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

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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

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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	035	Name of Student	Bhushan V. Tayade

Practical Number	9
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 and implement simple functions of Node-Red.
Problem Definition	Node-RED is a flow-based programming tool for visual programming of event-driven applications, primarily used for wiring together hardware devices, APIs, and online services. It provides a browserbased editor that makes it easy to create applications by connecting "nodes" to form "flows."
Theory (100 words)	Node-RED is an open-source, flow-based development tool for wiring together hardware devices, APIs and online services using a visual, browser-based editor. Built on Node.js, it exposes reusable "nodes" that represent inputs, outputs and processing logic; users connect these nodes into directed graphs called flows. Each flow executes event-driven JavaScript functions, enabling rapid prototyping of IoT, web and automation tasks without writing full applications. Node-RED supports extension via a palette of community nodes (MQTT, HTTP, file, GPIO, dashboard), persistent flow storage, and easy deployment. Its visual paradigm simplifies debugging, reduces boilerplate code and accelerates integration between disparate systems for teaching, research, and lightweight production services.
Procedure and Execution (100 Words)	Implementation Steps: 1. Install a recent LTS version of Node.js (v14/16/18+ recommended). • Verify: node -v and npm -v. 2. Install Node-RED globally:

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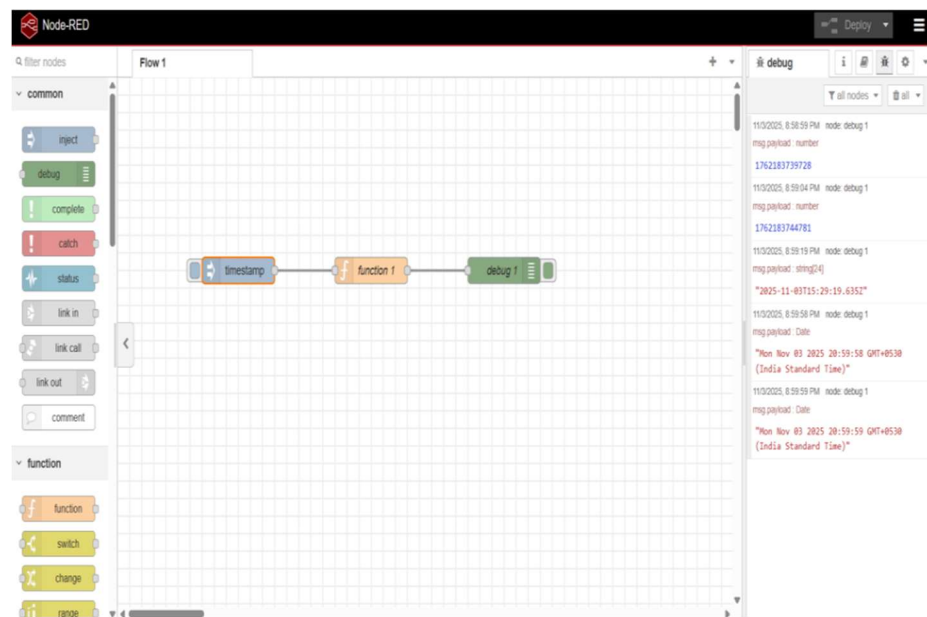
- Command (Windows/Linux/macOS):
  npm install -g --unsafe-perm node-red

3. Start Node-RED:
   - Run: node-red
   - Note console shows Server now running at http://127.0.0.1:1880/

4. In a browser go to http://localhost:1880 to access the visual editor.

5. Drag an Inject node (timestamp) to the canvas.

6. Drag a Function node and connect Inject → Function. Double-click Function and paste:
   // Simple function: create a greeting message
   msg.payload = "Hello from Node-RED at " + new Date().toLocaleString();
   return msg;

7. Add a Debug node, connect Function → Debug.

8. Click Deploy, then click the small square on the Inject node to trigger.
   - Check the right-hand Debug panel to see the message.

9. Drag http in, function, http response nodes and wire them: http in -> function -> http response.

10. Configure http in method = GET, URL = /hello. In Function node:
    msg.payload = { message: "Node-RED says hi", time: new Date().toISOString() };
    return msg;

11. Deploy. Visit http://localhost:1880/hello in your browser to see JSON response.

12. Install extra nodes if needed: Manage palette → Install or npm install node-red-dashboard for UI.

13. Save/export flows: Menu → Export (to JSON). Import with Menu → Import.

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14. Stop Node-RED with Ctrl+C in terminal; run as a service for production (use PM2 or systemd).

15. For hardware GPIO (Raspberry Pi), use the node-red-node-pi-gpio palette and follow hardware safety precautions.

16. Use the Debug panel to inspect msg objects. Add node.warn() or node.error() in Function code for runtime messages.

17. Keep Node.js up to date and run npm audit if you install many extra nodes. For multi-user or remote access, secure the editor (admin auth) via settings file.
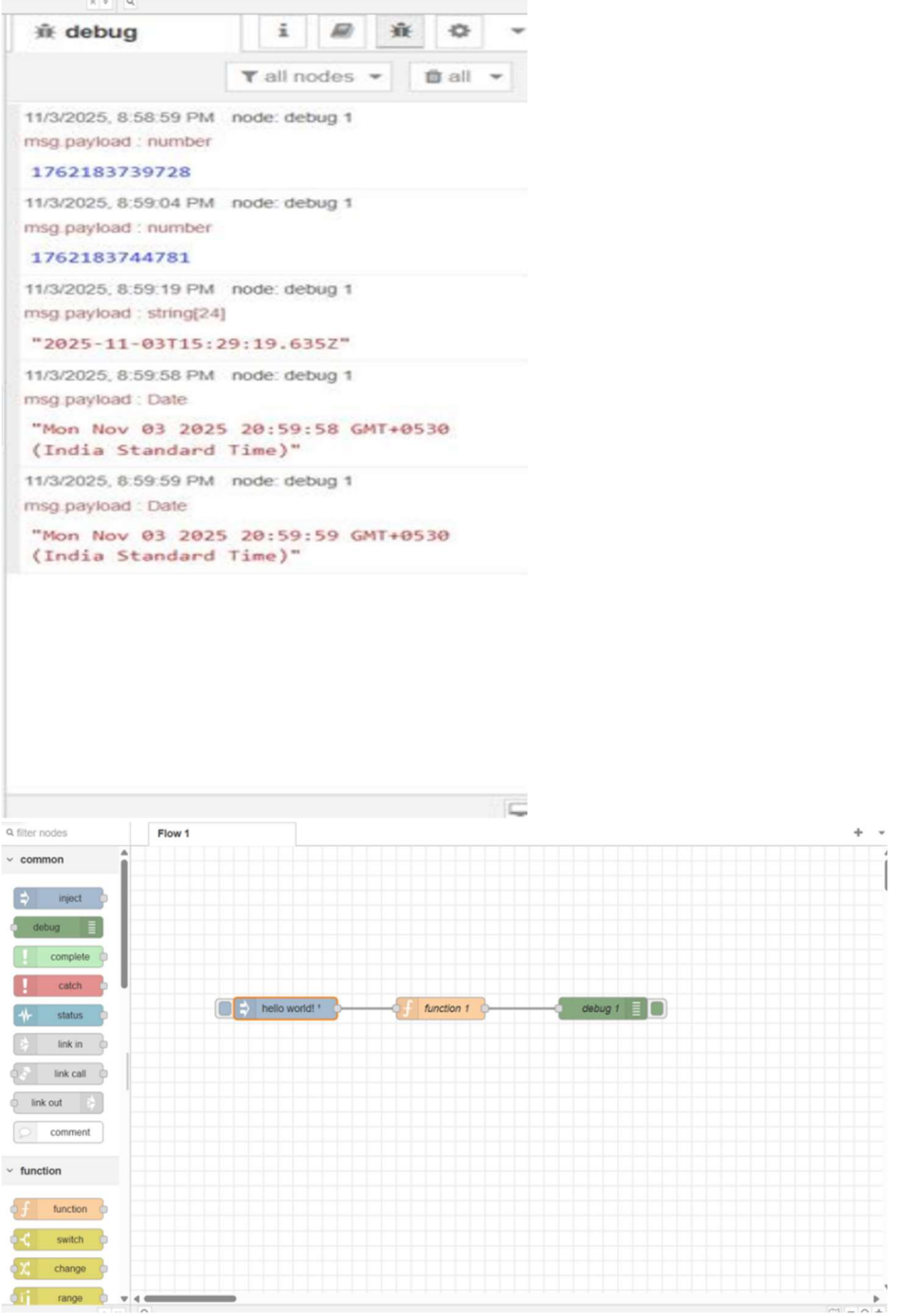
Stepwise Screenshots with steps:

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Output Analysis	The Node-RED flow executed successfully, demonstrating the correct processing of input data through connected nodes. The system effectively categorized and transformed a neutral numerical value into a meaningful, human-interpretable message using the Function and Template nodes. Each

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	node performed its designated task within the flow, ensuring accurate data handling and logical transformation. The output displayed in the Debug panel confirmed that the flow operated as intended, validating both the logic and structure of the designed process.
Link of student GitHub profile where lab assignment has been uploaded	"https://github.com/Bhushan-Tayade/YCCN-23071391.git"
Conclusion	The practical successfully achieved its objective of implementing and testing basic Node-RED functions. By utilizing Function and Template nodes, a raw numeric input (for example, 25) was converted into a contextually meaningful, natural language statement. This exercise demonstrated how Node-RED can simplify data processing and message generation through visual flow design, reinforcing its effectiveness as a low-code platform for event-driven IoT and automation applications.
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: 541 Total Characters: 3692 Plagiarized Sentences: 0 Unique Sentences: 32 (100%)
Date	28-10-2025