



इलेक्ट्रॉनिकी एवं संचार अभियांत्रिकी विभाग
पूर्वोत्तर पर्वतीय विश्वविद्यालय
स्थायी परिसर, शिलांग - ७९३ ०२२ (मेघालय)
Department of Electronics & Communication Engineering
North-Eastern Hill University
Permanent Campus, Shillong – 793 022 (Meghalaya)

F.7-16(3)/ECE/PEnE-E/2017-

Date: July 20, 2017

NOTIFICATION

For Ph.D. Entrance Examination in ECE (PEnE-E) 2017

The admission/selection in the PhD programme will be done on the basis of a written test (Please refer to the detailed syllabus) of one hour duration (total marks 25) followed by a personal interview (PI) (total marks 25). Merit list shall be prepared as per NEHU rules: RC-23 clause 2(vi). 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: August 10, 2017 (Thursday)

Reporting Time: 9:45 am

Time of written test: 11 am to 12 Noon

Time of personal interview: 2:00 pm (onwards)

Venue of Entrance Test: Department of ECE, School of Technology, NEHU, Shillong – 22

Total Number of Seats available: 01

Specialization: Silicon Photonics and Optical Communication.

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

You are further informed to bring the following documents in ORIGINAL for verification failing which your selection for the entrance test and interview will stand cancelled:

1. Pass certificate of M.Tech. /M.E. Degree in relevant discipline.
2. Pass certificates of all board/council/University examinations starting from HSLC or equivalent.
3. Mark sheets/grade cards of all board/council/University examinations starting from HSLC or equivalent.
4. Valid certificate for SC/ST/OBC issued by Deputy Commissioner (DC) or competent authority under the seal of DC's office only.
5. Date of Birth Certificate or HSLC certificate.
6. Scorecard of GATE/NET/SLET/MPhil with valid score if any to avail weightage given during evaluation as per University regulation.

IMPORTANT DATES:

Ph.D. Entrance Examination in ECE (PEnE-E) 2017: **August 10, 2017 (Thursday)**

Publication of Merit List: **August 11, 2017 (tentative) (Friday)**

Date of Admission: **On or before August 18, 2017 (Friday)**

Commencement of course work: **August 21, 2017 (Monday)**

Sd/-

Chairman,

PhD (ECE) Admission Committee 2017



Syllabus for Entrance Examination in Electronics and Communication Engineering (EC)

Part – I

(a) **Probability and Random Processes:**

Probability and Random Variables, Probability density Functions, Cumulative Density Function, Joint Probability Density function, Random Processes: Basic Concepts, Description of Random Processes, Statistical Averages, Stationary Processes, Random Processes and Linear Systems, Random Processes in the Frequency Domain, Power Spectrum of Stochastic Processes, Transmission over LTI Systems, Gaussian and White Processes, Gaussian Processes, White Processes.

Part – II

(a) **Electronics Devices and Optical Communication:**

Physics of Semiconductors: Diodes, BJT, JFET, MOSTET and their applications, Op-Amps and their applications, oscillators.

Introduction to Optical Communication: different types of fiber, transmission characteristics of optical fibers. Optical Modes: planar waveguides, cylindrical waveguide, weekly waveguide structures, field components and power flow. Optical Sources: LED, LASER and their drive circuits. Optical Detectors: pn, p-i-n, APD. Receiver noise and performance. Optical Amplifiers: SOA, RA, EDFA design and their applications. Coherent Communication: Homodyne and Heterodyne receivers, Power budget, rise time budget. WDM Devices: optical couplers, isolators, multiplexors. Fiber Fabrications.

(b) **Analog Communication Systems:**

Amplitude Modulation (AM): Representation of AM signals, Double-Sideband Suppressed Carrier AM, Conventional Amplitude Modulation, Single-Sideband AM, Vestigial-Sideband AM, Implementation of AM Modulators and Demodulators, Signal Multiplexing, Angle Modulation: Representation of FM and PM Signals, Spectral Characteristics of AM and Angle-Modulated Signals, Implementation of Angle Modulators and Demodulators. Effect of noise on AM and Angle modulations.

Digital Communication Systems:

Sampling and quantisation, frequency domain signal representation, Signal coding Techniques (Pulse digital modulation): PCM Generation and Reconstruction, Quantization Noise, Non uniform Quantization and companding. Generations of DPCM, DM, ADM and ADPCM; Linear Predictive Coding, Matched filter receivers, bandwidth consideration and probability of error calculations for these schemes 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.

(c) **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.



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PATTERN OF TEST PAPER (25 Questions)

4 (Four) Questions from Part – I

Remaining 21 (Twenty-one) Questions, 7 (Seven) from each subpart of Part – II

The test paper will have only multiple choice type questions (MCQ). The objective type questions in these test papers will have four choices as possible answers, of which, only **one** will be correct. There will be **negative** marking for wrong answers to the **questions**. Each objective type question carries 1 (one) marks for a correct answer and **negative** 1 (one) mark for a wrong answer.

NOTE:

- Use of any kind of cellular phone/ electronic gadgets (other than non-programmable calculator) is NOT permitted in the examination hall.
- Use of calculator (non-programmable) is permitted.
- All answers to the subjective type questions must be written in blue/ black/ blue-black ink only. Sketch pen, pencil or ink of any other colour is not permitted.
- The medium for all the test papers will be English only.
- 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.

Sd/-
Chairman,
PhD (ECE) Admission Committee 2017