II B.Tech – II Semester
(20EC4631) EMI / EMC
(Honors)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	4

Pre-Requisites: Electro Magnetic Waves and Transmission Lines

Course Objectives:
- To understand the basic concepts of natural and nuclear sources of EMI / EMC
- To estimate the EMI from apparatus, circuits and open area test sites.
- To discuss the measuring techniques of the electromagnetic Radiations and interferences.
- To know the concepts of ESD, Grounding, shielding, bonding and EMI filters.
- To identify EMC Cables, connectors and components with EMC standards.

UNIT–I:
Natural and nuclear sources of EMI / EMC
Introduction, Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations. An overview of EMI / EMC, Natural and Nuclear sources of EMI.

UNIT–II:
EMI from apparatus, circuits and open area test sites
Electromagnetic emissions, noise from relays and switches, non-linarites in circuits, passive inter modulation, cross talk in transmission lines, transients in power supply lines, electromagnetic interference (EMI). Open area test sites and measurements.

UNIT–III:
Radiated and conducted interference measurements
Anechoic chamber, TEM cell, GH TEM Cell, characterization of conduction currents / voltages, conducted EM noise on power lines, conducted EMI from equipment, Immunity to conducted EMI detectors and measurements.

UNIT–IV:
ESD, Grounding, shielding, bonding and EMI filters
Principles and types of grounding, shielding and bonding, characterization of filters, power lines filter designs. ESD, Electrical fast transients / bursts, electrical surges.

UNIT–V:
Cables, Connectors, Components & EMC standards
Introduction, EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, opto-isolators, Transient and Surge Suppression Devices.
EMC standards – National / International: Introduction, Standards for EMI and EMC, MIL-Standards, IEEE/ANSI standards, CISPR/IEC standards, FCC regulations, Euro norms, British Standards, EMI/EMC standards in JAPAN, Conclusions.

Course Outcomes:

After successful completion of the course, the students can be able to

S.No	Course Outcome	BTL
1	Understand the root causes of EMI and its sources.	L2
2	Analyse the effects of EMI from apparatus, circuits and open area test sites.	L4
3	Apply different measurement techniques of EMI (for conducted and normal) and analyse their influences in detail	L3
4	Discuss different compatibility techniques to reduce EMI	L2
5	Remember various standards followed across the world in the fields of EMI/EMC.	L1

Correlation of COs with POs& PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	1	-	-	-	-	-	-	-	-	-	-	1	2	-
CO 2	2	-	1	1	-	1	1	-	-	-	-	1	2	-
CO 3	2	2	1	2	-	2	1	-	-	-	-	1	2	-
CO 4	1	1	-	-	-	1	1	-	-	-	-	1	2	-
CO 5	-	-	-	1	-	2	1	-	-	-	-	2	2	-

Text Books:

1. Engineering Electromagnetic Compatibility – Prasad V. Kodali, S. Chand & Co, 2000.
2. Introduction to Electromagnetic compatibility – Clayton R. Paul, Wiley & Sons, 1992.

Reference Books:

1. Principles of Electromagnetic Compatibility – B. Keiser, Artech house, Third Edition, 1986.
2. Noise Reduction Techniques in Electronic Systems – Henry W. Ott, John Wiley and Sons, 1988.
3. EMP Radiation and Protective techniques – L. W. Ricketts, Jack E. Bridges, J. Milett, John Wiley and sons, 1976.