# 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

**Mission:** Means to achieve Vision

**Vision:** Dream of where you want.

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

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| 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)

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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** | **71** | **Name of Student** | **Vedant Yerne** |

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| Practical Number | Practical no. 1 |
| 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 | **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) | **10 Open-Source GIS Software and Their Features**   1. **QGIS (Quantum GIS)**    * User-friendly interface    * Advanced geospatial analysis tools    * Supports numerous file formats (e.g., shapefiles, GeoJSON, KML)    * Plugins for additional functionalities    * Symbology and cartographic customization 2. **GRASS GIS (Geographic Resources Analysis Support System)**    * Powerful raster and vector manipulation    * 350+ modules for geospatial data analysis    * Strong scripting support (Python, Bash)    * 3D visualization tools    * Time series analysis 3. **gvSIG**    * Desktop and mobile versions available    * Integration with remote sensing tools    * CAD tools for vector editing    * Support for 3D views    * Multilingual support 4. **uDig (User-friendly Desktop Internet GIS)**    * Java-based GIS platform    * Extensible through plugins    * Designed for use with web services (WMS, WFS)    * Good vector editing tools    * Easy integration with PostGIS and other databases 5. **SAGA GIS (System for Automated Geoscientific Analyses)**    * Specializes in terrain and hydrological analysis    * Easy-to-use GUI with modular tools    * Advanced raster processing capabilities    * Cross-platform compatibility    * Can be used via command line 6. **MapServer**    * Web mapping server software    * Publishes maps and spatial data online    * Supports OGC standards (WMS, WFS, WCS)    * Highly configurable via mapfiles    * Integration with databases like PostGIS and Oracle Spatial 7. **GeoServer**    * Java-based server for sharing geospatial data    * Implements OGC standards (WMS, WFS, WCS)    * Web-based administration interface    * Styling via SLD (Styled Layer Descriptor)    * Supports multiple formats including GeoTIFF, Shapefiles 8. **OpenLayers**    * JavaScript library for building web-based GIS applications    * Supports vector and raster layers    * Integration with various data sources (WMS, WMTS, OSM)    * Mobile-friendly design    * Active developer community 9. **Leaflet**    * Lightweight JavaScript library for web maps    * Simple API and extensive plugin ecosystem    * Mobile-optimized    * Works well with OpenStreetMap    * Easy to customize and embed in websites 10. **PostGIS**  * Spatial extension for PostgreSQL database * Advanced spatial queries and indexing * Supports raster, vector, and topology data * Integrates with other GIS software like QGIS and GeoServer * OGC-compliant geometry types and functions   **10 Licensed GIS Software and Their Features**   1. **Esri ArcGIS Pro**    * Advanced spatial analysis and geoprocessing tools    * 2D and 3D visualization capabilities    * Integration with ArcGIS Online and Enterprise    * Supports Python scripting (ArcPy)    * Extensive cartographic and symbology options 2. **Esri ArcMap (ArcGIS Desktop)**    * Legacy GIS desktop application by Esri    * Wide support for raster and vector formats    * Strong cartographic layout tools    * Advanced spatial statistics and modeling tools    * Geodatabase management capabilities 3. **MapInfo Professional (by Precisely)**    * Intuitive interface for mapping and spatial analysis    * Strong thematic mapping tools    * Supports spatial SQL and custom scripting    * Integration with various databases and data formats    * Layout designer for high-quality maps 4. **AutoCAD Map 3D (by Autodesk)**    * Combines CAD and GIS capabilities    * Supports spatial databases (e.g., Oracle Spatial, SQL Server)    * Data linking and attribute management    * Powerful for engineering and infrastructure projects    * Customizable via AutoLISP and .NET APIs 5. **ERDAS IMAGINE (by Hexagon Geospatial)**    * Specialized in remote sensing and image analysis    * Supports classification, change detection, and radar processing    * Powerful raster editing and modeling tools    * Integration with LiDAR and photogrammetry tools    * Multispectral and hyperspectral image processing 6. **ENVI (by L3Harris Geospatial)**    * Focused on advanced image processing and remote sensing    * Tools for spectral analysis and image classification    * Integration with ArcGIS    * Supports UAV and satellite imagery    * Machine learning and deep learning tools for image interpretation 7. **Smallworld GIS (by GE Digital)**    * Tailored for utility and telecommunications sectors    * Strong data modeling capabilities    * Supports large enterprise datasets    * Integration with business and operational systems    * Version management and long transaction support 8. **Bentley Map (by Bentley Systems)**    * GIS for infrastructure design and asset management    * Strong CAD and GIS integration    * Supports spatial database services    * 3D modeling and analysis capabilities    * Used in transportation, utilities, and urban planning 9. **Manifold System GIS**    * High-performance GIS with GPU acceleration    * Supports large datasets efficiently    * Integration with databases and web services    * Advanced geoprocessing and spatial SQL support    * Scripting in multiple languages (e.g., C#, VBScript) 10. **TatukGIS Editor**  * Lightweight but powerful desktop GIS tool * Advanced editing and spatial analysis functions * Supports a wide range of spatial formats * Customizable via built-in scripting (Pascal, Basic) * Strong projection and coordinate system support |
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| Output Analysis | To explore GIS tools, QGIS can be easily installed as a leading open-source software with a user-friendly interface and powerful mapping tools. By navigating its interface, users gain hands-on experience with layers, symbology, and geoprocessing. Compared to proprietary GIS like ArcGIS Pro or MapInfo, open-source software like QGIS offers similar functionalities without licensing costs. However, proprietary tools often provide more integrated enterprise support, advanced automation, and industry-specific solutions. |
| Link of student |  |

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| Github profile where lab assignment has  been uploaded |  |
| Conclusion | **Install/verify QGIS, explore interface, and understand open-source vs proprietary GIS features. Is perform successfully** |
| Plag Report (Similarity index < 12%) |  |
| Date | 22/7/25 |