D	5	10
E	3	8

a. 7 days
b. 10 days
c. 20 days
d. 25 days
(Medium)

52. If the following jobs are sequenced according to the LPT rule then the total number of jobs that would be late would be (assume today's date is day 0)

Job	Processing Time (days)	Due Date
A	8	12
B	6	15
C	11	17
D	5	10
E	3	8

a. 5 jobs
b. 4 jobs
c. 3 jobs
d. 2 jobs
(Medium)

53. If the following jobs are sequenced according to the LPT rule then job D would be completed on day (assume today's date is day 0)

Job	Processing Time (days)	Due Date
A	8	12
B	6	15
C	11	17
D	5	10
E	3	8

a. 5
b. 25
c. 30
d. 33
(Medium)

54. If the following jobs are sequenced according to the SLACK rule then the mean completion time (in days) for all jobs would be (assume today's date is day 0)

Job	Processing Time (days)	Due Date
A	8	12
B	6	15

B	6	15
C	11	17
D	7	10
E	3	8

a. 1 jobs
b. 2 jobs
c. 3 jobs
d. 4 jobs
(Hard)

58. If the following jobs are sequenced according to the SLACK rule then job A would be completed on day (assume today's date is day 0)

Job	Processing Time (days)	Due Date
A	8	12
B	6	15
C	11	17
D	7	10
E	3	8

a. 8
b. 7
c. 15
d. 12
(Hard)

59. If the following jobs are sequenced according to the DDATE rule then the mean completion time (in days) for all jobs would be (assume today's date is day 0)

Job	Processing Time (days)	Due Date
A	8	12
B	6	15
C	11	17
D	5	10
E	3	8

a. 16.4 days
b. 22.6 days
c. 28.7 days
d. 33.0 days
(Medium)

60. If the following jobs are sequenced according to the DDATE rule then the mean tardiness (in days) for all jobs would be (assume today's date is day 0)

Job	Processing Time (days)	Due Date

Short Answer Questions

1. What makes scheduling so difficult in a job shop?

Job shop scheduling is difficult because of the variety of jobs (or customers) that are processed, each with distinctive routing and processing requirements. In addition, although the volume of each customer order may be small, there are probably a great number of different orders in the shop at any one time. This necessitates planning for the production of each job as it arrives, scheduling its use of limited resources, and monitoring its progress through the system.

2. List some of the objectives in scheduling.

There are many different possible objectives in constructing a schedule, including: meeting customer due dates, minimizing job lateness, minimizing response time, minimizing completion time, minimizing time in the system, minimizing overtime, maximizing machine or labor utilization, minimizing idle time, and minimizing work-in-process inventory.

3. Outline the typical responsibilities of a production control department.

The responsibilities of a production control department typically consist of

a. **Loading—checking the availability of material, machines, and labor. Production control assigns work to individual workers or machines, and then attempts to smooth out the load to make the schedule "doable".**
b. **Sequencing—releasing work orders to the shop and issuing dispatch lists for individual machines. The dispatch list contains the sequence in which jobs should be processed.**
c. **Monitoring—maintaining progress reports on each job until it is completed.**

4. Why is monitoring an important component of job shop scheduling?

In a job shop environment, where jobs follow different paths through the shop, visit many different machine centers, and compete for similar resources, it is not always easy to keep track of the status of a job. When jobs are first released to the shop, it is relatively easy to observe the queue that they join and predict when their initial operations might be completed. As the job progresses, however, or the shop becomes more congested, it becomes increasingly difficult to follow the job through the system. Competition for resources (resulting in ling queues), machine breakdowns, quality programs, and setup requirements are just a few of the things that can delay a job's progress. Monitoring develops progress reports on each job until it is completed and helps maintain reliable schedules in the system.

5. What is Input/Output Control and why is it important?

Input/Output (I/O) control monitors the input to and output from each work center. I/O control provides the information necessary to regulate the flow of