

## NIRMA UNIVERSITY

<b>Institute:</b>	<b>Institute of Technology</b>
<b>Name of Programme:</b>	<b>M. Tech. in Electrical Engineering (Electric Vehicular Technology)</b>
<b>Semester:</b>	<b>II</b>
<b>Course Code:</b>	<b>3EE32D32</b>
<b>Course Title:</b>	<b>Electromagnetic Interference and Electromagnetic Compatibility</b>
<b>Course Type:</b>	( <input type="checkbox"/> Core/ <input type="checkbox"/> Value Added Course / <input checked="" type="checkbox"/> <b>Department Elective</b> / <input type="checkbox"/> Institute Elective/ <input type="checkbox"/> University Elective/ <input type="checkbox"/> Open Elective / <input type="checkbox"/> Any other )
<b>Year of Introduction:</b>	<b>2022 – 23</b>

L	T	Practical component			C	
		LPW	PW	W		S
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### Course Learning Outcomes (CLOs):

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

1. identify EMI/EMC problems in electrical systems (BL4)
2. analyze the effects of EMI on system performance (BL4)
3. select appropriate technique to reduce the EMI effects on electrical systems (BL6)
4. design of EM compatible electrical systems (BL6)

### Syllabus:

**Teaching Hours: 45**

#### **Unit-1: EMI and EMC Concepts 08**

Terminology and definitions, sources and victim of EMI, conducted and radiated Emission and susceptibility, transient EMI, electrostatic discharge (ESD).

#### **Unit-2 EMI Coupling Principles 10**

Conducted, radiated and transient coupling, common ground impedance coupling, common mode and ground loop coupling, differential mode coupling, field to cable coupling, power mains and power supply coupling.

#### **Unit-3: EMI in Analog and Digital Circuits 15**

EMI issues in electronic circuits, conducted noise emission from SMPS, conducted noise emission standards due to integration of IC based system, EMI issues in PWM techniques, ground loops problem in power converters, radiated emission issues in power converters, power distribution issues in PCB using different converters, conducted noise emission standards IEC EN 61000, ISO 11452, SAE J1113 .

#### **Unit-4: Control Techniques for EMC 12**

Conducted noise emission calculation in frequency domain using graphical methods, use of line filters, characteristics of filters, impedance and lumped element filters, design of line filters, shielding, grounding, transient suppressors, Case study on EMI Control.

**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 Reading:**

1. Clayton R.Paul - Introduction to Electromagnetic Compatibility, John Wiley Publications
2. H. W. Ott - Noise reduction techniques in electronic systems, John Wiley & Sons Publications
3. V. P. Kodali - Engineering EMC Principles, Measurements and Technologies, IEEE Press, Newyork
4. E. L. Bronaugh, and W. L. Lambdin - Electromagnetic interference test methodology and procedures, Interference Control Technologies Inc.
5. International standards in use.
6. EMI/EMC Literature – Analog Devices

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

w.e.f. academic year 2022 - 23 and onwards