Q.P. Code : **14904**

28|11|14

(3 Hours) [Total Marks : 80

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions from remaining **five** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable **data** wherever **necessary**.

1. (a) Explain the terms :   20
      (i) Signal level and Bias changes
      (ii) Impedance matching and concept of loading.

   (b) Draw and explain circuit for zero crossing detector.
   (c) Explain lead compensation in bridge circuits.
   (d) The resistors in a bridge are given by $R_1 = R_2 = R_3 = 120\ \Omega$ and $R_4 = 121\Omega$. If the supply is 10.0V, find the voltage offset.

2. (a) Draw and explain circuit for ideal differentiator with waveforms. Design a   10
differentiator to differentiate an input signal that varies in frequency from 10Hz to about 1KHz.

   (b) Discuss the applications of Instrumentation amplifier. explain one in detail.   10

3. (a) Draw and explain circuit diagram of absolute value circuit using op-amp. Discuss   10
its advantages over traditional diode rectifier.

   (b) What are the advantages of Active filters over passive filters. Design a second   10
order low-pass Butterworth filter at a high cut-off frequency of 1KHz.

4. (a) Draw and explain the principle and construction of metal strain gauges. What is   10
the signal conditioning associated with it ?

   (b) A sensor outputs a range of 20.0 to 250mV as a variable varies over tis range.   10
Develop signal conditioning so that it becomes 0 to 5V. The circuit must have very high input impedance.

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5. (a) What is a Multivibrator ? Design Astable multi-vibrator for frequency of 1KHz   10
and duty cycle of 75%, state its applications.

(b) Design an adjustable voltage regulator using LM317 to satisfy the following   10
specifications.

Output voltage V_0 = 5 to 12V

Output current I_0 = 1.0A

6. Write short notes on any **four** of the following :   20

    (a)   Sample and hold circuit
    (b)   V to F converter
    (c)   Dual slope A to D Converter
    (d)   PLL
    (e)   Data logger
    (f)   SMPS.

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