Roll No.

B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

ELECTRONICS AND COMMUNICATION ENGINEERING

VIII Semester

EC 9029 & Electro Magnetic Interference and EMC

(Regulation 2008)

Time: 3 Hours   Answer ALL Questions   Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Define EMC and Class A devices.

2. Sketch the FCC limit for Class A digital devices for CE, assuming quasi-peak detector.

3. Express in db µV/m the value of Electric Field intensity of 1V/m.

4. Explain briefly with diagram the Common Impedance Coupling.

5. Explain briefly with diagram the Multipoint Grounding System.

6. Explain with reference to a PCB layout the techniques to reduce Trace Impedance.

7. Explain briefly the Power Plane isolation.

8. How is the Chamber Quality assessed in a microwave anechoic chamber.

9. Explain briefly the operation of a Log periodic antenna.

10. If V_{direct} is 1 Volt and V_{site} is 100mv and Antenna Factor of 7dB for both Tx and Rx, what is the value of NSA?

Part – B (5 x 16 = 80 marks)

11. (i) Explain with diagram the Shielding Effectiveness (SE) of a metal barrier with respect to Absorption Loss, Reflection Loss and Multiple Internal Reflection Loss. **(8)**

(ii) Assuming a far field source, calculate the Reflection Loss in dB of sheet steel (σ_r = 0.1, μ_r = 1000) at 100MHz and Absorption Loss for a thickness of the material which is twice the skin depth at 100MHz. Calculate the Reflection loss in dB if the same sheet steel is placed at a distance of 10m (near field) from a E-dominant source of 1MHz. **(8)**

12. a) (i) Sketch the waveforms of ESD and EFT bringing out the Rise times and Amplitude values. Write down the Mathematical expression for ESD and EFT. **(8)**

(ii) Explain briefly the hybrid suppression techniques for ESD, EFT and Surges. **(8)**

(OR)

b) (i) Sketch the Wave Impedance Vs Distance from E&H sources bringing out the variations in the near and far fields. **(8)**

(ii) Explain the hybrid grounding for electronic systems and chemical salting to reduce soil resistivity. **(8)**

13. a) (i) What are CM and DM currents? Explain with sketches the suppression techniques for CM and DM currents in a typical power supply filter topology. **(8)**

(ii) Prove that the ground resistance, $R = \rho/2\pi a$, where ρ is resistivity of the conducting medium and 'a' is the radius of a metal hemisphere buried in uniform earth. **(8)**

(OR)

b) (i) Explain with diagrams the measurements of Shielding Effectiveness (SE) of shielding materials as per MIL-STD-285. **(8)**

(ii) Explain with diagram the operation of Artificial Main Network (LISN), with reference to CE evaluation. **(8)**

14. a) (i) Describe the features that govern a PCB layer stack up with reference to a 8 layer board. Discuss the various PCB power supply decoupling aspects to minimize EMI. **(8)**

(ii) Explain briefly the Shielding And Grounding aspects of Twinax and Triax cables. **(8)**

(OR)

b) (i) Explain with diagram the operation of a Spectrum Analyzer for measurement of various parameters for EMC compliance. Detail the usage of average detector. **(8)**

(ii) Explain briefly the EMI control method of Isolating transformers and Opto isolators. **(8)**

15. a) (i) Describe briefly with diagram the requirement for OATS for stationary EUT including conditions for Terrain roughness. **(8)**

(ii) What are NSA and Antenna Factor. Explain how NSA can be computed and measured for acceptance validation as a reliable OATS. **(8)**

(OR)

b) (i) Discuss with diagram the RE measurement that can be carried out in a TEM cell. How should the cell be designed for a characteristic impedance of 50 ohms? **(8)**

(ii) Describe with diagram the operation of Bi-Conical antenna for EMI measurements. What should be the cone angle for an input impedance of 50 ohms? **(8)**