PP2

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 AcosB + CosA SinB prove that Sin3A = 3SinA-4Sin 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 $\frac{1}{(x+2)(x-1)^2}$ in partial fractions (6Mks)

d) Simplify $\frac{1}{\sqrt{(x^2 - a^2)}}$ when x=a cosec ɵ (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 ɵ between 0^0 and 360^0 that satisfy the equation
$5 = 4\cos^2\theta + 4\sin\theta = 0$ (5Mks)

c) (i) Prove that $\tan\theta + \cos\theta = \sec\theta\operatorname{cosec}\theta$ (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
$X = \frac{t}{1+t}$ $y = \frac{t^2}{1+t}$ at the point (½, ½) (5Mks)

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

(ii) $Y = 2^{x2}$ (3Mks)

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

QUESTIONS FOUR

a) If $\frac{(2 - j)(3 + j^2)}{3 - j4} = r(\cos\theta + j\sin\theta)$ (4 mks)
Find r

b) (i) Rationalize
$$\frac{2 - j3}{1 + j2}$$ (3mks)

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

c) Given $\cos3\theta + j\sin3\theta) = (\cos\theta + j\sin\theta)^3$ by demoivers theorem; expand the expression and hence find tan 3ɵ (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
μ = 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
$f(x) = x^3\text{-}3x2 + 3x$ and sketch the graphs of $y = f(x)$ (5Mks)

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