MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

SECOND YEAR FIRST SEMESTER EXAMINATION FOR

DIPLOMA IN ELECTRICAL ENGINEERING MODULE 2

PLC

DATE: 2/9/2021 **TIME: 8.30-11.30 AM**

INSTRUCTIONS TO CANDIDATES:

ATTEMPT ALL QUESTIONS

1. (a) State five advantages of using a PLC over relay-based systems in industrial processes. (5 marks)

   (b) Draw a labeled block diagram of a PLC and explain the function of each block (9 mark)

   (c) Describe three types of buses in a PLC system. (6 marks)

2. (a) Describe each of the following semiconductor memories stating suitable applications with reference to a PLC system.

   (i) RAM

   (ii) ROM (4 marks)

   (b) A certain PLC memory stores 2048 words. Each word is 16 bits wide. Determine;

   I. Number of address lines

   II. Capacity in kilobytes

   III. Word size in bytes (6 marks)

(c) A PLC microprocessor has data pins labeled D_0-D_7 and address pins labeled A_0-A_{14}. Determine :

(i) word size

(ii) number of address lines

(iii) maximum number of addressable locations

(iii) accessible memory capacity in megabytes (10 marks)

3. (a) A certain PLC memory chip has 10 data lines and 8 address lines. Determine the:

(i) Word size

(ii) Number of addressable locations

(iii) Capacity in kilobytes (6 marks)

(b) For each of the following PLC devices, identify whether input or output and for each device cite a parameter that they control:

(i) Motor Starters

(ii) Proximity Switches

(iii)LVDT (linear variable differential transformer

(iv)otentiometer

(v) Solenoid Valves

(vi)Lights

(vii) Servo Motors (14 marks)

4. (a) With an aid of a labeled diagram explain the working principle of optoisolator optocoupler in PLC interfacing. (8 marks)

(b) Describe three PLC output interface types highlighting the merits of each. (6 marks)

(c) Distinguish between volatile and non-volatile memory and for each case state an example (6 marks)

5. (a) Hardwired control systems are inflexible compared to PLC systems .Discuss (4 marks)

(b) Explain the function of the elements of a CPU (6 marks)

(c) Explain five differences between a PLC and a conventional computer. (10 marks)