UNIT-I

1. Which of the following is an example of an industrial control system?

A) Traffic signal controller
B) Washing machine controller
C) Temperature control in a furnace
D) Calculator
Answer: C

2. A mathematical model of a physical system is used to:

A) Increase hardware cost
B) Predict system behavior
C) Reduce power consumption only
D) Eliminate sensors
Answer: B

3. Which component measures the output variable in a control system?

A) Actuator
B) Controller
C) Sensor
D) Amplifier
Answer: C

4. The Laplace transform is mainly used in control systems to obtain:

A) State equations
B) Transfer functions
C) Truth tables
D) Circuit diagrams
Answer: B

5. Transfer function is defined as the ratio of:

A) Output/Input in time domain
B) Input/Output in frequency domain
C) Laplace transform of output to input with zero initial conditions
D) Voltage to current
Answer: C

6. A Linear Time-Invariant (LTI) system is one whose parameters:

A) Change randomly
B) Remain constant with time
C) Depend on temperature only
D) Depend on input amplitude only
Answer: B

7. Which control system does not use feedback?

A) Closed-loop system
B) Automatic control system
C) Open-loop system
D) Servo system
Answer: C

8. An example of an open-loop control system is:

A) Air conditioner with thermostat
B) Automatic voltage regulator
C) Electric toaster with timer
D) Cruise control system
Answer: C

9. An example of a closed-loop control system is:

A) Traffic light timer
B) Automatic washing machine
C) Thermostat-controlled room heater
D) Electric iron without thermostat
Answer: C

10. Feedback in a control system generally improves:

A) Instability
B) Accuracy
C) Cost
D) Complexity only
Answer: B

11. Which type of feedback is commonly used in control systems?

A) Positive feedback
B) Negative feedback
C) Neutral feedback

D) Zero feedback
Answer: B

12. The main disadvantage of an open-loop system is:

A) High accuracy
B) High cost
C) No automatic error correction
D) Less stability
Answer: C

13. In a closed-loop system, the difference between reference input and output is called:

A) Gain
B) Error signal
C) Disturbance
D) Transfer function
Answer: B

14. The device that converts control signals into physical action is:

A) Sensor
B) Actuator
C) Comparator
D) Filter
Answer: B

15. Which block combines the reference input and feedback signal?

A) Amplifier
B) Controller
C) Summing point
D) Sensor
Answer: C

16. Block diagram algebra is used to:

A) Solve differential equations directly
B) Simplify complex control system diagrams
C) Design hardware only
D) Measure frequency response
Answer: B

17. Cascaded blocks in a block diagram are combined by:

A) Addition
B) Subtraction
C) Multiplication
D) Division
Answer: C

18. The transfer function of a feedback system is:

A) G(s)H(s)
B) G(s)/(1+G(s)H(s))
C) 1/G(s)
D) H(s)/G(s)
Answer: B

19. One benefit of feedback is:

A) Increased sensitivity to disturbances
B) Reduced accuracy
C) Reduced steady-state error
D) Higher noise only
Answer: C

20. The study of control systems primarily deals with:

A) Data storage
B) Signal processing only
C) Regulating system behavior
D) Computer programming only
Answer: C

Fill in the Blanks

1. A system used to regulate temperature in a furnace is an example of an **industrial control system**.
2. A mathematical representation of a physical system is called a **model**.
3. The ratio of output to input in the Laplace domain is called the **transfer function**.
4. Transfer functions are applicable to **linear time-invariant** systems.
5. An open-loop system operates without **feedback**.
6. A closed-loop system continuously compares output with the **reference input**.

7. The difference between desired output and actual output is called **error**.
8. A thermostat-controlled heater is a **closed-loop** control system.
9. Sensors are used to measure the system **output**.
10. Negative feedback generally improves system **accuracy**.
11. The controller generates a control signal based on the **error signal**.
12. The transfer function is usually represented in the **Laplace** domain.
13. In block diagram algebra, cascaded blocks are combined by **multiplication**.
14. The point where signals are added or subtracted is called a **summing point**.
15. Feedback helps reduce **steady-state error**.
16. An actuator converts electrical signals into **physical action**.
17. The transfer function of a closed-loop system contains both forward path and **feedback path**.
18. Industrial process control often uses **sensors** for measurement.
19. Open-loop systems are generally **simpler** than closed-loop systems.
20. Control systems are designed to achieve desired **performance**.