

**Mid-Term Exam (AY 2022-23, II Semester)**

**Operations and Supply Chain Management (MPBA G510)**

**Marks :30**

**Time: 90 Minutes**

**Instructor: Dr Rajesh Matai**

**Date: 15 March 2023**

Q:1 Adani Shipyards wants to develop control charts to assess the quality of its steel plate. They take ten sheets of 1" steel plate and compute the number of cosmetic flaws on each roll. Each sheet is 20' by 100'. Based on the following data, develop limits for the control chart, plot the control chart, and determine whether the process is in control. (8 M)

Sheet	Number of flaws
1	1
2	1
3	2
4	0
5	1
6	5
7	0
8	2
9	0
10	2

Q:2 An assembly line has been designed to make battery-powered beverage mixers. Task details are shown in the table below: (2x4=8 M)

Station	Task Assigned	Task Time (minutes)
1	1	3.0
2	3; 4	1.5; 2.0
3	2; 5; 6	1.5; 1.5; 1.0
4	7	3.0
5	8	2.5
6	9; 10; 11	2.0; 1.0; 1.0

- a. What is the assigned cycle time (in minutes)?
- b. What is the maximum output rate of this line in mixers per hour?
- c. What is the total idle time per cycle?
- d. What is the assembly line's efficiency?

Q: 3 Workplace, International is re-evaluating the design, cost and profitability of its line of office accessories. Currently, the items are constructed of metal-based parts for durable and consistent performance. At the time of the initial process decision, the metal drawing process was also the most economical. Management now suspects that the cost advantage enjoyed by metal parts is highly dependent on the volume of parts produced. To confirm their suspicions, management

would like you to compare the break-even volume for one of its products, the 3-hole punch, when fabricated from metal versus plastic. What decision can be made based on the individual break-even points of each process?

	<u>Metal Drawing Process</u>	<u>Plastic Injection Molding</u>
Fixed cost	\$ 50,000	\$100,000
Variable cost	\$ 5 per unit	\$ 2 per unit
Selling price	\$10 per unit	\$10 per unit

**Process Selection**

Referring to the previous example, Workplace management wants more specific information regarding the volume at which the 3-hole punch should be constructed from metal parts or from plastic parts. Management is also considering subcontracting out the production of the parts for \$8 per unit. Which alternative would you recommend? (8 M)

Q: 4 Jane and Jake do yard work throughout the year to earn extra money. One of their busiest times is in the fall when leaves must be raked before grass can be cut. The relationship between raking and mowing is not always clear-cut. Some lawns, which have a lot of trees, take a long time to rake but a very short time to mow. Jane and Jake have found that customers are plentiful and their income is bounded only by the time they have available to work. This Saturday, they have six lawns to mow. The estimated time to rake and mow each yard is shown here. How should Jane and Jake schedule their yard work so that it can be completed in the shortest amount of time? (6 M)

	Rake	Mow
Yard 1	30	90
Yard 2	60	45
Yard 3	45	45
Yard 4	15	60
Yard 5	40	60
Yard 6	90	30