Paper Code: MEC 918   Roll No.

M.Tech.
(SEM III) ODD SEMESTER EXAMINATION2015-16
Electronic Systems Design

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

Note- *Attempt All Questions. All Questions carry equal marks***:-**

1. **Attempt any FOUR of the following questions:**

   (a) What is SNR? Why should we improve the SNR?

   (b) Write short note on:

      (i) Parameters involved in PCB design

      (ii) CAD for PCB design.

   (c) Explain the need of using anti-aliasing filters in the process of signal conditioning.

   (d) List some software available to draw the PCB layout. What are the limitations of PCB design?

   (e) Define CMRR of an op-amp. Determine the output of op-amp for input voltage of 300uV and 240uV.the differential gain of the amplifiers is 5000 and the value of CMRR is 100000.

   (f) Design a second order low-pass filter for a cutoff frequency of 1KHz and passband gain of 1.587.

2. **Attempt any FOUR of the following questions:**

   (a) Explain the PCB design rules and its limitations for power electronics circuits.

   (b) Discuss all the steps involved in conversion of analog data into digital data.

   (c) Explain working of MOSFET as a switch. Draw the circuit diagram for NMOS logic inverter, PMOS logic inverter and CMOS logic inverter.

   (d) Discuss in brief the transfer functions of Butterworth filter, Chebyshev filter and Bessel filter.

   (e) Explain the working of smoothening filters?

   (f) Write short note on:

      (i)   Isolation Amplifier

      (ii)   Switched Capacitor circuits

3. **Attempt any TWO of the following questions:**

   (a) What is an Instrumentation Amplifier and what is its role in instrumentation? Draw the scheme of connections and derive the expression for its gain.

   (b) Explain the interfacing of ADC and DAC with the DSP.

(c) Why grounding and shielding is needed in digital systems? Give general recommendations for low-noise design procedure with sensor characteristics fixed.

4. **Attempt any TWO of the following questions:**

(a) Design a second order low pass filter.

(b) Explain spectral characteristics of noise. What are different types of noise? Explain below noise types in detail:

    (i)   Thermal noise

    (ii)   Shot noise

    (iii)   1/f noise

(c) Determine the rms thermal noise voltage of resistance of 1K, 50 K, 1 M for each of the following noise B.W. 50 KHz, 1 MHz, 20 MHz. Consider T=290K.

5. **Attempt any TWO of the following questions:**

(a) What do you mean by signal averaging? Derive an expression for the improvement signal to noise ratio for n samples.

(b) Explain the advantage /disadvantages of serial interfacing over Parallel interfacing with microcontroller.

(c) Explain following DAC characteristic:

    I.   Resolution

    II.   Maximum sampling rate

    III.   Monotonicity

    IV.   Total harmonic distortion and noise

    V.   Dynamic rang