



TECHNICAL UNIVERSITY OF MOMBASA
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF MEDICAL ENGINEERING
UNIVERSITY EXAMINATION FOR:
DIPLOMA IN MEDICAL ENGINEERING
EEP2350: PROGRAMMABLE LOGIC CONTROLLERS
SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: SEPTEMBER 2018
TIME: 2HOURS
DATE: Pick Date Sep 2018

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 (COMPULSORY)

- a) Explain the main function of each of the following major components of a PLC:
 - i). Processor module (CPU)
 - ii). I/O modules
 - iii). Programming device
 - iv). Power supply module

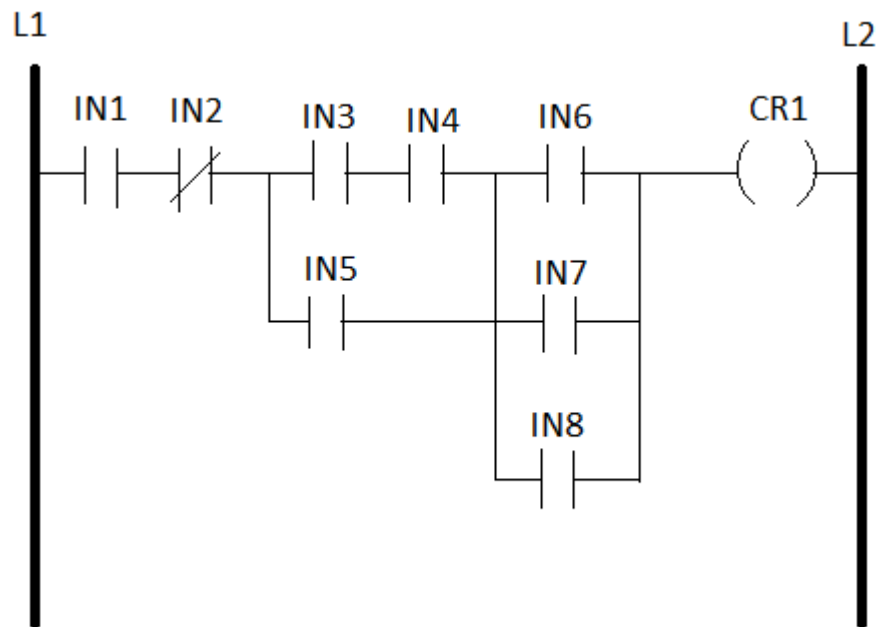
(12 marks)
- b) Compare the single-ended, multitask, and control management types of PLC applications. **(9 marks)**
- c) What two categories of software written and run on PCs are used in conjunction with PLCs?

(4 marks)
- d) List five factors affecting the memory size needed for a particular PLC installation. **(5 marks)**

Question TWO

- a) Enumerate the conventions that are adopted in drawing a ladder diagram **(7 marks)**
- b) Draw a ladder diagram of the following mnemonic code
 - 0000 LOAD NOT IN1
 - 0001 OR NOT IN2
 - 0002 OR IN3
 - 0003 AND IN4
 - 0004 OUT CR1
 - 0005 OUT CR2
 - 0006 AND RLY1
 - 0007 OUT CR3

(6 marks)
- c) Write down an instruction listing for the circuit in figure Q4. **(8 marks)**



Question THREE

- a) Explain the terms *program* and *programming language* as they apply to a PLC. (4 marks)
- b) Express each of the following equations as a ladder logic program:
 - i). $Y = (A + B)CD$
 - ii). $Y = A\bar{B}C + \bar{D} + E$
 - iii). $Y = [(\bar{A} + \bar{B})C] + DE$
 - iv). $Y = (\bar{A}BC) + (D\bar{E}F)$(16 marks)

Question FOUR

- a) Explain the following terms as applied in control systems
 - i). Controlled variable
 - ii). Controlled medium (2 marks)
- b) Using block diagrams, explain the difference between open and closed loop control system (8marks)
- c) Derive the transfer function for the system in figure Q4. (10 marks)

Question FIVE

- (a) describe the function of the following timers using timing diagrams.
 - (i) ON delay timer
 - (ii) OFF delay timer (6 marks)
- (b) With the aid of diagrams explain the following terms
 - (i) current sinking
 - (ii) current sourcing (6 marks)
- (c) (i) Write a ladder logic program for the relay ladder diagram shown in fig Q5.

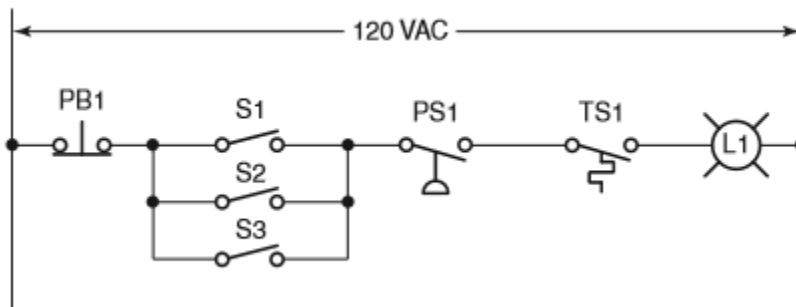


Fig. Q5 (5 marks)

- (ii) draw a gate circuit for the program in (i) above. (3 marks)

