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**BTECH**  
**(SEM V) THEORY EXAMINATION 2024-25**  
**INDUSTRIAL AUTOMATION AND CONTROL**

TIME: 3 HRS

M.MARKS: 70

**Note:** Attempt all Sections. In case of any missing data; choose suitably.

## SECTION A

**1. Attempt all questions in brief. 2 x 07 = 14**

Q no.	Question	CO	Level
a.	Define industrial automation.	1	K1
b.	Explain the purpose of Modbus protocol.	2	K2
c.	Define SCADA.	2	K1
d.	Describe contactor.	3	K2
e.	Write about the modes of HART protocol?	3	K1
f.	Based on poles and throws, list the types of relays.	4	K1
g.	Elaborate DOL circuit.	5	K2

## SECTION B

**2. Attempt any three of the following: 07 x 3 = 21**

a.	Express with the help of a diagram, express the architecture of Industrial automation.	1	K2
b.	Provide an overview of the history of PLCs and describe their evolution and current trends.	2	K3
c.	Discuss the working principles of on-delay, off-delay, cyclic, and retentive timers in PLC programming.	3	K2
d.	Explain the 4-20mA current loop and its significance in industrial automation systems.	4	K4
e.	Explain the role of pneumatics in industrial automation. Discuss its advantages over other systems.	5	K4

## SECTION C

**3. Attempt any one part of the following: 07 x 1 = 07**

a.	Explain the roles and functionalities of PLC and SCADA in automation systems.	1	K4
b.	Explain hydraulic systems used in industrial automation. What are the applications and advantages of hydraulic systems?	1	K4

**4. Attempt any one part of the following: 07 x 1 = 07**

a.	Discuss how relays can be used as memory elements in automation circuits. Provide an example.	2	K2
b.	Discuss the role of industrial sensors in enhancing automation system performance.	2	K2

**5. Attempt any one part of the following: 07 x 1 = 07**

a.	Explain the classification of PLCs based on their size, functionality, and application areas.	3	K4
b.	Explain the use of math instructions and up/down counters in PLCs with appropriate examples.	3	K4



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**6. Attempt any one part of the following: 07 x 1 = 07**

a.	Discuss the working principles and applications of optical, inductive, and capacitive sensors in automation.	4	K2
b.	<p>Explain a ladder logic for the following condition to start and stop a motor.</p>	4	K2

**7. Attempt any one part of the following: 07 x 1 = 07**

a.	Explain the operation of 2/2 and 3/2 valves and solve problems related to valve and actuator combinations.	5	K2
b.	Explain the components of a pneumatic system, including the compressor, air tank, and FRL unit.	5	K2

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