

KBC NORTH MAHARASHTRA UNIVERSITY, JALGAON

Faculty of Engineering and Technology (Instrumentation Engineering)

Pre-PhD Course No: 2 Syllabus

Recent Developments in Instrumentation Engineering

Sensors & Transducers,: Resistive, Capacitive, Inductive and piezoelectric transducers and their signal conditioning, Measurement of displacement, velocity and acceleration (translational and rotational), force, torque, vibration and shock,

Measurement & Industrial Instrumentation: Working principle, devices and techniques for measurement of pressure, flow, temperature and liquid level, Measurement of pH, conductivity, viscosity and humidity.

Control Systems: Feedback principles. Block diagram reduction rules, Signal flow graphs. Transient Response, steady state- errors, stability, Routh-Hurwitz criteria, Bode plot, Root loci, Time delay systems, Phase and gain margins, On-off, cascade, P, P-I, P-D, P-I-D, feed forward and derivative controller. The concept of state and state models, State equations for dynamic systems, State space representation and realization of transfer matrices, Minimal realization, Solution of state equation, concept of controllability & observability State feedback by pole placement, observers, reduced order observers.

Books:

1. A K. Sawhney, A Course in Elec. & Electronics Measurements & Instrumentation, 9th Edition, Dhanpat rai & Co. 2011.
2. Helfrick & Cooper, Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India, 2007
3. K Ogata, Modern Control Engineering, PHI, 5th Edition, 2010.
4. M. Gopal, Modern Control System Theory, Second Edition, New Age International (P) Limited, New Delhi, 1996.

KBC NORTH MAHARASHTRA UNIVERSITY, JALGAON

Faculty of Engineering and Technology (Electrical Engineering)

Pre-PhD course No: 2 Syllabus

Recent Developments in Electrical Engineering

Electrical Machines: Single phase transformer - equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformers - connections, parallel operation; autotransformer; DC machines - types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors; three phase induction motors - principles, types, performance characteristics, starting and speed control; synchronous machines - performance, regulation and parallel operation of generators, motor starting, characteristics and applications;

Power Systems: Basic power generation concepts; transmission line models and performance; cable performance, insulation; corona and radio interference; distribution systems; per-unit quantities; bus impedance and admittance matrices;

Control Systems: Principles of feedback; transfer function; block diagrams reduction rules, signal flow graph; steady-state errors; Stability, Routh criteria; Bode and Nyquist plots; root loci; lag, lead and lead-lag compensation; state space model; state transition matrix, controllability and observability.

Power Electronics and Drives: Semiconductor power diodes, transistors, thyristors, triacs, GTOs, MOSFETs and IGBTs - static characteristics and principles of operation; triggering circuits; phase control rectifiers; bridge converters - fully controlled and half controlled;

Books:

1. C.V. Jones, P.C. Krause, Analysis of Electric Machinery, McGraw Hill, NY, 1987.
2. The unified Theory of Electrical Machines, Butterworth,-London, 1967
3. Stevenson, Power System Analysis, McGraw Hill, NY
3. I. J. Nagrath, D.P.Kothari, Modern Power System Analysis, Tata McGraw Hill
4. S. Rao, EHV-AC, HVDC Transmission & Distribution Engineering, Khanna Publishers
5. Gopal. M., "Control Systems: Principles and Design", Tata McGraw-Hill, 1997.
6. Kuo, B.C., "Automatic Control System", Prentice Hall, sixth edition, 1993.
7. Ogata, K., "Modern Control Engineering", Prentice Hall, second edition, 1991.
8. P.C Sen Thyristor DC Drive , John wiley and sons, New York, 2001.
9. R.Krishnan, „Electric Motor Drives – Modeling, Analysis and Control“, Prentice-Hall of India Pvt Ltd., New Delhi, 2003.