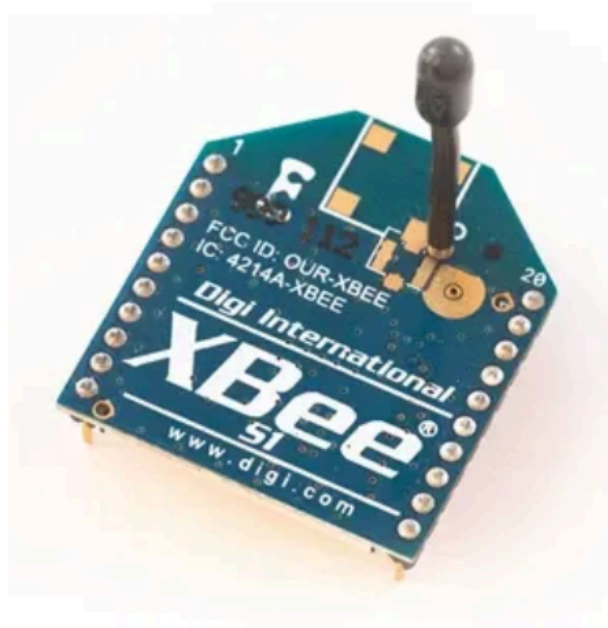# Practical - 4

Aim -

Configuration of the XBee S2C and LoRa Devices to Create a WSN (Network)

Theory -

Wireless Sensor Networks (WSNs) are integral to IoT systems, enabling multiple devices to collect and share data over wireless links. In this practical, students configure **XBee S2C** modules (which use ZigBee protocol) and **LoRa** modules to build a basic WSN. These networks are ideal for applications like smart farming, industrial monitoring, and environmental sensing.

Learners use tools like **XCTU** for configuring ZigBee devices and write programs to transmit data across nodes. LoRa modules are used for setting up long-range peer-to-peer networks. The goal is to establish a network where sensor nodes can collect and transmit data to a central device for processing.
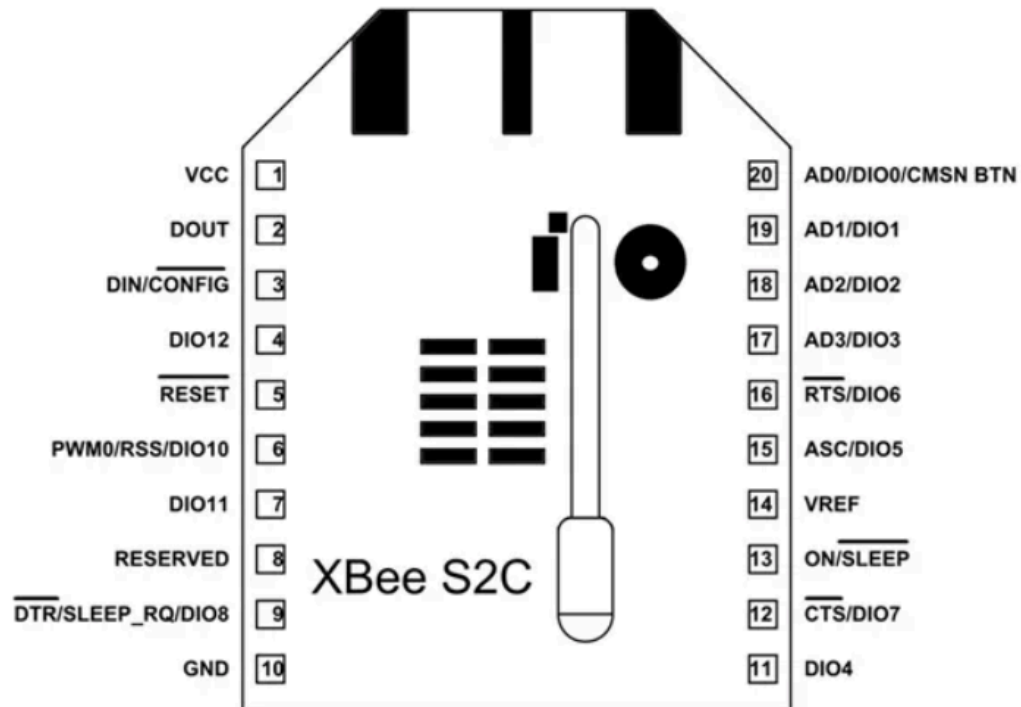
Key Points:

- **XBee S2C** modules follow the ZigBee protocol and support **star and mesh** topologies.

- Configuration is done using **XCTU software**, where students set device roles (Coordinator, Router, End Device).

- **PAN ID**, **Baud rate**, and **API mode** settings are customized during configuration.

- **LoRa modules** (e.g., SX1278) support long-range, low-power communication.

- Students configure **LoRa nodes** to transmit sensor data across a wide area.

- Libraries like LoRa.h allow easy interfacing with Arduino or ESP32 boards.

- Practical involves setting up **two or more nodes** and testing data transmission.

- Students simulate scenarios like **remote weather stations or soil monitoring**.

- Learn to handle issues like **interference, addressing, and range limitations**.

- Emphasizes practical WSN design, communication protocol selection, and debugging.