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Department of Computer Technology

Vision of the Department

To be a well-known centre for pursuing computer education through innovative pedagogy, value-based education and industry collaboration.

Mission of the Department

To establish learning ambience for ushering in computer engineering professionals in core and multidisciplinary area by developing Problem-solving skills through emerging technologies.

Session 2025-2026

Vision: Dream of where you want.	**Mission:** Means to achieve Vision

Program Educational Objectives of the program (PEO): (broad statements that describe the professional and career accomplishments)

PEO1	**Preparation**	**P: Preparation**	**Pep-CL abbreviation pronounce as Pep-si-lL easy to recall**
PEO2	**Core Competence**	**E: Environment (Learning Environment)**	
PEO3	**Breadth**	**P: Professionalism**	
PEO4	**Professionalism**	**C: Core Competence**	
PEO5	**Learning Environment**	**L: Breadth (Learning in diverse areas)**	

Program Outcomes (PO): (statements that describe what a student should be able to do and know by the end of a program)

Keywords of POs:
Engineering knowledge, Problem analysis, Design/development of solutions, Conduct Investigations of Complex Problems, Engineering Tool Usage, The Engineer and The World, Ethics, Individual and Collaborative Team work, Communication, Project Management and Finance, Life-Long Learning

PSO Keywords: Cutting edge technologies, Research

"I am an engineer, and I know how to apply engineering knowledge to investigate, analyse and design solutions to complex problems using tools for entire world following all ethics in a collaborative way with proper management skills throughout my life." *to contribute to the development of cutting-edge technologies and Research*.

Integrity: I will adhere to the Laboratory Code of Conduct and ethics in its entirety.

Name and Signature of Student and Date
(Signature and Date in Handwritten)

Session	**2025-26 (ODD)**	**Course Name**	**PE-I - Geo-Intelligence for Smart IoT Devices Lab**
Semester	**5**	**Course Code**	**23IOT1523**
Roll No	**36**	**Name of Student**	**Darshil D. Amalkar**

Practical Number	**02**
Course Outcome	Apply and demonstrate the use of proprietary and open-source GIS tools (e.g., QGIS) for creating, visualizing, and managing spatial datasets.
Aim	Download a shapefile, inspect metadata, and reproject it to a different CRS.
Problem Definition	The task involves downloading a shapefile, inspecting its metadata to analyse spatial reference and attribute information, and accurately reprojecting it to a different Coordinate Reference System (CRS).
Theory (100 words)	**Navigating Your GIS Data: The Essential First Steps** Working with spatial data is like being a detective. You receive a case file (your data), but before you can solve the mystery, you need to understand the evidence, check its sources, and make sure it's compatible with your other clues. This guide walks you through the foundational workflow for prepping your data so you can get to the exciting part: analysis and discovery. **Part 1: Acquiring the Evidence (Downloading a Shapefile)** Your first move is to get the primary dataset. One of the most common formats for this is a **shapefile**, which is the go-to standard for storing map features like points, lines, and polygons. A key thing to know is that a shapefile isn't a single file. It's a team of files that have to stay together. Think of it like a character in a video game: you have the visual model, the file for its stats, and an index file to make it all load quickly. For a shapefile, the essential trio you need are: • **.shp**: This holds the actual geometry—the dots, lines, and shapes themselves. • **.shx**: This is an index that helps the software work more efficiently. • **.dbf**: This is a database file that stores all the descriptive information about each shape (like a street's name or a park's size).

When you download a shapefile, you're grabbing this whole collection, usually in a single ZIP folder. **Your goal here is simply to get the complete, raw case file you're about to investigate.**

Part 2: Reading the Case File (Inspecting Metadata)

Now that you have the files, you can't just jump in. You need to read the file's "biography"—this is its **metadata**. Metadata gives you the context and background story of your data. Without it, you're working blind. The most critical piece of this story is the **spatial reference information**.

Here's what you need to look for in the metadata:

- **Coordinate Reference System (CRS):** This is the single most important detail. It tells you *how* the data's coordinates are connected to a real place on Earth. It's the "address system" for your map (e.g., WGS 84, NAD 83).
- **Datum:** This is the specific model of the Earth's shape the CRS is based on. Because the Earth is a bumpy, imperfect sphere, different datums exist to provide a better fit for different parts of the world.
- **Projection:** This describes how the 3D surface of the Earth was flattened into a 2D map. Every projection distorts reality in some way—some preserve area, others preserve angles. The metadata tells you which trade-offs were made.
- **Units:** This tells you what your coordinates are measured in. Are you working with **meters** or **feet** (common in projected systems), or are you dealing with **decimal degrees** (common in geographic systems)?
- **Attribute Information:** This is the key to understanding the data table. It explains what columns like POP2020 or RD_CLASS mean, so you know you're interpreting the information correctly.

The purpose of this step is to become an expert on your data. You need to know where it came from and what its rules are before you can change it or combine it with other information.

Part 3: Translating the Language (Reprojecting to Another CRS)

Often, your data's original CRS isn't the best one for your project. The process of converting it to a different CRS is called **reprojecting**. This is a powerful mathematical operation that recalculates the position of every single point in your dataset.

You'll need to reproject your data for a few key reasons:

- **To Perform Accurate Calculations:** You can't measure the length of a river in "degrees." To get meaningful

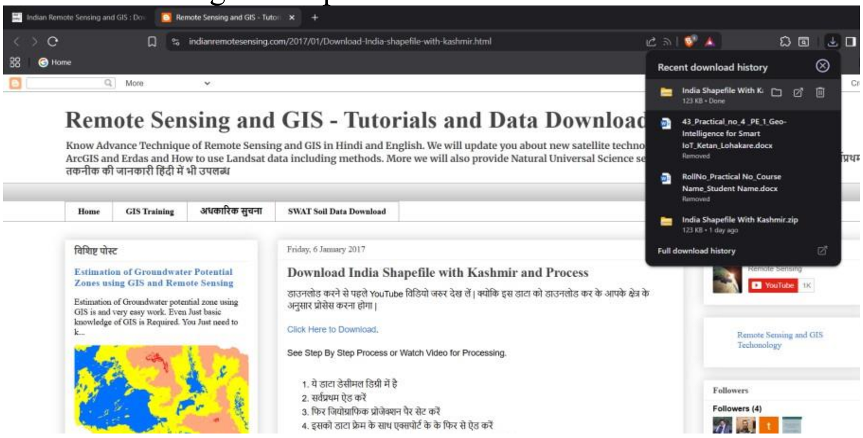
	measurements for distance, area, or length, you must reproject your data into a system that uses units like **meters or feet**. • **To Choose the Right View:** Different projections are better for different tasks. You might choose a projection that minimizes shape distortion for a local map or one that preserves land area for a global environmental analysis. • **To Make Your Data Play Well with Others:** If you want to layer your data on a web map like Google Maps or OpenStreetMap, they all need to be in the same "language." This usually means reprojecting your data to the standard **Web Mercator (EPSG:3857)** to ensure everything lines up perfectly. .

Procedure and Execution
 	
(100 Words)
	Implementation Steps:
	Step 1: Download & Unzip the Shapefile
	• Find and download your data, which will typically be a .zip file.
	• **Immediately unzip the file** into a dedicated project folder. A shapefile is a collection of files that must be kept together to work.
	
	Step 2: Inspect the Data's Properties
	• Open your GIS software (like QGIS or ArcGIS Pro) and add the .shp file to your map view.
	• Find the metadata to understand the data's current state:
	  ○ **In QGIS:** Right-click the layer → Properties → Information tab.
	  ○ **In ArcGIS Pro:** Right-click the layer → Properties → Source tab.
	• **Identify the current CRS** (Coordinate Reference System). This is the most important piece of information to find.
	• Briefly review the **Attribute Table** (right-click → Open Attribute Table) to see what data columns are included.
	
	Step 3: Reproject the Data
	This step converts the data to a new CRS, which is necessary for accurate measurements or to align with other map layers.
	• **Start the export process:** In QGIS, right-click the layer → Export → Save Features As....
	• **Set the file name:** Save the file in your project folder with a new, descriptive name that includes the new CRS (e.g., my_data_UTM.shp).

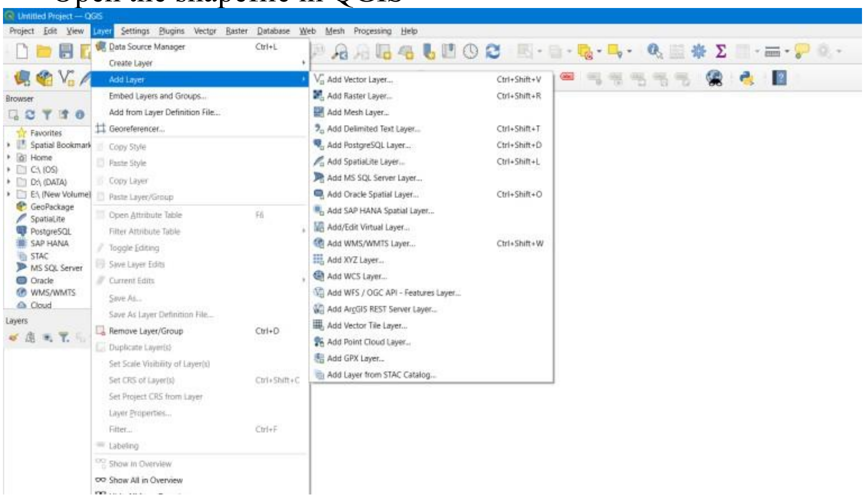
- **Select the new CRS:** This is the key step. Click the CRS selector button and choose your target system (e.g., a local UTM zone).
- Click **OK** to create the new, reprojected layer.
- **Verify it worked:** The coordinates displayed at the bottom of the map window should now show large numbers (meters or feet) instead of degrees. You can also check the new layer's properties to confirm its CRS has been updated.

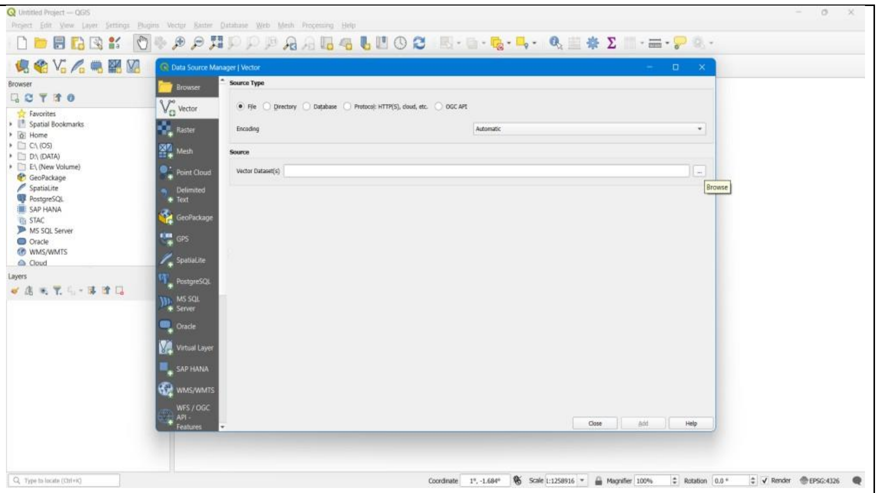
Stepwise Screenshots with steps:

- Downloading the shapefile from Brower.

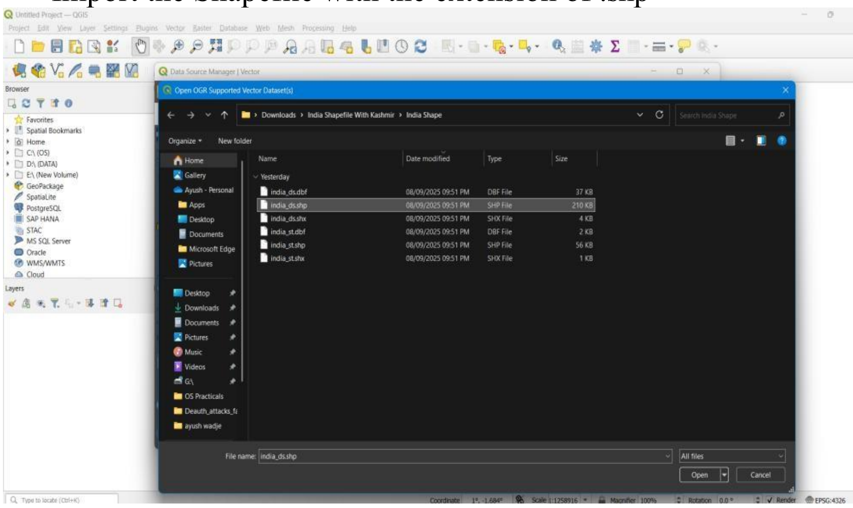


- Open the shapefile in QGIS

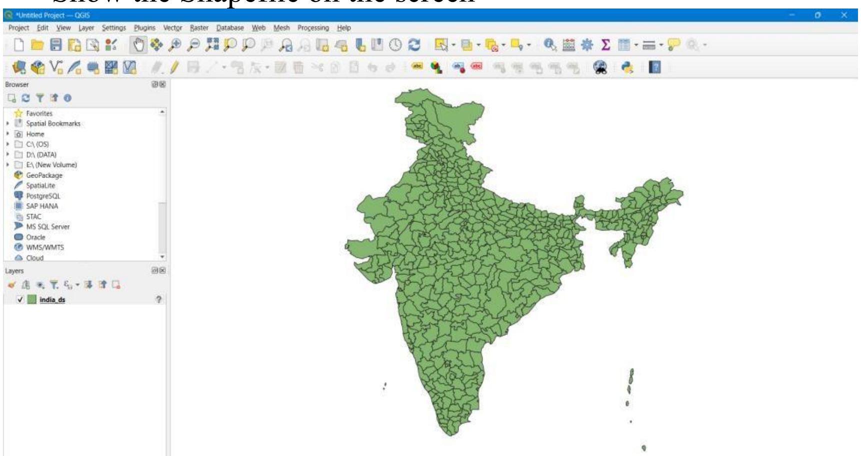


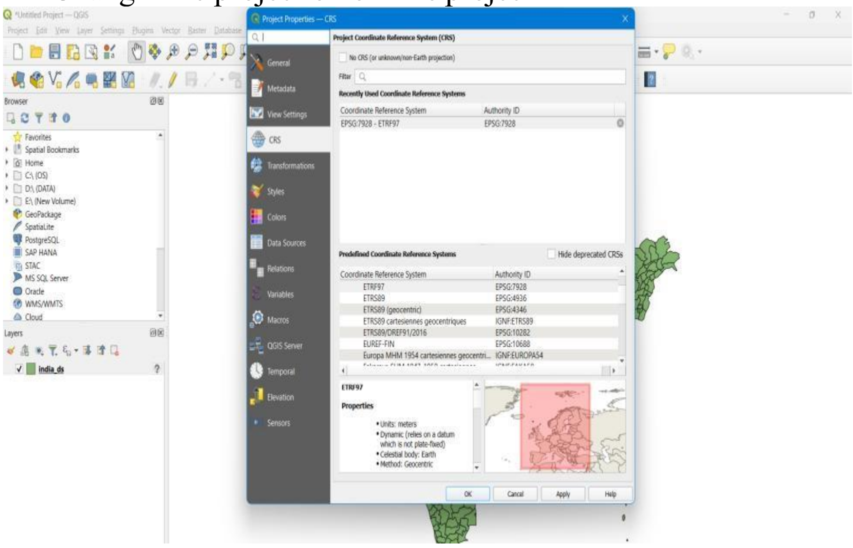


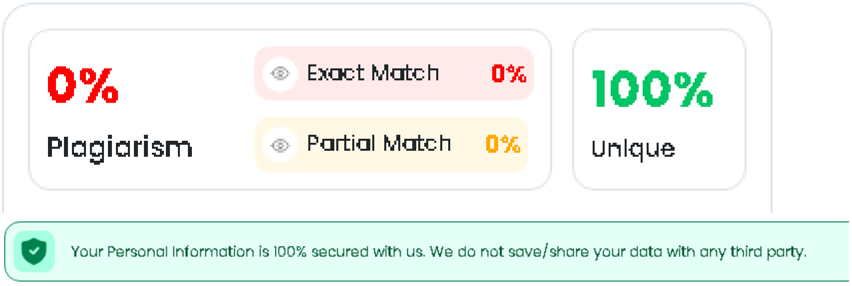
- Import the Shapefile with the extension of .shp



- Show the Shapefile on the screen



	• Changin the projection on this project 
Output Analysis	After creating a new layer, you must verify that it's correct before using it for analysis. First, perform a visual check by adding the layer to your map to confirm it's in the right location. Next, ensure the coordinate display at the bottom of the screen shows the new units, like meters instead of degrees. The ultimate proof is using the measure tool to get realistic distance or area calculations. Finally, quickly open the attribute table to confirm all the original data fields were carried over correctly.
Link of student Github profile where lab assignment has been uploaded	**https://github.com/Darshil-yup/GIS_Lab**
Conclusion	This workflow successfully transforms your raw data into a properly formatted and reliable dataset. By inspecting, reprojecting, and verifying your spatial data, you've ensured it has a consistent and appropriate Coordinate Reference System (CRS) for your project. This foundational work is critical because it prevents errors, priming your data for accurate measurements, correct alignment with other map layers, and meaningful spatial analysis. Your data is now fully prepared for the real work ahead.

Plag Report (Similarity index < 12%)	
Date	**29-07-2025**