Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – SUMMER 2016

Subject Code:182001 Date:10/05/2016

Subject Name:Programmable Logic Controllers

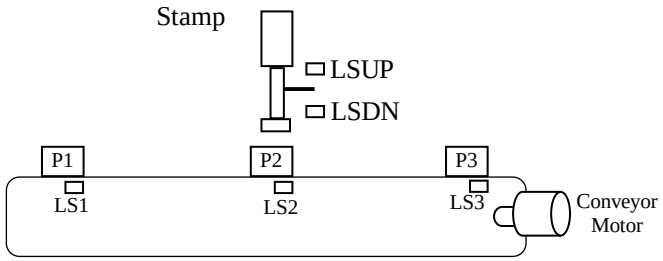
Time:10:30 AM to 01:00 PM Total Marks: 70

Instructions:

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

Q.1	**(a)**	Draw a block diagram of a PLC showing the main functional items and how buses link them, explaining the functions of each block	**07**
	(b)	Explain Retentive On Delay timer instruction using timing diagram and suitable example.	**07**
Q.2	**(a)**	Describe commissioning of PLC in details.	**07**
	(b)	List different instructions of Instruction List (IL) programming and explain all of them.	**07**
		OR	
	(b)	Discuss Functional Block Diagram (FBD) programming method with suitable example.	**07**
Q.3	**(a)**	Explain the arithmetic operations of PLC	**07**
	(b)	Prepare ladder diagram program for following application: An automatic car parking system, when the parking area is full with 10 cars the red bulb at entry should 'ON' to indicates it is full. If the number of cars within the parking area is less than 10 the green bulb should 'ON' to indicate that the space for parking is available.	**07**
		OR	
Q.3	**(a)**	Describe the different counter function in PLC.	**07**
	(b)	Design and draw ladder diagram to generate square wave at digital output terminal with ON time of 5 seconds and OFF time of 10 seconds when toggle switch is ON.	**07**
Q.4	**(a)**	What is analog module? Explain analog input module of PLC using suitable block diagram	**07**
	(b)	Draw the external wiring diagram and ladder program for 3-phase motor control in forward and reverse direction.	**07**
		OR	
Q.4	**(a)**	Design and draw a ladder diagram for the equation $Y=3+\cos X+X^2$, where X is the initial value and Y is the final output and covert the ladder diagram in FBD and IL.	**07**
	(b)	Design a ladder logic program for following process. A temperature control system consists of three thermostats. The system operates two heating units. The thermostats are set on 70°C, 75°C and 80°C. Below 70°C, two heaters are on. The temperature between 70°C and 75°C causes one heater to be on. Above 80°C, there is safety shutoff for two heaters in case one stays on by mistake. A master switch turns the system on and off.	**07**
Q.5	**(a)**	List and explain different number comparison functions in PLC	**07**

(b) Create the PLC based automation for given system. **07**



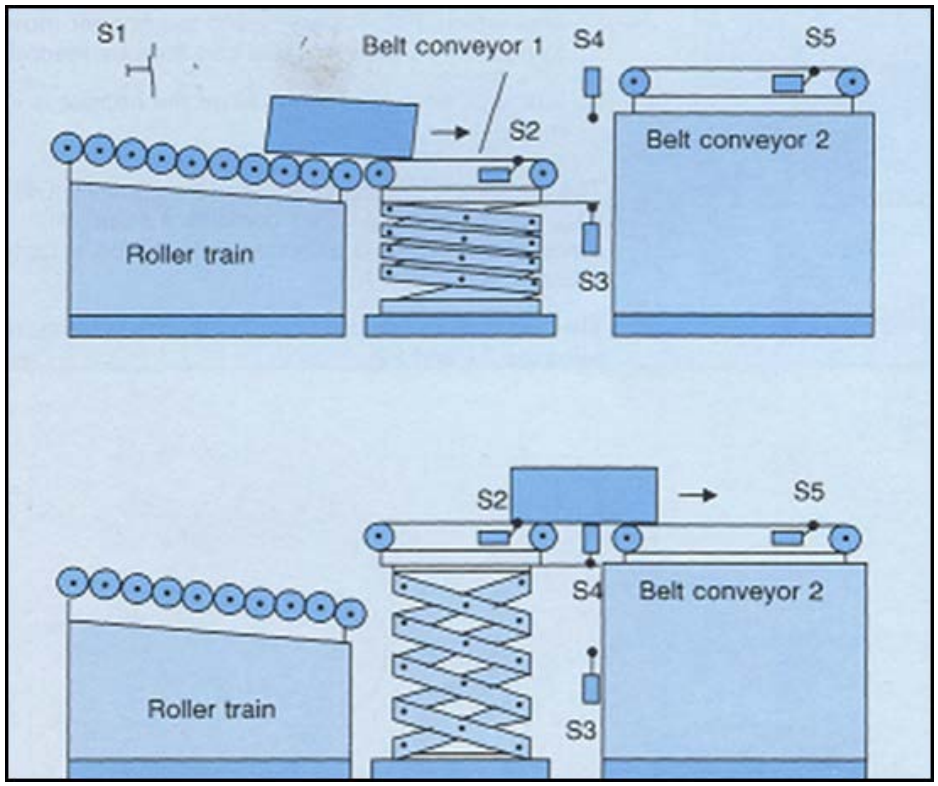
When a part is placed on the conveyor at position 1, it automatically moves to position 2. Upon reaching position 2, it stops and is stamped. After stamping, it automatically moves to position 3. It stops at 3, where the part is removed manually from the conveyor. Assume that only one part is on the conveyor at a time. Add limit switches, interlocks, pushbuttons, and other devices required

Or

Q.5 **(a)** Using suitable diagrams, explain JUMP instruction in PLC **07**

(b) Design the automation using PLC for given process. **07**

Belt conveyor 1 for the lifting table is started when momentary-contact pushbutton S1 is actuated. The pallet rolls over the inclined roller train onto the moving conveyor. As soon as the pallet actuates limit switch S2, belt conveyor 1 stops and the lifting table begins moving upward. When limit switch S4 is actuated, the lifting table stops moving and belt conveyors 1 and 2 are started. Both belt conveyors stop when limit switch S5 is actuated. The lifting table descends until limit switch S3 is actuated.(See below figure)



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