



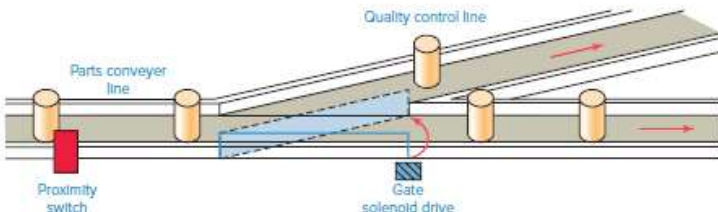
## End Semester Examination – Nov/Dec – 2016

Code : 14EI3014  
Sub. Name : Industrial Automation

Semester : 2016-17 ODD  
Duration : 3hrs  
Max. marks : 100

### ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Incorporation of P-I action may lead to instability in the closed loop performance-justify. Also propose a controller for flow process with proper reasoning.	CO1	12
	b.	Explain the reaction curve technique for tuning of controller. What are its limitations?	CO1	08
(OR)				
2.	a.	Draw the functional block diagram of a typical sensor system	CO1	7
	b.	Consider a strain-gage weigh bridge. Explore and identify the subsystems of the bridge and categorise these subsystems into the typical sensor system classes of elements.	CO1	7
	c.	List the types of production system used in industrial automation and explain the same.	CO1	6
3.	a.	What is integral windup? Suggest the schemes for overcoming this problem.	CO1	8
	c.	Explain the two different methods of implementing the PID controller in digital form.	CO1	12
(OR)				
4.	a.	Explain the architecture of PLC with the required diagrams.	CO1	10
	b.	Develop a ladder diagram for the following process. A wood saw, W, a fan, F and a lubricating pump P, all go on when start button is pushed. A stop button. A stop button stops the saw only. The fan is to run an additional 5 seconds to blow the chips away. The lube pump is to run for 8sec after the shutdown of W. Additionally, if the saw has run for more than 1 min. the fan should stay on indefinitely. The fan may be truned off by pushing a separate reset button. If the saw has run less than one minute, the pump should go off when the saw is turned off. The 8sec time delay off does not take place for a running time of less than 1 min.	CO2	10
5.	a.	With relevant examples, explain the various functions that are used to skip the preceding rungs.	CO2	10
	b.	Explain in detail about various PLC digital bit functions and applications	CO2	10
(OR)				
6.	a.	Write a program to operate a light according to the following sequence: <ul style="list-style-type: none"> <li>A momentary push button is pressed to start the sequence.</li> <li>The light is then switched on and remains on for 2 sec.</li> <li>The light is then switched off and remains off for 2 sec.</li> <li>A counter is incremented by one after this sequence.</li> <li>The sequence then repeats for a total count of 4 counts</li> </ul>	CO2	8

		<ul style="list-style-type: none"> <li>After the fourth count, the sequence will stop and the counter will be reset to zero.</li> </ul>		
	b.	<p>Write a program to implement the process in the diagram. A counter must be programmed as part of a batch-counting operation to sort parts automatically for quality control. The counter is installed to divert one part out of every 1000 for quality control. The circuit operates as follows:</p> <ul style="list-style-type: none"> <li>A start/stop push button is used to turn the conveyor ON/OFF</li> <li>A proximity sensor counts the parts as they pass by on the conveyor.</li> <li>When a count of 1000 is reached, the counter's output activates the gate solenoid, Diverting the part to the inspection line</li> <li>The gate solenoid is energised for 2seconds, which allows enough time for the part to continue to the quality control line.</li> <li>The gate returns to its normal position when the time 2 seconds is over.</li> <li>The counter resets to zero and continues to accumulate counts.</li> <li>A reset push button is provided to reset the counter manually also.</li> </ul> 	CO2	12
7.	a.	Explain the ideal characteristics of a control valve and classify them with respect to characteristics	CO2	10
	b.	Explain with a simple sketch the principle of operation of a flapper nozzle amplifier also identify the factors those affect the sensitivity of a flapper nozzle amplifier.	CO2	10
<b>(OR)</b>				
8.	a.	Devise a scheme for changing the feedrate in an interpolator in CNC	CO3	7
	b.	Why should a feed drive operate in constant torque mode, while the spindle drive should operate in a constant power mode?	CO3	3
	c.	How can you convert a 4-20mA current signal to a 3-15 psi pressure signal? Explain with a schematic.	CO2	10
<b><u>Compulsory:</u></b>				
9.	a.	Explain dynamic memory allocation in real time systems.	CO3	15
	b.	How to detect and recover from deadlock?	CO3	5

ALL THE BEST