TECHICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN ARCHITECTURE (DA 12J)
DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBC 12J)

AMA 1109: ALGEBRA

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

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator*
- *Mathematical Tables*

This paper consists of **FIVE** questions.
Answer any **THREE** questions

Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One

a) The first and last term of a G.P are 4 and 128 respectively. The sum of the terms is 84, find the 5th term. **(5 marks)**

b) (i) Expand up to the term containing x3 the following: $\left(1+\frac{x}{3}\right)^6$
(ii) Evaluate 1.33^6 correct to 4 decimal places. **(7 marks)**

c) Solve $\cos^2 x - \sin x = 0.5 \qquad 0 \le x \le 360^o$ for **(8 marks)**

Question Two

a) (i) Given $Z1 = 3 - Zj,\ Z2 = -4j,\quad Z_3 = -1 - j$

(ii) Evaluate $\frac{z_1\ z_3}{z_2}$ in the form $a + bj$ **(10 marks)**

b) The angle of depression to a boat on a lake is 20°. This angle is measured from the top of a tower on the cliff. From the foot of the tower the angle of depression to the boat 15°. If the tower is 50m high, find:
(i) Distance of the boat from the cliff
(ii) The height of the cliff above the ground surface. **(10 marks)**

Question Three

a) A contractor borrows k£ 100,000 and is to repay in 25 equal monthly installments at 5% interest on outstanding balance. Find the total interest to be paid. **(7 marks)**

b) Use binomial expansion method to evaluate $\frac{1}{2.64}$ correct to 5 decimal places. **(6 marks)**

c) The radius of a cylinder increases from 40cm to 40.1mm while the height decreases from 100mm to 99.8mm. Use binomial expansion method to find the % change cause to the surface area. **(7 marks)**

Question Four

a) Use binomial expansion method to evaluate $\frac{1}{2.46}$ correct to 4 decimal places. **(7 marks)**

b) The supply of construction material will be of the form 4500 tonnes this year, 1350 tonnes next year, 395 tonnes next year and so on. Find:
(i) The supply in the 6th term
(ii) The time when only 50 tonnes could be needed

(iii) The amount of material that will have been supplied by end of 5th year. **(6 marks)**

c) (i) Evaluate $z = -1$ giving the answer in the form; $[r, \theta]$

(ii) Represent the solution obtained in c(i) on an Argand diagram. **(7 marks)**

Question Five

$$10_{C_8} \times 18_{C_{15}}$$

a) Evaluate correct to 4 decimal places **(3 marks)**

b) Given $Z_1 = -2j,\ Z_2 = 4 - 5i,\ Z_3 = -2 - 6i$:

$$\frac{Z_2 \times Z_1}{Z_3}$$

(i) Evaluate in the form $x + yi$

(ii) Represent the roots obtained from b(i) on an Argand diagram. **(17 marks)**