

**UNIVERSITY COLLEGE TATI (UC TATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE	: BMT 2063 / BET 2063
COURSE	: PROGRAMMABLE LOGIC CONTROLLER
SEMESTER/SESSION	: 2 – 2021/2022
DURATION	: 3 HOURS

Instructions:

1. This booklet contains **4** questions. Answer all questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO**THIS BOOKLET CONTAINS 7 PRINTED PAGES INCLUDING COVER PAGE**

QUESTION 1

- a) Differentiate the characteristics between compact PLC and modular PLC. (8 marks)
- b) The central processing unit (CPU) of a PLC controls all the PLC activity and does a repetitive process known as scanning. Recognize the three processes that occurs during scanning. (3 marks)
- c) Classify any two (2) types of PLC output module. (2 marks)
- d) You are given one normally open pushbutton, one normally closed limit switch, one lamp and one solenoid valve. Illustrate the wiring diagram of all of this components to a CPM2A PLC unit. (7 marks)

QUESTION 2

- a) Classify the other four (4) types of PLC programming languages that are available to use besides the ladder diagram. (4 marks)
- b) Describe the meaning of latching. Provide your answer with a drawing of latching ladder diagram. (8 marks)
- c) Describe how does the instruction SET and RSET operates. (8 marks)
- d) Produce the ladder diagram program for the following tasks:
- i. Activate a lamp when both pushbutton A and pushbutton B are turned on. (3 marks)
 - ii. Activate a lamp if pushbuttons A and B, or pushbuttons C and D are turned on. (4 marks)
- e) Produce the ladder diagram program using SET/RSET instruction for the following operation:
- By pressing Start pushbutton, an indicator lamp L1 will turn on.
 - After that, by pressing ON pushbutton, another indicator lamp L2 will turn on together with extension of cylinder using single solenoid valve.
 - Once the cylinder has fully extended, the cylinder then retracts.
 - After cylinder has retracted and by pressing Reset pushbutton, all indicator lamps L1 and L2 will turn off.

Note: The cylinder is equipped with limit switches (LS1 and LS2).

(13 marks)

QUESTION 3

a) Describe three (3) advantages of using timer instruction in PLC system. (6 marks)

b) Briefly explain the operation of on-delay timer. (4 marks)

c) Refer to the ladder diagram program in Figure 1.
 i. Identify the length of the timer period. (1 mark)
 ii. Describe the status of each output when the ladder diagram is operated. (2 marks)

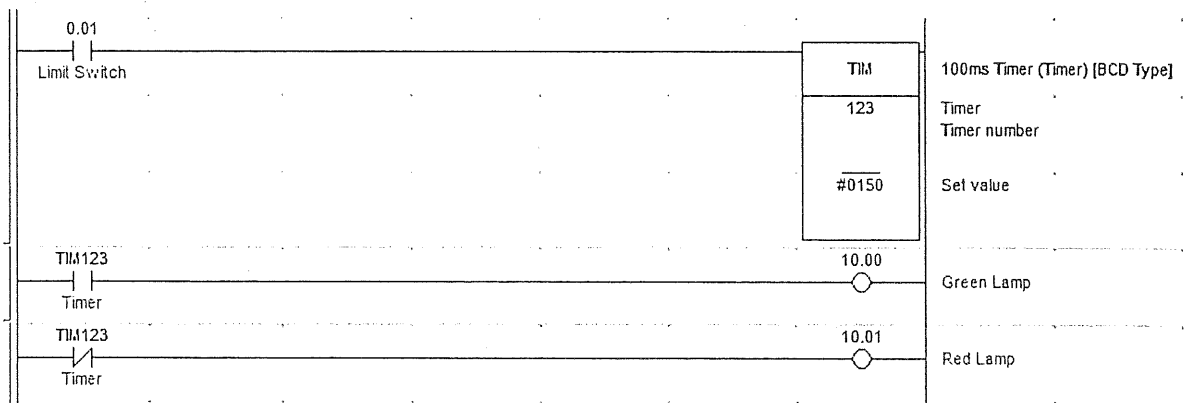


Figure 1

PROGRAMMABLE LOGIC CONTROLLER (BMT 2063 / BET 2063)

- d) Figure 2 shows a diagram of a drilling machine. The sequence of operation requires that a part must be present at the drilling area (detected by a sensor) and the operator has to turn on the drill motor by pressing PB1 and PB2 momentarily. The drill motor will operate for 30 seconds before it turns off. When the drill motor has turned off, the operator can take out the part that has been drilled and place a new part for the next drilling process.

Produce the required ladder diagram program to operate the drilling machine. Use SET/RSET instruction.

(7 marks)

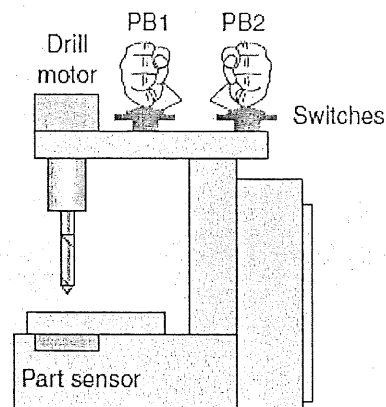


Figure 2

QUESTION 4

- a) Describe the operation of the following counter instruction:
- i. CNT (2 marks)
 - ii. CNTR (3 marks)
- b) Refer to the ladder diagram program in Figure 3. Describe the operation of the ladder diagram.

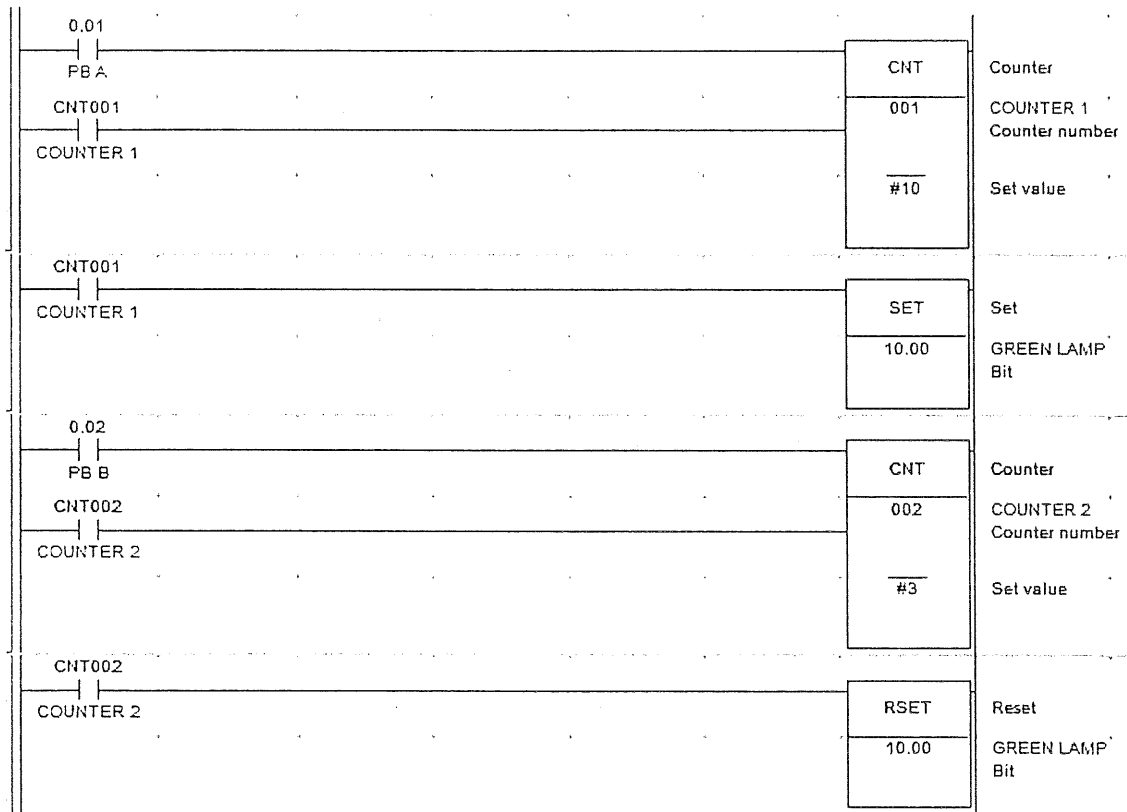


Figure 3

(5 marks)

- c) Figure 4 shows a washer system with container to be dipped in and out of a cleaning bath. The washer system is equipped with a double acting cylinder and two limit switches to detect the retract and extend position. The cylinder is control using a 5/2 way single solenoid valve. The cleaning process are continuous movement in and out of the cleaning bath by pressing Start pushbutton momentarily. The cleaning process finishes automatically in the raised position after 5 extending strokes. The counter then must be reset using pushbutton Reset before a restart is possible.

Produce the ladder diagram program for this application.

(10 marks)

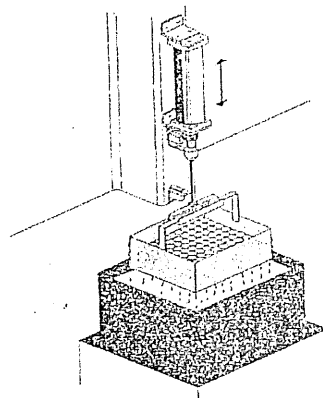


Figure 4

-----End of question-----

