## ECMC2T4: EMI/EMC

### Unit I

Introduction: History and concept of EMI, Definitions of EMI/EMC, Electromagnetic environment, Practical experiences and concerns, frequency spectrum conservation, mechanisms of EMI generation, EMI testing, Methods of elimination of EMI and Biological effects of EMI

### Unit II

Natural and manmade sources of EMI/EMC: Sources of Electromagnetic noise, typical noise paths, modes of noise coupling, designing for EM compatibility, lightening discharge, electro static discharge (ESD), electromagnetic pulse (EMP).

### Unit III

EMI from Apparatus / Circuits and open area test sides: Electromagnetic emissions, noise form relays and switches, non-linearities in circuits, passive inter modulation, transients in power supply lines, EMI from power electronic equipment, EMI as combination of radiation and conduction. Open area test sides: OATS measurements, measurement precautions.

### Unit IV

Radiated Interference Measurements: anechoic chamber, TEM cell, reverberating chamber, GTEM cell, comparison of test facilities.

### Unit V

Conducted Interference Measurement: Characterization of conduction currents / voltages, conducted EM noise and power line, conducted EMI from equipment, immunity to conducted EMI, characteristics of EMI filters and power line filter design.

### Unit VI

Grounding and Cabling: Safety and signal grounds, low and high frequency grounding methods, grounding of amplifiers and cable shields, isolation, neutralizing transformers, shield grounding at high frequencies, digital grounding, types of cables, mechanism of EMI emission / coupling in cables.

### Unit VII

Shielding and Bonding: effectiveness of shielding, near and far fields / impedances, methods of analysis, total loss due to absorption and reflection effects, composite absorption and reflection losses for electric fields / magnetic fields, magnetic materials as a shield, shield discontinuities, slots and holes, seams and joints, conductive gaskets Electrical Bonding, Shape and Material for Bond straps, General Characteristics of good bonds.

### Unit VIII

Components for EMC and EMC Standards: Choice of capacitors, inductors, transformers and resistors, EMC design components National / International EMC standards, military and civilian standards

**Text Book:**


1. Engineering Electromagnetic Compatibility by Dr. V.P. Kodali, IEEE Publication, Printed in India by S. Chand & Co. Ltd., New Delhi, 2000.
2. Electromagnetic Interference and Compatibility IMPACT series, IIT-Delhi, Modules 1-9.


**References:**


1. Introduction to Electromagnetic Compatibility, Ny, John Wiley, 1992, by C.R. Pal


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