B.E. (Semester - I)
ELECTRONICS
Electronic System Design
(2008 Pattern)

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

Instructions to the candidates:

    1)   *Answers to the two sections should be written in separate answer books.*

    2)   *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right side indicate full marks.*

    5)   *Use of Calculator is allowed.*

    6)   *Assume Suitable data if necessary.*

SECTION - I

Q1) Draft-1. Electrical 2. Mechanical and 3. Environmental specifications of a practical 4-channel Temperature indicator and controller. Justify the values you have proposed.   **[18]**

Q2) Draw circuit diagram of a linear regulated power supply (including mains side protection devices) for + 5 V fixed output using 3 terminal regulator.   **[18]** Table below gives failure rates of components of power supply per 1000 hours-

Component	Failure rate per1000 hours
ON-OFF switch	0.02
MOV	0.005
Line Filter	0.003
Power Transformer	0.0025
Rectifier Diode	0.001
Electrolytic Capacitor	0.06
Ceramic Disc capacitor	0.004
3-Terminal regulator	0.001
Fuse	0.08
Resistors	0.0015
LED	0.001

For this circuit, - Calculate- 1) Selling price and 2) MTBF of the power supply and Explain techniques you will use to ensure reliability.

Q3) a) Compare, by giving suitable examples, the performance of signal conditioning circuits using- **[8]**
   i) General Purpose OPAMPs
   ii) Precision OPAMPs and
   iii) Instrumentation amplifiers.

b) Explain the significance of following errors associated with ADC-
   i) Gain error
   ii) Offset error
   iii) Non-linearity error.

What are the techniques to minimize the effect of these errors on overall performance of the circuit using ADC? **[8]**

Q4) a) What do you understand by the term- Error Budget Analysis? Explain the significance of it with suitable example. **[8]**

b) For certain ADC with full scale of 10V, calculate-
   i) Root mean square error and
   ii) Worst case error for following individual errors
      (expressed as % of full scale)-
      i) Differential non-linearity- 0.08%
      ii) Gain error- 0.05%
      iii) Offset error- 0.3%

Practically, the error will be close to which of the above errors? Why? **[8]**

Q5) With reference to a case study, explain in details the factors affecting the choice of Microcontroller. **[16]**

Q6) Write detailed notes on- **[16]**
   a) High Brightness LED Interface
   b) SPI Bus.

SECTION - II

Q7) With the help of suitable example, explain in details how Waterfall model is used for software development. **[18]**

Q8) Discuss the advantages and limitations of following methods and tools of software debugging- **[18]**
  a)   Single stepping
  b)   Break points
  c)   Software simulators
  d)   Emulators
  e)   Integrated Development Environment (IDE).

Q9) a)   For electronic products listed below, explain with justification the type of EMI/EMC tests that will be necessary **[8]**
       i)   Desktop PC
       ii)   Domestic Pump Controller
       iii) Audio Amplifier
       iv)   Bedside ECG Monitor.
  b)   Explain the differences between PCB design practices for low speed and high-speed digital circuits. **[8]**

Q10) What do you understand by the term Signal Integrity? Explain various mechanisms that affect signal integrity in high-speed digital circuits. **[16]**

Q11) a)   Explain how DC or Operating point analysis helps in finding faults in analog circuits? **[8]**
  b)   Justify the usefulness of Sensitivity analysis with the help of suitable example. **[8]**

Q12) Explain in details the need for and the mechanism of carrying out following environmental tests- **[16]**
  a)   Dry Heat Test
  b)   Vibration Test
  c)   Bump Test.

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