

**II B.Tech II Semester Supplementary Examinations,  
November/December 2005  
TRANSDUCERS IN INSTRUMENTATION  
( Common to Electronics & Instrumentation Engineering and Electronics &  
Control Engineering)**

**Time: 3 hours****Max Marks: 80**

**Answer any FIVE Questions  
All Questions carry equal marks**

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1. (a) Define accuracy and precisim of a measuring instruments with suitable examples.  
(b) An Instrument reads the values for four different readings 4.0, 4.1, 3.9, 4.2. What is the absolute error and mean error.  
(c) An Instrument measures 4.1V, 4.1V, 4.1V and 4.1V in four readings. Is the instrument precise explain. If the true value is 4V what is the error?  
(d) Is the precise Instrument is better than the errganeous instrument - Explain  
[4x4]
2. (a) Derive the differential equation describing the dynamics of mechanical translational system subjected to a step input force. Draw up a table showing analogy between mechanical and electrical quantities based upon force-voltage analogy .  
(b) An RC circuit consists of  $1\ \mu\text{F}$  in series with a resistor of  $5\text{K}\Omega$  . A D.C voltage of 50 volts is suddenly applied across the circuit. Calculate the value of voltage after
  - i. 5 m sec.
  - ii. 25 m sec.[8+8]
3. (a) What are RTD's, and on what basic principle do they work? Explain their construction.  
(b) The resistance of a platinum resistance thermometer element at  $15^{\circ}\text{C}$  is required to be 50 ohms. Determine the length of the wire needed if the diameter of the wire is 0.25 mm. Assuming that the temperature coefficient of resistance of the wire is constant, calculate the element resistance's at '0' and  $100^{\circ}\text{C}$ . Assume missing data. [8+8]
4. (a) Show how output voltage signals proportional to linear displacements imparted to the movable plate of a parallel plate capacitor.  
(b) Discuss the problems encountered while measuring small displacements by capacitive transducers. [8+8]
5. (a) How the piezoelectric pick-up is useful for measuring torque and explain the same.

- (b) “Piezoelectric crystal as a measuring element” Explain it clearly. [8+8]
6. (a) What is meant by ‘The Force-balance principle’.
- (b) List out the advantages and the disadvantages of Force-balance transducers and briefly explain their working with relevant diagram. [6+10]
7. (a) Write short notes on compensating leads in thermocouple.
- (b) List out advantages and disadvantages of thermocouple. [8+8]
8. (a) List the detectors used in radiation and optical pyrometers.
- (b) Explain the factors affecting the static accuracy of filled in thermometers. [8+8]

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