



United International University (UIU)

Term Final Examination

IPE 401/IPE3401: Industrial Management/ Industrial and Operational Management

Summer Trimester: 2024

Total time: 2:00 hours

Date: 17/09/2024

Total marks: 50

Section: A/B/C/D/E

There are 5 questions. You must answer 4 questions.

1. a) What do you mean by a 6-sigma system? Explain it with necessary diagrams

[2.5]

b) A company produces Winter Jackets, and their monthly sales have been recorded over the past five months. The company wants to find the forecasted demand for the next two months based on the trend from the last five months using **Linear Regression**. Now, find the forecasted **demand** for the month **6 & 7**, and also **draw** the approximate **trend line**.

[10]

Monthly Sales Data

Month	1	2	3	4	5
Demand	150	130	115	95	80

2. Apply the **Critical Ratio** sequencing rules to these five jobs in order to find:

[12.5]

- Average completion time.
- Utilization.
- Average numbers of jobs in the system.
- Average job lateness

Job	Job Work (Processing) Time (Days)	Job Due Date (Days)
A	5	11
B	4	8
C	7	13
D	3	9
E	6	7

3. a) A company manufactures two products, Chairs and Tables. Each Chair sold brings in a profit of \$50, and each Table sold brings in a profit of \$40. The company has a limited weekly supply of 100 hours of labor and 80 kg of wood. Producing one Chair requires 2 hours of labor and 4 kg of wood, while producing one Table requires 5 hours of labor and 2 kg of wood. The goal is to determine how many Chairs and Tables the company should produce each week to maximize its profit, while staying within its labor and wood availability. Solve it by **Linear Programming Method**. Draw approximate necessary graphs and show calculations. (No graph papers will be provided)

[8]

- b) The cost to transport goods from factories to dokans are given in the following table. Now, calculate the total transportation cost using the **Northwest Corner Method**. [4.5]

	D1	D2	D3	D4	Supply
Factory F1	4	6	8	5	40
Factory F2	2	7	3	9	30
Factory F3	5	4	9	6	50
Demand	20	40	30	30	

4. a) A manufacturing company produces precision components with a target dimension of 100 mm. Any deviation from this ideal measurement results in financial loss. Last year, due to a deviation where the actual dimension measured 102 mm, the company incurred a loss of \$500. This year, the production team measured the dimensions are to be 101 mm & 103 mm. Your task is to determine expected financial loss for both the 101 mm and 103 mm, respectively? [4]

- b) A subassembly of a computer system consists of 3 components (A) in parallel, one component (B) in series, and 2 components (C) in parallel. Reliabilities per 100 hours of A = 0.75, B = 0.97 and C = .95. Find the system (i) **failure rate**, (ii) **MTBF** and (iii) **the probability** that the system will work for **300 hours**? [8.5]

5. a) Two competing smartphone manufacturers, X and Y, must choose between two strategies: Camera Improvements or Battery Life Improvements. The payoffs depend on the strategy combination they select, with the goal of maximizing market share. If both choose Camera, each gains 6%. If X chooses Camera and Y chooses Battery, X gains 4% and Y gains 12%. If X chooses Battery and Y chooses Camera, X gains 10% and Y gains 3%. If both choose Battery, each gains 5%. Find the payoff matrix and determine the optimal strategies using the Minimax Criteria. [5]

- b) A software development team is consistently missing project deadlines due to poor communication between the development and testing teams, leading to frequent rework and increased project costs. Use a **Fishbone Diagram** to identify the root causes of each problem and organize them into categories like Materials, Methods, Equipment, and Management for each category you should have mention 2 possible reasons. [7.5]

CO2	Analyze various industrial problems by using operation management, technique, operation research technique and cost accounting technique and solve it. Applicable for questions 1 & 2.
CO3	Explain the importance of quality control, and various industrial engineering techniques to improve the process in any engineering sector and how this affect the organization and customers. Applicable for questions 4 & 5 (a).
CO4	Analyze the optimization problems and solve it by using graphical method. Applicable for questions 3 & 5 (b).

