



End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Course and semester: M.Tech(1st Sem)

Name of the Paper: Internet of things

Paper Code: MCS **134**

Time: 3 hour

Maximum Marks: 100

Note:

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty).
- (iv) Each sub-question carries 10 marks.

Q1. (2X10=20 Marks) (CO1)

- a. Analyze how IoT evolved from embedded systems, M2M communication, and ubiquitous computing. Identify the technical breakthroughs that enabled the modern IoT ecosystem.
- b. IoT definitions vary widely between IETF, ISO, ITU-T, and industrial bodies. Analyze the underlying assumptions each institution makes about **connectivity**, **identity**, and **autonomy**, and explain why a universally accepted definition is difficult to establish
- c. IoT nodes must balance sensing, computation, and communication under limited power. Construct a **trade-off analysis** between computation at edge vs. cloud for an industrial IoT system

Q2. (2X10=20 Marks) (CO2)

- a. Analyze how interoperability challenges arise from **heterogeneous communication stacks**, and propose a layered solution that preserves backward compatibility.
- b. Evaluate the suitability of RFID, BLE, ZigBee, 6LoWPAN, and NB-IoT technologies in terms of **power consumption**, **coverage**, **reliability**, and **device density**. Which combination is optimal for large smart-city deployments?
- c. Design a **device-power optimization framework** for IoT nodes using adaptive duty-cycling, energy harvesting, and context-aware transmission. Illustrate decision-making rules

Q3. (2X10=20 Marks) (CO3)

- a. Create a **cross-layer integrated protocol** for IoT-WSN systems that optimizes routing, power consumption, and security simultaneously. Explain the mathematical basis of your optimization strategy
- b. Compare WSN and IoT networks in terms of architecture, routing logic, and power model. Why is traditional WSN architecture insufficient for modern IoT?
- c. Create a **hybrid IoT-WSN architecture** for disaster response management. Include node connectivity, data aggregation mechanisms, and security considerations across layers

Q4. (2X10=20 Marks) (CO4)

- a. Propose a **multi-agent IoT resource management framework** that incorporates object representation, context synchronization, and trust scoring. Provide a conceptual diagram illustrating agent interactions.
- b. Create a **unified identity and trust framework** for IoT that integrates blockchain, digital signatures, and AI-driven anomaly detection. Explain how trust propagation occurs across devices
- c. Analyze the synchronization problem in distributed IoT systems. Is eventual consistency sufficient for safety-critical IoT applications like healthcare and autonomous.



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Q5.

(2X10=20 Marks) (CO5)

- a. Design a complete **security model** for a smart city IoT system (covering smart metering, Transportation, waste management, lighting). Your model should address access control, trust, encryption, updates, and availability.
- b. Design a complete **security model** for an IoT-based healthcare (Body Area Network) system. Include identity establishment, message integrity, non-repudiation, and defense against availability attacks.
- c. Evaluate the effectiveness of access control models (RBAC, ABAC, Capability-Based Access) in IoT-specific challenges such as mobility, heterogeneity, and constrained devices.