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Department of Computer Science & Engineering (IOT)

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
Bhushan Tayade
29-07-2025

Session	**2025-26 (ODD)**	**Course Name**	**PE-I - Geo-Intelligence for Smart IoT Devices Lab**
Semester	**5**	**Course Code**	**23IOT1523**
Roll No	**035**	**Name of Student**	**Bhushan V. Tayade**

Practical Number	2
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 analyze spatial reference and attribute information, and accurately reprojecting it to a different Coordinate Reference System (CRS).
Theory (100 words)	Shapefile: • A shapefile is one of the most popular and long-standing vector data formats used in Geographic Information Systems (GIS) for representing spatial features and their related attributes. It was originally developed by Esri (Environmental Systems Research Institute) and has become a standard format supported by most GIS software platforms. • In essence, a shapefile stores geometric location data (the shape or form of a geographic feature) along with descriptive attribute information (data about that feature). These features can take the form of points (e.g., schools, wells), lines (e.g., roads, rivers), and polygons (e.g., city boundaries, lakes, land parcels). • Although referred to as a single "file," a shapefile actually consists of multiple files that work together to represent spatial data. Each file serves a specific purpose, and all must be present in the same directory for the shapefile to function correctly within GIS software. Common File Extensions and Their Roles: • .shp (Shapefile Geometry)

	Stores the geometric shape (point, line, or polygon) of spatial features. This is the main component that represents the visual layout of the data. • .shx (Shape Index File) Acts as an index that links geometric features (.shp) with their attributes (.dbf), allowing GIS systems to quickly access and display data. • .dbf (Database File) A dBase file that contains the attribute data for each feature in tabular form (e.g., name, type, population, area). • .prj (Projection File) Defines the coordinate system and map projection used, ensuring that spatial data aligns correctly on the earth's surface. • .sbn / .sbx (Spatial Index Files) Optional files that improve drawing speed and spatial query performance. • .cpg (Code Page File) Specifies the character encoding used for text fields, ensuring correct display of non-English characters. Other Related GIS File Formats: Apart from traditional shapefiles, several other formats are widely used in modern GIS applications • .geojson A JSON-based geospatial data format designed for web use. It's lightweight, easy to share, and integrates well with web mapping libraries such as Leaflet and Mapbox. • .kml (Keyhole Markup Language) A format developed by Google for visualizing spatial data in Google Earth and Google Maps. It can represent points, paths, polygons, and even multimedia annotations. • .gdb (Geodatabase) Esri's advanced format that supports topology, relationships, and large datasets more efficiently than shapefiles.

<table>
<tr><td></td><td>Advantages of Using Shapefiles:
Widely supported across most GIS platforms.
Easy to share and manage for small to medium-sized datasets.
Efficient for storing vector data (as opposed to raster data like images).
Limitations:
Cannot store topological relationships between features.
Has a 2 GB file size limit.
Lacks support for storing multiple feature types (points, lines, polygons) in a single file.
Summary:
A shapefile is a foundational component of GIS that enables the visualization, analysis, and management of spatial data. Despite the emergence of newer formats like GeoJSON and Geodatabases, shapefiles remain a crucial and universally compatible means of storing vector-based geographic information.</td></tr>
<tr><td>Procedure and Execution

(100 Words)</td><td>Implementation Steps:

Procedure to Load a Shapefile into a GIS Program:
Open Your GIS Application
Start by launching your preferred GIS software, such as QGIS, ArcGIS, or any other compatible platform that supports vector data formats.
Access the Add Layer Option
From the top menu bar, go to ‘Add Layer’ → ‘Add Vector Layer’ (the exact option name may vary slightly depending on the software). This command allows you to import spatial vector data into your project.
Locate the Shapefile on Your System
A file browser window will appear. Navigate to the directory where your shapefile is stored.
Select the file with the .shp extension (this contains the geometric data).</td></tr>
</table>

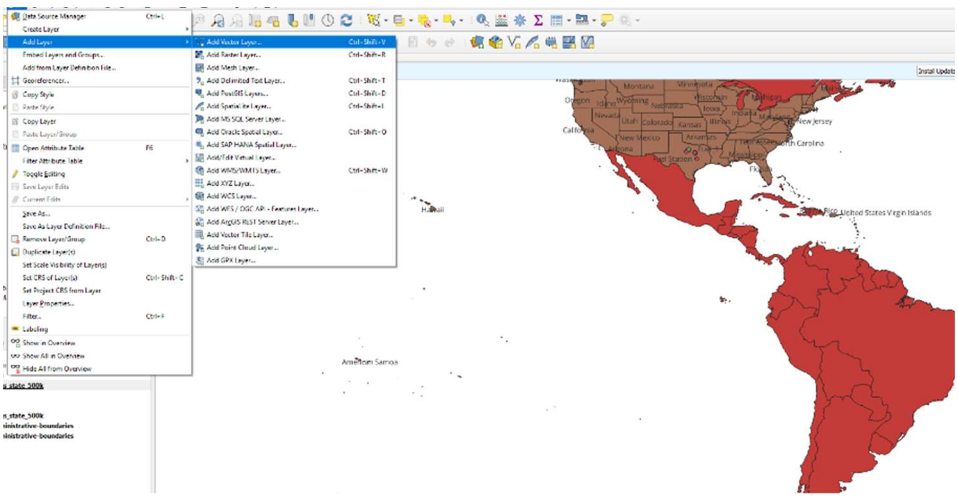
- Ensure that the .shx (index file) and .dbf (attribute table) files are in the same folder. These supporting files are necessary for the shapefile to load properly.

4. Load the Layer
   Click 'Open' or 'Add' to import the shapefile into your GIS workspace. The software will automatically read all the associated components and render them on the map view.

5. View the Layer on the Map Canvas
   Once loaded, the shapefile will be visible on the map canvas and will also appear in the Layers panel or Table of Contents. You can toggle its visibility, change its order, or adjust its appearance.

The shapefile layer is now successfully added and ready for further use. You can proceed to perform data visualization, editing, styling, spatial analysis, or attribute queries as needed for your GIS project.

Stepwise Screenshots with steps:



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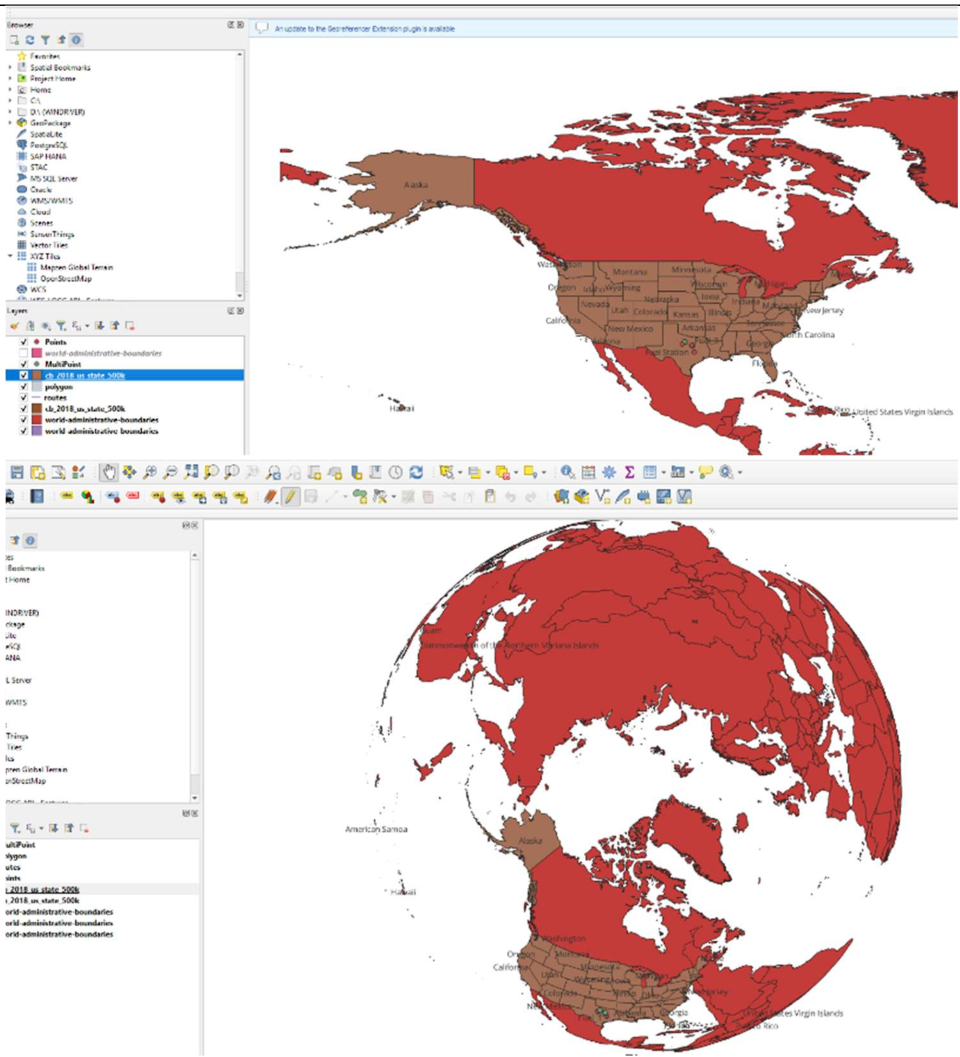
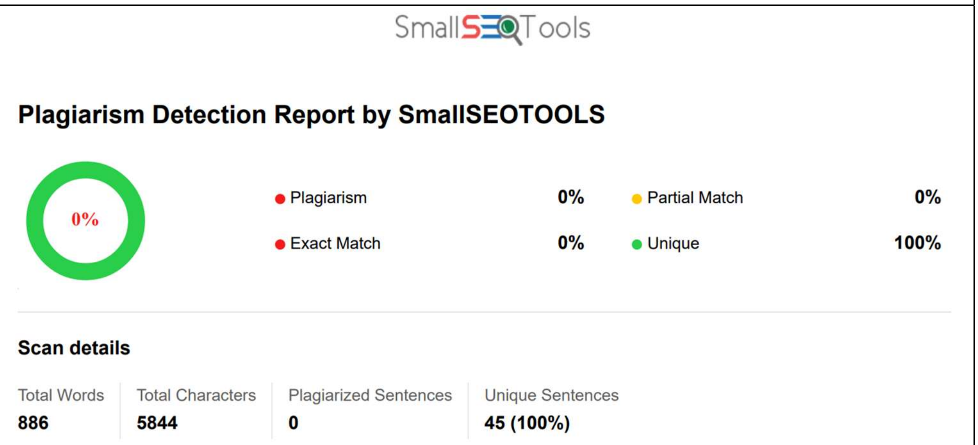
	
Output Analysis	The output demonstrated the successful handling and transformation of spatial data using GIS tools. The downloaded shapefile was thoroughly examined to verify its metadata, including the spatial reference system and attribute information. Through QGIS, the dataset was accurately reprojected into a new Coordinate Reference System (CRS), ensuring proper spatial alignment with other map layers. This process highlights the effectiveness of GIS in data validation, projection management, and visualization, confirming that the transformed shapefile retained both its geometric integrity and attribute accuracy after reprojection.
Link of student GitHub profile where lab	"https://github.com/Bhushan-Tayade/YCCN-23071391.git"

assignment has been uploaded	
Conclusion	The task of downloading a shapefile, examining its metadata, and reprojecting it into a different Coordinate Reference System (CRS) was successfully completed. This exercise demonstrated the practical use of GIS software (such as QGIS) for managing spatial data, verifying spatial references, and ensuring accurate map alignment. The process reinforced the importance of proper data handling and projection management in achieving reliable geospatial analysis results.
Plag Report (Similarity index <= 12%)	 SmallSEOTools **Plagiarism Detection Report by SmallSEOTOOLS** 0% Plagiarism 0% · Partial Match 0% Exact Match 0% · Unique 100% **Scan details** Total Words 886 · Total Characters 5844 · Plagiarized Sentences 0 · Unique Sentences 45 (100%)
Date	29-07-2025