College of Engineering, Pune

Instrumentation & Control

IE – 403 Industrial Automation

Timing: 3 hr

Academic Year: 2013- 14 Max. Marks: 60

End Semester Examination

Instructions:

1. All Questions are compulsory
2. Assume suitable data
3. Draw neat diagrams wherever necessary
4. Use of non programmable calculators are allowed

		Marks
Q. 1	A Fertilizer plant automation is to be done with Distributed Control System. The plant is having minimum automation and most of the I/Os are connected to control system with hardwire, 4-20mA loops. Select and justify a best suited network protocol that can be used for the application. List all the hardware required for the implementation of the protocol and write their significance. Specify and explain the protocol selected for the above application.	10
Q. 2	A Cement plant has Stackers and reclaimers for lime stone and other additives, wet cement processing control, klin control, packing station control. Total I/O count for the plant is as follows DI - 734 DO – 856 TC signal - 78 AI – 269 AO – 146 RTD signal – 34 DCS scheme is to be chosen for the automation. Design all the required hardware & software for the DCS system. Plant should have area wise control. The DCS system should have inventory control and also able to connect to a standalone PLC system of third party. Plant is already using software like ERP and energy management system (EMS) and data from these software must be polled by DCS system. Draw a complete architecture for above DCS system and write down the specifications for the system.	15
Q. 3	An oven temperature is between 1200deg C and 1500deg C. When it passes 1500 degrees the oven will be turned off, when it falls below 1200deg C it will be turned on again. The voltage from the thermocouple is passed through a signal conditioner that gives 1V at 500deg C and 3V at 1500deg C. The oven system has a start and stop pushbutton that can start and stop the operation manually at any time and temperature. If thermocouple output is not changing for 1min then system will generate the alarm "to check heater coil and thermocouple". The operation will be on	10

	hold (no current to heater). If the "fault removed" button pressed manually, then the operation will resume. Develop PLC program for the above operation. Follow all the steps of listing I/Os, cause and effect matrix and flow chart.	
Q. 4	Design a typical architecture of SCADA system for batch distillation column control which uses steam from boiler (boiler also has minimum necessary instrumentation for control). Explain the components used in system. State standard for HMI and explain the components of HMI that defines its quality. Draw a HMI for reflux ration control loop in distillation column	10
Q. 5	Write short Notes 1. Higher level Automation in DCS 2. Foundation Field Bus 3. PLC Hardware components and their specifications	15