The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Mechanical Engineering

Study Programme	: Bachelor of Science (Honours) in Engineering
Name of the Examination	: Final Examination
Course Code and Title	**: DMX7304 Factory Automation**
Academic Year	: 2023/24
Date	: 07th March 2025
Time	: 0930 -1230 hrs.
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Five (5)** questions. Answer **All** questions.
3. All questions carry equal marks.
4. Answer for each question should commence from a new page.
5. This is a Closed Book Test (CBT).
6. Answers should be in clear handwriting.
7. Do not use Red colour pens.

Question 01

(a) Automatic Identification and Data Capture (AIDC) technologies are fast being employed in automating factories at present. Briefly explain three drawbacks of manual data collection which has led to the use of AIDC, particularly in factory automation.

(*06 Marks*)

(b) List out four AIDC technologies that are currently used in the factory automation environment. (*04 Marks*)

(c) Many technologies are used for AIDC in factory automation. Briefly discuss five categories of technologies that are currently being used for AIDC.

(*10 marks*)

Question 02

(a) Briefly discuss by taking suitable examples the various methods of process control, namely, sequential control and modulating control used in factory automation. (*06 marks*)

(b) Draw a block diagram and briefly explain the control of a closed looped process. (*08 marks*)

(c) Briefly discuss Integral control and Proportional plus Integral (P-I) control and their applicability in process control. (*06 marks*)

Question 03

(a) *The development of Computer Numerical Control (CNC) machines has made it possible the automation of the machining processes with high precision and flexibility to handle production of small to medium batch productions of parts in the modern factory environment.* Elaborate on this statement. (*06 marks*)

(b) List three advantages and disadvantages each for CNC machines. (*06 marks*)

(c) Briefly discuss the two systems used in CNC based on whether the machine cuts metal while the work-piece moves relative to the tool. (*08 marks*)

Question 04

(a) Industrial wireless networks are widely used in modern factory automation environment. Briefly discuss the difference between wireless networks vs. industrial wireless networks in terms of data volume and battery life. (*06 marks*)

(b) Why is reliability considered a critical factor in industrial wireless network? Explain. (*06 marks*)

(c) Explain how ISA100 industrial wireless protocol meets the current and future trends in industrial wireless communication technology. (*08 marks*)

Question 05

(a) A safety PLC is an integral part of a Safety Instrumented System (SIS) used in modern factory environment. What is the function of a safety PLC? (*06 marks*)

(b) How does a safety PLC differ from a regular PLC? Describe three such features. (*06 mark*)

(c) Briefly explain the Safety Integrity Levels (SIL) used in factory automation safety systems. (*08 marks*)

End