P1333   **[3864]-242**
B.E. (Electronics)
ELECTRONIC PRODUCT DESIGN
(2003 Course)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any Three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) With the help of suitable block diagram explain in detail the different stages of an electronic product development. Discuss the implications of skipping particular stage in development.   **[10]**

b) An electronic circuit consists of 4 resistors, 4 capacitors, 1 transistor, 4 diodes and a power transformer. The failure rate of each components are 0.1, 0.01, 0.8, 0.25 and 0.6 per 10^6 hrs respectively. Calculate -
   i) The MTBF of the circuit.
   ii) The reliability at t = 1000 hrs.   **[5]**

c) In the far field a 50 dB shielding effectiveness using conductive coating is to be obtained at enclosure level. Calculate the value of coating impedance to achieve this value of SE.   **[3]**

OR

Q2) a) State the various objectives of Ergonomics. Also explain how the ergonomics and aesthetic design considerations are satisfied for mobile phone.   **[8]**

b) Discuss the different noise coupling mechanisms and ways to reduce the noise being coupled with suitable sketches.   **[8]**

c) Calculate the value of a decoupling capacitor, if the current is 50 mA and the voltage is changing at the rate of 0.1v/5ns.   **[2]**

Q3) a) Discuss the PCB design considerations for the microcontroller based circuits. **[8]**

b) Estimate:

   i) Resistance of 25 cm long copper track with 1.0 mm width on standard 35 micron copper-clad laminate. (Assume $\rho = 1.72 \times 10^{-6}$ Ω.cm).

   ii) Capacitance of two tracks on opposite side of double sided PCB with width 2.0 mm, length 15 cm, laminate thickness 1.6 mm and relative permittivity is 4.5. **[8]**

OR

Q4) a) Discuss in detail the various PCB design practices recommended for:
   i) Power supply & ground routing.

   ii) Decoupling. **[8]**

b) Estimate the characteristic impedance for stripline geometry when the PCB laminate thickness is 1.6 mm, the width of embedded track is 1.5 mm, the track thickness is 35 microns and the relative permittivity is 4.5. **[4]**

c) Explain the different termination schemes to avoid reflections in high speed PCB designs. **[4]**

Q5) a) State the different capabilities of DPO. With suitable schematic how DPO can be used to observe the eye pattern. **[8]**

b) With the help of any one circuit explain the use and limitations of operating point analysis and AC analysis. **[8]**

OR

Q6) a) Define signal integrity. Discuss in detail the significance of signal integrity and the factors on which signal integrity is dependent. **[8]**

b) An eight channel DAS is designed with 89C51 microcontroller. How will you test:

   i) The A to D converter is working properly?

   ii) The different control and data signals. **[8]**

SECTION - II

Q7) a) What are the goals of software design? Discuss the different phases of software design with the help of neat diagram. **[8]**

b) Discuss the advantages and limitations of the following methods/tools of software debugging: **[10]**
  - i) Break points.
  - ii) Software simulators.
  - iii) IDE.
  - iv) Emulators
  - v) Single stepping.

OR

Q8) a) Explain the different phases of bugs introduction in the software and how to debug these bugs. **[8]**

b) Explain how the ASM method can be used to design a washing machine. Draw the detailed ASM chart. **[10]**

Q9) a) Justify the need of different tests to be carried out on following products:
  - i) Laptop.
  - ii) Mobile Phone.
  - iii) UPS.
  - iv) PLC. **[8]**

b) Explain the importance of shielded room while conducting EMI/EMC testing. **[4]**

c) What is CE marking? What are the objectives of CE marking? **[4]**

OR

Q10) a) In order to test the suitability of an instrument for a typical application which different tests are to be carried out on the instrument. Also discuss the effect and action taken for each test. **[10]**

b) Differentiate between conducted EMI and radiated EMI. **[6]**

Q11) a) Explain the role of documentation in product design and development. **[5]**

b) What are the different types of documentation? State the features of each type of documentation. **[8]**

c) Justify - the bill of materials is considered to be the basic product cost. **[3]**

OR

Q12) a) Explain in detail:

    i)   Service manual for radio plus tape recorder.

    ii)   User manual of mobile phone.   **[10]**

  b) Justify:

    i)   Engineering notebook is foundation of any engineering task.

    ii)   Bare board testing is essential for high track density PCB's. **[6]**

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