17785

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – M.Tech.(RA)-2024
Course Name – Industrial Automation
Course Code - MEC30109
(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) Recall the full form of FMS.
a) Flexible Manufacturing Setup b) Fixed Manufacturing System
c) Flexible Manufacturing System d) Flow Management System

(ii) Define cellular manufacturing.
a) Manual batch production b) Layout with grouped machines
c) Conveyor-based system d) One-product system

(iii) Define advanced automation function.
a) Only switches b) Logic and decision-making
c) Manual override d) Optical zoom

(iv) Outline the function of sensors in automated systems.
a) Store data b) Record documents
c) Detect process conditions d) Convert power

(v) Evaluate a suitable transfer mechanism for light components.
a) Chain drive b) Vibratory feeder
c) Screw jack d) Gear train

(vi) Identify the type of system designed for temporary storage during production.
a) Final storage b) WIP storage
c) Inbound storage d) Static storage

(vii) List one common feature of automated storage.
a) High labor cost b) Inconsistent retrieval
c) Manual shelf tracking d) Programmable location tracking

(viii) Illustrate how storage system performance is evaluated.
a) Employee feedback b) Number of floors
c) Retrieval time and space utilization d) Machine count

(ix) Illustrate routing logic for AGV avoiding blocked zone.
a) Reprogram later b) Assign alternate path

c) Wait until clear
d) Follow existing route

(x) Classify the SCADA component that collects data from the field.

a) HMI
b) RTU
c) PLC
d) CPU

(xi) Classify Profibus under communication protocols.

a) Wireless
b) Analog
c) Digital fieldbus
d) Visual signal

(xii) Choose appropriate protocol for remote configuration of transmitters.

a) Profibus
b) USB
c) Modbus RTU
d) HART

(xiii) Name a non-contact inspection method.

a) Micrometer
b) Dial gauge
c) Laser scanner
d) Vernier caliper

(xiv) Select an example of a contact inspection tool.

a) Ultrasonic sensor
b) CMM probe
c) Laser scanner
d) Camera

(xv) Classify sensors used in inspection tasks.

a) Output sensors
b) Vision sensors, tactile sensors
c) Measurement sensors only
d) Sound sensors only

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain the architecture of SCADA used in process industries. (3)
3. Assess the effectiveness of LCU security mechanisms in mitigating cyber threats. (3)
4. Define automated inspection. (3)
5. Demonstrate how storage buffers in flow lines improve system performance. (3)
6. Examine how PLC instruction sets affect control system design. (3)

OR

Analyze how international safety standards influence PLC-based process safety automation. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Analyze the key design considerations for conveyor systems in automated factories. (5)
8. Analyze the block diagram of a typical PLC system and its role in automation. (5)
9. Analyse typical process interfacing issues faced by LCUs and propose mitigation strategies. (5)
10. Describe the principle of automated inspection. (5)
11. Describe different types of automated material handling systems used in manufacturing. (5)
12. Evaluate how process safety levels are achieved using PLCs in automation. (5)

OR

Assess the challenges in integrating international standards like IEC 61508 with PLC programming. (5)

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