



NOTIFICATION

For Ph.D. Entrance Examination in ECE (PEnEE) - 2026

The admission/selection in the PhD programme for a limited number of seats available in the department shall be done on the basis of a written test (please refer the detailed syllabus attached herewith) of one-hour duration (weightage: 70%) followed by a personal interview (PI) (weightage: 30%). Merit list shall be prepared as per NEHU rules: RC-23, OC-4. **The list of candidates found eligible for the written test is available in Annexure I.**

The decision of the admission committee in all matters shall be binding and final. Date, time and venue of the written test as well as the personal interview are as follows:

Date of Written Test and the Interview	August 20, 2026 (Thursday)
Reporting Time:	10:00 AM
Time of Written Test:	11:00 AM to 12:00 NOON
Time of Personal Interview:	2:00 PM onwards
Venue:	Department of ECE, School of Technology, NEHU, Shillong 793022

In case, any candidate fails to report at the reporting time on the specified date and time mentioned above, he/she will forfeit his/her claim to appear for entrance test and Interview.

Notes:

1. All qualifying candidates will be provisionally admitted.
2. A qualifying candidate needs to take admission by depositing the requisite fees on or before **7th September, 2026, failing which the admission will stand cancelled.**
3. Physical verification of the original Mark sheets, Certificates, Testimonies etc. will be done **on the day of admission i.e. August 20, 2026 (Thursday).**
4. If any candidate is found to be not fulfilling the desired criteria, his/her admission will stand cancelled.



Syllabus for Ph.D. Entrance Examination in Electronics & Communication Engineering (PEnEE-2026)

Part – I

(a) Introduction to Research Methodology: Meaning, Objectives, importance, types, Approaches, Characteristics of Scientific Method, Criteria of Good Research.

(b) Problem Identification & Formulation: Defining and formulating the research problem, Problem identification process; Components of the research problem; Formulating the research hypothesis; Writing a research proposal.

(c) Reviewing the literature: Searching the existing literature, reviewing the selected literature, Identifying gap areas from literature review, Development of working hypothesis.

(d) Research Design: Meaning & Need, Features of a Good Design, Important Concepts Relating to Research Design.

(e) Data Collection and Analysis: Collecting data, Methods of data collection, Data Preparation, Data Processing, Hypothesis testing.

(f) Research Report Writing: Types of research reports – Brief reports and Detailed reports; Report writing: Structure of the research report- Preliminary section, Main report, Interpretations of Results and Suggested Recommendations; Report writing: Formulation rules for writing the report: Guidelines for presenting tabular data, Guidelines for visual Representations.

(g) Use of Tools/Techniques for Research: Methods to search required information effectively, Reference Management Software like Mendeley/Zotero; Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism.

(h) Quantitative Techniques and Mathematical Modelling: Quantitative research – Concept of measurement, causality, generalization. Vector spaces - norms - Inner Products - Eigen values using QR transformations. Numerical Computing, Solutions of equations in one variable, Polynomial equations and Transcendental equations, Bisection Methods, False Position method, Newton-Raphson Method, Secant Method etc. Conditional probability, independence and Bayes theorem, continuity property of probabilities; random variable: probability distribution, density and mass functions, functions of a random variable; expectation, characteristic and moment-generating functions; joint distribution and density functions.

(i) Ethics in Research: Meaning of Research Ethics; Clients Ethical code; Researchers Ethical code; Ethical Codes related to respondents; Responsibility of ethics in research.

Part – II

(j) Electronics Fundamentals: Physics of semiconductors, diodes, BJT, FET and their applications; op-amps and oscillators with their applications.



(k) Digital Electronics & Microprocessors: Number systems, logic gates, combinational & sequential circuits; basic of microprocessors, architecture & assembly language programming of 8085 microprocessor.

(l) Silicon Electronic-Photonic Fundamentals: Optical properties of silicon, Silicon-Photonic (SiPh) based waveguides, Y-branch, Directional Couplers, Mach-Zehnder Interferometers, PN and P-I-N optical phase shifter and modulators, passive and active SiPh devices and circuits on Silicon-on-Insulator (Sol), Photonic Integrated Circuits (PICs) basics.

(m) Analog Communication Systems: Linear modulation & demodulation: time domain expression & frequency domain spectra of AM, DSBSC, SSB-SC, VSB; power & bandwidth. Angle Modulation: Representation of FM and PM Signals, Spectral Characteristics of AM and Angle-Modulated Signals.

(n) Digital Communication Systems: Sampling and quantisation, frequency domain signal representation, Signal coding Techniques (Pulse digital modulation): digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), Basics of TDMA, FDMA and CDMA, Fundamentals of information theory and channel capacity theorem.

(o) Signal Processing: Sampling theorem. Linear Time-Invariant (LTI) Systems: definitions and properties; causality, stability, impulse response, convolution, poles and zeros, parallel and cascade structure, frequency response, group delay, phase delay. Signal transmission through LTI systems. Continuous-time and discrete-time Fourier Transform, DFT and FFT. Filter Design- analog and digital IIR and FIR filters. Multirate, Filter banks.

(p) EM Theory, Microwave and Antenna: Maxwell's equations: boundary conditions, wave equation; Plane waves and properties: reflection and refraction, polarization, phase and group velocity, propagation through various media, skin depth; Transmission lines: equations, characteristic impedance, impedance matching, S-parameters, Smith chart; Waveguides: modes, boundary conditions, cut-off frequencies; Antennas: antenna types, radiation pattern, gain and directivity, antenna arrays.

(q) Control system: Basic Control System Components, Feedback Principle, Transfer Function, Type and Order of system, Block Diagram Representation, Signal Flow Graph, Transient and steadystate analysis of LTI systems, Routh-Hurwitz stability criteria, Bode, Nyquist and root-locus plots.



PATTERN OF TEST PAPER (28 Questions)

14 (Fourteen) Questions from Part – I

Remaining 14 (Fourteen) Questions from Part – II

The test paper shall be of multiple choice type questions (MCQ). Each question shall have four choices as possible answers, of which, only **one** will be correct. Each question carries 2.5 marks.

Instructions to Candidates:

- Use of unfair means by a candidate in written test, whether detected at the time of test, evaluation or at any other stage, will lead to cancellation of his/her candidature as well as disqualification of the candidate from appearing in written test in future.
- Candidates are advised to check their email id (*given in their application form*) and the NEHU website on regular basis for any updates.



Annexure-I

List of candidates found provisionally eligible for PhD Entrance Exam, 2026:

Sl. No.	Form No.	Name of the Candidate
1	NEHU260000175	VIDYA RANI
2	NEHU260000692	NEEHARIKA SONOWAL
3	NEHU260000977	WANHUN K BANI
4	NEHU260001035	PRIYA DEURI
5	NEHU260001259	MEBANTEI SALAHE
6	NEHU260001381	PYNSHAIBORLANG KHARBANI
7	NEHU260001477	SONIA MAHANTA
8	NEHU260001718	SANTOSH KUMAR
9	NEHU260001721	SURESH KUMAR PRAJAPATI

All candidates are hereby informed to bring the following documents in **ORIGINAL along with a photocopy of the same and a printed copy of the application form** for physical verification, failing which they will **not be allowed to appear in the entrance test and personal interview**:

1. Pass certificates of all board/council/University examinations starting from HSLC or equivalent.
2. Mark sheets/grade cards of all board/council/University examinations starting from HSLC or equivalent.
3. Documents to substantiate the grade conversion into a percentage of marks for the qualifying examination, if applicable.
4. Valid certificate for SC/ST issued by the Deputy Commissioner (DC) or the competent authority under the seal of DC's office only (for SC/ST candidates only).
5. No Objection Certificate from the Employer if the candidate is already employed.
6. Valid GATE/NET scorecard, if any.
7. Any other certificates in support of your application.

Sd/-
Chairman,
PhD (ECE) Admission Committee 2026