UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: DMT 3033
COURSE	: PROGRAMMABLE LOGIC CONTROLLER II
SEMESTER/SESSION	: 1-2023/2024
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 up your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 5 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

Assume the application shown in Figure 1 used the Programmable Logic Controller (PLC) to control the input / output devices. The inputs are **pushbutton S1, infrared sensors IR1 & IR2.** Output is **double acting cylinder.**

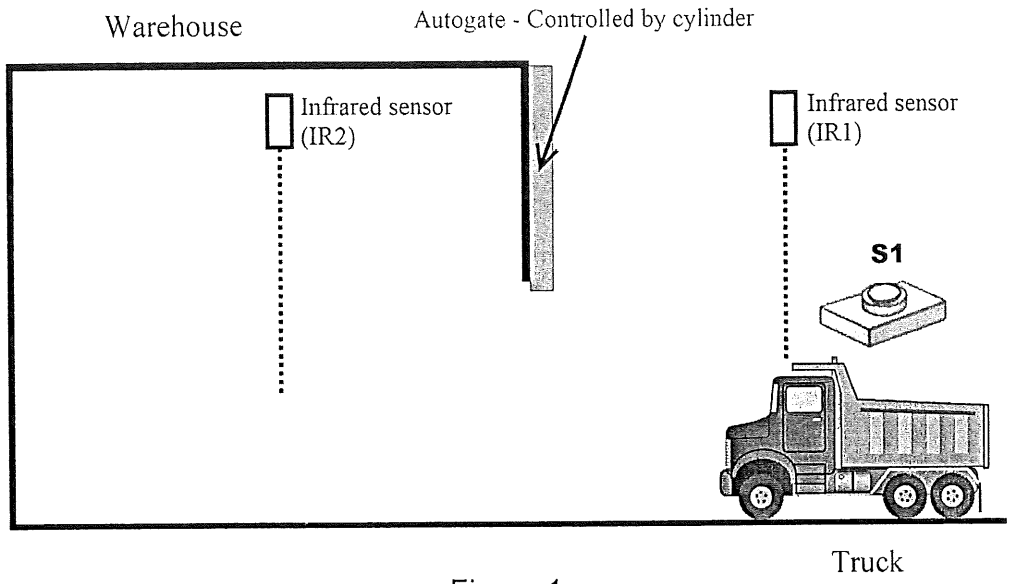

Figure 1

The auto gate system for a warehouse is started when pushbutton S1 is pressed and sensor IR1 detect the presence of a truck outside of the warehouse, the cylinder will retract to open the gate of the warehouse. The truck can get into the warehouse and sensor IR2 will detect the truck. The gate will close only after the truck has passed through sensor IR2 (Negative Edge). *Use proper components / sensor if necessary.*

a) Draw pneumatic diagram of the described system. (2 marks)

b) Draw the PLC wiring diagram based on statement above. (6 marks)

c) Write the allocation list in answer booklet. (4 marks)

d) Produce the ladder diagram for the above described system. (10 marks)

QUESTION 2

Assume the application shown in Figure 2 used the Programmable Logic Controller (PLC) to control the input / output devices. The inputs are **pushbutton S1**, sensor at extend & retract position (**LS0, LS1**) & output is **cylinder 1A**.

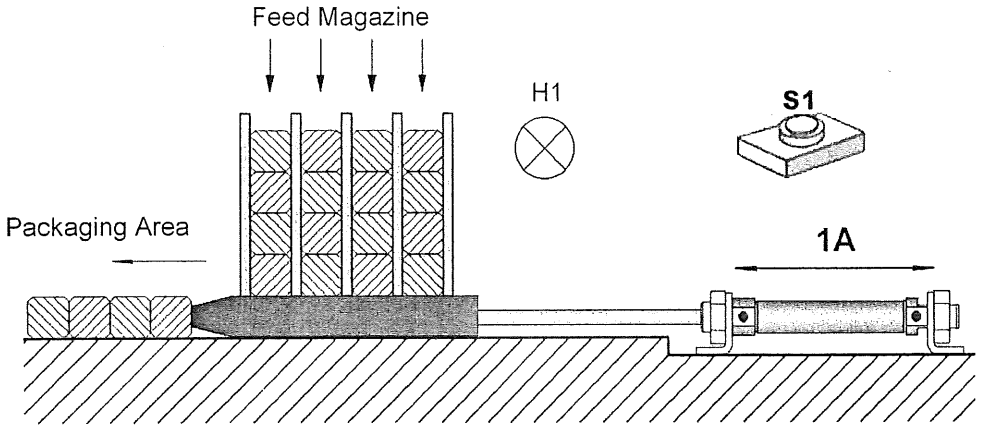

Figure 2

By pressing pushbutton S1 **and** the cylinder is in fully retracted position (confirmed by limit switch), lamp **H1 turn ON** and **cylinder extend** then pushes the workpiece to the packaging area. When it reach fully extended position, it will **retract immediately** and the new workpiece will fall and take place in feed megazine. The process is **continously for 10 times**. After that, it will stop. **Reset button** must be pressed first, to restart the process again. Based on illustrated system in figure 2:

a) Draw pneumatic diagram of the described system. (2 marks)

b) Draw the PLC wiring diagram based on statement above. (6 marks)

c) Write the allocation list in answer booklet. (4 marks)

d) Produce the ladder diagram for the above described system. (10 marks)

QUESTION 3

Figure 3 shows stamping workstation. Given the sequence as follow:

By pressing START pushbutton, the cylinder 1A will extend. Then cylinder 2A will fully extend to stamp the product and retract back to the initial position. Only after cylinder 2A is fully retracted, cylinder 1A will retract. After cylinder 1A is fully retracted, cylinder 3A will extend to push the product into the box and retract back to initial position. If the STOP pushbutton presses, all system will be stop.
Use a proper component / sensor if necessary.

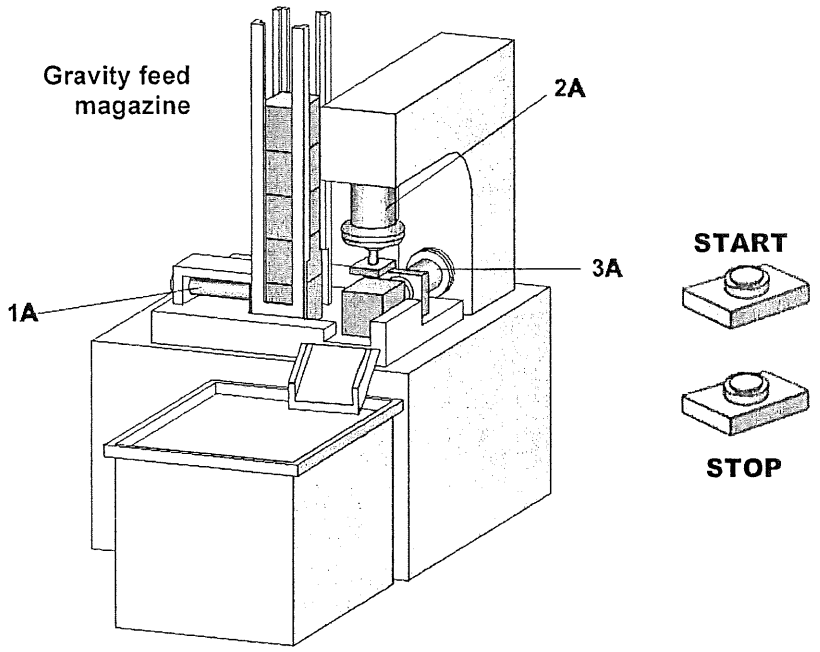

Figure 3

a) Draw pneumatic diagram for the above application. (6 marks)

b) Produce the Sequential Function Chart (SFC) for the above application. (10 marks)

c) Produce the ladder diagram by referring to the SFC in Q3b. (18 marks)

QUESTION 4

The sorting system in Figure 4 is used to sort bad bottle from good bottle. The conveyor will start after PB1 is pressed. When the sensor detect a bad bottle, the ejector will eject the bottle from the conveyor. The bottle will pass through sensor every second. By pressing PB2 the system will stop.

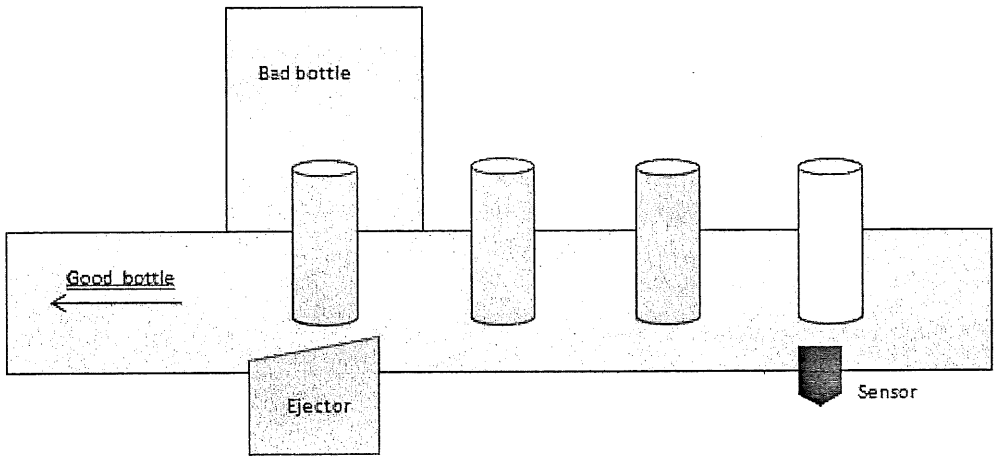

Figure 4

a) Draw pneumatic diagram for the above application. (2 marks)

b) Draw the PLC wiring diagram based on statement above. (6 marks)

c) Write the allocation list in answer booklet. (4 marks)

d) Produce the ladder diagram (used shift register instruction). (10 marks)

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