Register Number:……..

KUMARAGURU
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B.E. DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Fourth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U18EEI4205: PLC Automation

COURSE OUTCOMES

CO1: Describe the architecture of PLC.
CO2: Understand the working of PLC analog input and output devices.
CO3: Program on basic ladder logic diagram using timer and counters.
CO4: Understand the interface of PC with PLC and hardware implementation.

Time: Three Hours **Maximum Marks: 100**

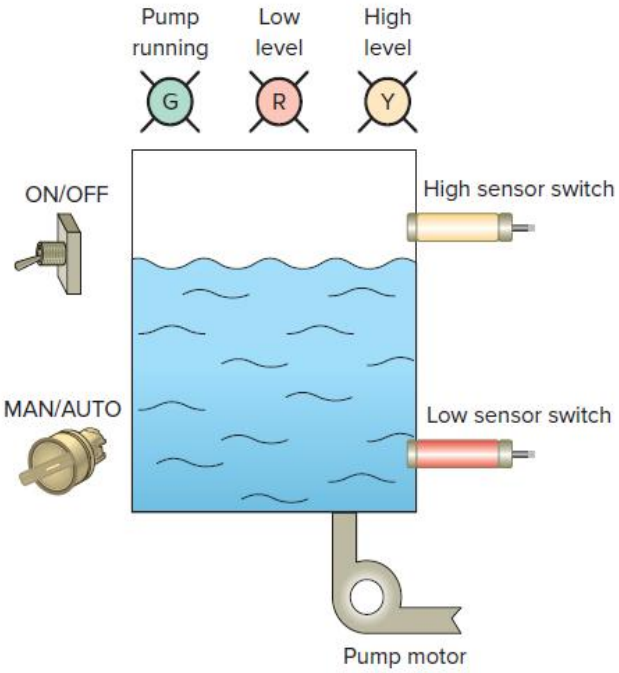
Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Draw the PLC scan cycle.	CO1	[K_2]
2.	List the types of I/O modules	CO1	[K_2]
3.	What is meant by sourcing and sinking?	CO1	[K_2]
4.	Draw the Analog input module wiring diagram.	CO2	[K_2]
5.	Draw the electrical logic circuit with truth table for AND logic.	CO2	[K_2]
6.	Write the ladder program for EXOR logic with I/O table.	CO2	[K_2]
7.	Compare ON delay and OFF delay timers	CO3	[K_2]
8.	Mention any four program control instructions.	CO4	[K_2]
9.	Wite the ladder program for square root math operation.	CO4	[K_2]
10.	List application of PLC.	CO4	[K_2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Describe in details about PLC architecture with neat sketch.	8	CO1	[K_2]
	b)	Explain with neat sketch of optocoupler isolation between i/o modules and PLC I/P module:	8	CO1	[K_2]

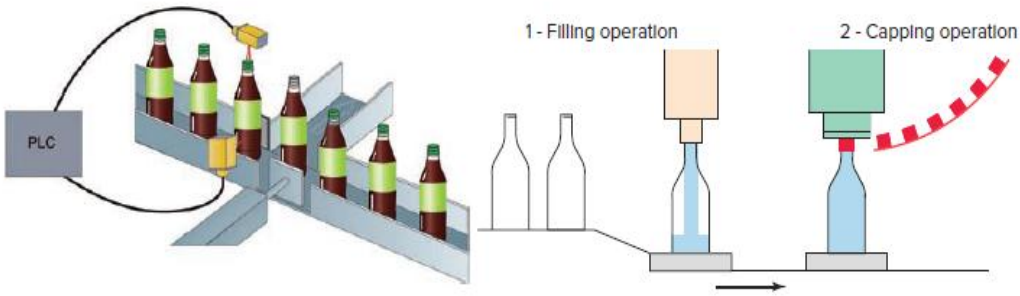
12.	a)	Illustrate the wiring diagram of AC and DC input and output modules.	10	CO1	[K_2]
	b)	Describe in details about how the discrete type AC input and output modules are interfaced with PLC.	6	CO1	[K_2]
13.	a)	Elucidate with necessary diagrams how the hard wired logic differs with ladder logic using digital logics.	12	CO2	[K_2]
	b)	Describe in details about Program scan cycle is followed in PLC.	4	CO2	[K_2]
14.	a)	An electrical interlocking circuit is used to prevent a piece of equipment from operating under certain potentially hazardous or undesirable conditions. A Three motor hardwired relay control circuit electrically interlocked to prevent the motors from accidently operating in an order other than their proper sequence. Develop ladder logic program for the given condition: • Motor 1 has to be operating before Motor 2 can be started. • The NO auxiliary interlocking contact M1-2 is used for this purpose. • Motor 2 has to be operating before Motor 3 can be started. • The NO auxiliary interlocking contact M2-2 is used for this purpose.	8	CO3	[K_2]
	b)	The process is to be used to control the level of water in a storage tank by turning a discharge pump on or off.	8	CO3	[K_2]



Develop the ladder program as per the given condition:

1. OFF Position —The water pump will stop if it is running and will not start if it is stopped.
2. Manual Mode—The pump will start if the water in the tank is at any level except low.
3. Automatic Mode—If the level of water in the tank reaches a high point, the water pump will start so that water can be removed from the tank, thus lowering the level.
   - When the water level reaches a low point, the pump will stop.
4. Status Indicating Lights—Water pump running light (green)
   - Low water level status light (red)
   - High water level status light (yellow)

15.	a)	Explain the any four MATH Instructions with suitable examples.	8	CO4	[K_2]
	b)	Explain the four types of Sequencer Instructions with suitable examples.	8	CO4	[K_2]
16.	a)	Explain with a neat Ladder Diagram the operation of a Stepper Motor in forward and reverse direction with a time period of 50ms and 100ms.	8	CO4	[K_2]
	b)	A sequential control process is required for processes that demand the certain operations be performed in a specific order. A bottle filling process is shown below the filling and capping operations, the tasks are (1) fill bottle and (2) press on cap. Develop the ladder program to complete the given task.	8	CO4	[K_2]



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