Sample Answers to In-Text Questions

# Chapter 19: Detailed Scheduling

## Discussion Questions

1. Explain the scheduling technique used when multiple products have to be scheduled in a line process.

Answer: Flow shop scheduling is the loading of line process systems. The scheduling is somewhat built into the process. For multiple products the runout time technique allows for different resource requirements for each product. The key scheduling time is the switchover between products.

1. Why is job-shop scheduling considerably more complex?

Answer: In a job shop, they have to schedule multiple products through the same work center, in the most efficient manner. Inventories of WIP have to be controlled more carefully.

1. What is input-output control and why is it an important scheduling technique for job shops?

Answer: IOC lets the planners know which work centers are ahead or behind, and whether it is because they are not getting the materials from the upstream work center, or whether their own output is ahead or behind schedule. It also indicates if they are overloaded.

1. Describe Gantt charts and how they are useful in job shop scheduling

Answer: Gantt chart are useful because they indicate the start and stop dates to remain on schedule, and where you are currently on the timeline.

1. Define backward loading and forward loading and what is the purpose of using each of these loading techniques?

Answer: Backward scheduling begins with the due date for each job and loads the processing requirements for these jobs at each work center by proceeding backward in time. Managers use backward scheduling to determine in advance the capacity required at each work center for each time period to complete the jobs by the due dates. In addition to scheduling in manufacturing firms, backward scheduling is used in many service companies and for individual projects. Backward scheduling can be used to schedule surgeries in hospitals and to plan an event such as a wedding.

Forward scheduling begins with the current date for those jobs that have known processing requirements, and it loads the jobs forward in time. The processing time is accumulated against each work center. The objective of forward scheduling is to determine the approximate completion time for each job and the capacity required in each time period. In many made-to-order manufacturing processes and services, forward scheduling is used to determine if early delivery due dates requested by customers can be met. In reality, however, businesses use a combination of the forward and backward scheduling techniques, by loading some jobs forward and others backward in time to strike a balance between available capacity and the need to meet customer due dates. Figure 19.4 shows the backward and forward scheduling techniques.

1. What is sequencing and explain how each of the five commonly used priority rules work in sequencing individual jobs?

Answer: Sequencing is the decision of which orders to work on first, and so on.

Priority rules are what to work on first – first received, shortest processing time, earliest due date, longest processing time, and critical ratio.

1. List the assumptions made in the use of the five priority rules.

Answer: existing jobs are not cancelled, setup times are known and constant, setup times are independent of sequence, and there are no interruptions, such as downtime. Everyone knows these can be unrealistic.

1. Describe briefly the three criteria used to evaluate the performance of the priority rules

Answer: The rules can be evaluated overall by: average job flow time. Average number of jobs, and average job tardiness. These can evaluate whether your rules are the best strategically.

1. Explain when Johnson’s rule can be used as a scheduling technique

Answer: It can be used when there are multiple jobs sequencing through several machines. It minimizes the make-span.

1. What is finite capacity scheduling (FCS) and what are its features?

Answer: FCS generates a realistic schedule based on actual capacities and tries not to overload the work centers.

1. Explain how applying the principles of the theory of constraints can minimize the complexity of scheduling.

Answer: TOC assures that the materials are not released at a rate faster than the constraint using Drum-Buffer-Rope method.

1. Explain the drum-buffer-rope concept.

The drum is the rate of the bottleneck, the buffer assures that the constraint never runs out of materials, and the rope pulls materials at the rate of the drum. This is supposed to make the best use of the constrained resources, until the bottleneck can be fixed.

1. What is the difference between a process batch and transfer batch?

Answer: The process batch is the lot size that is produced, and the transfer batch is the quantity moved at one time through the facility.

1. In what ways scheduling for services different from scheduling in the manufacturing environment?

Answer: Scheduling services are more difficult, because of the fluctuating demand, that services are non-standard, and services cannot be stored, and most scheduling is really people allocation

1. What is yield management and what ethical issues that an organization has to deal with in using this scheduling strategy?

Answer: Yield management is manipulating the demand by adjusting the pricing. Is it ethical to charge people different prices for the same exact service, a room, or an airline seat? Most likely not.

1. What is supply chain scheduling, its key features and benefits?

Answer: In the supply chain, however, the ability of these individual companies to meet these performance measures really depends on the scheduling decisions made by the upstream and downstream partners of their supply chains, not just an individual company. You must try to achieve overall coordination.

1. Describe some of the sustainability and ethical issues that organizations have to contend with in making scheduling decisions.

Answer: Side effects, such as excessive carbon emissions and other undesirable byproducts generated by these operations, can lead to serious concerns about the detrimental consequences of a too narrow focus on scheduling. From a sustainability perspective, one of the key areas of concern for many manufacturing firms is energy consumption. Scheduling decisions made by these companies can play a vital role in improving the energy efficiency their manufacturing operations. Many restaurant employees work double shifts or work early-morning shifts immediately after late-night shifts. Such a pattern of scheduling that overworks the employees raises the issue of whether these service companies are conducting their business in an ethically responsible manner

## Critical Thinking Exercises

1. Visit a local bank and write a report on how you would use the drum-buffer-rope concept to alleviate the bottleneck problems (if any) that the bank faces in providing effective customer service.

Answer: Student examples will vary.

1. Search the internet and choose three computerized planning and scheduling software programs. Write a brief summary on the features of each of these software systems.

Answer: Student answers will vary.