Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
(An Empowered Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
Hingna Road, Wanadongri, Nagpur - 441 110
NAAC A++
Ph.: 07104-237919, 234623, 329249, 329250 Fax: 07104-232376, Website: www.ycce.edu

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
28-10-2025

Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
(An Empowered Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
Hingna Road, Wanadongri, Nagpur - 441 110
NAAC A++
Ph.: 07104-237919, 234623, 329249, 329250 Fax: 07104-232376, Website: www.ycce.edu

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	**2025-26 (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	7
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	Implement Geo-processing Tools(Clip, Buffer, Difference, Union, Intersection and Dissolve) on various vector data.
Problem Definition	Geo-processing tools are fundamental operations in Geographic Information Systems (GIS) used to analyze, manipulate, and transform spatial (vector) data. These operations take an input dataset (feature class or layer) and apply a geometric or attribute-based rule to create a new output dataset.
Theory (100 words)	Geo-processing tools in GIS are essential for performing spatial analysis and data manipulation on vector datasets such as points, lines, and polygons. These tools enable users to combine, extract, and modify spatial features based on their geometric and attribute relationships. Common operations include Clip, which trims features within a specified boundary; Buffer, which creates zones around features; Difference, which removes overlapping areas; Union, which merges multiple layers; Intersection, which identifies overlapping regions; and Dissolve, which aggregates features sharing a common attribute. Using these tools, GIS professionals can efficiently process spatial data, generate meaningful outputs, and support decision-making in mapping, planning, and environmental analysis.
Procedure and Execution (100 Words)	Implementation Steps: 1. Open QGIS Software: Launch QGIS and load the required vector datasets (e.g., India_States.shp and India_Country.shp). 2. Access Geo-processing Tools:

Go to the Processing Toolbox and open the Vector Overlay and Vector Geometry sections.

3. Clip Tool:
   - Open Vector Overlay → Clip.
   - Input Layer: India_States
   - Overlay Layer: India_Country
   - Output: Clipped_States

4. Buffer Tool:
   - Open Vector Geometry → Buffer.
   - Input Layer: India_Country
   - Distance: 100 km
   - Output: Country_Buffer

5. Difference Tool:
   - Open Vector Overlay → Difference.
   - Input Layer: India_Country
   - Overlay Layer: India_States
   - Output: Country_Diff

6. Union Tool:
   - Open Vector Overlay → Union.
   - Input Layers: India_Country and India_States
   - Output: Union_Layer

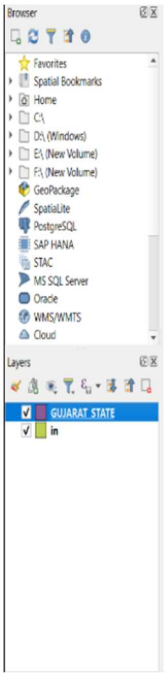
7. Intersection Tool:
   - Open Vector Overlay → Intersection.
   - Input Layers: India_Country and India_States
   - Output: Intersect_Layer

8. Dissolve Tool:
   - Open Vector Geometry → Dissolve.
   - Input Layer: India_States
   - Field: COUNTRY_NAME
   - Output: India_Dissolved

9. Save and Visualize Outputs
   All processed layers will appear in the Layers Panel. Visualize, style, and label the results for better interpretation.

10. Export Final Results:
    Save the output layers in a chosen directory for future use and documentation.

Stepwise Screenshots with steps:



Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
(An Empowered Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
Hingna Road, Wanadongri, Nagpur - 441 110
NAAC A++
Ph.: 07104-237919, 234623, 329249, 329250 Fax: 07104-232376, Website: www.ycce.edu

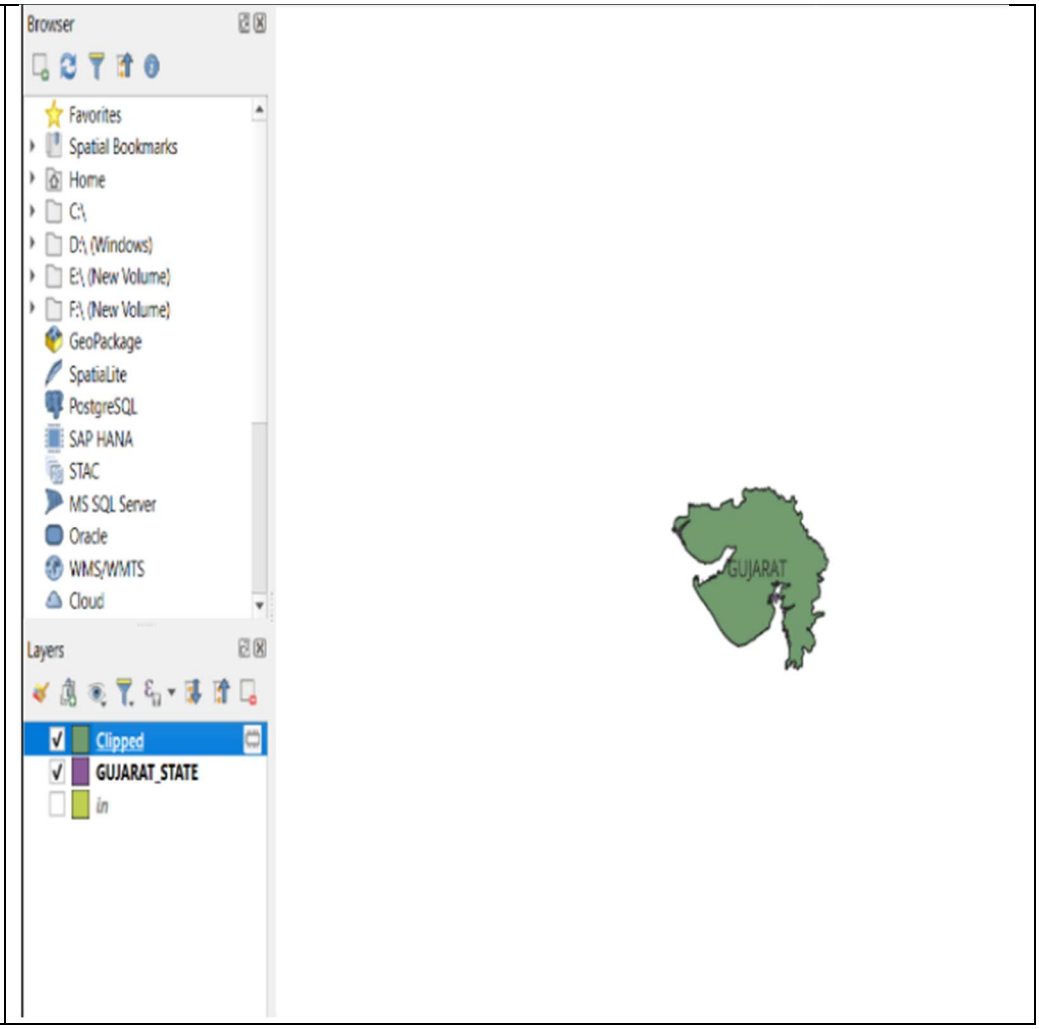
Department of Computer Science & Engineering (IOT)

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.



Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
(An Empowered Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
Hingna Road, Wanadongri, Nagpur - 441 110
NAAC A++
Ph.: 07104-237919, 234623, 329249, 329250 Fax: 07104-232376, Website: www.ycce.edu

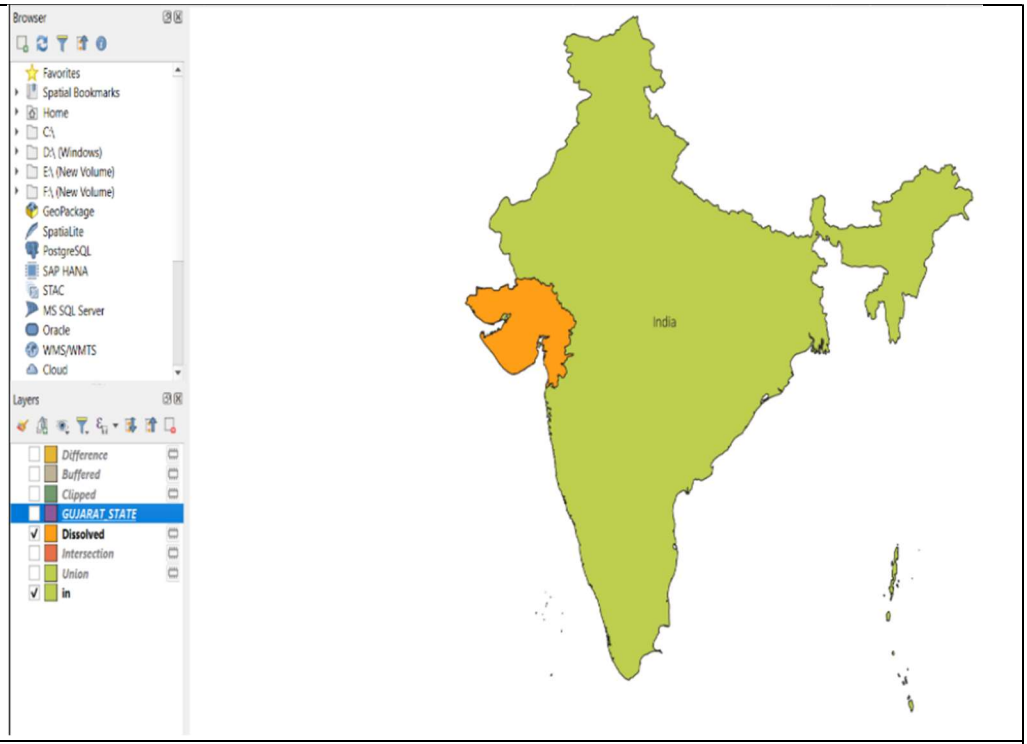
Department of Computer Science & Engineering (IOT)

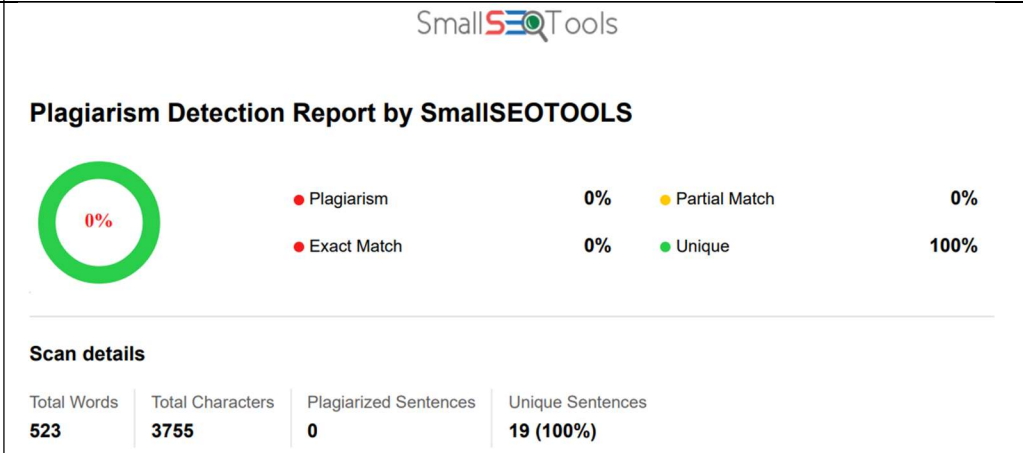
Vision of the Department

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.

	
Output Analysis	After implementing the geo-processing tools — Clip, Buffer, Difference, Union, Intersection, and Dissolve — on the India_States and India_Country vector layers, multiple meaningful spatial outputs were successfully generated in QGIS. The Clip tool extracted only the state boundaries within the national boundary, while the Buffer tool created a 100 km zone around the India boundary, useful for proximity analysis. The Difference tool removed overlapping areas between the two layers, and the Union tool combined both datasets into a single comprehensive layer. The Intersection tool displayed only the overlapping regions of states and the country boundary, and the Dissolve tool merged state polygons based on the COUNTRY_NAME attribute to form a unified national boundary. Each operation executed successfully, producing accurate results that clearly demonstrate the power and versatility of geoprocessing tools in spatial data analysis and map-based decision making.
Link of student GitHub profile where lab	"https://github.com/Bhushan-Tayade/YCCN-23071391.git"

assignment has been uploaded	
Conclusion	In this practical, various geo-processing tools — Clip, Buffer, Difference, Union, Intersection, and Dissolve — were successfully implemented on India's vector datasets (State and Country shapefiles) using QGIS. Each tool was applied through the geospatial processing toolbox to perform spatial analysis and data manipulation. The outputs generated from these operations accurately demonstrated how different layers can be combined, compared, and refined to extract meaningful geographic information. Overall, the exercise provided practical insight into the use of geo-processing tools for analyzing spatial relationships, improving map accuracy, and supporting geospatial decision-making in GIS.
Plag Report (Similarity index <= 12%)	
Date	28-10-2025