



MACHAKOS UNIVERSITY

University Examinations for 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR FIRST SEMESTER EXAMINATION FOR BACHELOR SCIENCE IN
COMPUTER SCIENCE

SCO 106: ELECTRONICS

DATE: 15/12/2017

TIME: 8.30-10.30 AM

INSTRUCTIONS

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

QUESTION ONE (COMPULSORY)

- a) Two batteries each with an emf (voltage) of 1.5V are connected in series. Two resistors with resistance **$R_1 = 6 \text{ ohms}$** and **$R_2 = 2 \text{ ohms}$** are then connected in the circuit. Find the current through the circuit and voltage drop across each resistor when (6 marks)
 - i. Resistors are connected in series
 - ii. Resistors are connected in parallel
- 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) Discuss the three types of flip-flop triggering (6 marks)
- d) Using block diagrams, explain operations of the following logic circuits
 - i. 8-to-3 line Encoder (4 marks)
 - ii. 1 x 4 Demultiplexer (3 marks)
 - iii. Full Adder (4 marks)

QUESTION TWO (20 MARKS)

- 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) Distinguish between combinational & sequential logic circuits (4 marks)
- c) Discuss any two applications of diodes (6 marks)

QUESTION THREE (20 MARKS)

- a) Perform the binary arithmetic $17.75_8 - A9_{16}$ (6 marks)
- b) Discuss operation of RS Latch using circuit diagrams, state diagrams and characteristic tables (8 marks)
- c) Compare SRAM and DRAM capacitor (6 marks)

QUESTION FOUR (20 MARKS)

- a) Explain interface between TTL to CMOS circuit. (6 marks)
- b) Design 5 Mod counters using J-K Flip Flop and implement it (6 marks)
- c) Given $S = AB' + A'B$ and $C = AB$. Implement this using a Half Adder. (5 marks)

QUESTION FIVE (20 MARKS)

- 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 XOR gate (4 marks)