

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VII EXAMINATION – WINTER 2015

Subject Code: 170802**Date: 07/12/2015****Subject Name: Industrial Automation****Time: 10:30am to 1:00pm****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) Explain Various types of Automation Techniques applied in Production Systems with suitable example. **07**
- (b) Draw block diagram of PLC and explain each block in detail. **07**
- Q.2** (a) Explain PI mode control. **07**
- (b) Define following terms with respect to Process control **07**
1. Error
 2. Variable Range
 3. Control Parameter Range
 4. Control Lag
 5. Dead Time
 6. Cycling
 7. Controller Modes
- OR**
- (b) Define following Process Characteristics: **07**
1. Process Equation
 2. Process Load
 3. Process Lag
 4. Self-Regulation
- Q.3** (a) (1) A stepper motor has a step angle = 3.6° . (1) How many pulses are required for the motor to rotate through ten complete revolutions? (2) What pulse frequency is required? For the motor to rotate at a speed of 100 rev/min? **04**
- (2) Advantages and Disadvantages of Automation. **03**
- (b) (1) A 5m diameter cylindrical tank is emptied by a constant outflow of 1.0m³/min. A two position controller is used to open and close a fill valve with an open flow of 2.0m³/min. For level control, the neutral zone is 1m and the set point is 12m. (a) Calculate the cycling period (b) Plot the level vs. time. **04**
- (2) Explain basic block diagram of process control loop. **03**
- OR**
- Q.3** (a) Explain elements of ladder diagram and its application. **07**
- (b) An integral controller is used for speed control with a set point of 12 rpm within a range of 10 to 15rpm. The controller output is 22% initially. The constant KI = -0.15% controller output per second per percentage error. If the speed jumps to 13.5rpm, calculate the controller output after 2sec for a constant ep. **07**
- Q.4** (a) Explain following discontinuous controller modes **07**
- (i) Two position mode (ii) Multi position mode
- (b) Develop & explain the Ladder Diagram for Standard Traffic Control Signals. **07**
- OR**
- Q.4** (a) Explain supervisory digital control with suitable diagram. **07**

- (b) Develop ladder diagram for bottle filling conveyor belt. 07
- Q.5** (a) Explain in detail the input-output module used in PLC. 07
- (b) Explain Timer and counter instructions for PLC with timing diagram. 07
- OR**
- Q.5** (a) With the importance of DCS in automation, Explain the hierarchical evolution and functional distribution of DCS. 07
- (b) Explain in detail with suitable diagram, Direct Digital Control. 07
