

**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-IL 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)



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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	01
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	Install/verify QGIS, explore interface, and understand open - source vs proprietary GIS features.
Problem Definition	The task is to install and verify QGIS on a computer system, explore its user interface to become familiar with the essential tools, and understand the differences between open-source GIS software and proprietary GIS platforms. (Discuss about 10 open source and proprietary software.)
Theory (100 words)	<p>What is GIS?</p> <p>A Geographic Information System (GIS) is a digital tool used to collect, store, process, and display information that is linked to specific locations on the earth's surface. It helps in organizing spatial data so that patterns, connections, and geographic relationships can be studied and understood.</p> <p>In simpler terms, GIS integrates maps with relevant data, making it easier to identify what is happening, at which place, and for what reason. There are two categories of GIS software one is open source and other is proprietary GIS software. Some of the examples are:</p> <p style="text-align: center;">❖ Open Source Applications</p> <ol style="list-style-type: none">1. ArcGIS Pro:<ul style="list-style-type: none">● Unified 3D integration● 64-bit processing2. QGIS 3:<ul style="list-style-type: none">● user base and Large support● 900+ tools in total



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3. ArcGIS Desktop:

- Solid geoprocessing symbology
- ArcGIS for Online for web maps and apps

4. Hexagon GeoMedia:

- Fast querying and analysis

5. MapInfo Professional:

- Side by Side Mapping

6. FME Feature Manipulation Engine:

- It's data is in a interoperability specialist

7. Global Mapper:

- Advance elevation manipulation tools

8. QGIS 2:

- Beautiful labeling option

9. Cadcorp:

- Build Cordearp SIS Map web maps

10. GRASS GIS:

- LiDor and Network Analysis
- 3D raster rendering and customization

❖ Proprietary Software of GIS

1. Gris Arc GTS:

- wide range of tools for spatial synthesis

2. Map into Pro:

- creates high quality and professional maps

3. Maptitude:

- Offers tools analysis for location

4. Auto CAD Map 3D:

- integrate with AutoCAD
- provides tools for infra details



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5. Mapbox:

- provides a powerful APT. for map integration in to applications

6. Carto:

- creates interactive web maps applications and location bared

7. Google Earth Pro:

- create and explore 3D visualization of the Earth.
- high resolution satellite imagery and terrain data.

8. Maplytic:

- Easy to use and cloud based

9. eSpatial:

- Strong focus on location intelligence and collab, data visualization and business insight

10. Global Mapper:

- Handles various data formats and offers advanced analysis and terrain data

Installing QGIS on Windows

Download the Installer:

Go to the official QGIS web site: <https://qgis.org>.

- Select the current Long-Term Release (LTR) for Windows, as this gives maximum stability for those starting out.
- Run the Installer: Double-click the downloaded .exe file.
- Accept the terms of the license agreement and choose the default installation directory (recommended).
- Select Components: Make sure the check boxes for QGIS, GRASS GIS, and GDAL are selected, as these provide valuable analytical and spatial processing capabilities.



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	<ul style="list-style-type: none">● Continue with Installation: Click Install and allow the process to complete. The installation may take several minutes depending on your system's performance. <p>Launch QGIS: Once installed, open QGIS from the Start Menu. The main interface will appear, displaying menus, toolbars, and panels for spatial data handling.</p> <p>Exploring the QGIS User Interface and Tools(After installation of QGIS in the system)</p> <p>When QGIS opens for the first time, its interface might feel complex, but it is structured logically to help users perform spatial tasks efficiently.</p> <ul style="list-style-type: none">● Menu Bar: Has drop-down menus such as Project, Layer, Vector, Raster, Database, Plugins, and Help to access principal functions in a hurry.● Toolbars: Offer shortcuts to common tools including zooming, panning, layer styling, and attribute table access.● Layers Panel: Shows all the datasets loaded into the project at the moment. Users can turn layers on/off, re-order layers, and group layers.● Browser Panel: Enables system drives and database browsing to import shapefiles, raster data, and connections such as PostGIS directly.● Map Canvas: The main working space where spatial data is viewed and edited.● Status Bar: Displays key project information such as map coordinates, scale, and rendering progress.● Plugins: Perhaps one of QGIS's greatest strengths. Plugins (official or community-created) add functionality to the software—real-time GPS tracking, network analysis, or geocoding to name a few.
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	<p>Through the discovery of these tools, users rapidly build confidence in managing spatial datasets and carrying out key GIS tasks like mapping, spatial analysis, and visualization.</p>
<p>Procedure and Execution (100 Words)</p>	<p>Implementation Steps:</p> <pre>graph TD; Start --> Download[Download the Installer]; Download --> Website[Go to official QGIS website (https://qgis.org)]; Website --> LTR[Select Long-Term Release (LTR) for Windows]; LTR --> Run[Run the Installer (.exe file)]; Run --> License[Accept License Agreement]; License --> Directory[Choose Default Installation Directory]; Directory --> Components[Select Components (QGIS, GRASS GIS, GDAL)]; Components --> Install[Click Install → Wait until process completes]; Install --> Launch[Launch QGIS from Start Menu]; Launch --> Interface[QGIS Interface Opens (Menus, Toolbars, Panels)]; Interface --> End[End];</pre>



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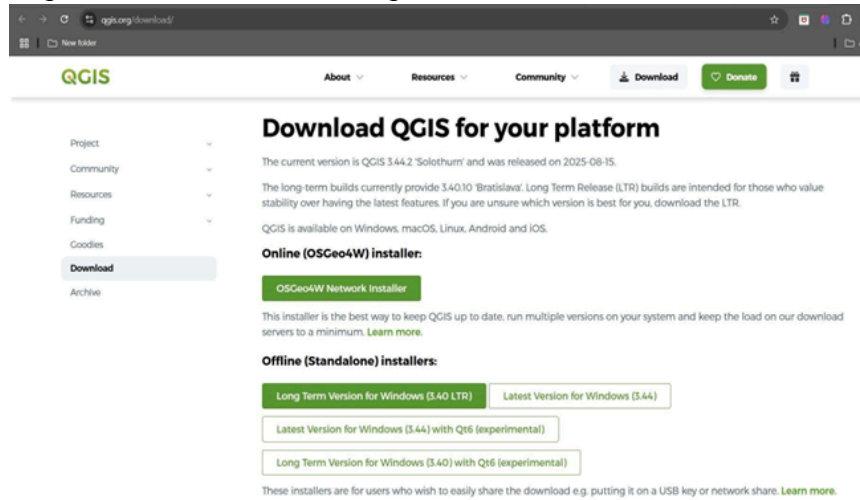
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Stepwise Screenshots with steps:



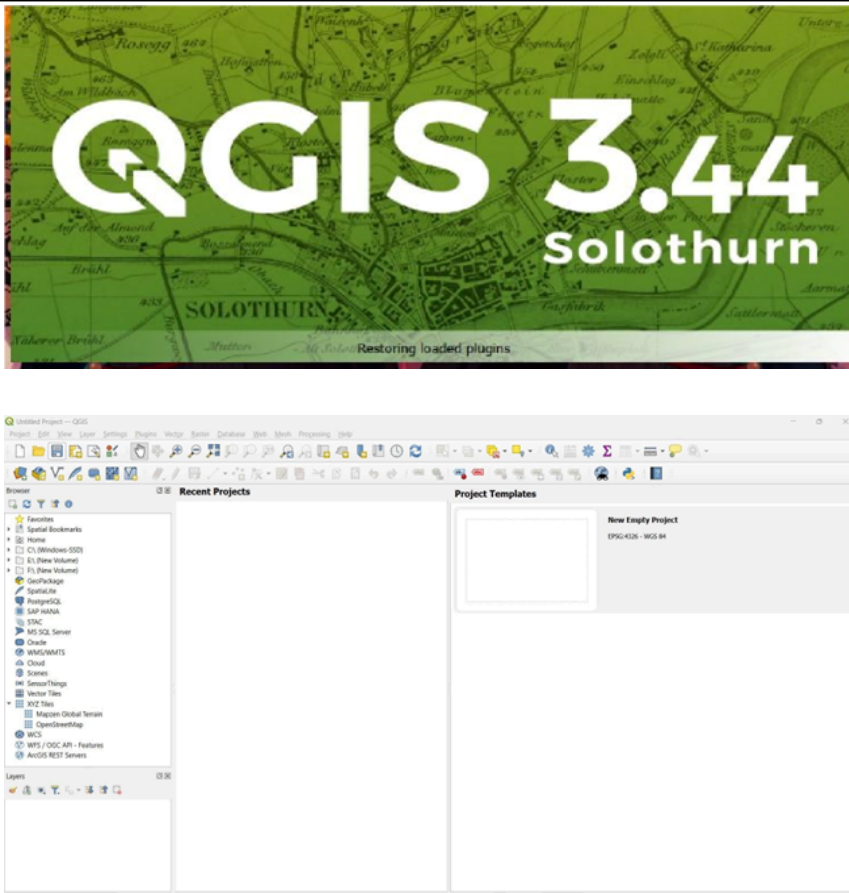
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Output Analysis	<p>After successfully completing the installation of QGIS:</p> <ul style="list-style-type: none"> • The user is able to launch QGIS from the Start Menu without errors. • The QGIS interface loads with menus, toolbars, and panels visible. • Installed components such as GRASS GIS and GDAL are available for advanced spatial data processing. • The environment is ready to handle spatial data, perform mapping tasks, and run geospatial analyses.
Link of student Github profile where lab assignment has been uploaded	<p>https://github.com/Darshil-yup/GIS_Lab.git</p>



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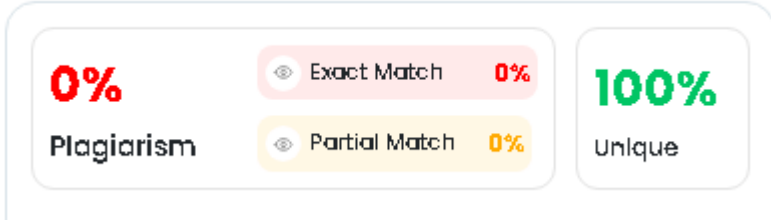
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Conclusion	Downloaded and installed the QGIS software on the desktop and viewed many different features and tools of it. Analyzed many different-different kinds of open source and proprietary softwares with their unique features and tools.
Plag Report (Similarity index < 12%)	
Date	22-07-2025