

GUJARAT TECHNOLOGICAL UNIVERSITY**BE SEM-VIII Examination May 2012****Subject code: 182001****Subject Name: Programmable Logic Controllers****Date: 10/05/2012****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Draw and explain internal architecture of PLC. **07**
(b) Explain AC output card with suitable diagrams. **07**

- Q.2** (a) When a new PLC is required to be purchased to control a large system, which specifications are to be listed for the PLC order? Explain all of them in detail. **07**
(b) Enlist different timer instructions in PLC and explain any two of them with timing diagrams. **07**

OR

- (b) Explain all the data comparison instructions in PLC. **07**

- Q.3** (a) What is IL programming in PLC? Explain different IL mnemonics codes. **07**
(b) Design Function Block Program (FBD) for the ladder diagram given in figure 1 of page 3. **07**

OR

- Q.3** (a) Design Sequential Function Chart Program (SFC) for the ladder diagram given in figure 1 of page 3. **07**
(b) Write Instruction List Program (IL) for the ladder diagram given in figure 1 of page 3. **07**

- Q.4** (a) There are three mixing devices in a processing line A,B and C. When 'START' pushbutton is pressed, mixer A will be ON after 7 seconds. 5 seconds later, mixer B will turn ON. Both will then remain in ON condition. If now a 'RESET' pushbutton is pressed, mixer A will be turned OFF immediately and mixer C will turn ON after 10 seconds. If 'STOP' pushbutton is pressed, mixer A will turn OFF after 2 seconds and mixer B will be turned OFF immediately. Mixer C will not turn ON when 'STOP' pushbutton is pressed. All three mixers operate with single phase AC 230V supply. START pushbutton is 'NO', RESET pushbutton is 'NO' and STOP pushbutton is 'NC'. The PLC is having relay output. Design PLC function block diagram (FBD) program to control the system and also show electrical connections of system with PLC. The PLC operates with 24 V DC supply. **07**
(b) The operation of two indicating lamps (both operate with single phase AC 230 V supply) is to be controlled by PLC which is having TTL outputs. When 'NO' START pushbutton is pressed lamp 1 will be turned ON and lamp 2 will remain in OFF condition. After 5 seconds lamp 1 will be turned OFF and lamp 2 will be turned ON. Now if CHANGE pushbutton is pressed, lamp 2 will be turned OFF after 3 seconds and lamp 1 will be turned ON immediately, otherwise lamp 1 will remain in OFF condition **07**

and lamp 2 will remain in ON condition. When 'NC' Stop pushbutton is pressed both the lamps will be turned OFF. Design PLC ladder logic diagram and also show electrical connections of the system with PLC. The PLC operates with 24 V DC supply

OR

- Q.4 (a)** Two feeder conveyors (F1 and F2) feed parts to a main conveyor (M). Both F1 and F2 are having 'NC' proximity sensor at the end. When 'NO' START pushbutton is pressed, F1 will be turned ON and after feeding 5 parts to M, F1 will be turned OFF. After waiting for 7 seconds, F2 will be turned ON and will remain in ON condition until it feeds 7 parts to M. When all 12 parts are arrived, M will be turned ON for 1 minute. If at any time 'NC' STOP pushbutton is pressed, all the outputs will be turned OFF. Design PLC functional block diagram (FBD) program to control the given system. **07**
- (b)** A conveyor belt is having a 'NC' photo sensor at both ends which will sense the objects entering and leaving the conveyor belt. When conveyor runs in forward direction, objects will enter on the conveyor from END 1 and leave from END 2. If number of objects on the conveyor is less than 5, conveyor will continue running in the forward direction, and if more than 4, conveyor will stop running in forward direction and after 10 seconds, conveyor will run in the reverse direction so that objects can leave the conveyor from END 1. When once again, the number of objects on the conveyor becomes less than 5, it will start running in forward direction. Objects can enter on conveyor only from END 1. A 'NO' START pushbutton will make the conveyor belt running and a 'NC' STOP pushbutton will make the conveyor belt permanently stopped. Design PLC ladder logic diagram to control the given system. **07**
- Q.5 (a)** How a closed loop system can be controlled by a PLC? Explain in detail. **07**
- (b)** In a temperature control system, two heaters (H1 and H2) and two temperature sensors are used. Suppose reading of temperature sensor 1 is X and reading of temperature sensor 2 is Y. For $X > \sqrt{Y^2 + 2Y + \sin Y}$, H1 should remain in ON condition, otherwise H2 should remain in ON condition. Design a PLC ladder logic diagram for this system. **07**

OR

- Q.5 (a)** Write a short note on distributed control system using PLC. **07**
- (b)** Explain all the factors to be taken care while commissioning a PLC. **07**

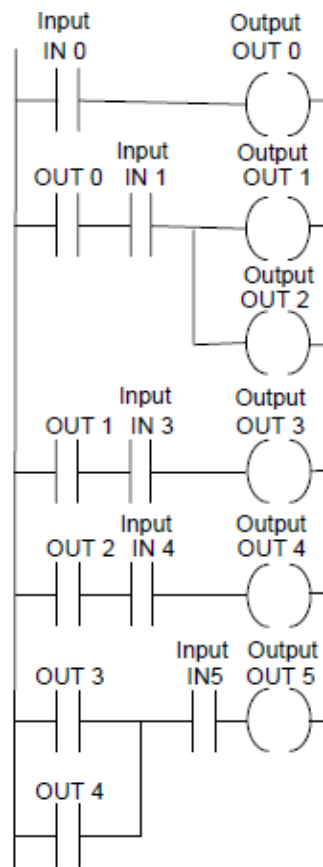


Figure 1
