

**ANNA UNIVERSITY - 2007**  
**B.E/B.TECH DEGREE EXAMINATION**  
**MEASUREMENT AND INSTRUMENTATION**  
**(ELECTRICAL & ELECTRONICS ENGINEERING)**

TIME-3HOUR  
MARK-100

**ANSWER ALL QUESTIONS**

**PART A (10 X 2 = 20 )**

1. Define limiting errors? Derive the expression for relative limiting error?
2. Define linear time invariant and line time variant systems. Give examples.
3. Why PMMC ammeters are the most widely used instrument?
4. Draw the equivalent circuit and phasor diagram of a potential transformer.
5. List out the types of input circuits used in the signal conditioning.
6. Define (i) Differential mode gain (ii) Common mode rejection ratio.
7. Give the advantages and disadvantages of LCDS.
8. List out the basic components of a tape recorder.
9. An accelerometer has a seismic mass of 0.05kg and a spring constant of  $3 \times 10^3 \text{N/M}$ . Maximum mass displacement is  $\pm 0.02 \text{m}$ . Calculate.  
(i) Maximum measurable acceleration (ii) Natural frequency
10. List out the advantages and disadvantages of RTD.

**PART B (5 X 16 = 80 )**

- 11.i) A set of independent ten measurement were made to determine the weight of a load shot. The weights in gramme were 1.570, 1.597, 1.591, 1.562, 1.577, 1.580, 1.564, 1.586, 1.550, 1.575. Determine
- (i) Arithmetic mean
  - (ii) Average deviation
  - (iii) Standard deviation
  - (iv) Variance
  - (v) Proable error of one reading
  - (vi) Proable error of the mean
- ii) A measuring system has an exponential response to step input. The time constant of the system is 2S. What is the time required for reaching (i) 50% and (ii) 80% of final steady state reading.
- 12.a) Explain in detail the effect of
- (i) Opening the secondary circuit of a current transformer when primary winding is energized?
  - (ii) With a neat sketch explain the working of a 3F wattmeter.

OR

- 12.b)i) Explain the construction and working of Weston type frequency meter.

ii) Design a multirange ammeter with range of 1A, 5A, 25A and 125A employing individual shunts in each case. A d'Arsonval movement with an internal resistance of  $730\ \Omega$  and full-scale current of 5mA is available.

13.a)i) Explain in detail the successive approximation method of A/D Conversion.

ii) Explain the operation of V/F converter.

OR

13.b)i) A thermistor of resistance  $1000\ \Omega$  at  $50^\circ\text{C}$  temp is connected in a bridge circuit having all arms of resistance  $1000\ \Omega$ . The supply voltage to the bridge is 40V. The resistance of the thermistor increases by  $5\ \Omega$  for a decrease of temp of  $1^\circ\text{C}$ . Find the temp if the open circuit voltage of the bridge is 50mv.

ii) Explain the operation of sample and hold circuit with suitable diagram.

14.a)i) Draw the block diagram of a digital CRO and explain each block.

ii) The gap of reproducing head in a tape recorder is  $6.4\ \mu\text{m}$ . Determine the minimum speed of the tape for satisfactory response at 50KHZ. Assume the wave length on the tape is greater than 2.5 times the gap length.

OR

14.b) Explain in detail the operation of any two digital printers.

15.a) Write short note on

i. Digital transducer

ii. Piezo electric transducer

OR

15.b)i) Explain the liquid level measurement using resistive method.

ii) Describe the method of measurement of differential pressure using inductive transducer.