

National Taiwan University of Science and Technology
Graduate Institute of Intelligent Manufacturing Technology

Ph.D. Qualifying Examination

Subject	Intelligent Manufacturing and Operations		
Date	2025 / 05 / 05	Time	14:00 (Start) to 17:00 (End) (Total 180 Minutes)
Instructions to Candidates:			
<ol style="list-style-type: none">1. This exam paper consists of ONE page. Please verify the number of pages.2. Do not write any text or symbols unrelated to the answers on the exam paper.3. Answers should be written on the answer sheet, with clear indication of the question number.4. Upon the announcement of the exam end time, please stop writing immediately and submit both the exam paper and the answer sheet.5. Violation of examination rules will be dealt with according to university regulations.6. Reference materials not allowed in this exam.			

Full Name: _____ Student ID: _____

◆ Question 1 (25 Points)

What are the primary distinctions between traditional and Industry 4.0 manufacturing? Please explain two aspects of them. Will workers face mass unemployment as a result? How do the methods proposed by Work 4.0 alleviate workers' challenges during the transition to Industry 4.0?

◆ Question 2 (25 Points)

Taiwan's semiconductor technology is leading the world, and the academic community is indispensable in training talent. What are the keys to leading the semiconductor industry? How can this technological superiority be maintained in terms of intelligent manufacturing?

◆ Question 3 (25 Points)

Several popular algorithms, such as predictive maintenance (PdM) and equipment health monitoring (EHM), are commonly employed in real-world manufacturing. Suppose you are tasked with implementing one of these algorithms in a factory. What types of data would you collect, and how would you prepare the data to support the selected method?

◆ Question 4 (25 Points)

Recently, quality digital twins have been widely adopted to reduce unnecessary costs. Please introduce the concept of a quality digital twin and further design the construction flow.