



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 106: ELECTRONICS

DATE: 24/7/2019

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer question **ONE** and Any other **Two** among the four selective questions

QUESTION ONE (COMPULSORY)

- a) Discuss semiconductor theory including pn junction (10 marks)
- b) Minimize the function and realize it using minimum number of gates.
 $F = \sum m(0, 3, 5, 6, 9, 10, 12, 15)$ (8 marks)
- c) Explain common types of counters (6 marks)
- d) Using block diagrams, explain operations of the following logic circuits
 - (i) 8-to-3 line Encoder (3 marks)
 - (ii) 1 x 4 Demultiplexer (3 marks)

QUESTION TWO

- a) Implement a circuit that takes four inputs and outputs a one(1) when any two of the inputs are both ones(1) or **three zeros** (0). (10 marks)
- b) Discuss Full Adder (4 marks)
- c) Discuss TTL (6 marks)

QUESTION THREE

- a) Perform the binary arithmetic $18.75_8 - A9_{16}$ (6 marks)
- b) Discuss the conversion of SR into JK flip flop (8 marks)
- c) Compare SRAM and DRAM capacitor (6 marks)

QUESTION FOUR:

- a) Explain interface between TTL to CMOS circuit. (6 marks)
- b) Design 3 Mod counters using J-K Flip Flop and implement it (8 marks)
- c) Discuss three common logic hazards . (6 marks)

QUESTION FIVE

- a) A student is taking a project on traffic light. In his display he would like to use a seven segment display. Using relevant diagrams explain how this would be achieved (10 marks)
- b) Explain the working of a Shift-register (6 marks)
- c) Using circuit symbols, truth tables, and boolean expressions, describe NOR gate (4 marks)