TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

Department of Mathematics & Physics

UNIVERSITY EXAMINATION FOR:

Certificate in Electrical and Electronic Engineering

AMA 1151 ENGINEERING MATHEMATICS II

END OF SEMESTER EXAMINATION

SERIES: July 2017

TIME: Two HOURS

Instructions to Candidates

You should have the following for this examination
Answer Booklet, examination pass and student ID, Scientific Calculator & No Mobile Phone.
This paper consists of five questions. Attempt Question One **COMPULSORY** and any other TWO questions.
Maximum marks for each part of a question are as shown.
This paper consists of **THREE** printed pages

Do not write on the question paper.

QUESTION ONE (Compulsory)

a) Using special triangles and without using calculator, write down the values of :-

i) Sin 30^0 (2Mks)

ii) Cos 30^0 (2Mks)

iii) Tan 45^0 (2Mks)

b) (i) Solve the equation $1 + \text{Cos}\ \theta = 2\text{Sin}^2\ \theta$ for values of between 0 and 36^0. (6Mks)

(ii) Calculate the area of triangle ABC givenType equation here. $<ACB = 49^0$. (3Mks)

c) Express $(6, 120^0)$ in contesion co-ordinates (3Mks)

d) Express $\frac{2x^2 + 6x - 35}{x^2 - x - 12}$ in partial fractions (5Mks)

e) Find the derivative of $Y=3x^2 + 7x$ from first principles. (7Mks)

QUESTION TWO

a) (i) Eliminate θ from the equations $x = a \sin\theta$, $y = b \tan\theta$ (3Mks)

ii) Prove that $\sin 3A = 3\sin A - 4\sin 3A$ (5Mks)

b) Draw up a table of values from which you plot a graph of $Y = \sin Ø$ (5Mks)

c) Solve triangle JKL, given $<j = 123^0 17$,

JK = 72mm and JL = 43mm (7Mks)

QUESTION THREE

a) (i) Express $\frac{2 + j3}{1 + j}$ in form p + jy (4Mks)

i) Given IzI = 10 and arg. z = 120^0. Write down Z (3Mks)

b) Express the complex number -4-j3 in polar form (5Mks)

c) i) Find the modulus and argument of

$\frac{1}{12 + j5}$ if $12+J5 = r(\cos\theta - j\sin\theta)$ (6Mks)

ii) Let Z = 4+j2 and w = 7-j3. Find Z+W (2Mks)

QUENSTION FOUR

a) Express the following in partial fractions

i) $\frac{x+7}{x^2 + 7x + 10}$ (5Mks)

ii) $\frac{42x + 44}{(6x + 5)^2}$ (5Mks)

b) Find the three cube roots of 5-j3 in the form a+jb (giving the values of a and b to three decimal places), and represent them on an Argand diagram.

(10Mks)

QUESTION FIVE

a) i) Find the turning values of y on the graph y=f(x) where $f(x) = 5+24x-9x^2-2x^3$ and distinguish between them. (6Mks)

b) Differentiate the expression

$Y=(x^2-3)(x+1)^2$ and simplify the results (4Mks)

c) Differentiate the following:

i) $2\sin 4x - 3\cos 4x$ (3Mks)

ii) $2\cos\frac{1}{3}\prod^{x}$ (3Mks)

iii) $\sin(3x-2)^3$ (4Mks)