



राष्ट्रीय प्रौद्योगिकी संस्थान राउरकेला
NATIONAL INSTITUTE OF TECHNOLOGY ROURKELA

NITR/ES/2023/L/1659

6th July, 2023

REVISED SELECTION PROCEDURE AND SYLLABUS
AGAINST NON-TEACHING RECRUITMENT ADVERTISEMENT NO. NITR/ES/08/2022

TECHNICAL ASSISTANT (PL – 06)

Mode of Selection:

Written Test, Trade and/or Skill Test & Career.

Written Test (200 marks)

The written Test will be of 200 marks, and the test will be for Three Hours. This will comprise Section – I (Objective) of 100 marks and Section – II (Descriptive) of 100 marks. The medium of Language will be English only.

Section – I (OMR/Computer based)

There shall be 100 Objective Type Multiple Choice Questions (MCQs) of 01 mark each consisting of:

- General Aptitude such as Science, Arithmetic, Reasoning, English, and General Awareness (**40 questions**).
- Graduation (for Science)/Diploma (For Engineering) level subject-specific questions (**60 questions**). There will be a subject-wise group of questions from the list given below, and a candidate, based on their educational background, shall attempt only **one group*** to answer the questions:

- | | |
|-------------------------|---|
| 1. Chemistry | 9. Computer Science and Engineering |
| 2. Life Sciences | 10. Electrical Engineering |
| 3. Mathematics | 11. Electronics and Communication Engineering |
| 4. Physics | 12. Food Process Engineering |
| 5. Earth Science | 13. Mechanical Engineering |
| 6. Ceramic Engineering | 14. Metallurgical Engineering |
| 7. Chemical Engineering | 15. Mining Engineering |
| 8. Civil Engineering | |

* Option to choose a group will be given to the candidates before the written test. Candidates will be intimated regarding the same through email/SMS.

The detailed subject-wise syllabus for each group is given below.

There shall be a 0.25 negative mark for each wrong answer. Each correct answer will carry a 01 mark. Un-attempted questions will be awarded Zero marks.

The Section – II answer sheet will be evaluated only if a candidate secures minimum qualifying marks in Section I.

Section – II (Descriptive Type)

Graduation (for Science)/Diploma (For Engineering) level descriptive subject-specific questions

from the list given above. The candidate shall attempt only one group to answer the questions.

Trade and/or Skill Test (50 marks)

Skills pertaining to the subject would be assessed through a trade/skill test conducted by the concerned department. The trade test shall be conducted to elicit the candidate's ability to handle various laboratory/scientific experiments in a typical laboratory setup of the concerned department (this may include a written explanation of experiments). This Trade/skill test is aimed to check communication skills on the subject along with the practical knowledge of the candidate in terms of various Do's and Don'ts in a laboratory related to procedures such as hazards, precautions etc.

The number of candidates qualifying in the written test for Trade and/or Skill Test will be in the ratio of 1:7 on merit, i.e., seven times the number of vacancies.

The candidates securing less than 30% in either Written Test or Trade/Skill Test shall be disqualified.

Final Merit:

The final merit list will be prepared based on the Written Test (combined scores of both Sections), Trade/skill Test and Career. The weightage given to each is 60% (Written Test), 30% (Trade Test) and 10% (Career).

SYLLABUS

Chemistry

Inorganic chemistry (Atomic structure, Chemical bonding, Periodicity, Coordination Chemistry, Acid-Base titrations, redox titration, Volumetric Analysis, qualitative analysis of cations and anions), *Organic Chemistry* (Aliphatic and aromatic hydrocarbons, Halogenated Hydrocarbons, Alcohols, Phenols, Ethers and Epoxides, carbonyl compounds, Carboxylic Acids, organometallic compounds, heterocyclic Compounds, functional group identification), *Physical chemistry* (*Gaseous, Liquid and Solid state*, thermodynamics, Chemical equilibrium, colligative property, Chemical Kinetics, electrochemistry, potentiometric and conductometric titrations).

Life Sciences

Botany (Biodiversity, Plant Ecology and Taxonomy, Plant Anatomy and Embryology, Plant Physiology and Metabolism, Economic Botany and Biotechnology (Cereals and Legumes, Spices and Beverages), Cell and Molecular Biology (Cell and Cell Organelles, Genetic material, transcription, gene expression and Cell Cycle), **Zoology** (Cell Biology, Genetics, Conservation Biology, Biostatistics and Aquatic Biology, Evolution and Animal Behavior, Developmental Biology, Immunology, Microbiology, Physiology, Biochemistry and Molecular Biology, Economic Zoology, Wildlife Conservation And Management).

Mathematics

Calculus and Differential equations, Algebra, Matrices, algebra of matrices, determinants, fundamental properties, Vector spaces and subspaces, Real Analysis, Numerical Methods, Group Theory: Symmetry properties, definition of group, subgroup, product of two subgroups, Properties of cyclic groups, abelian groups, Linear Programming.

Physics

Mechanics, Electricity and Magnetism, Thermal Physics, Potential and Kinetic Theory of Gases, Statistical Mechanics, Maxwell-Boltzmann Distribution Law, Partition Function, ensembles, Waves and Optics, Digital and Analog Circuits & Instrumentation, Modern physics, Planck's quantum theory, wave-particle duality, uncertainty principle, particle in a box, Quantum mechanical scattering and tunneling, Radioactivity, Fission and fusion.

Earth Science

General geology and mineralogy, Petrology and historical ecology, Structure and engineering geology, Applied geology, Ore Genesis, Mining and Resource Evaluation, Mineral Resource, Fuel geology, Coal as a fuel, types, Petroleum, Petroleum Reservoirs and Traps, Climate

change and disaster management, Natural disasters and their management, Climatology, World Weather Circulation, Climate Change.

Ceramic Engineering

Ceramic Manufacturing Process, Chemistry of Ceramic Materials, Raw Material for Ceramic Making, Refractory Technology, Ceramic Science, Fuels and Ceramic kiln, Process Control in the Ceramic Industry, Ceramic Science, Glass Technology, Ceramic WhiteWare, Refractory application in the metallurgical industry, Testing of ceramic, Advance Ceramic, Ceramic Coating & Composites, Cement Technology.

Chemical Engineering

Introduction to Chemical Engineering, Industrial Chemistry, Chemical Process Calculations, Momentum Transfer, Mechanical Operations, Engineering Thermodynamics, Process Heat Transfer, Mass Transfer, Chemical Engineering Thermodynamics, Chemical Technology, Chemical Reaction Engineering, Process Control & Instrumentation, and Project Engineering.

Civil Engineering

Construction Materials, Basic Surveying, Mechanics of Materials, Building Construction, Concrete Technology, Geotechnical Engineering, Hydraulics, Advanced Surveying, Theory of Structure, Building Planning and Drawing, AutoCAD, Water Resources Engineering, Transportation Engineering, Design of Steel and RCC structures, Estimating and Costing, Public Health Engineering.

Computer Science and Engineering

Programming using C, Data Structures, Computer System Organization, Algorithms, Digital Logic, Operating Systems, Introduction to DBMS, Computer Networks, Software Engineering.

Electrical Engineering

Basic Electrical Engineering, Introduction to Electric Generation Systems, Electrical Circuits, Electrical and Electronic Measurements, Electric Motors and Transformers, Renewable Energy Power Plants, Fundamentals of Power Electronics, Electric Power Transmission and Distribution, Induction, Synchronous and FHP Machines, Microcontroller Applications, Energy Conservation and Audit, Building Electrification.

Electronics and Communication Engineering

Basic Electronics Engineering, Principles of Electronic Communication, Electronic Devices and Circuits, Digital Techniques, Electronic Measurements and Instrumentation, Electric circuits and network, Microcontrollers and Applications, Consumer Electronics, Digital Communication Systems, Embedded Systems, Computer Networking and Data Communication.

Food Process Engineering

Introduction to food processing and preservation technology, Elements of food engineering, Food product technology, Basics of food chemistry, Instrumentation and process control, Strength of materials, Food engineering operation, Food storage and packaging, and Food quality control.

Mechanical Engineering

Engineering Mechanics, Computer Aided Machine Drawing Practice, Material Science & Engineering, Fluid Mechanics & Hydraulic Machinery, Manufacturing Engineering, Thermal Engineering, Measurements & Metrology, Strength of Materials, Theory of Machines & Mechanisms, Industrial Engineering & Management, Design of Machine Elements, Production & Operations Management.

Metallurgical Engineering

Mineral Processing, Fuels & Refractories, Ferrous Metallurgy, Environmental Studies, Material Testing, Physical Metallurgy, Principle of Extractive metallurgy, Sponge Iron & Ferro Alloys, Heat Transfer Fluid Flow & Furnace, Heat Treatment Technology, Foundry Technology, Non-Ferrous Metallurgy, Mechanical Metallurgy, Industrial Metallurgy.

Mining Engineering

Surface Mining Technology, Mine Survey, Mine Geology, Mechanical Operation, Environmental Studies, Underground Coal Mining, Mine Ventilation, Electrical Equipment in Mines, Mine Hazard and Safety, Mine Legislation & General Safety, Mine Machinery, and Underground Metal Mining.

SENIOR TECHNICIAN (PL – 04)

Mode of Selection:

Written Test, Trade and/or Skill Test & Career.

Written Test (200 marks)

The written Test will be of 200 marks, and the test will be for Three Hours. This will comprise Section –I (Objective) of 150 marks and Section – II (Descriptive) of 50 marks. The medium of Language will be English only.

Section – I (OMR/Computer based)

There shall be 150 Objective Type Multiple Choice Questions (MCQs) of 01 mark each consisting of:

- a) General Aptitude such as Science, Arithmetic, Reasoning, English, and General Awareness (100 questions)
- b) Matric/10th level Science (Physics, Chemistry, Mathematics & Biology) questions (50 questions).

There shall be a 0.25 negative mark for each wrong answer. Each correct answer will carry a 01 mark. Un-attempted questions will be awarded Zero marks.

The Section – II answer sheet will be evaluated only if a candidate secures minimum qualifying marks in Section I.

Section – II (Descriptive Type)

Descriptive questions of Matric/10th level Science (Physics, Chemistry, Mathematics & Biology).

Trade and/or Skill Test (50 marks)

Skills pertaining to the subject would be assessed through a trade/skill test conducted by the concerned department. The trade test shall be conducted to elicit the candidate's ability to handle various laboratory/scientific experiments in a typical laboratory setup of the concerned department (this may include a written explanation of experiments). This Trade/skill test is aimed to check communication skills on the subject along with the practical knowledge of the candidate in terms of various Do's and Don'ts in a laboratory related to procedures such as hazards, precautions etc.

The number of candidates qualifying in the written test for Trade and/or Skill Test will be in the ratio of 1:7 on merit, i.e., seven times the number of vacancies.

The candidates securing less than 30% in Written Test or Trade/Skill Test shall be disqualified.

Final Merit:

The final merit list will be prepared based on the Written Test (combined scores of both Sections), Trade/skill Test and Career. The weightage given to each is 40% (Written Test), 50% (Trade/skill Test) and 10% (Career).

TECHNICIAN (PL – 03)

Mode of Selection:

Written Test, Trade and/or Skill Test & Career.

Written Test (200 marks)

The written Test will be of 200 marks, and the test will be for Two and a half Hours. The medium of Language will be English only.

There shall be 200 Objective Type Multiple Choice Questions (MCQs) of 01 mark each consisting of:

- a) General Aptitude such as Science, Arithmetic, Reasoning, English, and General Awareness (100 questions)
- b) 10th level Science (Physics, Chemistry, Mathematics & Biology) questions (100 questions).

There shall be a 0.25 negative mark for each wrong answer. Each correct answer will carry a 01 mark. Un-attempted questions will be awarded Zero marks.

Trade and/or Skill Test (50 marks)

Skills pertaining to the subject would be assessed through a trade/skill test conducted by the concerned department. The trade test shall be conducted to elicit the candidate's ability to handle various laboratory/scientific experiments in a typical laboratory setup of the concerned department (this may include a written explanation of experiments). This Trade/skill test is aimed to check communication skills on the subject along with the practical knowledge of the candidate in terms of various Do's and Don'ts in a laboratory related to procedures such as hazards, precautions etc.

The number of candidates qualifying in the written test for Trade and/or Skill Test will be in the ratio of 1:7 on merit, i.e., seven times the number of vacancies.

The candidates securing less than 30% in Written Test or Trade/Skill Test shall be disqualified.

Final Merit:

The final merit list will be prepared based on the Written Test, Trade/skill Test and Career. The weightage given to each is 40% (Written Test), 50% (Trade/skill Test) and 10% (Career).

NOTE FOR ALL POSTS:

For calculating total marks obtained by a candidate in the selection process, the marks obtained by an individual in a particular test (viz. written, interview, trade/skill, computer proficiency test, career, as applicable) shall be normalized and thereafter prescribed weightage will be applied.

ALL OTHER SELECTION PROCEDURE AND SYLLABUS FOR ALL POSTS OTHER THAN THE ABOVE THREE NOTIFIED VIDE NOTIFICATION NO. NITR/ES/2023/L/1254 DATED 19th MAY, 2023 SHALL REMAIN UNCHANGED.

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REGISTRAR