TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSISCS

CERTIFICAE IN BUILDING & CIVIL ENGINEERING (CBCE)

AMA 1150: ENGINEERING MATHEMATICS I

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2014
TIME ALLOWED: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consist of **FIVE** questions

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

Question One (Compulsory)

a) (i) Show that $1+\tan^2\theta = \sec^2\theta$ **(3 marks)**

(ii) Solve $\frac{6-j2}{4-j3}$ **(4 marks)**

(iii) Find the sum of the first 10 terms for the series $8+4+2+1+\frac{1}{2}+....$ **(4 marks)**

(iv) Solve $4y^2+12y+5=0$ by factorization. **(4 marks)**

(v) Use binomial theorem to find the first three terms of x of $(1+x)^{32}$ **(2 marks)**

b) Evaluate:

(i) $\log_{32} 8$ **(3 marks)**

(ii) $32^{-1/5}\times\left(2^2\right)^2$ **(3 marks)**

c) (i) Find the 4th term for the binomial series $\left(2-\frac{3}{x}\right)^8$ **(4 marks)**

(ii) Solve $\frac{2e^{0.2}-3e^{0.2}}{3e^{0.2}+2e^{-0.2}}$ **(3 marks)**

Question Two

a) Draw the graph of $y = 5e^{0.4x}$ over a range x = -3 to x = 3. Use the graph to determine:

(i) Value of x when y = 10

(ii) Value of y when x = 2.7 **(15 marks)**

b) Show that $\tan\theta+\cot\theta = \sec\theta\,\mathrm{cosec}\,\theta$ **(5 marks)**

Question Three

a) Solve the simultaneous equation:

$$2x + y - 3z = -5$$
$$x - y + 2z = 12$$
$$7x - 2y + 3z = 37$$

(8 marks)

b) Solve for x given $3\cos 2x - 1 = 0$ **(3 marks)**

c) Given $z_1 = 3 + j,\ \ z_2 = j,\ \ z_3 = -2 - 4j$ find $|z_4|$ and arg z4 where: **(9 marks)**

$$z_4 = \frac{z_1 \times z_2}{z_3}$$

(9 marks)

Question Four

a) Express $z = 2 - 6j$ in polar form. **(5 marks)**

b) Find the sum of the first 5 terms for the GP series 8, -4, 2, -1 + … **(6 marks)**

c) Simplify $(2 + j4)(3 - j)(-4 + 5j)$ **(4 marks)**

d) Solve the equation $\log_8 2x + \log_8 (x + 1) = 2/3$ **(5 marks)**

Question Five

a) Find the sum of the first 20 terms of an AP given the 6th term is -5 and 10th term is -21. **(6 marks)**

b) Express $\frac{15x^2 - x + 2}{x - 5(3x^2 + 4x - 2)}$ into partial fraction. **(10 marks)**

c) Solve
$$6a - 19 = 3b$$
$$13 = 5a + 6B$$
(4 marks)