Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V- EXAMINATION – SUMMER 2016

Subject Code: 151704 **Date: 17/05/2016**

Subject Name: Industrial Control Systems(Institute Elective-II)

Time: 02:30 PM to 05:00 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)**	What is Process Variable? Classify Process Variable. Explain open loop and closed loop control system with help of block diagram.	**07**
	(b)	What is mathematical modelling? List types and uses of mathematical modelling in process control. Find mathematical modelling for liquid level system without resistance element.	**07**
Q.2	**(a)**	What is Controller? Classify controller with respect to modes of operation. Explain on-off controller with help of waveform and one practical example.	**07**
	(b)	Draw the P&I symbols: **(i)** Pneumatic Signal **(ii)** Electrical Signal **(iii)** Hydraulic Signal **(iv)** Capillary tubing (filled system) **(v)** Internal software link **(vi)** Pilot light **(vii)** Rotary motor with electrical signal.	**07**
		OR	
	(b)	Explain the concept of "Integral Windup" and "Anti Windup".	**07**
Q.3	**(a)**	Design and Explain Electronics Proportional Integral (PI) Controller.	**07**
	(b)	What is DDC? Explain Components and Working of DDC. List Benefits of DDC.	**07**
		OR	
Q.3	**(a)**	Explain Control valve characteristics with help of suitable diagram.	**07**
	(b)	What is control valve? List main four function of control valve. Define following terminology of Control Valve: **(i)** Plug **(ii)** C_v **(iii)** Vena Contracta **(iv)** Flashing.	**07**
Q.4	**(a)**	Explain Cascade Control scheme for any one application. List Features, Advantages and Disadvantages of Cascade Control scheme.	**07**
	(b)	Explain Feedforward-Feedback control configuration with help of example.	**07**
		OR	
Q.4	**(a)**	Justify why the derivative controller is not used alone? and compare following, **(i)** Compare P, I and D controller **(ii)** Compare P, PI and PID controller.	**07**
	(b)	A controller outputs a 4-20 mA signal to control motor speed from 140-600 rpm with linear dependence. Calculate: **(i)** The current corresponding to 310 rpm **(ii)** The value of current in (i) expressed as a percentage of control output.	**07**
Q.5	**(a)**	Draw the basic symbols used in PLC Realization: **(i)** Push button switch (NO Type) **(ii)** Pressure switch (NC Type) **(iii)** Temperature switch (NO Type) **(iv)** Limit switch (NC Type) **(v)** Relay Coil **(vi)** Relay contact (NC Type) **(vii)** Solenoid.	**07**
	(b)	Explain DCS Structure. List three advantages and disadvantages of DCS.	**07**
		OR	
Q.5	**(a)**	Draw the ladder diagram to realized two input AND, NAND, OR and NOR Gates and Draw the ladder diagram to realized 8:1 multiplexer.	**07**
	(b)	Explain SCADA system with suitable diagram.	**07**

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