Fifth Semester B.Tech Degree Examination (2013 Scheme)

13.506.7 Electromagnetic Compatability

Time:3Hrs **Max.Marks:100**

Part A (Answer all Questions; Each carries 2 Marks)

1. **A 50-V source is attached to a 50-V signal measurer with 300 ft of RG58U cable. The source is tuned to a frequency of 100 MHz, and the dial indicates an output of -15 dBm. Determine the voltage at the input to the signal measurer in dBμV.**
2. **Define radiated and conducted emission.**
3. **What are the requirements for class A device as per CISPR norms in terms of radiated emission?**
4. **Distinguish between multipoint grounding scheme and floating point**
5. **Compare the electric and magnetic field strengths at high frequency and low frequency cases.**
6. **Explain the significance of reflection and absorption loss from shielding aspect.**
7. **Define antenna factor**
8. **What is the role of H field and E field absorbers in an anechoic chamber**
9. **What is the role of GTEM cell from EMI/EMC view point**
10. **What is radiation susceptibility**

(10x2=20 Marks)

Part B(Answer one question from each module; each carries 20Marks)

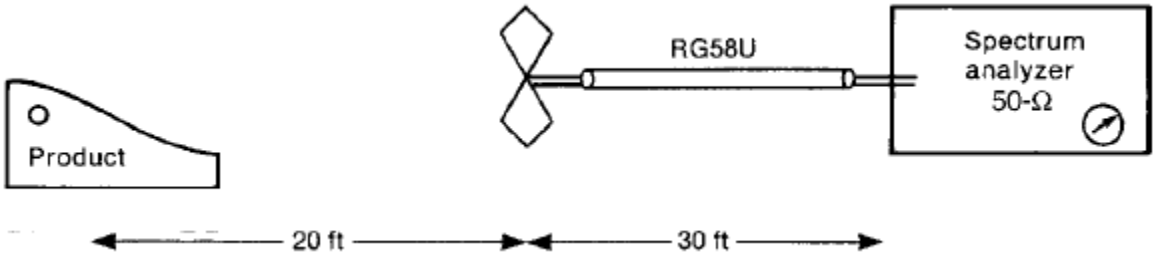
Module I

11.a)Write note on contribution of differential and common mode current Components to conducted emission .How common mode can be reduced

(14 Marks)

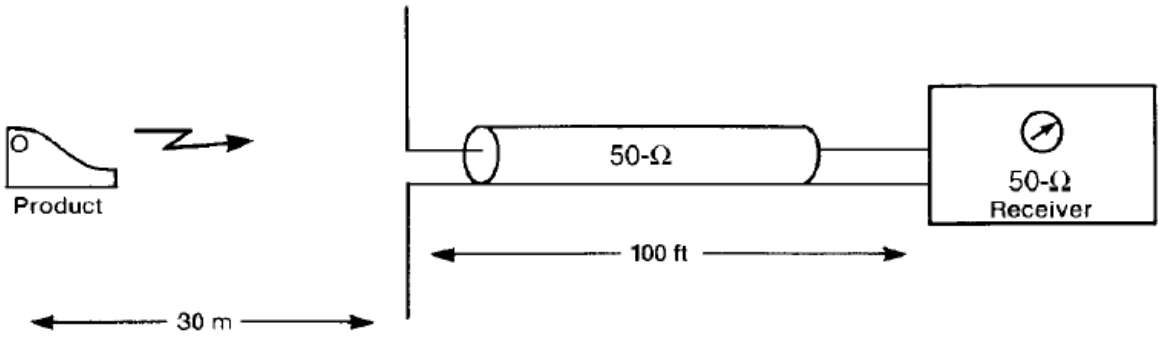
b)list the different sources of EMI (6 Marks)

12a)A product is to be tested for FCC class B radiated emission compliance as in Figure. the distance between antenna and product is 20ft.Spectrum analyser Is connected to the above antenna with 30ft of RG58U cable that has loss of 4.5dB/100ft at 100MHz.The receiving antenna provides an output voltage at 100MHz of 6.31V for each V/m of incident E field. If Spectrum analyzer Indicates a level of 53dBμV at 100MHz.Determine the level of received field At the antenna. Determine whether the product will pass FCC



(10 Marks)

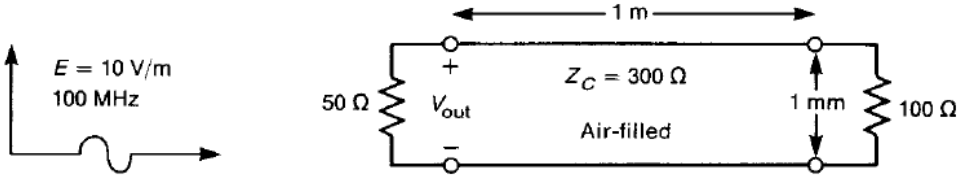
b)A digital product is tested for CISPR class A requirements. The receiving antenna is placed 30m away and is attached to a 50Ω receiver with a 100ft length of 50Ω cable that has a loss of 10dB/100ft at 300MHz.If receiver indicates a level of -64.5dBm at 300MHz and the antenna provides 4V at its base for every 1V/m of E field incident on it.Determine whether the product fails CISPR22 class A



(10 marks)

Module II

13a)A 100MHz,10V/m uniform plane wave is propagating parallel to an air Filled 2 wire transmission line as in fig. The E field is parallel to the plane of 2 wires. Compute the magnitude of induced voltage across the load



(12Marks)

b)Write note on shielding effectiveness for far field sources Also illustrate and explain multiple reflections of E field at the shield Barrier (8 Marks)

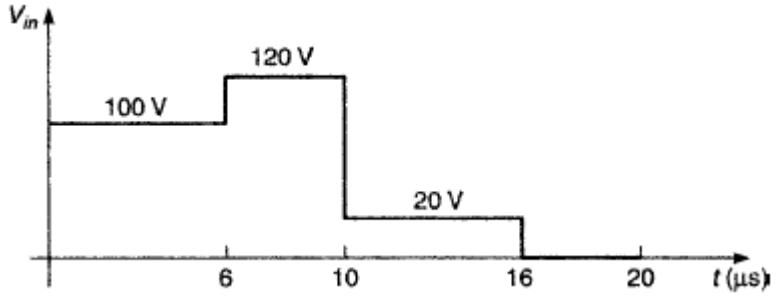
14a) Write note on magnetic field shielding (7 Marks)

b)Compute the reflection and absorption loss for a 20 mill steel barrier at 10kHz & 100MHz for a near field magnetic source which is at a distance 5cm from the shield (13Marks)

Module III

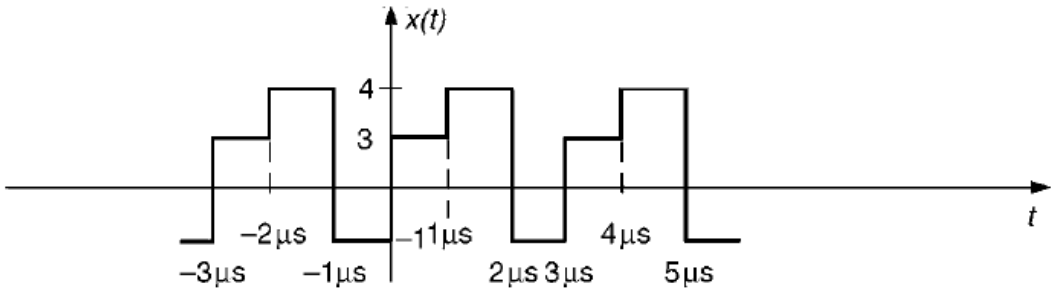
15 a)A TDR is an instrument used to determine properties of transmission line In particular it can be used to detect locations of imperfections such as Breaks in the line. The instrument launches a pulse down the line and Records transit time for that pulse to be reflected at some discontinuity And to return to the line input. Suppose TDR is having a source impedance of 50Ω is attached to a 50Ω coaxial cable having unknown length and load Resistance. Dielectric of cable is Teflon (ε_r=2.1). Open circuit voltage of TDR is A pulse duration 10μs.If the recorded voltage at the input to the line is in fig.

Determine length of line & unknown impedance.



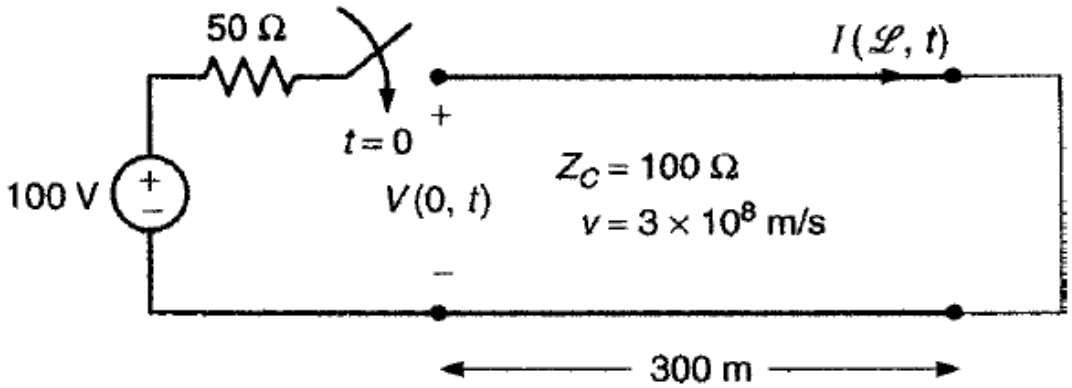
(14Marks)

b) Determine the period ,frequency and average value of the given wave form



(6Marks)

16 a)Sketch the input voltage to the line V(0,t) and the load current I(l,t) for the System given in fig for 0<t<10μs.What should these plot converge to in the Steady state



(14 Marks)

b.Write note on susceptibility model for PCB (6 Marks)

Module IV

17a)Explain how a filter has to be inserted between power chord and power Supply for reducing conducted emission (9 Marks)

b)Write note on measurements on radiated emission in open test site & anechoic chamber (11 Marks)

18 a)With diagram explain the working of LISN circuit (10 Marks)

b) Using LISN illustrate how it can be used for measuring conducted emissions (10 Marks)