

Study Programme	: Bachelor of Science Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	DMX7402 – Analysis of Manufacturing systems & Processes
Academic Year	: 2023/24
Date	: March 20, 2025
Time	: 09:30 hrs. – 12:30 hrs.
Duration	: 3 hours

General instructions

- 1) Read all instructions carefully before answering the questions
- 2) This question paper consists of 05 questions. All questions carry equal marks.
- 3) Answers all questions.

Question 01.

- a) Define a manufacturing system and explain its key components with examples.
- b) Discuss the importance of analyzing manufacturing systems in improving productivity and efficiency.
- c) Discuss the major challenges in analyzing and optimizing manufacturing systems.

Question 02.

- a) What are the major decision-making factors in designing of a manufacturing system? Discuss their implications on cost and efficiency.
- b) Explain the significance of performance metrics (such as lead time, efficiency, and productivity) in evaluating manufacturing systems.
- c) Discuss the different types of models used in manufacturing systems analysis.

Question 03.

- a) Define deterministic and stochastic models in the context of manufacturing systems analysis. Discuss the differences between the two types of models.
- b) Define production flow lines in manufacturing systems. Explain the key characteristics that distinguish them from other production system configurations.
- c) How do bottlenecks affect manufacturing system performance? Explain methods for identifying and resolving bottlenecks.

Question 04.

- a) Define cellular manufacturing and explain its core principles. Provide examples of industries or products that can benefited from cellular manufacturing.
- b) What are the advantages and disadvantages of Flexible Manufacturing Systems (FMS) in adapting to changing production demands? Provide examples of industries or products that benefit the most from FMS.
- c) Explain the role of Computer-Integrated Manufacturing (CIM) in modern manufacturing systems and its benefits.

Question 05.

- a) A single-machine workstation is used to process parts in a manufacturing system. The system has the following parameters:
 - Processing time per part = 0.5 hours
 - Arrival rate of parts = 1.2 parts per hour
 - Machine availability = 95%

Answer the following questions:

- (i) Calculate the machine utilization.
- (ii) Determine the maximum achievable throughput of the system.
- (iii) Compute the average number of parts in the system (work-in-process, WIP) using Little's Law.
- (iv) Estimate the average cycle time of a part in the system.

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