```
#include <SPI.h>
#include <LoRa.h>
#include <Wire.h>
#include <OneWire.h>
#include <DallasTemperature.h>
#include <GravityTDS.h>

//LoRa Pin
String outgoing;

#define ss 10
#define rst 9
#define dio0 2

byte msgCount = 0;
byte MasterNode = 0xFF;
byte Node1 = 0xBB;

//Sensor Pin
const int turbidityPin = A0;    // Analog pin for turbidity sensor
const int temperaturePin = A1;  // Analog pin for temperature sensor
const int tdsPin = A2;          // Analog pin for TDS sensor
const int oneWireBus = 2;       // Digital pin for OneWire bus
const int pHpin = A3;
float temperatureValue = 0;
float turbidityValue = 0;
float tdsValue = 0;
float pHvalue = 0;
unsigned long int avgValue;
float b;
int buf[10];
OneWire oneWire(oneWireBus);
DallasTemperature sensors(&oneWire);
GravityTDS gravityTds;

String Mymessage = "";
String incoming = "";

void setup() {
  Serial.begin(115200);

  while (!Serial);

  Serial.println("LoRa Node1");

  LoRa.setPins(ss, rst, dio0);

  if (!LoRa.begin(433E6)) {
  Serial.println("LoRa Fail!!!!");
  while (1);
  }

  gravityTds.begin();
  sensors.begin();
  pinMode(2, OUTPUT);
}

void loop() {
for (int i = 0; i < 10; i++) {
    buf[1] = analogRead(pHpin);
    delay(10);
  }

  for (int i = 0; i < 9; i++) {

    for (int j = i + 1; j < 10; j++) {

      if (buf[i] > buf[j]) {
        temperatureValue = buf[i];
        buf[i] = buf[j];
        buf[j] = temperatureValue;
      }
    }
  }
  avgValue = 0;
```

```
  for (int i = 2; i < 8; i++)
    avgValue += buf[i];
  float pHvalue = (float)avgValue * 5.0 / 1024 / 6;
  pHvalue = 3.5 * pHvalue;

  // Read sensor values
  float turbidityValue = analogRead(turbidityPin);
  float temperatureValue = getTemperature();
  float tdsValue = gravityTds.getTdsValue();

  // Print values to Serial Monitor
  Serial.print("Turbidity: ");
  Serial.println(turbidityValue);

  Serial.print("Temperature: ");
  Serial.print(temperatureValue);
  Serial.println(" °C");

  Serial.print("TDS: ");
  Serial.print(tdsValue);
  Serial.println(" ppm");

  Serial.print("pH: ");
  Serial.print(pHvalue);

  onReceive(LoRa.parsePacket());

}

float getTemperature(){
  sensors.requestTemperatures();
  return sensors.getTempCByIndex(0);
}

void onReceive(int packetSize){
  if (packetSize == 0) {
    int recipient = LoRa.read();
    byte sender = LoRa.read();
    byte incomingMsgId = LoRa.read();
    byte incomingLength = LoRa.read();

    String incoming = "";

    while (LoRa.available()) {
      incoming += (char)LoRa.read();
    }

    if (incomingLength != incoming.length()){
      ;
      return;
    }

    if (recipient != Node1 && recipient != MasterNode) {
    ;
    return;
    }

    Serial.println(incoming);
    int Val = incoming.toInt();
    if (Val == 10) {
      Mymessage = Mymessage + turbidityValue + ',' + temperatureValue + ',' + tdsValue + ',' + pHvalue;
      sendMessage(Mymessage, MasterNode, Node1);
      delay(100);
      Mymessage = "";
    }
  }
}

void sendMessage(String outgoing, byte MasterNode, byte Node1){
  LoRa.beginPacket();
  LoRa.write(MasterNode);
  LoRa.write(Node1);
  LoRa.write(msgCount);
  LoRa.write(outgoing.length());
```

```
  LoRa.print(outgoing);
  LoRa.endPacket();
  msgCount++;
}
```