

NIRMA UNIVERSITY
Institute of Technology
B. Tech. in Electrical Engineering
Semester – VI

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| Course Code | 2EEDE09 |
| Course Title | Multi-Level Inverters |

Course Outcomes (COs):

At the end of the course, students will be able to –

1. analyze different multi-level inverter topologies
2. acquire the knowledge of various PWM techniques and their comparative analysis for multi-level inverters
3. understand issues related to multi-level inverters and various mitigation techniques used for problems
4. select multi-level inverter topology and its control based on application need

Syllabus:

Teaching Hours: 45

Unit-1: Basics of Multi-Level Inverter

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Basic concept of general n-level inverter, comparison of multi-level inverter with their two-level number part (two-level inverter), advantages and disadvantages, scope and applications of multi-level inverters for high power induction motor drives.

Unit-2: Operation of Multi-Level Inverters

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Types of multi-level inverters: Neutral Point Clamped (NPC), capacitor clamped (flying capacitor), cascaded multi-cell (cascaded H-bridge), hybrid H-bridge, cascaded inverters.

Unit-3: Control of Multi-Level Inverters

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Voltage and current controlled PWM techniques used for multi-level inverters, comparative analysis of various PWM control techniques used for multi-level inverters, problems of common-mode voltage generation and dc-link capacitor voltage unbalance in multi-level inverters and various mitigation techniques for these problems in multi-level inverters.

Unit-4: Multi-Level Inverter based Induction motor drives

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Dual-inverter fed open-end winding induction motor structure, asymmetric dc-link structure, Direct conversion drives using SGCT and IGCT.

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Suggested Readings:

1. Ned Mohan, Tore M. Undeland and William P. Robbins, Power Electronics: Converters, Applications and Design, John Wiley & Sons.
2. B. K. Bose, Power Electronics & AC Drives, Prentice-Hall.
3. M. H. Rashid, Power Electronics, Prentice Hall of India.
4. Recent Papers of reputed journals

L = Lecture, T = Tutorial, P = Practical, C = Credit