



# MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)  
University Examinations for 2015/2016 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FIRST SEMESTER EXAMINATION FOR  
DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING  
DIPLOMA IN MECHANICAL ENGINEERING  
DIPLOMA IN CIVIL ENGINEERING

**BCECD 105: ALGEBRA**

Date: 10/8/2016

Time: 8:30 – 10:30 AM

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## INSTRUCTIONS:

Answer Question one and any other **two** questions

### QUESTION ONE

a) How many combinations are there of 5 different things taken 4 at a time? (4 marks)

b) Simplify

$$\log_{5^{11.5}} + \log_5 2 \quad (3 \text{ marks})$$

c) Evaluate without using a calculator

$$3^{3\frac{1}{3}} \div 3^{-\frac{1}{3}} \quad (3 \text{ marks})$$

d) Simplify the equations below

i.  $\frac{1}{2-\sqrt{3}}$  (3 marks)

ii.  $\frac{2X^2-6X+2}{X-3}$  (4 marks)

- e) Solve for x in  $(x-2)^2-12=0$  (4 marks)
- f) From the word square
- i) How many permutations do you have? (2mks)
  - ii) In how many is **a** the second letter? (3mks)
  - iii) In how many of them are **u** and **a** next to each other? (4mks)

### QUESTION TWO

- a) How many 5 digits odd number can be made from 0, 1,2,3,4 without repetition? (3mks)
- b) The first term of an arithmetic sequence is equal to 6 and the common difference is equal to 3.
- i) Find the formula of the  $n^{\text{th}}$  term (4 marks)
  - ii) Find the  $50^{\text{th}}$  term (3 marks)
- c) Find the  $9^{\text{th}}$  term of the sequence
- $1, \sqrt{2}, 2, \dots\dots$  (5 marks)

### QUESTION THREE

- a) Find the  $a_6$  for an arithmetic sequence where  $a_1 = 3x + 1$  and  $d = 2x + 6$  (8 marks)
- b) A display of cans on a grocery shelf consist of 20 cans on the bottom, 18 cans in the next row and so on an arithmetic sequence until the top row has 4 cans. How many cans in total are in the display? (6 marks)

#### QUESTION FOUR

- a) Solve the following without using a calculator  $\frac{\sqrt{16} \div 2^2}{(2^1 \times 4^{-2})^3}$  (6 marks)
- b) Out of 40 students, 17 have ridden an airplane, 28 have ridden a boat, 10 have ridden a train, 12 have ridden both airplane and boat, 4 have ridden an airplane only, 3 have ridden a train only. The number of students who have not ridden any mode of the 3 transportations is the same as the students who have ridden all three transportations. How many have not ridden any mode of the 3 transportation? How many have ridden a boat? (14 marks)