



E6224 Aug 3:0

Topics in Power Electronics and Distributed Generation

Instructor

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Department: Electrical Engineering

Course Time: MWF 10.00-11.00am

Lecture venue: EE-B308

Detailed Course Page: <http://www.ee.iisc.ac.in/new/people/faculty/vjohn/course.html>

Announcements

Course target - For research students and MTech students in the 3rd semester.

Brief description of the course

The course is intended for students who are doing their research or projects related to power electronics and distributed generation issues.

Prerequisites

Though there are no prerequisites, the student is expected to have completed a basic power electronics course.

Syllabus

Part 1: Distribution system related issues:

- a) What is DG and why DG? Power generation, transmission, distribution, central power plants versus distributed generation, cost implications.
- b) Introduction to distribution systems - distribution equipment, system protection, fault calculations, grounding methods. Per unit based analysis, sequence methods for fault calculations.
- c) Implications of fault on distributed generation, a machine and power converter DG.
- d) DR-grid interconnection, DG-Transformer connection concerns, location of DG, Relaying
- e) Protective relaying for distribution protection, intentional islanding - situations where it is desired.

f) Distribution switching operation - circuit breaker, contactors, reclosers, sectionalizers, static switches, unintentional islanding and its prevention.

g) Line model and voltage profile.

Part 2: Comparison and bench-marking

Initial cost, Cost of energy, Net present cost

Part 3: Power electronic topics

a) Inverters “ characteristics, topologies, filtering requirements, average model, preliminary control methods for the converter

b) DC bus design considerations

c) Semiconductor design considerations

d) Filter design considerations

e) Common mode and differential mode of a circuit and implications

Course outcomes

The student is expected to understand the various challenges behind introducing distributed generation. The student is also expected to become comfortable with the design methods for electronic power converters for optimized industrial requirements.

Grading policy

1) 2 Tests each with 20 points = 40 points

2) 5 long homeworks = 5 points

3) Project = 5 points on DG related topics and related to ME projects / Research work / Relevant areas of interest.

4) Finals = 50 points

All tests and exams are open note book.

Assignments

There will be about 5 major assignments in the course. The assignments will be followed by tutorial classes

where they will be discussed.

Resources

This is an older recording of the course from around 2010:

<http://nptel.ac.in/courses/108108034/>