

- Note : 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 whenever necessary

Duration : 03 hours

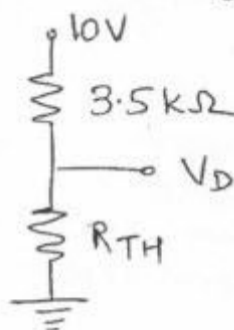
Marks : 80



- Q.1. a. Explain the characteristics of digital data. 20
b. Explain lead compensation in bridge.
c. A bridge circuit has $R_1 = R_2 = R_3 = R_4 = 120\Omega$ resistances and a 10V supply. Suppose a $3^{1/2}$ digit DVM on a 200mV scale will be used for the null detector. Find the resistance resolution for measurements of R_4 .
d. Explain the significance of all-pass filters.
- Q.2. a. Mention the applications of instrumentation amplifier. Explain any one in detail. 10
b. Draw and explain circuit diagram of absolute value circuit using op-amp. Discuss its advantages over traditional diode rectifier. 10
- Q.3. a. Draw and explain circuit for ideal integrator with waveforms. Discuss the problems associated with ideal integrator and draw the circuit diagram for practical integrator. 10
b. What are the advantages of active filters over passive filters. Design a second-order low pass filter at a high cut-off frequency of 1kHz. 10
- Q.4. a. Explain the following terms : 10
(i) Signal level and bias changes
(ii) Filtering and impedance matching
(iii) Linearization
(iv) Concept of loading
b. A sensor outputs a voltage ranging from -2.4 to -1.1V. For interface to an analog-to-digital converter, this needs to be 0 to 2.5V. Develop the required signal conditioning. 10

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- Q. 5. A thermistor is to monitor room temperature. It has a resistance of $3.5\text{k}\Omega$ at 20°C with a slope of $-10\%/^\circ\text{C}$. The dissipation constant is $P_D = 5\text{mW}/^\circ\text{C}$. It is proposed to use the thermistor in the divider of figure shown below to provide a voltage of 5.0V at 20°C . Evaluate the effects of self-heating. 10



- b. Draw and explain the principle and construction of metal strain gauges. What is the signal conditioning associated with it. 10
- Q.6. Write short notes on : (any four) 20
- Sample and hold circuit
 - Phase Locked loop
 - IC 555 timer
 - Data Acquisition System
 - A to D converters
 - SMPS

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