



राष्ट्रीय प्रौद्योगिकी संस्थान मेघालय

NATIONAL INSTITUTE OF TECHNOLOGY MEGHALAYA

Bijni Complex, Laitumkhrach, Shillong – 793 003

ELECTRICAL ENGINEERING DEPARTMENT

Syllabus for Written Test to Ph. D Programme, June, 2017.

Group A: (30 Marks: MCQ)

Mathematics and General Aptitude

1) Calculus:

Functions of single variable, Limit, continuity and differentiability, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

2) Discrete Mathematics:

Basic operations on sets, cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses. Complete partial ordering, chain, lattice. complete, distributive, modular, and complemented lattices. Boolean and pseudo Boolean lattices. Algebraic structures with one binary operation – semigroup, monoid and group. Cosets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operations- ring, integral domain, and field. Boolean algebra and boolean ring.

3) Logical Reasoning, Data Analysis & Interpretation and Verbal Ability:

Number Sequence Completion; Pattern Completion; Sets based on grouping and patterns; Seating Arrangement problems; Circular Arrangements; Relational problems; Selection and Conditionals; Mapping and best routes; Miscellaneous sets consisting of formal logic, testing, sports events and other critical reasoning, Data Analysis, Data Interpretation, Data Sufficiency, Reading Comprehension, Verbal Logic, Vocabulary, Grammar Correction.

Group B: (40 Marks: MCQ)

This Section will cover fundamentals from B. Tech Syllabus in Electrical and Electronics Engineering.

Group C: (30 Marks: Descriptive)

Candidate is required to answer one of the groups. However, his/her selection may not be limited to that specialization only.

Power Systems:

Basic power generation concepts; line parameters: line inductance and line capacitance, transmission line models and performance: short, medium and long transmission lines, cable performance, insulation; corona and radio interference; distribution systems; per-unit quantities; bus impedance and admittance matrices; load flow analysis; voltage control; power factor correction; economic operation; symmetrical faults, symmetrical components, asymmetrical faults analysis; power system stability, protective relays and circuit breakers; Renewable energy operation & its impact; Importance of renewable energy sources.

Power Electronics and Machine Drives:

Phase controlled rectifiers; line commutated converters, principles of choppers and inverters; elementary overview of digital control for power converters, SVPWM control for inverters & rectifiers, basis concepts of adjustable speed dc and ac drives, Variable speed drives & VVVF drives, performance of rectifier and chopper controlled DC drives, PWM inverter fed AC drives.
