram express

(i) -5 +ʃ4 in polar form (4mks)

(ii) 3 <300 in the form of a + jb (4Mks)

c) (i) Simply $\frac{4 - j5}{2 - j}$ (4mks)

(ii) Determine (3 – j2) (3 + j2) (2Mks)

QUESTIONS FOUR

a) (i) Find from first principles $f'(x)$ when $f(x) = x$ (4mks)

b) (i) Obtain the differential coefficient of $3x^4 - 2x^3 + x^2 - x + 10 = 0$ (2Mks)

(ii) Find the equations of the tangent and normal to the curve $X^2 + y^2 x 3xy - 11 = 0$ at the point x = 1, y = 2 (6Mks)

c) Differentiate the following

(i) X^3 Sinx (2Mks)

(ii) $\frac{4e^x}{Sin^x}$ (2Mks)

(iii) Tan(4x + 1) (4Mks)

QUESTION FIVE

a) Express the following in partial fractions

(i) $\frac{1}{(x + 2)(x-1)^2}$ (4Mks)

(ii) $\frac{3x + 1}{(x - 1)(x^2 + 1)}$ (6Mks)

b) (i) Find the greatest or least value of the function $f(x) = x^2 + 4x + 3$ (4Mks)

(ii) 1000m of fencing is to be used to make a rectangular enclosure find the greatest possible area and the corresponding dimensions. (6Mks)