T.E. Sem-VI (ECS) (C-Scheme) (Honours/Minor) Dec, 2025
15/12/2025.

Duration: 3Hrs **Max. Marks: 80**

N. B: (1) **Q1** is compulsory
(2) From Q2 to Q6 solve **any three** questions
(3) All questions carry equal marks
(4) Assume suitable data, if required, and state it clearly

Q1 Answer **any four** of the following **[20]**

A. Prepare a concise note outlining key trends currently shaping the Internet of Things (IoT) ecosystem.
B. Examine how IP addressing varies between Internet of Things (IoT) architectures and traditional computer networks with respect to structure, scalability, and implementation approaches.
C. What is the Controller Area Network? List an example of its application.
D. Define the Internet of Things (IoT) and identify key challenges associated with its implementation.
E. Outline the essential parameters and strategic considerations for designing systems that incorporate sensor technologies.
F. Discuss the differences between ZigBee and RFID technologies with respect to architecture, typical applications, communication range, data rates, power usage, and identification methods.

Q2. **[20]**

A. Compare UART and SPI communication protocols with respect to their functional principles and applicability across different system requirements.
B. Identify the specific design trade-offs (e.g., delay vs. security, life of battery vs. strength of encryption) that an IoT system designer must consider when implementing data privacy measures, and illustrate how these trade-offs affect the overall system architecture.

Q3. **[20]**

A. Describe the purpose of Node-RED and discuss how it handles flow control in application development.
B. Discuss how MQTT and CoAP differ in the transport protocols they use, and explain why this matters for basic IoT communication.

Q4 **[20]**

A. Explain the concept of I²C (Inter-Integrated Circuit) and discuss its practical applications across various domains.
B. How the Controller Area Network (CAN) operates within a vehicle's electronic system while ensuring its principles to a real-world safety feature. Explain how CAN facilitates reliable communication among components to enhance vehicle safety.

Q5 [20]

A. A smart agriculture company is deploying an IoT-based solution to monitor soil moisture, temperature, and crop health across multiple farms. The system includes sensors embedded in the field, edge devices for local processing, cloud platforms for data analytics, and mobile apps for farmer alerts. Based on the scenario above, explain the Functional View and Infrastructure View of the IoT system.

B. Develop code snippet that establishes Ethernet connectivity. Apply appropriate libraries and hardware configurations, and include a practical code snippet to illustrate the implementation.

Q6. [20]

A. Explain the implementation of data logging on a Raspberry Pi through the use of appropriate hardware connections and software programming techniques.

B. Analyze the differences and similarities between the network protocols TCP and UDP and explain the use-case for application of these protocols in IoT

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