Integrating Electromechanical Systems

Part 1: Roleplay Dialogue

Context: A Mechanical Engineer is working with an Electrical Engineer to integrate electromechanical systems.

Characters:

- **Mark** (Mechanical Engineer)
- **Sophia** (Electrical Engineer)

Mark: We're almost done with the mechanical assembly, but we need to refine the **mechatronics** integration.
Sophia: Agreed. Have you tested the **servo motor**? We need to ensure smooth movement.
Mark: I ran a basic test, but we're getting slight jitter. It could be an issue with **electromagnetic interference (EMI)**.
Sophia: That makes sense. If the wiring isn't shielded properly, EMI can disrupt the signal.
Mark: Exactly. I'll check the grounding and reroute some cables to reduce interference.

Sophia: Good. Once that's fixed, we need to finalize the **control system integration**. Are all the actuators responding correctly?
Mark: Mostly, but we need to fine-tune the feedback loop. The response time isn't ideal.
Sophia: Let's adjust the PID controller settings. That should improve the stability.
Mark: Good idea. Also, I want to ensure our **embedded sensors** are calibrated correctly for real-time monitoring.
Sophia: I'll handle that. Once we optimize the control loop, we can run a full

integration test.
Mark: Sounds like a plan. Let's meet in the lab after lunch and finish this up.

Part 2: Comprehension Questions

1. What issue did Mark notice with the servo motor?
    - (A) It was overheating
    - (B) It was not responding at all
    - (C) It had slight jitter
    - (D) It consumed too much power
2. What might be causing interference in the system?
    - (A) Incorrect actuator placement
    - (B) Lack of proper grounding
    - (C) Low power supply
    - (D) Overheating components
3. What will adjusting the PID controller settings help improve?
    - (A) Energy consumption
    - (B) Structural stability
    - (C) System stability
    - (D) Cooling efficiency
4. What does Mark want to check before finalizing the integration?
    - (A) The durability of the mechanical frame
    - (B) The quality of the wiring
    - (C) The battery life
    - (D) The calibration of embedded sensors

Part 3: Key Vocabulary with Definitions in Japanese

- **Mechatronics** – メカトロニクス
- **Servo motor** – サーボモーター
- **Electromagnetic interference (EMI)** – 電磁干渉
- **Control system integration** – 制御システム統合
- **Embedded sensors** – 組み込みセンサー

Part 4: Answer Key

1. **What issue did Mark notice with the servo motor?**
   ✅ (C) It had slight jitter
2. **What might be causing interference in the system?**
   ✅ (B) Lack of proper grounding
3. **What will adjusting the PID controller settings help improve?**
   ✅ (C) System stability
4. **What does Mark want to check before finalizing the integration?**
   ✅ (D) The calibration of embedded sensors