TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

DIPLOMA IN ELECTRICAL & ELECTRONIC ENGINEERING

AMA 2101: ENGINEERING MATHEMATICS I

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2013
TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Mathematical Table*
- *Scientific Calculator/Drawing Instruments*

This paper consist of **FIVE** questions in **TWO** sections **A** & **B**

Answer 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

SECTION A (COMPULSORY)

Question One

a) Simplify:

$\log 64 + \log 32 - \log 128$

(i) **(3 marks)**

$\frac{x^{13}}{x^4 \times x^5}$

(ii) **(2 marks)**

b) Solve

$3s + 2t = 12$

$4s - t = s$

(i) by elimination method **(3 marks)**

$2x^2 + 5x - 4 = 0$

(ii) by completing square method **(5 marks)**

$8x^2 + 2x - 15 = 0$

(iii) by factorization

$(x - j2y) + (y - j3x) = 2 + j3$

c) Solve **(4 marks)**

d) Point A lies at co-ordinate (2, 3) and point B at (8, 7). Determine

(i) The distance AB **(4 marks)**

(ii) The gradient of the straight line AB **(3 marks)**

(iii) The angle AB makes with the horizontal **(2 marks)**

SECTION B (Answer any TWO questions from this section)

Question Two

a) In a triangle CDE, D = 90º, CD = 14.83cm and CE = 28.31. Determine the length of DE **(5 marks)**

$\cos x = \frac{9}{41}$

b) If , find sin x and tan x in fraction form **(4 marks)**

c) Evaluate:

$\frac{3\tan 60^o - 2\cos 30^o}{\tan 30^o}$

without using calculator and leaving your answer in surd form **(4 marks)**

d) Evaluate correct to 4 decimal places:

$\cot^{-1} 2.1273$

(i) **(2 marks)**

$\cos ec^{-1} 1.1784$

(ii) **(2 marks)**

$5\pi/24$

(iii) Cotangent **(3 marks**

Question Three

a) Solve the quadratic equations:

$x^2 + 64 = 0$

(i) **(4 marks)**

$4t^2 5t + 7 = 0$

(ii) **(5 marks)**

b) If

$z_1 = 1 - j3$

$z_2 = -2 + j5$

$z_3 = -3 - j4$

determine in a +jb form:

$\frac{Z_1}{Z_3}$

(i)

$\frac{Z_1 Z_2}{Z_1 + Z_2}$

(ii) **(4 marks)**

(iii) Z_1 Z_2 Z_3 **(3 marks**)

c) Determine in polar form:

$\left[3 < 35^o\right]^4$

(i) **(2 marks)**

$\left(2 < 6^o\right)^3$

(ii) **(2 marks)**

Question Four

a) (i) Write log 30 and log 450 in terms of log 2, log3 and log 5 **(5 marks)**

$4x^2 + 7x + 2 = 0$

(ii) Solve giving your answers to 2 decimal places **(5 marks)**

(iii) Solve triangle XYZ given $<X = 90^o$ $<y = 23^o$ 17' and YZ = 20mm. Determine its area.

(10 marks)

Question Five

a) If E 100 is inverted at compound interest of 8% per annum, determine:

(i) The value of after 10 years

(ii) The time, correct to the nearest year, it takes to reach more than E300 (4 marks)

b) Evaluate:

(i) 10_{C_6} (3 marks)

(ii) 5_{C_3} (3 marks)

(iii) 6_{P_2} (3 marks)

(iv) 3_{P_2} (3 marks)