Enrolment No. _____

AHMEDABAD UNIVERSITY

AMRUT MODY SCHOOL OF MANAGEMENT

UNDERGRADUATE PROGRAMMES

2025-2026 WINTER SEMESTER

MID SEMESTER EXAMINATION

TOD221 OPERATIONS MANAGEMENT

Date: 24-02-2026
Time: 11.00 am – 12.30 pm

Total Marks: 20
No. of printed pages: 06

General Instructions:

1. Students must carry their identity card during the examination.
2. No break is allowed during the examination under any circumstances. In case of an emergency, with prior permission of the invigilator and an escort, a break of maximum five minutes is allowed.
3. No unauthorized devices, such as mobile phones, any kind of watches, other gadgets, or any kind of material is allowed on person.
4. Any violation of examination rules and an intent of malpractice will lead to strict disciplinary action, including a possible expulsion from the university.

Course Specific Instructions:

1. The duration of the examination is one hour and thirty minutes.
2. All questions are compulsory.
3. Answers must be written in this question paper only; no additional sheets will be provided.
4. At the end of the examination, return this paper to the invigilator.
5. The examination carries a total of 20 marks.
6. Little's Law: Average Inventory = Average Flow Rate X Average Flow Time
7. Capacity when batching is considered = Batch Size/(Setup time + (Batch Size X Run Time))

Please read the questions carefully and follow the instructions. All the best for the exam.

Question 1

AromaGlow Candles Pvt. Ltd. manufactures premium scented candles for large retail chains across India. In order to offer greater product variety, the company produces multiple fragrances in batches. Management is evaluating whether its current batch size and setup practices are efficient. The plant produces 480,000 candles annually. The average batch size is 12,000 candles. Each candle requires 30 seconds of processing time on the automated production line. Every time production switches from one fragrance to another, a setup is required, which takes 2 hours per batch. The plant operates 300 days per year, running 2 shifts per day, with each shift lasting 8 hours. Each shift employs 10 workers, and each worker is paid ₹250 per hour. Additionally, each setup results in material waste costing ₹50,000 per setup. The raw material cost per candle is ₹40.

a. Calculate the total annual production time (processing + setup time). **(2 marks)**
b. Determine the annual capacity utilisation of the plant. **(2 marks)**
c. Compute: (i) Total annual labour cost, (ii) Total annual setup waste cost, and (iii) Total annual production cost **(6 marks)**

SOLUTION

Question 2

A city government plans to introduce electric buses to reduce urban air pollution. The buses must be charged overnight at a central depot. Each charging station can serve only one bus at a time, and switching between different battery types requires setup time during which no charging occurs. Due to budget constraints, the government has installed a limited number of charging stations.

To improve charging efficiency, the operations team suggests grouping buses by battery type and charging them in larger batches to reduce setup time and increase station utilisation. However, doing so may delay early-morning bus departures, potentially affecting commuters and reducing public trust in the new system.

Using concepts from process analysis, please answer the following questions:

a. Why an operationally efficient solution (larger charging batches) may create economic and social consequences. **(3 marks)**
b. How trade-offs emerge between environmental goals, service reliability, and financial constraints. **(2 marks)**

SOLUTION

Question 3

A multiplex cinema is preparing for a blockbuster movie release. Two service stations operate continuously during peak evening hours:

1. Popcorn Counter Preparation: Before preparing a batch of popcorn, the machine must be pre-heated and loaded with ingredients, which takes 18 minutes. Once ready, it takes 2 minutes to prepare one tub of popcorn. The manager decides to prepare popcorn in batches of 36 tubs.
2. Juice Machine: Each cup of soda takes 10 seconds to fill. However, after every 240 cups, the machine must be cleaned and refilled with syrup and carbonation, which takes 20 minutes, during which no soda can be served.

Assume demand is not a constraint, and both stations operate continuously.

(a) If popcorn is prepared in batches of 36 tubs, what is the effective capacity of the popcorn counter (in tubs per hour)? **(2.5 marks)**

(b) What is the maximum capacity of the soda fountain machine (in cups per hour), considering cleaning and refill time? **(2.5 marks)**

SOLUTION