



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 106: ELECTRONICS

DATE: 20/1/2021

TIME: 2:00 – 4:00 PM

INSTRUCTIONS

Answer Question ONE and any other TWO 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)
- Resistors are connected in series
 - 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
- 8-to-3 line Encoder (4 marks)
 - 1 x 4 Demultiplexer (3 marks)
 - Full Adder (4 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 zeros (0). (10 marks)
- b) Distinguish between combinational & sequential logic circuits (4 marks)
- c) Discuss any two applications of diodes (6 marks)

QUESTION THREE

- 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

- 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

- 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)