Syllabi for Comprehensive Examination of Eligible Ph. D Scholars

(Only for the Courses relating to Research Domains for both Full Time & Sponsored Part Time)

Department: Electrical Engineering

1) Research/Specialization Group: 1
(Name of the Group): Power & Energy System

- **EE 513: Smart Grid Technology**

Syllabus Content: Concept of Smart Grid, Present development & International policies in Smart Grid, Real Prizing, Smart Appliances, Automatic Meter Reading(AMR), Smart Substations, Substation Automation, Feeder Automation, IEDs & their application for monitoring & protection, need & applications of microgrid, Information and Communication Technology for Smart Grid

- **EE 504: Renewable & Distributed Energy Systems**

Syllabus Content: Renewals Resources, Microgrid, DERs, Grid connected DERs, Hydrogen Energy, Wave Technologies, Distributed Generations and associated Technologies.

- **EE 502: Power System Interconnection & Control**

Syllabus Content: P-f loop, V-Q loop, Cross-coupling between P-f loop and V-Q loop, control area, governor control, two-area power system, tie-line power flow, Load frequency control, Blackouts.

2) Research/Specialization Group: 2   NA

3) Research/Specialization Group: 3
(Name of the Group) Instrumentation, Control and Signal Processing

- **EE 521: Instrumentation and Control in Energy system**

Syllabus Content: Basic measurement concepts, Measurement errors, Transducer classification, Static and dynamic characteristics of transducers; Measuring of temperature, pressure, liquid levels; Analog signal conditioning, AID and D/A converters, Computer data processing and control; Air pollution sampling and measurement of particulates, bacteriological measurements, Solid waste measurements and disposal; Measurement of phase difference using X-OR and SR Flip-Flop Methods.

- **EE 510: Advanced Control Systems**

Syllabus Content: Introduction of State-Space, State-Space representation in Canonical forms frequency folding, bilinear transformation and stability analysis of sample data systems; Issues of state feedback design, concept of state estimators, compensator design by separation principle; Nonlinear systems and equilibrium points, concepts of stability, linearization and local stability, system analysis based on Lyapunov's direct method; Sliding surfaces, Filippov's construction of the equivalent dynamics; adaptive control of linear systems, adaptive control of nonlinear systems.

- **EE 512: Advanced Digital Signal Processing**

Syllabus Content: Digital filter design techniques, Basic concepts of IIR and FIR filters; Introduction to multirate DSP, decimation and interpolation, polyphase decomposition, uniform DFT filter banks; FIR adaptive filters; Signal Transformation Techniques; Digital models for speech signal: Mechanism of speech production; power spectral density and properties, spectral estimation methods; architecture and important instruction sets of TMS320C processor; mapping of DSP alrorithms onto FPGA.

Signatures and Names of DRC Members:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Signature of DRC Chairman

Date