

## Cyber-Physical Systems (CPS) - 1 Mark Answers

1. **Define Cyber Physical Systems**
  - Integrated systems where computation, networking, and physical processes are tightly coupled for real-time control and monitoring.
2. **List models of Cyber-Physical Systems**
  - Continuous-time models, Discrete-event models, Hybrid automata, Timed automata, Petri nets.
3. **What are the advantages of Cyber Physical Systems?**
  - Real-time monitoring, improved efficiency, enhanced safety, predictive maintenance, better human-machine collaboration.
4. **List the components of Cyber-Physical Systems**
  - Sensors, Actuators, Embedded controllers, Communication networks, Data storage, HMI, Power supply.
5. **What is the need of medical system in CPS?**
  - To provide continuous patient monitoring, automatic control, remote diagnosis, and safe device coordination in healthcare.
6. **List any one challenge in Smart Energy Cyber Physical Systems (SECPS)**
  - Cybersecurity of distributed energy resources and grid control against attacks causing outages.
7. **List any one application domain of CPS**
  - Transportation systems (autonomous vehicles, traffic management, adaptive cruise control).
8. **What is the perception layer in Cyber Physical System?**
  - The layer responsible for sensing, acquiring raw data from the physical world, and initial preprocessing.
9. **Name the elements of Workflow of CPS**
  - Sensing, Communication, Computation, Actuation, Monitoring, Human-in-the-loop interaction.
10. **What are the CPS security goals?**
  - Confidentiality, Integrity, Availability, Authenticity, Privacy, and Safety/Resilience.
11. **List any two Cyber-Physical System security models**
  - Bell-LaPadula model, Biba integrity model.
12. **List any two cyber consequences in CPS security**
  - Physical harm or equipment damage, Loss of availability or service disruption.
13. **What is a cyber-attack?**
  - Deliberate action to compromise confidentiality, integrity, availability, or security properties of a system.
14. **Define Risk Assessment**
  - Process of identifying assets, threats, estimating likelihood and impact, and prioritizing risks.
15. **Define Integrity**
  - Assurance that data and system functions are complete, accurate,

and unaltered.

**16. Define Authenticity**

- Assurance that an entity or message is genuine and originates from the claimed source.

**17. Define virus**

- Malicious software that replicates by attaching to programs/files and spreads to cause damage.

**18. Define eavesdropping**

- Passive interception of communications to obtain information without authorization.

**19. Define Reliable Transmission**

- Communication ensuring correct message delivery using acknowledgements, retransmissions, and error control.

**20. Define Shared Memory**

- Memory region accessible by multiple processes used for inter-process communication and data exchange.

**21. Define Periodic Job Model**

- Task model where jobs arrive at regular fixed intervals with execution time and deadline.

**22. Define Schedulability**

- Property that all tasks complete execution before their deadlines under a given scheduling algorithm.

**23. Define Denial of Service Attack**

- Attack that exhausts system resources to prevent legitimate users from accessing services.

**24. What is medium impact in CPS systems?**

- Consequence level causing measurable performance degradation and partial functionality loss that is recoverable.