UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: BME 4033
COURSE	: MANUFACTURING SYSTEM DESIGN
SEMESTER/SESSION	: 2-2023/2024
DURATION	: 3 HOURS

Instructions:

1. This booklet contains 5 questions. Answer **ALL** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 7 PRINTED PAGES INCLUDING COVER PAGE

Answer ALL questions.

QUESTION 1

A single station manufacturing cell is a self-contained unit in a manufacturing system where all tasks for a specific operation are performed.

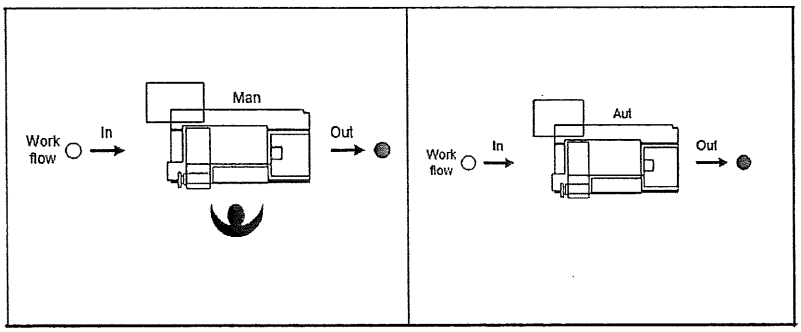

Figure 1: Single Station Manufacturing Cells

a) **Predict** why single-station manufacturing cells are commonly utilized in the industry. (6 Marks)

b) **Identify** three (3) machine operations for single-station manned cells. (6 Marks)

c) **Compare** single-station manned cells and single-station automated cells in terms of worker's attendance, production rate and operation. (6 Marks)

QUESTION 2

"ABC company employs both manual and automated assembly lines"

a) **Illustrate how** the manual assembly line and automated production line work in ABC Company. (4 Marks)

b) **Determine** typical operations performed on manual assembly line workers at ABC Company. (4 Marks)

c) **Evaluate** three (3) types of mechanized work transport system used in manual assembly line. (6 Marks)

d) **Identify** reasons why storage buffer is required in automated production line. (6 Marks)

e) **Designate** two (2) possible line pacing options implemented by ABC Company. (8 Marks)

QUESTION 3

Hollier employs the use of data from "from-to" charts to effectively arrange machines and optimize the proportion of in-sequence parts within the cell. The classification and coding of parts can be a time-consuming method when it comes to identifying part families.

a) Given the rotational part design in Figure 2. By referring to Appendix 1, **determine** the suitable form code in the Opitz classification and coding system. (5 Marks)

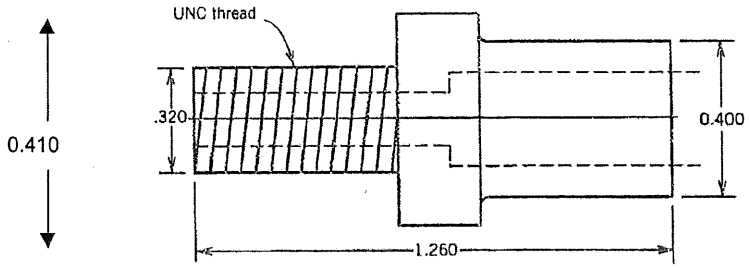

Figure 2: Part Design

b) Five machines will constitute a GT cell, as per Figure 3. By using Hollier Method, **calculate** percentage of in-sequence moves, bypassing moves and backtracking moves. (13 Marks)

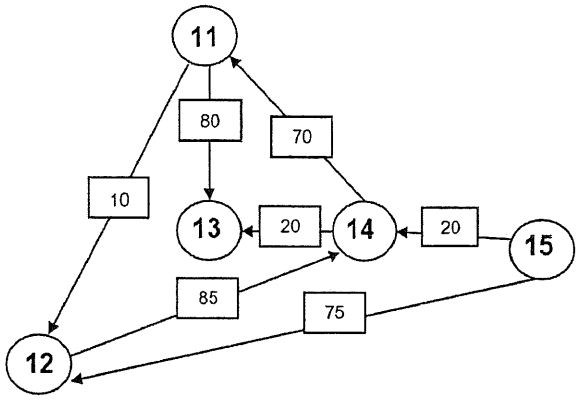

Figure 3: GT Cell for Five (5) Machines

QUESTION 4

Flexible manufacturing system (FMS) is a highly automated GT machine cell with one or more processing stations (typically CNC machine tools), interconnected by an automated material handling and storage system, and controlled by a distributed computer network.

a) In your own words, **interpret** two (2) alternative approaches to FMS. (6 Marks)

b) Figure 4 depicts a manufacturing cell with automation, but is it a flexible manufacturing cell? **Evaluate** this circumstance by providing a thorough explanation. (12 marks)

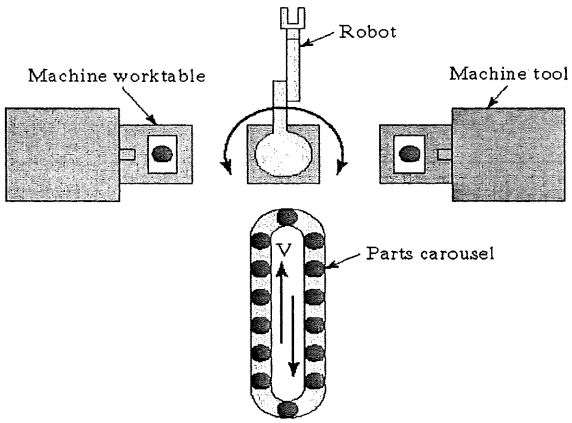

Figure 4: Automated Manufacturing Cell