

Automation & Robotics – Quick Revision Sheet

1. Types of Automation

- Fixed Automation – Mass production (e.g., car assembly line)
- Programmable Automation – Batch production (e.g., CNC)
- Flexible Automation – Medium volume, variety (e.g., FMS)
- Integrated Automation – Fully automated (e.g., CIM)

2. Applications of Fluid Power in Automotive

- Hydraulic brakes
- Power steering
- Automatic transmission
- Suspension (shock absorbers)
- Hydraulic clutch
- Hydraulic jacks/lifts
- Convertible top systems

3. Applications of Transfer Machines

- Mass production
- Automobile engines, gearboxes
- Aerospace precision parts
- Electrical components
- Consumer goods (appliances, hardware)

4. Automated Feeding System

Definition: Supplies parts automatically in correct orientation & quantity.

Devices: Vibratory bowl feeder, conveyors, hoppers, robotic feeders.

Benefits: Continuous flow, accuracy, reduced labor

5. Open vs Closed Loop Systems

Open Loop: No feedback, simple but less accurate (e.g., toaster)

Closed Loop: Uses feedback, accurate, self-correcting (e.g., AC thermostat)

Diagrams:

Open Loop → [Input] → [Controller] → [Process] → [Output]

Closed Loop → [Input] → [Controller] → [Process] → [Output] → Feedback

6. Benefits of Automation

- Higher productivity
- Improved quality
- Reduced cost
- Safety
- 24/7 operation
- Flexibility & consistency

7. Practical Significance Today

- Industry 4.0 smart factories
- Automotive assembly lines
- Healthcare (robotic surgery)
- Agriculture (drones, irrigation)
- Smart homes
- Banking
- Logistics

8. Automation in Production Systems

Definition: Using machines & control systems for production.

Types: Fixed, Programmable, Flexible

Benefits: Mass production, efficiency, accuracy

9. Needs for Automation

- Increase productivity & quality
- Reduce cost & wastage
- Ensure safety
- Flexibility & competitiveness
- Real-time monitoring & data collection

10. Part Handling & Feeding

Part Handling: Movement/orientation/positioning of parts

Part Feeding: Automatic supply in right orientation/quantity

Example: [Hopper] → [Bowl Feeder] → [Chute] → [Conveyor/Robot] → [Machine]

11. Automation in Industry 4.0

Technologies: IoT, AI/ML, Robotics, CPS, Cloud, Big Data

Features: Smart factories, predictive maintenance, customization

Diagram: [IoT + Robotics] → [CPS] → [Cloud + AI] → [Smart Factory]