UNIT -5: Scheduling in Production Planning

1. Introduction and Meaning of Scheduling

- **Scheduling** is the process of **arranging, controlling, and optimizing work and workloads** in a production process.
- It involves **assigning tasks, resources (manpower, machines, materials), and time frames** to ensure smooth workflow.
- In simple terms, **scheduling determines "when" and "in what order" jobs or tasks should be performed.**

Definition: Scheduling is the process of establishing the timing for the use of facilities, equipment, and human activities in a production system to achieve efficiency and timely completion.

2. Objectives of Scheduling

- **To ensure timely delivery:** To complete jobs/orders within deadlines.
- **To maximize utilization of resources:** Optimum use of men, machines, and materials.
- **To minimize production cost:** By reducing idle time and bottlenecks.
- **To balance workload:** Equal distribution of work among machines and workers.
- **To increase productivity and efficiency:** Smooth flow of materials and operations.
- **To reduce waiting time and delays:** Avoid unnecessary downtime and queuing of jobs.
- **For customer satisfaction:** Deliver products of the right quality on time.
- **Flexibility:** Ability to adjust schedules with changes in demand or priority.

3. Selection Criteria for the Type of Scheduling

Choosing the appropriate type of scheduling depends on several factors:

1. **Nature of Production System:**
   o **Job Production:** Small quantities, customized → Job Shop Scheduling.
   o **Batch Production:** Moderate quantities → Batch Scheduling.
   o **Mass/Continuous Production:** Large scale, repetitive → Flow/Line Scheduling.
2. **Volume of Production:**
   o Low volume → Job/Batch scheduling.
   o High volume → Flow/Line scheduling.
3. **Variety of Products:**
   o High product variety → Job scheduling.
   o Standardized products → Flow scheduling.
4. **Delivery Deadlines & Customer Priorities:**
   o Urgent jobs may need priority-based or deadline scheduling.
5. **Availability of Resources:**
   o Number of machines, labor skills, raw material availability.
6. **Complexity of Operations:**
   o Simple processes → Line scheduling.
   o Complex, customized operations → Job scheduling.
7. **Cost Considerations:**
   o Type of scheduling chosen should minimize cost of idle resources and delays.

Summary:
Scheduling ensures the **right job at the right time with the right resources**. Its objectives are to improve productivity, reduce delays, and ensure customer satisfaction. The type of scheduling is selected based on production type, volume, variety, deadlines, and available resources.

Types of Scheduling: Scheduling is classified based on the **production system** and **approach of scheduling**.

1. Based on Production System

1. **Job Shop Scheduling**
o Used where products are made to customer specifications in small quantities.
o Jobs are unique and require different operations.
o Example: Customized machinery, repair workshops.
o **Focus:** Meeting due dates and reducing job waiting time.
2. **Batch Scheduling**
o Suitable when a limited quantity of products is manufactured in batches.
o Each batch passes through different machines in sequence.
o Example: Bakeries, garment manufacturing.
o **Focus:** Reducing setup time and optimizing batch flow.
3. **Flow (or Line) Scheduling**
o Used in continuous or mass production systems.
o Jobs move through machines in a fixed sequence (assembly line).
o Example: Automobile assembly, bottling plants.
o **Focus:** Reducing cycle time and increasing efficiency.
4. **Project Scheduling**
o Applied to large, complex, one-time activities with a definite start and end.
o Example: Construction projects, shipbuilding.
o Tools: Gantt Charts, CPM (Critical Path Method), PERT (Program Evaluation and Review Technique).

2. Based on Scheduling Approach

1. **Forward Scheduling**
o Scheduling starts from the date an order is received.
o Jobs are scheduled forward in time until completion.
o Ensures early completion but may cause high inventory buildup.
o **Used when:** Delivery dates are not tight.
2. **Backward Scheduling**
o Scheduling starts from the due date of delivery and moves backward.
o Ensures jobs finish exactly on time but requires precise planning.
o **Used when:** Meeting deadlines is critical.

3. Other Common Types

- **Priority Scheduling:** Jobs are scheduled based on priority rules (e.g., earliest due date, shortest processing time, first come–first served).
- **Cyclic Scheduling:** Repeated schedules used in services or continuous operations (e.g., bus/train timetables, duty rosters).
- **Machine Scheduling:** Allocation of jobs to machines to avoid conflicts and idle time.