BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – M.Tech.(RA)-2023
Course Name – Industrial Automation
Course Code - PCC-MIRA301
(Semester III)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) State the primary goal of automation in production systems
   a) Increasing human labor b) Reducing efficiency
   c) Minimizing errors d) Promoting manual tasks

(ii) State the automation which is characterized by fixed sequence and high production volumes
   a) Fixed Automation b) Programmable Automation
   c) Flexible Automation d) Batch Automation

(iii) Identify the type of automation which involves the complete replacement of human labor with machines or computers
   a) Supervisory control b) Process control
   c) Fixed automation d) Flexible automation

(iv) Classify the type of automation, which is known for its ability to handle high product variety and changeovers easily
   a) Fixed automation b) Flexible automation
   c) Process control d) Robotic automation

(v) Predict the type of conveyor, which is commonly used for elevating materials vertically between different levels
   a) Chain conveyor b) Bucket conveyor
   c) Gravity roller conveyor d) Vibrating conveyor

(vi) Select the key advantage of DDC systems in building automation
   a) Lower initial cost b) Simplicity of installation
   c) Improved energy efficiency d) Limited scalability

(vii) Write down the primary purpose of a DDC controller in a building automation system
   a) To generate power for the entire system b) To provide heating and cooling to the building

c) To monitor and control various building systems
d) To facilitate manual control by building occupants

(viii) Write down the full form of PID control in the context of DDC systems
a) Programmable Input Device control
b) Proportional-Integral-Derivative control
c) Primary Input Data control
d) Power Interface Device control

(ix) Write down the primary goal of DDC systems in building automation
a) Maximizing manual control by building occupants
b) Reducing energy consumption and operating costs
c) Increasing the complexity of building systems
d) Minimizing the use of sensors and actuators

(x) Predict a Distributed Control System (DCS) is
a) A system that controls a single process with centralized control
b) A system that controls multiple processes with centralized control
c) A system that controls multiple processes with distributed control
d) A system that controls a single process with distributed control

(xi) Select an OR function implemented in ladder logic uses :
a) Normally-closed contacts in series
b) Normally-open contacts in series
c) A single normally-closed contact
d) Normally-open contacts in parallel

(xii) Decide the purpose of the "Scan Cycle" in a PLC
a) To scan for viruses
b) To execute the program repeatedly
c) To shut down the PLC
d) To update the operating system

(xiii) The component in a DCS is recommended for processing control algorithms and executing control actions are
a) Field devices
b) Human-Machine Interface (HMI)
c) Remote Terminal Unit (RTU)
d) Controller

(xiv) Choose the full form HART
a) High-speed Adaptive Real-Time
b) High-frequency Analog Real-Time
c) Highway Addressable Remote Transducer
d) Hyperactive Automated Remote Transmission

(xv) Field bus communication is often recommended in industries like
a) Retail
b) Healthcare
c) Manufacturing and process control
d) Education

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain the purpose of timers and counters in PLC programming. (3)

3. Describe material handling system. (3)

4. List the main types of material handling equipment. (3)

5. Illustrate how does automation impact the transportation industry. (3)

6. Write the advantages of using a DCS in industrial automation. (3)

OR

Write some common applications of DCS in industrial processes. (3)

Group-C
(Long Answer Type Questions) 5 × 6=30

7. Name and describe the five major categories of material handling equipment. (5)

8. Briefly describe the three principal components in automatic identification technologies. (5)

9. Write the short note on Output Energize (OTE) Instruction. (5)

10. Differentiate between DCS Network and Field Communication Protocol. (5)

11. Write the key features of Mass Flow Meters. (5)

12. Explain the factors that must be considered while selecting a HART multiplexer. (5)

OR

Differentiate between HART Protocol and Modbus. (5)

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