



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

Department of Electrical & Electronics engineering

UNIVERSITY EXAMINATION FOR:

BACHELOR OF ELECTRICAL AND ELECTRONIC ENGINEERING

TEE 4414: PLC AND SCADA SYSTEMS

END OF SEMESTER EXAMINATION

ORDINARY PAPER

SERIES: NOV 2024

TIME: 2 HOURS

DATE:

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of five questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

- a) State the advantages of PLC over relays. **[4 marks]**
- b) Outline the steps in selecting a PLC for a particular application. **[8 marks]**
- c) With the aid of a diagram describe the functions of various units of a PLC. **[8 marks]**

Question Two



TUM is ISO 9001:2015 Certified

- a) Design a circuit to control the operation of a planer table. The forward and backward movements of this table are obtained by the forward and reverse controls of a suitable motor. The following push button and limit switches are to be used .stop button S, retentive start button m. Forward start button of limit switches, h and k ,reverse start button, r. [15 marks]

- b) Derive the Boolean equation for state transition Fig. Q2b. A clock pulse x cycles through the four states. The output is taken from S₂ and S₃.

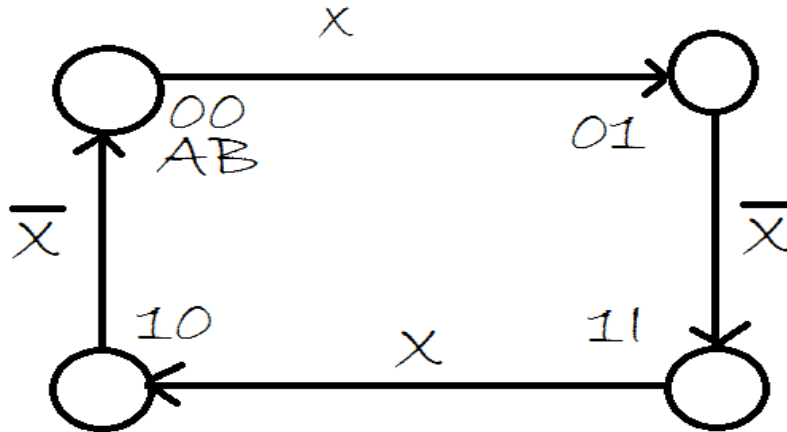


Fig Q2 b

[5 marks]

Question Three

- (a) (i) Identify and describe the FOUR levels of SCADA concept. (10 marks)
- (ii) Explain the need for SCADA system in a large plant.
- (b) (i) Identify **FOUR** attributes of SCADA implementation in a plant. (10 marks)
- (ii) Outline precautions that need to be taken when acquiring a SCADA system. (8 marks)

Question Four

Design a PLC system that endless the control of a feeder according to the following modes.



- (a) Pressing the button S^1 will connect a group of capacitors at a time, whereas pressing the button S^2 will disconnect it. Thus, pressing the button S_1 for four consecutive times will enable the four counters in sequence; on the contrary pressing the button S_2 for four times will disconnect these counters (in sequence).
- (b) Besides the first operating mode, carry out the control of five lines, instead of four.

[20 marks]

Question Five

- (c) Identify:
- (i) Hardware components
 - (ii) Software components
- of a SCADA system

