Switched Mode Power Conversion - Video course

COURSE OUTLINE

Switching devices - ideal and real characteristics, control, drive and protection.

Reactive circuit elements - their selection and design.

Switching power converters - circuit topology, operation, steady-state model, dynamic model.

Analysis, modeling and performance functions of switching power converters.

Review of linear control theory.

Closed-loop control of switching power converters.

Sample designs and construction projects.

COURSE DETAIL

Module No.	Topics
1	**Switched mode power conversion – Overview**
	1. Introduction to DC-DC converter
2	**Power semiconductor switches**
	2. Diode 3. Controlled Switches
3	**Prior art**
	4. Prior Art
4	**Reactive components**
	5. Inductor 6. Transformer 7. Capacitor 8. Issues related to switches 9. Energy storage – Capacitor 10. Energy storage – Inductor

NP-TEL

NPTEL

http://nptel.iitm.ac.in

Electrical Engineering

Pre-requisites:

Circuit Theory, Electromagnetics, Analog & Digital Electronic Circuits.

Coordinators:

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5	**Non-isolated converters**
	11. Primitive Converter 12. Non-Isolated converter – I 13. Non-Isolation converter – II
6	**Isolated converters**
	14. Isolated Converters - I 15. Isolated Converters – II
7	**CCM and DCM operation of converters**
	16. Conduction Mode 17. Problem set - I 18. Problem set – II
8	**Modeling of converters**
	19. Modeling DC-DC converters 20. State space representation - I 21. State Space representation - II 22. Circuit Averaging - I 23. Circuit Averaging - II 24. State Space Model of Boost Converter
9	**Controller basics**
	25. DC-DC converter controller 26. Controller Structure 27. PID Controller - I 28. PID Controller - II 29. PID Controller - III 30. Implementation of PID controller
10	**Pulse width modulation**
	31. Pulse Width Modulator
11	**Controller design principles**
	32. Controller Design - I 33. Controller Design – II
12	**Common practical control applications**

	34. Controllers and Sensing Circuit 35. Regulation of Multiple outputs - I 36. Regulation of Multiple outputs - II 37.Current Control 38. Unity Power Factor Converter
13	**Basics on design of magnetics**
	39. Magnetic Design
14	**Design examples**
	40. DC-DC Converter Design

References:

1. Middlebrook, R. D. (Robert David), and Slobodan Cuk, Advances in Switched-Mode Power Conversion, Volumes I and II, 2nd Edition,TESLAco, 1983.

2. Erickson, Robert W., Fundamentals of Power Electronics, Chapman & Hall, 1997.

3. V. Ramanarayanan Course Material on Switched Mode Power Conversion,Department of Electrical Engineering, Indian Institute of Science, Bangalore 560012.
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