ELECTRICAL ENGINEERING DEPARTMENT
Syllabus for Written Test to Ph. D Programme, June 2018

Group A: (30 Marks: MCQ)

1) 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.

2) General information on Science and its interface with society to test the candidate's awareness of science, aptitude of scientific and quantitative reasoning, Common elementary Computer Science, Programming instructions, simple algorithms and computational methods.

Group B: (40 Marks: MCQ)

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

Group C: (30 Marks: Descriptive)

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.

Control Systems and Signal Processing

Basic control system components; Feedback principle; Transfer function; Block diagram representation; Signal flow graph; Transient and steady-state analysis of LTI systems; Frequency response; Routh-Hurwitz and Nyquist stability criteria; Bode and root-locus plots; Lag, lead and lag-lead compensation; State variable model and solution of state equation of

LTI systems. State-space representation and features of dynamical systems, phase-portraits of second order systems, types of equilibrium points, stability of nonlinear systems.

Continuous-time signals: Fourier series and Fourier transform representations, sampling theorem and applications; Discrete-time signals: discrete-time Fourier transform (DTFT), DFT, FFT, Z-transform, LTI systems: definition and properties, frequency response, group delay, phase delay, digital filter design techniques: FIR, IIR, adaptive filters, PLL; autocorrelation and power spectral density, properties of white noise, filtering of random signals through LTI systems; Analog communications: amplitude modulation and demodulation, angle modulation and demodulation, spectra of AM and FM, circuits for analog communications.

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