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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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