



# MACHAKOS UNIVERSITY

University Examination 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

CERTIFICATE IN ELECTRICAL AND ELECTRONIC ENGINEERING

EPC 117: DIGITAL ELECTRONICS

DATE: 7/5/2019

TIME: 2.00-4.00 PM

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## INSTRUCTIONS:

*Answer question one and any other two questions.*

### QUESTION ONE (30 MARKS) (COMPULSORY)

- a) State two advantages of using binary number system as compared to denary number system. (2 marks)
- b) Perform the following conversions;
- i.  $110_2$  to decimal;
  - ii.  $ABCD_{16}$  to decimal;
  - iii.  $23_{10}$  to binary;
  - iv.  $736_8$  to octal;
  - v.  $110001111001_2$  to octal. (10 marks)
- c) Using Boolean theorems, simplify the following boolean expression; (10 marks)
- $$A.C + A.\bar{C} + \bar{A}.B + \bar{A}.A$$
- d) With an aid of a truth table, prove that  $M.(X + Y) = M.X + M.Y$  (8 marks)

### QUESTION TWO (20 MARKS)

- a) Express the following decimal number into 8421 BCD;  $(135)_{10}$  (4 marks)
- b) Using the 8421 BCD arithmetic, perform the following operation of decimal numbers

- 13 + 9 (6 marks)
- c) Express the following XS<sub>3</sub> number in decimal;  
1111010 (4 marks)
- d) Perform the following conversions;
- 11011 binary to gray code
  - 11001100 BCD to XS – 3 (6 marks)

### QUESTION THREE (20 MARKS)

Compute the following binary arithmetic operations;

- 110000 + 11111 + 110001
- 111 × 110
- 1111 ÷ 101
- 1101 - 1010 using 1's complement
- 1110 - 1001 using 1's complement (20 marks)

### QUESTION FOUR (20 MARKS)

- State Demorgans Theorem (2 marks)
- Draw the truth tables of any **six** logic gates used in digital systems (18 marks)

### QUESTION FIVE (20 MARKS)

Simplify using K map the following Boolean expressions;

- $f(A,B,C,D) = \sum(0,1,2,3,4,5,6,7,8,9,12,13)$
- $D = ABC + A\bar{B}C + AB\bar{C} + \bar{A}BC$  (20 marks)