

**II B.Tech II Semester Supplementary Examinations, April/May 2005**  
**INSTRUMENTATION ENGINEERING-I**  
( Common to Electronics & Instrumentation Engineering and Electronics &  
Control Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) Classify various transducers and give an example of each and mention their applications.  
(b) What is the true value of voltage across the  $500\text{ K}\Omega$  resistor connected between terminals A and B as shown in fig. below ? What would a voltmeter with a sensitivity of  $20\text{ K}\Omega/\text{V}$  read on the following ranges: 50, 15, 5 volts when connected across terminals C and D.
2. (a) Differentiate between static and dynamic characteristics of a measurement system.  
(b) Derive the equations for time response of a first order system when subjected to unit ramp input. Draw the response curves and find the steady error.
3. (a) List of instruments used to measure temperature.  
(b) Explain the working principle of bimetallic thermometer.  
(c) Discuss the merits and demerits of bimetallic thermometers.
4. A parallel plate capacitive transducer uses plates of area  $500\text{ mm}^2$  which are separated by a distance of  $0.2\text{ mm}$ . Calculate the value of capacitance when the dielectric is air having a permittivity of  $8.85 \times 10^{-12}\text{ F/m}$ .  
(a) Calculate the change in capacitance if a linear displacement reduces the distance between the plates to  $0.18\text{ mm}$ . Also calculate the ratio of per unit change of capacitance to per unit change of displacement.  
(b) Suppose a mica sheet  $0.01\text{ mm}$  thick is inserted in the gap. Calculate the value of original capacitance and change in capacitance for the same displacement. Also calculate the ratio of per unit change in capacitance to per unit change in displacement. The dielectric constant of mica is 8.
5. (a) Why the piezo electric transducer cannot be used for measurement of static displacement.  
(b) Explain the concept of piezo electric accelerometer with neat sketch.
6. (a) Explain the dynamic performance of feedback type acceleration transducer to sinusoidal excitation, with velocity compensation.  
(b) Draw and explain the schematic diagram of feedback type angular-acceleration transducer with velocity compensation.

7. Explain the principle of working and applications of optical pyrometers.
8. (a) List the detectors used in radiation and optical pyrometers.  
(b) Explain the factors affecting the static accuracy of filled in thermometers.

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