GUJARAT TECHNOLOGICAL UNIVERSITY

M.E - Instrumentation and Control Engineering

(Applied Instrumentation)

Semester: II

Subject Name: **ELECTROMAGNETIC COMPATIBILITY**

Sr.No	Course content
1.	**Introduction:** Designing for Electromagnetic Compatibility (EMC), typical noise path, methods of noise coupling, noise sources, methods of noise elimination
2.	**Cabling:** Capacitive coupling, effect of shield on capacitive coupling, inductive coupling, mutual inductance, effect of shield on magnetic noise, magnetic coupling between shield and inner conductor, shielding to prevent magnetic radiation, shield transfer impedance, various types of shielded cable and its application.
3.	**Grounding:** Safety ground, signal ground, single point ground, multi point ground, hybrid ground, functional ground layout, practical low frequency grounding, hardware ground, single ground reference for a circuit, amplifier shield, grounding of cable shields, ground loops, frequency analysis of common mode choke, differential amplifier, shield grounding at high frequency, guard shields, guarded meters
4.	**Balancing and Filtering:** Balancing, power supply decoupling, decoupling filters, amplifier decoupling, high frequency filtering, system bandwidth
5.	**Passive Components:** Capacitors, inductors, transformers, resistors, noise in resistors, conductors, ferrite beads
6.	**Shielding:** Near field and far field, characteristic and wave impedance, shield effectiveness, absorption loss, reflection loss, composite absorption and reflection loss, shielding with magnetic material, aperture, wave guide below cutoff, conductive gaskets, conductive, windows, conductive coating, cavity resonance, grounding of shield
7.	**Contact Protection:** Glow discharge, metal vapor or arc discharge, contact material, contact rating, loads with high inrush current, inductive load, contact protection, transient suppression for inductive noise, contact protection networks for inductive loads, resistive load contact protection
8.	**Intrinsic noise sources:** Thermal noise, shot noise, contact noise, popcorn noise, noise voltage, measuring random noise

9.	**Active Device Noise:** Noise factor, calculating S/N ratio, noise voltage and current model, noise factor for cascade stages, BJT noise, FET noise, noise in IC amplifiers
10.	**Digital circuit noise and layout:** Digital logic noise, Digital circuit ground, power distribution, logic families
11.	**Digital Circuit radiation:** Differential mode radiation, controlling differential mode radiation, common mode radiation, controlling common mode radiation, engineering documentation and EMC
12.	**Electrostatic discharge:** Static generation, Human body model, static discharge, ESD protection, Software and ESD protection, ESD versus EMC

Reference Books:

1 Noise Reduction Techniques in Electronics Systems, Henry Ott, A Wiley – Interscience Publication, John Wiely and Sons

2 Grounding and shielding