सीएसआईआर- भारतीय पेट्रोलियम संस्थान
मोहकमपुर, हरिद्वार रोड, देहरादून,उत्तराखंड- 248005
**CSIR-INDIAN INSTITUTE OF PETROLEUM**
**Mohkampur, Haridwar Road, Dehradun, Uttarakhand-248005**

F. No. Rectt/Grade III & II/2025-Pers Dated: 23.01.2026

**Advt. No. 07/2025: NOTIFICATION**

**Sub: Notification of Syllabus for Written and Trade Test for the Posts of Technical Assistant- reg.**

It is notified for information of the candidates who have been shortlisted for appearing in the Trade Test notified vide CSIR-IIP Notification No. Rectt/Grade III & II/2025-Pers dated 15.01.2026 that the Trade Test for the following positions of Technical Assistant will be held shortly. Therefore, the syllabus for the conduct of Trade Test & Written Examination (Paper III) for the Post of Technical Assistants, Area- Climate Change & Data Science and Information Technology is being notified as follows:

| Sr. No. | Name of the Area | Page No. |
|---|---|---|
| 1. | Climate Change & Data Science | 2, 3 & 4 |
| 2. | Information Technology | 5 & 6 |

Candidates may also take note that, this Institute, vide its notification of Even No. dated 19.01.2026 has already notified the syllabus for the Post of Technical Assistants, Areas- Business Development, Chemical Science, Science Communication & Dissemination Directorate (SCDD), KRC (Library) & Guest House Manager (Hotel Management) on the Institute's Website. Therefore, in view of the above, all the candidates are advised to prepare for the Trade Test as well as for Objective Type Multiple Choice Question Examination i.e. Paper I, Paper II and Paper III.

All candidates are informed that this Institute has already notified that Paper I will be on General Mental Ability and Paper II shall be on General Awareness and English Language. Paper III shall be on Subject Paper which will vary according to the Posts as mentioned above. Therefore, the syllabus for different subjects of Paper III & Trade Test is being notified along with this notification for the benefit of the candidates so that they can prepare accordingly.

(Anjum Sharma)
Sr. Controller of Administration

Enclosure- As Above

**Copy to:**

1. Head IT for uploading on Official Website of CSIR-IIP
2. All Notice Boards

## Syllabus for Paper III (Written Exam) for the Post of Technical Assistant, Area – Climate Change and Data Science, Post Code – CCDS-1

### Data Science and AI/ML

**Foundation of Data Science:** Introduction to Data Science, Data Science vs. AI vs. Machine Learning vs. Big Data, Types of Data – Structured, Unstructured, Semi-Structured, Data Collection, Cleaning and Preprocessing.

**Statistics and Probability:** Hypothesis Testing, Probability Distributions, Descriptive Statistics, Inferential Statistics, Linear Algebra.

**Python for Data Science:** Python Basics, Operators, Control Flow (Conditionals, Loops), Functions and Modules, Data Structures (Lists, Dictionaries, Sets, Tuples), Object-Oriented Programming, Error Handling, Libraries Overview (Numpy, Pandas, Matplotlib), Data Analysis with Python.

**Artificial Intelligence:** Definition & Scope, Key Concepts – Agents, Environments, Rationality, Search Problems, Search Techniques – BFS, DFS, A*, Heuristic Search, Planning & Decision Making – Rule Based Systems, Expert Systems, AI Applications.

**Machine Learning:** Supervised, Unsupervised, Semi-Supervised, Reinforcement Learning, Key Terms – Features, Labels, Training/Test Sets, Overfitting, Underfitting, Bias-Variance Trade-off, Supervised: Linear Regression, Logistic Regression, Decision Trees, Random Forest, SVM, k-NN, Unsupervised: k-Means, Hierarchical Clustering, PCA, Model Evaluation – Accuracy, Precision, Recall, F1- Score, ROC-AUC, Cross-Validation.

**Statistical Inference:** Measures of Central Tendency, Statistical Inference & Regression Analysis Overview, Sampling Distribution, Central Limit Theorem, Hypothesis Testing (Null/Alternative, p-values, t-test, chi-square test, ANOVA), Confidence Intervals.

**Regression Analysis:** Simple Linear Regression, Multiple Linear Regression, Concept of Linearity, Independence, Homoscedasticity, Normality, Multicollinearity, Autocorrelation.

**Predictive Modelling:** Steps in Predictive Modelling, Model Selection – Regression, Classification, Clustering, Performance Metrics – MSE, RMSE, $R^2$, Accuracy, Precision, Recall, F1-Score, Validation Techniques – Train-Test Split, Cross-Validation, Bootstrapping, Applications – Forecasting, Risk Assessment, Recommendation Systems.

## LCA and GHG Accounting

**Fundamental of LCA:** Concept of Life Cycle Assessment, Definition, Purpose & Applications of LCA, Product Life Cycle Stages (Cradle to Grave, Cradle to Cradle, etc.) Sustainability Linkages: SDGs, Circular Economy, Carbon/Water Footprints.

**LCA Framework & Standards:** ISO 14040 and ISO 14044 Framework, Phases of LCA: 1.Goal & Scope Definition (Functional Unit, System Boundary), 2. Life Cycle Inventory (LCI), 3. Life Cycle Assessment (LCIA), 4. Interpretation of Results.

**Life Cycle Inventory (LCI):** Data Requirements: Primary vs. Secondary Data, Allocation Methods (Mass, Energy, Economic), System Expansion and Cut-Off Approaches, Role of Databases (Ecoinvent, ELCD, GaBi, Agrifootprint, etc.)

**Life Cycle Impact Assessment (LCIA):** Impact Categories: Global Warming Potential (GWP), Acidification, Eutrophication, Human & Ecotoxicity, Resource Depletion, Land Use, Water Use, etc. Midpoint vs. Endpoint Approaches, LCIA Methods (CML, ReCiPe, etc.), Hotspot Analysis, Senstivity Analysis, Uncertainity and Data Quality Indicators, Limitations of LCA.

**Software and Applications of LCA:** LCA Software (SimaPro, GaBi, GREET, OpenLCA, etc.), Case Studies, Role of LCA in policy, Corporate Sustainability & Decision Making.

**Fundamentals of GHG Accounting:** Climate Change, Greenhouse Effect, Major GHGs ($CO_2$, $CH_4$, $N_2O$, HFCs, PFCs, $SF_6$, $NF_3$), Global Warming Potential (GWP), Concept of $CO_2$-Equivalent, Importance of GHG Accounting, UNFCCC, Paris Agreement, IPCC.

**GHG Protocol & Standards and Method for GHG Calculation:** GHG Protocol Overview (WRI/WBSD), ISO 14064 and ISO 14067 Standards, Principles of GHG Accounting: Relevance, Completeness, Consistency, Transparency, Accuracy. Methods of GHG Quantification, Tools and Databases (IPCC Guidelines, EPA Factors, DEFRA, IEA), GHG Inventory Reporting, Data Quality, Uncertainty and Materiality.

**Organizational & Operational Boundaries:** Equity Share and Control Approaches (Financial & Operational Control), Defining Boundaries for GHG Inventories, Scope 1, Scope 2, Scope 3 Emissions (Direct & Indirect), Examples of Emission Sources in Each Scope.

**Applications of GHG Accounting:** National GHG Inventories (IPCC 2006 Guidelines), Corporate GHG Inventories (BSSR), Product-Level Carbon Footprint (PAS 2050, ISO 14067), Science-Based Targets (SBTi), Net Zero Commitments, Carbon Markets, Offsets & Trading (CDM, VCM, Article 6 of Paris Agreement)

**Syllabus for Trade Test for the Post of Technical Assistant, Area- Climate Change & Data Science, Post Code- CCDS-1**

1. Demonstration of data analysis using provided datasets in Excel, including data cleaning, consolidation, graphical plotting and logical interpretation of trends. Assessment will include statistical analysis such as correlation, regression, error and uncertainty analysis and evaluation of key statistical parameters with clear presentation and logical reasoning of results.
2. Demonstration of building and evaluating a machine learning model in Python using the provided input and output datasets. Assessment will focus on the correct use of Python libraries, logical workflow, interpretation of results and basic model validation. This activity will include data preprocessing, feature selection, model selection, training, testing and performance evaluation of different machine learning models.
3. Demonstration GHG emission calculation using provided activity data and emission factors in an Excel Sheet, as per IPCC/ISO guidelines. Assessment will include application of the correct formula, unit conversion, aggregation of emissions, interpretation of results and clear presentation to demonstrate knowledge of Scope 1, Scope 2 and Scope 3 emissions.
4. Execution of a Life Cycle Assessment case study using standard LCA software using the provided process// product information and material/ energy inputs. This exercise will cover goal & scope definition, functional unit selection, system boundary modelling, inventory data input, impact assessment and interpretation of results. Evaluation will include correct software usage, data handling and clarity in presenting LCA outcomes.

## Syllabus of Paper III (Written Test) for the Post of Technical Assistant, Area- Information Technology, Post Code- IT-1

1. **Computer Fundamentals -** Concepts of Hardware and Software, Functions of Motherboard Components and Processors, Input/ Output Devices and their Functionalities, Web Browsers.

2. **Operating Systems (Windows and Linux) -** Basics of Operating Systems (Windows, Linux), Process/ Job Scheduling, Paging Concept, Deadlock Detection/ Prevention, Memory Management, Troubleshooting Hardware and Software Issues.

3. **Computer Languages and Database Concepts**- C and Object-Oriented Programming (C++) Concepts, Data Types, Basics of Database Management Systems, SQL Commands, ACID Properties, Basics of Data Structure, Time Complexity, Queue, Array, Sorting/ Searching and Tree Data Structure (Binary tree, B/B+ tree).

4. **Office Productivity Tools-** Word Processing (MS Word, Open Office Writer), Spreadsheet Applications (MS Excel, Open Office Calc), Presentation Software (MS Power Point, Open Office Impress).

5. **Networking & Internet Concepts -** Networking Basics {Local Networks (LAN, WAN), Ethernet, Wi-Fi, Routing}, IP addressing, Network Topologies, Network Protocols (IOS, OSI), TCP/ UDP, SMTP, Internet protocols, Network Topology, DNS, IP Addressing, MAC Address, Email Communication, Binary and Hexadecimal representation.

6. **Network Security & Cyber security-** SSL, HTTPS, Firewalls, Malware Protection

7. **Web Development & Scripting-** HTML, CSS, Java Script Basics, XM, Web Servers and Hosting Concepts

## Trade Test Syllabus for the Post of Technical Assistant, Area- Information Technology, Post Code- IT-1

1. Install and configure operating systems such as Windows and Linux. Perform troubleshooting of Windows and Linux systems, servers, network devices, and storage. Understand basic network security and safe computing practices. Understand network security fundamentals.
2. Management and basic administration of Linux and Windows servers, configuration and operation of firewalls including Next Generation Firewalls (NGFW), understanding and use of Intrusion Detection and Intrusion Prevention Systems (IDS/IPS), management of network switches and basic routing, implementation of network security policies, monitoring and troubleshooting network traffic and security issues, securing servers and endpoints, performing backup of configurations and logs, and optimizing network architecture to ensure secure and reliable network operations within an organization.
3. Installation, configuration, and basic administration of MySQL database server; understanding relational database concepts, tables, keys, and relationships; creation and management of databases and tables; performing data insertion, update, deletion, and retrieval using SQL queries; use of constraints, indexes, and basic normalization; applying data filtering, sorting, and aggregation; writing queries using functions, joins, and sub-queries; importing and exporting data; performing database backup and restore; basic user management and access control; and troubleshooting common MySQL performance and connectivity issues for small to medium-scale applications.
4. Assemble a desktop computer. Install operating systems, printers, and peripheral devices. Install commonly used application software. Identify and troubleshoot common hardware and software problems. Use basic DOS and Linux commands. Customize basic settings in Windows and Linux. Set up and troubleshoot basic computer networks and Internet connections.
5. Identify networking cables and connectors. Prepare UTP cables and connect computers in a local area network. Assign computer names and workgroups. Share printers and Internet connections on a network. Check network connectivity. Configure basic network devices such as hubs and switches. Understand DHCP, firewall, and basic network security tools.
6. Create and use email accounts. Send and receive emails. Use text chat and video calling applications safely and effectively.
7. Create basic web pages using HTML and CSS. Design simple pages with text, images, lists, tables, links, and forms. Apply basic CSS for layout, colors, and styling. Create simple dynamic web pages using JavaScript. Use variables, operators, conditions, loops, functions, arrays, and basic form validation. Create and manage Excel workbooks. Use formulas, charts, and pivot tables. Perform basic data analysis and generate reports using spreadsheet tools.
8. Software development using PHP and MySQL, including understanding client–server architecture, installation and configuration of web servers (Apache/Nginx), PHP, and MySQL; development of dynamic web applications using PHP with form handling, sessions, cookies, and file upload; database connectivity using MySQL, creation and management of databases and tables, and execution of CRUD operations; implementation of basic security practices such as input validation, authentication, and access control; introduction to Content Management Systems (CMS) including installation, configuration, customization, and basic administration of commonly used CMS platforms (such as Word Press); development and management of CMS-based websites, themes, and plugins/modules; and testing, debugging, deployment, and maintenance of web applications for small to medium-scale projects.