Faculty of Engineering and Technology
Department of Mechanical & Automotive Engineering
UNIVERSITY EXAMINATION FOR:
DIPLOMA IN MARINE ENGINEERING
EMR 2201 : ENGINEERING MATH III
SPECIAL/ SUPPLIMENTARY EXAMINATIONS
SERIES: SEPTEMBER 2018
TIME: 2 HOURS
DATE: Sep2018

Instruction to Candidates:
You should have the following for this examination
- *Answer booklet*
- *Non-Programmable scientific calculator*

This paper consists of **FIVE** questions. Attempt question **ONE** and any other **TWO** questions.
Maximum marks for each part of a question are as shown.
Do not write on the question paper.

Question ONE(30mks)

a)Evaluate $(\frac{1+j3}{1-j2})^2$ (4mks)

b)Prove that $1+2sinh^2x$=cosh 2x   (5mks)

c)Find the sum of the first 7terms of the series
$\frac{1}{2}, 1\frac{1}{2}, 4\frac{1}{2}, 13\frac{1}{2}$……………………   (3mks)

d)Reduce the equation to quadratic and solve for x

$\frac{1}{2}(e^x + e^{-x})$=1.5   (8mks)

e) Express (6, 5.5 rad) in Cartesian coordinates (3mks)

f) Evaluate (2+j3) (-4-5j)   (3mks)

g) Evaluate tanh 5.2. (4mks)

Question TWO   (20mks)

a) Evaluate (2+j3) + (3-j4) using argand diagram (5mks)

b) Express $(-14+j3)^{-\frac{2}{5}}$ in polar form.Give your answer in degree and minutes   (8mks)

c) Given Ae^x+Be^{-x}=4chx-5shx.Determine values of A and B (4mks)

d) Express the complex number Z=2+j3 in polar form (3 marks)

Question THREE (20mks)

a) Solve the following equation simultaneously(10mks)

$\frac{1}{x}+\frac{2}{y}+\frac{3}{z}=6$

$\frac{2}{x}+\frac{3}{y}+\frac{4}{z}=8$

$\frac{3}{x}+\frac{2}{y}+\frac{2}{z}=5$

b)The first, twelfth and last term of an arithmetic progression   are 4, $31\frac{1}{2}$, and $376\frac{1}{2}$ respectively. Determine

i)Number of terms in the series (5mks)

ii)Sum of all terms in the series (3mks)

c) Evaluate sinh 1.2 (2mks)

Question FOUR (20mks)

a) Find sum of the five terms in the series   8,-4, 2,-1 ……….. (3mks)

b) Express in polar form leaving answers in surd form

$(-2+j)^3$(6mks)

c) Solve for x given

$$\log_4 x + \frac{4}{\log_4 x} = 5 \qquad \text{(7mks)}$$

d) Solve for x and y given

2(x+jy)=6+2j   (4mks)

Question FIVE (20MKS)

A) Prove the identity sin 3x=sinx - 4sin³x   (7mks)

b)Given Z_1=1-3j , Z_2=-2+j5 andZ_3=-3-j4 .Determine in Cartesian form

$\frac{Z_1 Z_3}{Z_1 + Z_2}$ (6mks)

C)In Geometric progression the 6th term is 8 times the 3rd term and sum of the 7th and 8th term is 192.Determine

i) The common ratio   (2mks)

ii) The first term   (2mks)

iii) The sum of the 5th of the 11th term inclusive   (3mks)