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Question Paper Code : 17068

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Third Semester

Applied Electronics

AP 7301 — ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

(Common to M.E. Communication Systems/M.E. Communication and
Networking/M.E. Electronics and Communication Engineering/M.E. Medical
Electronics and M.E. VLSI Design)

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define ESD.
2. Is it possible to develop circuit models of EMI.
3. Define LISN.
4. What allows a conductive transfer to occur?
5. Mention the need for EMI gasket.
6. List any four approaches to combat EMI.
7. Mention the use of decoupling capacitors.
8. What is impedance control in PCB?
9. Write the significance of narrow band test.
10. Differentiate military standards and civilian standards.

PART B — (5 × 13 = 65 marks)

11. (a) (i) How are the various sources of EMI kept under control and measured? What are the various parameters of measurement? Give their relevant units. (6)
- (ii) Discuss how lightning discharges affect the transmission line communication. Explain the transients, transient effects and how to minimize the transient effects? (7)
- Or
- (b) (i) Explain the conducted EMI and radiated EMI with examples. (6)
- (ii) An ESD discharge is modelled as a capacitance of 150pf. Charged to 2 KV and discharged through a resistance of $1K\Omega$.
- (1) Write down the expression for the current waveform. (7)
- (2) Approximating the current waveform as a short dipole, calculate the interference power at a distance of 10cm and find its variation with time.
12. (a) (i) With a neat diagram, describe the ground loop coupling. (6)
- (ii) Explain in detail about power supply coupling. (7)
- Or
- (b) Give suitable examples for intentional and unintentional electromagnetic emissions during operation of various equipments. How to control them? Also list out electric field intensity levels of various home appliances. Also prove CE is more significant than radiated one. (13)
13. (a) (i) How does cable routing control EMI? How is signal control achieved? (6)
- (ii) Explain the various grounding techniques used in electronic circuits. (7)
- Or
- (b) (i) Illustrate how the effectiveness of shielding is obtained in SMPS and industrial computers. (6)
- (ii) Differentiate between single and double shields. Briefly explain about shielding discontinuities. (7)
14. (a) (i) Discuss about the various factors to be considered for EMC design of PCB. (6)
- (ii) Explain the various procedures to minimize cross talk. (7)
- Or
- (b) (i) Explain the concept of power distribution decoupling. (6)
- (ii) What are all the procedures used for effective grounding in PCB design? Explain. (7)

15. (a) Explain the following: (13)
- (i) Need for EMI standards
 - (ii) Civilian standards IEC, CISPR and FCC
 - (iii) Requirements for the EMI shielded chamber

Or

- (b) Explain the following: (13)
- (i) MIL standard 461E/462
 - (ii) EMI test instruments
 - (iii) EFT Test bed

PART C — (1 × 15 = 15 marks)

16. (a) "Electromagnetic interferences occur between an existing gas pipeline and a newly designed high voltage power line sharing the same right-of-way" - Discuss possible suggestions for mitigation of this issue. (15)

Or

- (b) (i) Point your suggestions in making this World free from unwanted EMI/EMC. (6)
- (ii) Highlight the information gained for designing a high speed PCB with minimum interference based on the knowledge gained from this course. (9)