<table>
<tr><td>Course Title</td><td>Switched Mode Power Converters</td><td>Course No
(to be assigned by Academic Cell)</td><td colspan="4"></td></tr>
<tr><td>Dept. offering the course</td><td>ECE</td><td>Structure (LTPC)</td><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>To be offered for (UG/PG)</td><td>PG/UG</td><td>Status</td><td colspan="4">Elective</td></tr>
<tr><td>Faculty Proposing the course</td><td>Dr. Chitti Babu. B</td><td>Type</td><td colspan="4">New</td></tr>
<tr><td>Pre-requisite (if any)</td><td>Electromagnetics, Analog & digital circuits</td><td>Submitted for approval</td><td colspan="4">_____Senate</td></tr>
<tr><td>Learning Objectives</td><td colspan="6">Understand the concepts, basic operation, steady-state operation of efficient switched mode power conversion techniques, including basic circuit operation and magnetic design.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">Upon completion of the course, the students will be able to recognize and use the following concepts, ideas, and/or tools:
● Understand why power management dc-dc circuits are needed in a low-power VLSI system.
● Steady-State Analysis of switched-mode dc-dc power converters.
● Understand different components of a power management system with focus on dc-dc converters
● Dynamic Modelling Development and Analysis for switched-mode dc-dc converters
● Analysis and Design of Control Loops around switched-mode power converters using averaging small-signal dynamic models and classical control theory.</td></tr>
<tr><td>Contents of the course</td><td colspan="6">Switching devices: Ideal and real characteristics, Selection, control, drive, and Heat sink design. (6L+2T)
Design constraints of reactive elements in Power Electronic Systems: Design of inductor, transformer and capacitors for power electronic applications, Input filter requirement. (8L+2T)
Switching power converters: Circuit topology, operation, steady-state and dynamic model. PWM DC - DC Converters (CCM and DCM) - operating principles, constituent elements, characteristics, Loss calculation, comparisons and selection criteria. (10L+4T)
Soft-switching DC - DC Converters: Zero-voltage-switching converters, zero-current switching converters, Multi-resonant converters and Load resonant converters. (6L+2T)
Pulse Width Modulated Rectifiers: Properties of ideal rectifier, realization of near ideal rectifier, control of the current waveform, single phase converter systems and design examples. (6L+2T)
Review of linear control theory. Closed-loop control of switching power converters and Study of PWM pulse generation using Microcontroller. Sample designs. (6L+2T)</td></tr>
<tr><td>Text Books</td><td colspan="6">1. R. W. Erickson and D. Maksimovic, Fundamentals of Power Electronics, 2nd Kluwer Academic Publishers, 2000.
2. Ned Mohan, T. Undeland, and W. Riobbins, “Power Electronics: Converters, Applications and Design,” Wiley-India, 2011.
3. H. W. Whittington, B. W. Flynn, D. E. Macpherson, ‘Switched Mode Power Supplies’, John Wiley & Sons Inc, 1997.</td></tr>
<tr><td>Reference Books</td><td colspan="6">1. L. Umanand. Power Electronics: Essentials and Applications, India Wiley, 2009.
2. Daniel Hart, Power Electronics, 1st Edition, ISBN10: 0073380679 | ISBN13: 9780073380674.
3. V.Ramanarayanan Course Material on Switched Mode Power Conversion, Department of Electrical Engineering IISc Bangalore 56001, December,2007.</td></tr>
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