

Uttara University

Department of Computer Science & Engineering

B.Sc. in Computer Science & Engineering.

Course code: CSE0612405

Total marks: 10

Batch: 59A Eve

Student's ID:

Test Examination, Fall 2025

Course title: Internet of Things

Time: 25 minutes

Date:

1(a) [2 Marks] [CLO-1] Analyze why the TCP/IP protocol suite uses both TCP and UDP at the transport layer even though WPAN protocols are used in the personal area network for IoT devices.

1(b) [3 Marks] [CLO-2] Differentiate between RESTful HTTP and WebSocket in terms of data flow direction, state management and overhead when used as communication gateway protocols for IoT web connectivity.

1(c) [5 Marks] [CLO-3] Analyze how the separation of device domain and gateway domain functions in modern IoT reference architectures (ITU-T, ETSI, CISCO, Oracle, IBM) contributes to affordability and ease of designing IoT devices.

2(a) [2 Marks] [CLO-1] Justify the necessity of ports when multiple application layer protocols (HTTP/HTTPS/FTP/Telnet) run simultaneously on the same IoT gateway that has only one IP address.

2(b) [3 Marks] [CLO-2] Compare SOAP and RESTful HTTP in terms of overhead, state management, and suitability for constrained IoT devices when acting as communication gateway protocols.

2(c) [5 Marks] [CLO-3] Analyze the impact of low-power wireless technologies (e.g., 802.15.4, 6LoWPAN, Bluetooth LE, LoRa) at the physical cum data-link layer on the affordability and scalability of large-scale IoT deployments compared to wired alternatives.

3(a) [2 Marks] [CLO-1] Analyze why 6LoWPAN is required even when devices already support IPv6 in low-power IoT networks.

3(b) [3 Marks] [CLO-2] Explain how the use of DTLS instead of TLS improves battery life in constrained IoT devices when WebSocket or CoAP is used for web connectivity.

3(c) [5 Marks] [CLO-3] Analyze the role of the data-adaptation layer functions (consolidation, aggregation, compaction, fusion, security, privacy) in making large-scale IoT deployments affordable.

4(a) [5 Marks] [CLO-3] Evaluate the impact of recent international standardization efforts (IETF 6LoWPAN/RPL/CoAP, oneM2M, ITU-T Y.2060, ETSI, ETSI M2M domains) on affordability and ease of designing IoT devices.

4(b) [5 Marks] [CLO-4] Illustrate the complete data flow path (including encapsulation/decapsulation and protocol translation) for a battery-powered temperature sensor in a smart building using publish-subscribe model over secure WebSocket (WSS) to a cloud broker.

5(a) [5 Marks] [CLO-3] Analyze why the vast majority of affordable IoT devices use wireless rather than wired physical/data-link technologies, even when reliability is critical.

5(b) [5 Marks] [CLO-4] Illustrate the layered data flow and security mechanisms in a smart city streetlight control system using client-server model with RESTful HTTPS for polling and WebSocket (WSS) for real-time overrides, showing encapsulation at each stage from device to cloud.