



Study Programme	:	Bachelor of Science Honours in Engineering
Name of the Examination	:	Final Examination
Course Code and Title	:	<b>DMX4212 MANUFACTURING ENGINEERING</b>
Academic Year	:	2023/24
Date	:	March 07, 2025
Time	:	14:00 hrs. – 17:00 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.

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**Question 01.**

- a) Define metrology and explain its importance in manufacturing technology.
- b) Describe the difference between line standards and end standards in metrology. Provide an example of each.
- c) Explain the process of calibrating a measuring instrument and state why calibration is important in ensuring accurate measurements.

**Question 02.**

- a) Describe the function of a vernier caliper and how it differs from a micrometer in terms of measurement applications.
- b) Define surface roughness and surface texture. Explain their significance in manufacturing and discuss how they influence the fatigue life of a mechanical component.
- a) Define the terms tolerance, limit, and fit in the context of mechanical engineering. Explain why tolerances are essential in manufacturing processes and factors influence the selection of tolerance values.

**Question 03.**

- a) Define chip formation in metal cutting and explain factors that influence chip formation.

- b) In a turning operation, the chip thickness before cutting is 0.25 mm and the chip thickness after cutting is 0.75 mm. Calculate the chip reduction ratio, shear plane angle, and shear strain.

*Question 04.*

- a) Discuss the concept of tool wear in metal cutting operations. Explain the common types of tool wear and how can they be minimized.
- b) Describe the Taylor tool life equation and its significance in metal cutting. Explain how the Taylor equation can be used to optimize machining processes.
- c) Given the Taylor's tool life equation  $VT^n=C$ , where  $V$  is the cutting speed,  $T$  is the tool life,  $n$  is the tool life exponent and  $C$  is a constant. If  $n=0.5$  and  $C=120$ , calculate the percentage increase in tool life when the cutting speed is reduced by 50%.

*Question 05.*

- a) Define the term 'machine tool' and explain its primary function in manufacturing processes. Provide examples of common machine tools used in manufacturing industry.
- b) Explain the various geometrical tests that are to be conducted to get a better accuracy in machine tools. Discuss the measurement techniques and what instruments are commonly used for these measurements.
- c) Differentiate between hot working and cold working processes in metal forming, focusing on how temperature influences material behaviour.

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