**EGS PILLAY ENGINEERING COLLEGE, NAGAPATTINAM**

**Department of Electronics & Communication Engineering**

**EC6011- Electromagnetic Interference & Compatibility**

**Final Year A & B**

**UNIT- I BASIC THEORY**

**PART-A**

**1.** What is meant by electromagnetic compatibility?

**2.** Define ESD.

**3.** What are the three criteria to be satisfied by any system to become electromagneticallycompatible?

**4.** How do you prevent emission?

**5.** Why is EMC a vital problem?

**6.** Why do we feel electric shock at times, when we touch TV and Computer monitors?

**7.** List the sources of EMI.

**8.** What is conducted coupling of EMI?

**9.** Draw an equivalent circuit model for electrostatic discharge.

**10.** Define EMI and EMC.

**PART-B**

**1.** (i) Distinguish between the features of conducted EMI and radiated EMI.

(ii) Explain the different sources of EMI in detail. Give examples.

**2.** (i) What are the sources and victims of EMI? Explain with examples.

(ii) Explain in detail classification of EMI/EMC. How do you minimize each?

**3.** (i) Compare time domain EMI with frequency domain EMI.

(ii) Explain ESD in detail. What are all the remedial procedures?

**4.** (i) Why is EMI significant in system design? Explain with industry citations. What are thesources and victim of EMI?

(ii) How do electrostatic discharges occur? Explain in detail EMI radiation Hazards.

**5.** How are the various sources of EMI kept under control and measured? What are the various parameters of measurement? Give their relevant units.

**UNIT- II COUPLING MECHANISM**

**PART-A**

**1.** List out the types of coupling between cables (or) List the EMI coupling methods.

**2.** Define Ground coupled Interference.

**3.** Define edge rate. Define Transient Coupling.

**4.** What is transient coupling?

**5.** Define cross talk with reference to EMI/EMC design issues?

**6.** Define ‘Ground’ with respect to working on electrical gadgets.

**7.** What is electromagnetic emission?

**8.** How does one avoid power mains interference?

**9.** Why is a limit on the lower frequency portion ofthe conducted emission and which is thestandard followed during the testing accordingly?

**10.** What are the steps in the procedure to analyse EMP susceptibility?

**PART-B**

**1.** (i)Describe the differences between radiated DM and CM coupling with suitable example.

(ii) With neat diagram explain near field coupling.

**2.** Discuss in detail with neat diagram about ground loop coupling and power supply coupling.(or) Explain in detail various coupling methods/mechanisms.

**3.** Explain in detail the conducted, radiated and common impedance ground couplings withexamples.

**4.** What is radiated differential mode coupling? In what way this is different from the radiatedcommon mode coupling? Explain this with example.

**5.** Explain cable coupling and its electromagnetic impact in system design.

**UNIT- III EMI MITIGATION TECHNIQUES**

**PART-A**

**1.** What is EMI shielding? What is the need for shielding?

**2.** Classify EMI filters.

**3.** What are the advantages of multipoint grounding?

**4.** What is the functionality of transient suppressors?

**5.** What is meant by ‘bulging’ capacitor?

**6.** What does transient suppressor mean?

**7.** Name four techniques/approaches to combat EMI.

**8.** What does ‘Chemical Salting’ mean?

**9.** What is an electrical filter?

**10.** Write the definitions of grounding and bonding.

**PART-B**

**1.** (i) Explain about the various types of non-solid shielding techniques.

(ii) Describe the shielding effectiveness of both solid and non-solid materials includingmultiple soil shields and thin film shielding.

**2.** What ate the factors influencing the EMI performances of the bonding? How can bondingbe made? Mention some guidelines for good bonds.

**3.** (i) What are Isolation Transformers? Explain in detail.

(ii) Explain various method of grounding with examples.

**4.** (i)What are transient suppressors? Explain them.

(ii)Explain briefly the cable routing and signal control techniques.

**5.** (i) How does an isolation transformer control EMI? Explain shielding and filtering methodsof controlling EMI.

(ii) Explain the basics of shielding (or) Explain different shielding techniques (or) Explainthe concepts of shielding?

**UNIT- IV STANDARDS AND REGULATION**

**PART-A**

**1.** What are class A device with reference to FCC?

**2.** Mention the two very important needs for TEM cell. With neat diagrams explain TEM cell.

**3.** Why do CISPR standards evolve?

**4.** Can High Voltage lines be allowed to cross residential sites? Justify.

**5.** How test bed is selected for ESD testing?

**6.** What are CISPR standards for EMIC?

**7.** What are Class A devices with reference to FCC?

**8.** What are MIL STD 461,462 and 463?

**9.** Name at least two standards for design guidelines and Test and Measurement procedures

published by IEEE/ANSI.

**10.** What is the objective of requirements CS 103/104/105?

**PART-B**

**1.** (i) What is the need for EMI standards? Explain. (ii) Explain the civilian standards FCC,

CISPR and IEC in detail. (iii) Mention the requirements for the EMI shielded chamber.

**2**. (i)Write in detail about the specifications of Electromagnetic emission and susceptibility.

(ii) What are the needs for civilian and military standards? Compare and contrast thesestandards with reference to IEC and MIL461E462.

**3**. (i)Discuss, in detail, the role of ANSI standards in EMI/EMC area.

(ii)Why are military standards more stringent for Radiated Emission?

**4.** Why do the standards vary with reference to civilian and military applications? What are the

various standards for civilian applications? How do they evolve? Discuss them in detail.

**5.** Tabulate conducted and radiated emission limits under military standards and explain.

**UNIT- V EMI TEST METHODS AND INSTRUMENTATION**

**PART-A**

**1.** What is the main difference between radiated measurements for class A devices and others?

**2.** What is the significance of narrow band test?

**3.** What for MIL STD 461, 462 and 463 are used?

**4.** What are class A device with reference to FCC?

**5.** Mention the two very important needs for TEM cell. With neat diagrams explain TEM cell.

**6.** Can High Voltage lines be allowed to cross residential sites? Justify.

**7.** How test bed is selected for ESD testing?

**8.** What are the advantages of loop antenna? Specify the antenna used for microwavefrequencies.

**9.** Define the term LISN? With LISN draw the basic circuit used for RI measurements?

**10.**What is a current probe? Give some guidelines to carry OATS.

**PART-B**

**1.**(i)With circuit diagram explain the working principle of feed through capacitor**.**

(ii)Derive the expression for NSA of OATS.

**2.** How are measurements made in the following:

(i) Tx/Rx Antennas (ii) EMI Rx and

spectrum analyzer

**3.** Explain the step-by-step approach for evaluating RE and RS using TEM cell

**4.**(i)Discuss how LISN is placed in a measurement set-up.

(ii) Why do the standards vary with reference to civilian and military applications? What are the

various standards for civilian applications? How do they evolve? Discuss them in detail.

**5.**(i) Explain various testing antenna and their frequencies as specified in CISPR standard.

(ii) What is TEM cell? Explain in detail with neat diagram.