

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	: 2024/25
Date	: 15 th March 2026
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 in **two (2)** pages. 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) If implemented correctly, Flexible Manufacturing Systems (FMS) can reap its fullest potential. Explain four (04) potential benefits that can be achieved when successfully implementing FMS. (You are required to explain how these benefits are achieved when implementing FMS)
(08 Marks)
- (b) It is important that a company identify and address the issues related to planning and design, and operations management before implementing FMS. Briefly explain three (03) issues related to planning and design to be considered before implementing FMS.
(06 Marks)
- (c) Explain three (03) categories in which FMS can be classified based on the number of processing machines used.
(06 marks)

Question 02

- (a) Taking a suitable example, explain the difference between a factory and an Industry as applicable in manufacturing/production.
(06 marks)

- (b) Discuss the features and applicability of Hard Automation and Soft Automation in relation to industrial/factory automation. (08 marks)
- (c) Automation had been employed for decades in process plants, well before the introduction of automation into discrete part manufacturing industries (factories). Discuss the reasons as to why it was not possible to automate discrete part manufacturing industries, as in the case of automating process plants at a very early stage in the evolution of automation. (06 marks)

Question 03

- (a) Digitalization is very much talked about in the modern manufacturing environment. Discuss the importance and the main obstacles in the digitalization of manufacturing industries. (06 marks)
- (b) Why are traditional Field Bus Technologies not suited for the modern factory automation scenarios? Explain. (06 marks)
- (c) By using the automation pyramid, explain how Single Pair Ethernet (SPE) address the problems faced with traditional field bus technologies in relation to modern Industrial/Factory automation. (08 marks)

Question 04

- (a) Edge computing and cloud computing are often heard terms in Industrial Internet of Things (IIoT) employed in Factory 4.0. Distinguish between Edge Computing and Cloud Computing. Explain the reason for using Edge Computing in Factory 4.0. (08 marks)
- (b) Explain the importance of Cloud Computing in the Factory/Industry 4.0 environment. (04 marks)
- (c) Integration of Edge Computing and Cloud Computing within IIoT is vital in the Factory/Industry 4.0 environment. However, there are some challenges. Explain the challenges and solutions when implementing Edge Computing and Cloud Computing within a Factory/Industry 4.0 environment. (08 marks)

Question 05

- (a) Sensors and actuators play a vital role in data acquisition and control automation systems. Taking an example from factory automation, draw and explain a typical instrumentation system containing sensors and actuators. (08 marks)
- (b) In a modern factory automation environment, especially in Factory 4.0, traditional sensors and actuators are replaced by smart sensors and actuators. What are smart sensors and actuators? Explain. (08 mark)
- (c) Smart sensors are superior to traditional sensors due to their enhanced processing capabilities. List four (4) such capabilities that a smart sensor possesses. (04 marks)

End

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