Tutorial 9

ET0917 / ET0817 / ET0832

INDUSTRIAL CONTROL SYSTEM

ICS OVERVIEW AND HMI

Learning Outcome for ICS

Describe industrial control system

List common industrial networking protocols/standards

Describe various functions of Human Machine Interface (HMI)

Describe a typical SCADA application

Explain OPC-UA principle and benefits

Describe the functionality of Digital Twin

Q1 - MCQ

Which is NOT a typical Industrial Control System (ICS)

a) Systems deploying Raspberry Pi

b) Distributed Control System (DCS)

c) Supervisory Control & Data Acquisition (SCADA)

d) Systems deploying Programmable Logic Controllers (PLC)

Q2 - MCQ

Typical ICS operation would require several components to work. Select the option that is NOT a typical component for ICS.

a) Sensors

b) Actuators

c) Human Machine Interface (HMI)

d) Power electronics such as Inverter

Q3 - MCQ

Select the option that **correctly** describe the image.

a) Purdue Model

b) Industry 4.0 Model

c) Automation Pyramid

d) Typical ICS Architecture
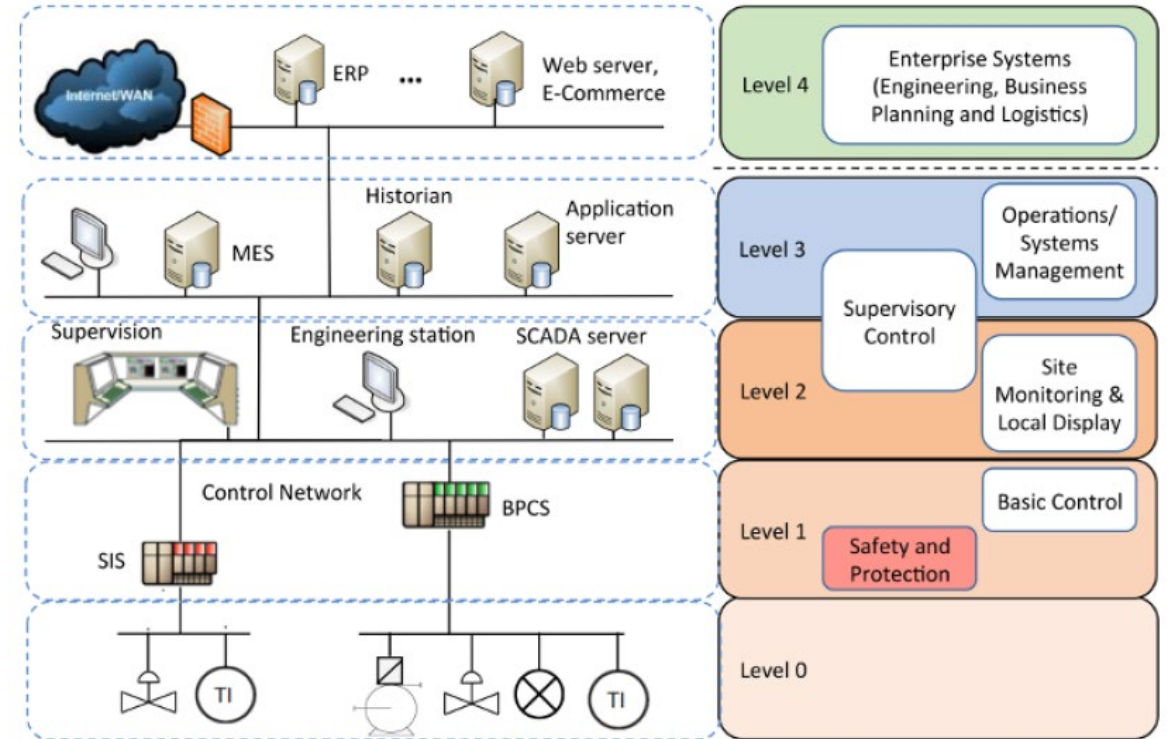
Q4 - MCQ

Select the **correct** statement about Purdue Model.

a) Automation pyramid is the same as Purdue Model

b) It is a guideline for industrial network of an ICS

c) It is a reference model for hierarchical representation of ICS

d) It suggest that Manufacturing Enterprise System (MES) and Enterprise Resource Planning (ERP) shall be in the same level

Q5 - MCQ

Select the **most suitable statement** that describes Fieldbus.

a) 4-20mA that is commonly used for instrument is one of the fieldbus

b) Fieldbus is very popular as it provides multiple 4-20mA signal output from a single instrument

c) Fieldbus is proprietary communication protocol that only allow specific vendor products to communicate to the controller

d) Fieldbus is non-proprietary (open) communication protocol that define how devices communicate with other devices or controllers

Q6 - MCQ

Select the option that is **FALSE** about Human Machine Interface (HMI).

a) Enable local inspection and manipulation of process values

b) 4-20mA is commonly used to communicate from controller to HMI

c) Controller such as PLC interfaced to HMI has the actual control over the process

d) HMI is capable of trend logging of process values

Q7 - MCQ

How does a Human Machine Interface (HMI) communicate with a controller?

a) I/O device such as buttons, sensors, lamps and relays are directly wired to HMI

b) HMI communicate with a controller via the established (during engineering) connection between HMI and controllers for specific HMI tags

c) Root screen of HMI is used for selection of communication protocol

d) Engineering station with valid license such as Siemens TIA Portal need to be connected to HMI to facilitate communication

Q8 - MCQ

What are the considerations of planning screen structure for HMI?

a) It should be eye catching with as many flashing animation as possible

b) It is a MUST for operator to log in with secure password to operate HMI

c) EVERYTHING shall fit into 1 page, as multi-screen is not possible for HMI

d) Collect, group and structure the information to display in the manner that is optimal for user navigation