



FACULTY OF ENGINEERING
END OF SEMESTER EXAMINATIONS - APRIL 2025

PROGRAMME: BACHELOR OF ELECTRICAL AND CONTROL ENGINEERING

YEAR/SEM: YEAR 1/SEMESTER 2

COURSE CODE: MEC1212 (CIVIL/ELECTRICAL)

NAME: MANUFACTURING TECHNOLOGY

DATE: 2025-04-24

TIME: 2:00-5:00PM

INSTRUCTIONS TO CANDIDATES:

1. Read the instructions very carefully
2. The time allowed for this examination is STRICTLY three hours
3. Read each question carefully before you attempt and allocate your time equally between all the Sections
4. Write clearly and legibly. Illegible handwriting cannot be marked
5. Number the questions you have attempted
6. Use of appropriate workplace examples to illustrate your answers will earn you bonus marks
7. Any examination malpractice detected will lead to automatic disqualification.

DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Section A Answer any THREE QUESTIONS from this section

Question 1:

- a) List and explain three types of chips in manufacturing.
- b) Differentiate between cutting speed and feed in the manufacturing process.
- c) The figure below shows the machining of a certain material with the given dimensions. Assume cutting speed v of 124 SFPM (surface feet per minute) and feed f as 0.00145 inches per revolution. Compute (i) Rotational speed N (ii) Feed Rate, f_r (iii) Depth of cut, d (iv) Machine Time, T_m (v) Material Removal Rate, MRR.

Question 2:

- a) What is a chip as applied to machining?
- b) List and explain the types of chips known to you. Support your answers with schematics.

Question 3:

- (a) Differentiate between destructive and non-destructive testing
- (b) List and explain two non-destructive testing known to you.
- (c) An ultrasonic pulse is sent through a copper block, and the echo is recorded after 4000000 Picoseconds. If velocity of ultrasonic waves in that metal is 8000 m/s, calculate the thickness of the copper block. At another location in same block echo is recorded after 1.242 μ s. What is the location of flaw from the bottom?

Question 4:

- a) Differentiate between Lean and agile Manufacturing
- b) Explain the following terms: mass production, batch production, projects and Job shop production

Section B Answer any TWO QUESTIONS from this section

Question 1:

- a) Differentiate between material characterization and characteristic.
- b) List three merits and demerits of material characterization that exist in an industrial or research-based scenario.
- c) As a Manufacturing technology Engineer, how will you explain the difference between manufacturing and production to a groundnut seller in Kansanga market?

Question 2:

- a) What do you understand by machining as applied to manufacturing?
- b) Differentiate between conventional and non-conventional machining processes. Support with examples.

- c) List two advantages and disadvantages of machining.
- d) Differentiate between orthogonal cutting and oblique cutting as applied to manufacturing.
- e) What do you understand by a chip in manufacturing?
- f) In an orthogonal cutting operation, the 0.245-inch-wide tool has a rake angle of 4.9° . The lathe is set so the chip thickness before the cut is 0.010 inches. After the cut, the deformed chip thickness is measured to be 0.027 inches. Calculate (i) the shear plane angle and (ii) the shear strain for the operation.
- g) Briefly explain the implication of the Merchant Equation in manufacturing.

Question 3:

Differentiate between destructive and non-destructive testing. List and explain only two non-destructive tests.

- b) An ultrasonic pulse is sent through a block of steel. The echo is recorded after 1.425 microseconds. Calculate the thickness of the steel block and the wavelength of the pulse if the frequency of the ultrasonic pulse is 101 kHz and the velocity of ultrasonic in steel is 6000 m/s.

Question 4:

- a) Differentiate between oblique and orthogonal cutting in machining
- b) List and explain factors Influencing Cutting Process.