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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent Institution of MAHE, Manipal)

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKE UP EXAMINATIONS, JANUARY 2018

SUBJECT: INDUSTRIAL AUTOMATION & CONTROL [ELE 4015]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 2 January 2018** **Max. Marks: 50**

Instructions to Candidates:

- Answer **All** the questions.
- Missing data may be suitably assumed.

1A. Differentiate between a job shop and a flow shop with example. ***(03)***

1B. A gas furnace (heating control-reverse control action) requires uo = 55% to maintain a set point temperature of 450^{0}C. The controller's range is from 200^{0}C to 100^{0}C.The Proportional Band is set to 12%. Calculate the upper and lower temperature limits for the Proportional band PB. ***(03)***

1C. Explain Why provision for Anti- integration Windup is necessary for process with P-I-D control? ***(04)***

2A. How to select a PLC for the industrial applications, Explain with the example. ***(03)***

2B. Design the PLC ladder logic for the control circuit used to detect and fill the box passing through the conveyor, where start and stop are the inputs when process starts boxes starts moving on the conveyor line sensed by proximity sensor (normally closed) and solenoid valves used to fill the content to the box indicated by fill relay, once the box is full can be recognized by full relay, solenoid valve should close again conveyor starts moving to carry to full the box away and empty box again to fill. (note start button is momentary closed push button and stop is normally closed switch) ***(04)***

2C. Explain Industrial Application of Sequence Control using PLCs taking an example of die stamping process ***(03)***

3A. Explain what type of motors, drives, controllers and sensors would you recommend for continuous axis control in CNC Machine ***(02)***

3B. With neat cross sectional diagram explain Axial Piston Pump used in the Hydraulic system and Describe the role of Swash plates in Axial piston Pump. ***(04)***

3C. Find the Volume flow rate of acetone (m3/h) with valve fully open Control Valve, pressure p1 = 9 bar, p2 = 5 bar, $\boldsymbol{K_v}$ = 20 m3/h Density of acetone is ρ = 800 kg/m3. ***(04)***

4A. Why PLCs are recommended for SCADA system justify your answer with example. ***(05)***

4B. Describe the characteristics of Distributed system with typical example. ***(05)***

5A. With neat diagram explain I^2C Bus configuration and protocol. ***(05)***

5B. Explain how data transfer takes place using MODBUS TCP/IP Network, in Industrial automation system. ***(05)***