

**UNIVERSITY COLLEGE TATI (UC TATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE	: BME 3093
COURSE	: INDUSTRIAL ENGINEERING
SEMESTER/SESSION	: 1-2024/2025
DURATION	: 3 HOURS

Instructions:

1. This booklet contains 4 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 5 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

- a) Why is it important to assess manufacturability in process engineering? **Discuss** the factors considered during the assessment. (6 Marks)

- b) **Clarify** the considerations in selection of an equipment or process. (4 Marks)

- c) Select an assembled item that you can disassemble that has 8 to 15 parts (e.g., stapler, pencil sharpener, toy truck or car, or similar item). **Prepare** a product structure tree that has at least three levels for the item. (10 Marks)

- d) **Produce** a route sheet for manufacturing mechanical part (you can select your part and use your engineering judgement to analyze the manufacturing process). Your part must have at least 5 processing steps. (10 Marks)

QUESTION 2

- a) Elmer's Fudge Factory is planning to open 10 retail outlets in New Brunswick over the next two years. **Identify** those factors relevant to the decision. (6 Marks)
- b) Ching-Chang Kau is considering opening a new foundry in Digby, Nova Scotia; Edmonton, Alberta; or Gatineau, Quebec, to produce high-quality rifle sights. He has assembled the following fixed cost and variable cost data:

Table 1: Fixed and variable costs for three potential plant locations

Location	Fixed Cost per Year	Per-Unit Costs		
		Material	Variable Labour	Overhead
Digby	\$200 000	\$0.20	\$0.40	\$0.40
Edmonton	\$180 000	\$0.25	\$0.75	\$0.75
Gatineau	\$170 000	\$1.00	\$1.00	\$1.00

Perform an analysis of the volume over which each location is preferable.

(10 Marks)

- c) Briefly **outline** the impact that job sequence has on each of the layout types.

(4 Marks)

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QUESTION 3

- a) **Discuss** some of the main advantages and disadvantages of specialization from a management and a worker's perspective. (8 Marks)
- b) **Explain** the term knowledge-based pay system. (2 Marks)
- c) A work operation consisting of three elements has been subjected to a stopwatch time study. The recorded observations are shown in the following table. By union contract, the allowance time for the operation is personal time 5%, delay 5%, and fatigue 10%. **Determine** the standard time for the work operation. (10 Marks)

Table 2: Cycle Observed in Minutes

JOB ELEMENT	OBSERVATIONS (MINUTES)						PERFORMANCE RATING (%)
	1	2	3	4	5	6	
A	0.1	0.3	0.2	0.9	0.2	0.1	90
B	0.8	0.6	0.8	0.5	3.2	0.7	110
C	0.5	0.5	0.4	0.5	0.6	0.5	80

QUESTION 4

- a) Think of a specific product such as a camera. If you were to measure human performance in using this device, what criteria would be important? **Identify** and denote how you would measure each criterion. (10 Marks)
- b) What are some methods for improving the safety of tools and machines at the point of operation? **Discuss** the role of ergonomics with respect to each method. (6 Marks)
- c) **Demonstrate** the importance of housekeeping in most industrial facilities and how do 5S programs fit into this picture. (6 Marks)
- d) **Discuss** ergonomic issues that might arise for each form of protective equipment. (8 Marks)

-----End of question-----

