



B.E DEGREE EXAMINATIONS: APRIL / MAY 2024

(Regulation 2018)

Sixth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U18EII6201: Industrial Automation

COURSE OUTCOMES

CO1: Apply the design aspects of industrial automation.

CO2: Build PLC program and logic controllers with case study.

CO3: Develop PLC diagram & implement the Automation technique used in Industry.

CO4: Solve engineering problems for Field Automation and analyse their safety/redundancy.

Time: Three Hours

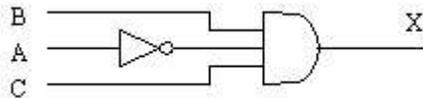
Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

- | | | |
|---|-----|-------------------|
| 1. Define Process automation. | CO1 | [K ₁] |
| 2. Compare Fixed and Modular PLC. | CO1 | [K ₃] |
| 3. Classify the methods available to program PLC. | CO2 | [K ₂] |
| 4. Develop the laager logic for the given Boolean expression. | CO2 | [K ₃] |



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|---|-----|-------------------|
| 5. Draw the ladder logic diagram for EX-NOR Gate. | CO2 | [K ₃] |
| 6. Write about Tag and mention its uses. | CO3 | [K ₁] |
| 7. Compare low level operator interfaces and high-level interfaces. | CO3 | [K ₃] |
| 8. Classify the types of displays used in DCS. | CO4 | [K ₂] |
| 9. Differentiated CCS and DCS. | CO4 | [K ₃] |
| 10. List out few Industrial Communication Protocols. | CO4 | [K ₂] |

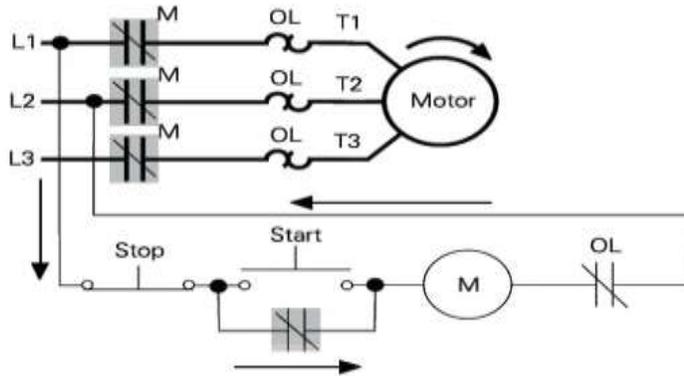
Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

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|--|---|-----|-------------------|
| 11. a) Formulate the five levels of automation in a Cement production plant and explain in detail. | 8 | CO1 | [K ₂] |
|--|---|-----|-------------------|

- b) Categorize three basic types of automation and explain about each type in detail. 8 CO1 [K₂]
12. a) Describe the basic function of discrete AC input module involved in PLC. 10 CO2 [K₂]
- b) Construct the ladder logic for the given motor control circuit. 6 CO2 [K₃]



13. a) Develop a ladder program for Traffic light control system with following conditions: i) Red light ON for 30 sec, ii) green light ON for 25 sec, and iii) Yellow light on for 05 sec. iv) Repeat the sequence until stop push button is pressed. 6 CO2 [K₃]
- b) Categorize the different types of Counter instructions in PLC. Explain in detail with example. 10 CO2 [K₂]
14. Describe the components and architecture of SCADA with neat diagram. 16 CO3 [K₂]
15. A newly constructed thermal power plant consists of multiple interconnected units handling various chemical reactions and processes, it is decided to control the whole plant by DCS. DCS architecture must ensure seamless communication, robust control, and efficient monitoring of the entire plant operations. Design a DCS architecture for the plant, considering factors such as redundancy, scalability, and integration with existing systems 16 CO4 [K₃]
16. a) Categorize the PLC Special instructions elaborate with example. 10 CO4 [K₂]
- b) Write a PLC program for the following conditions: The heat exchanger is to maintain an average set point temperature of 200 °C with a variation of about 1% between the off and on cycles. 6 CO4 [K₃]
