Exam Date & Time: 23-May-2022 (10:00 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SIXTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, MAY 2022

INDUSTRIAL AUTOMATION [ICE-4302]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) Differentiate Distributed control system and programmable logic controllers (2)

A)

B) List the elements required for distributed control systems. (4)

C) Describe the presentation and monitoring devices used in distributed control systems (4)

2) Write the instruction list for the process shown in Fig 2A. The problem statement is described below (4)

A) Step 1: Filling the liquid in a tank

Pump A is used to fill the tank until high level switch is reached, then a small amount of liquid is added by running additive pump B for 10 seconds. The mixture is heated to 60ºC before being drawn off (step 2) as required. Pump C is used to drawn off the mixture from the tank.

Step 2: Draining the liquid from tank

While draining the tank, all the actuators like pump A, pump B and heater should be off. Pump C should be on until level reaches to low level. When the level of tank reaches to low level then control of program need to go to step 1. This cycle repeats continuously.

Use a start button to start the process and stop Button to stop the process. Strictly follow the sequence as mentioned in the Problem statement.

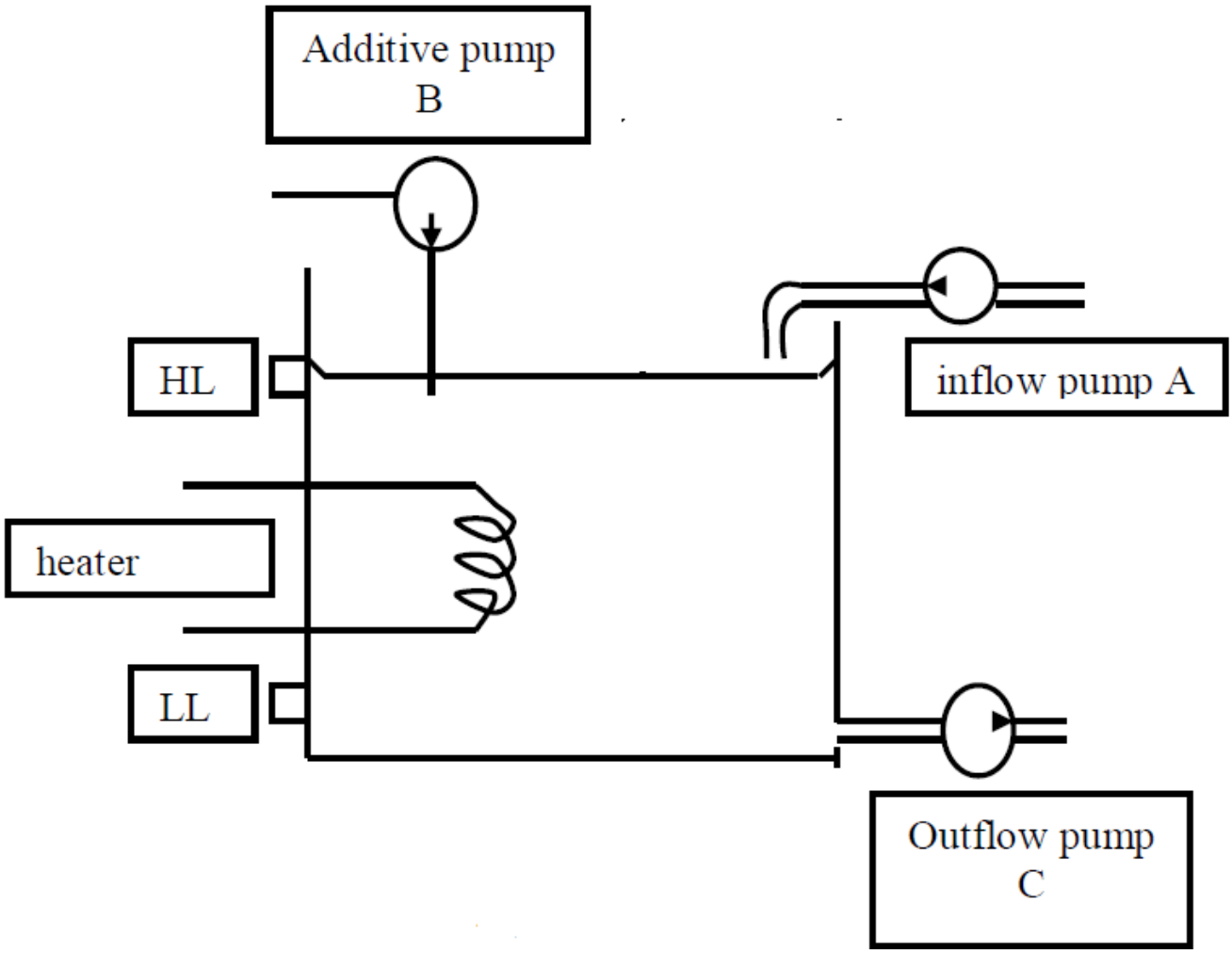

Fig 2A: Heater and mixer

B) Write the structure text for the following expression

$(A+B+C+D+E)^3$.

Note1: Do not use X power Y Instruction. (3)

Note2: Use NAND/NOR gates only.

C) Write ladder logic and truth table for SR flip flop. (3)

3) List the benefits of Field bus over the existing 4-20mA analogue signal communication. (3)

A)

B) Illustrate the communication paradigms used in Field bus. (3)

C) With neat diagrams, explain the method to eliminate reflections in Profi bus - RS 485 communication. (4)

4) Using Modbus RTU CRC technique, compute CRC Generator and CRC checker. Data is given in table 4A. (4)

A) Table 4A: Data

Data to send	1100110101

Data received	1101110101
Divisor	110101

B) With an example, explain process automation communication profile in Profibus. (4)

C) Draw Modbus RTU message timing diagram.. (2)

5) With a neat diagram, describe the hierarchy of distributed control system. (3)

A)

B) Differentiate centralised control system and local control system. (3)

C) With a neat diagram, explain large facility SCADA system. (4)

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