Code No: RR320403 **Set No. 1**

III B.Tech II Semester Supplimentary Examinations, Apr/May 2008
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Common to Electronics & Communication Engineering and Electronics & Telematics)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are the advantages of an Aryton shunt Ammeter over a multirange Ammeter?
   (b) What is a thermocouple? Explain the Construction and working of a thermocouple measuring Instrument with its range of measurement. [6+10]
2. (a) Discuss the bridge which is used for the precision measurement of capacitors and their insulating properties. How does the balancing conditions help in finding the reactance of the unknown component and its dissipation factor.
   (b) A bridge has 2000 ohm in one arm and its opposite arm has a capacitor of value $0.5\mu F$ The arm to the right of resistor arm is having 1000 ohm in shunt with a 0.5 μF The arm opposite to this arm is connected with the unknown component. Find the value of the component and its dissipation factor. [8+8]
3. (a) Why is Wagner's additional ground connection made?
   (b) Why does not this connection affect the balance conditions?
   (c) What are problems associated with shielding? How they are handled.[5+5+6]
4. (a) What is distortion. Explain different types of distortion.
   (b) Explain about Harmonic Analyzer. [8+8]
5. (a) An input pulse V_i of 5 ns duration is applied to the basic sweep circuit using R and C at the instant Vo reaches 4.76V. What is the voltage across the capacitor after 50 μ s if the saturated transistor presents a resistance of 0.2kohms to the circuit?
   (b) A trigger pulse is applied to the basic sweep using R and C for every 10 ms. Compute the amplitude of the voltage, V_0, across the capacitor when the trigger pulse is applied. The values of V_{cc} = 50 V, R = 500 KΩ, C = 0.2 μF.
   (c) Discuss the relationship between the bandwidth and rise time in CRO. [6+5+5]
6. (a) Draw the block diagram of X-Y recorder and explain it. Give few examples of it. [3+5+2=10]
   (b) What are the advantages of Magnetic tape recorders. [6]
7. (a) Where are piezoelectric transducers mainly used and why? [4]
   (b) Give the equivalent circuit of a crystal and explain how a crystal is used as a transducer? [2+4=6]

(c) Explain the construction and working of strain gauge. [3+3=6]

8. (a) Show with an example, how the capacitive transducer has excellent frequency response? [8]

(b) What is temperature co-efficient of resistor? Explain in detail. [3+5=8]

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

Answer any FIVE Questions
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1. (a) Explain the basic principle of a digital voltmeter.
   (b) Explain with the help of neat Circuit diagram, the working of a dual slope Digital voltmeter. [6+10]

2. Calculate the range of standard resistance in a Wheatstone bridge if:
   (a) the unknown resistance is in the range of 1 -100kohm and the other two arms have each 10 kohm
   (b) the unknown resistance is 10 kohm and arm opposite to the standard resistor is 1 kohm and the other arm has range of 2 -20 kohm
   (c) Explain the use of Thevenin's theorem in the analysis of Wheatstone bridge. [5+5+6]

3. With the aid of circuit diagrams and derivations, explain how effective resistance of series resonant circuit can be measured using:
   (a) Resistance variation method and
   (b) Reactance variation method. [8+8]

4. (a) If the internal time base of frequency counter is 10,000Hz, what frequency range is best measured by period measurement and what frequency is best measured by a conventional frequency measurement?
   (b) What method can be used to increase the frequency range of a frequency counter? How can this be achieved without degrading the accuracy of the counter? [8+8]

5. Describe the following:
   (a) Sources of Synchronisation.
   (b) Blanking circuit
   (c) Focus control. [5+6+5]

6. (a) Explain the two types of Spectrum Analyzers. [2×3=6]
   (b) Explain the following terms associated with Spectrum Analyzer: [3×2=6]
      i. Sensitivity
      ii. Dynamic Range

iii. Harmonic Mixing.

(c) Compare the selectivity characteristics of the Spectrum Analyzer and Wave Analyzer. [4]

7. (a) Explain the equivalent circuit of piezoelectric crystal under conditions of load. [6]

(b) What are the uses of piezoelectric transducers? [5]

(c) Draw the experimental set up measuring force using piezoelectric crystal. [5]

8. (a) What is an LVDT? Where is it used? Explain its operating principle [2+2+4]

(b) What are linearity and sensitivity of resistance transducers? [8]

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Code No: RR320403 **Set No. 3**

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ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Common to Electronics & Communication Engineering and Electronics & Telematics)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain in case of DVM
   i. $3\frac{1}{2}$ digits ,
   ii. $5\frac{1}{2}$ digits. What is the significance of $\frac{1}{2}$ digit.
   (b) Explain about the conversion logic used in case of simultaneous type of A/D DVM. [8+8]

2. (a) Explain how a Kelvin's double bridge can accurately measure low resistances. Also derive the condition for balance.
   (b) A four terminal resistor of approximately 50 $\mu\Omega$ resistance was measured by means of a Kelvin's double bridge having the following component values : Standard resistance = 100.03 $\mu\Omega$, inner ratio arms = 100.31 Ω and 200 Ω , Outer ratio arms = 100.25Ω and 200 Ω . Resistance of the link connecting the standard and the unknown resistor = 700$\mu\Omega$. Calculate the unknown resistance to the nearest of 0.01$\mu\Omega$. [10+6]

3. (a) Briefly explain any three differences in the operation of a CT and a PT.
   (b) Draw the equivalent circuit and the phasor diagram of a PT . Derive an expression for phase angle. [9+7]

4. (a) Define delay. Explain the methods for measuring group delay.
   (b) Define the term phase. With neat diagram explain how phase is measured using vector voltmeter? [8+8]

5. (a) Derive the equations for Resistive voltage divider and capacitive voltage divider of compensated attenuator .
   (b) Explain the method of finding phase, frequency relationship of two waveforms using Lissajous figures.
   (c) What are the advantages of using an active probe. [6+6+4]

6. (a) Explain the two types of Spectrum Analyzers. [2×3=6]
   (b) Explain the following terms associated with Spectrum Analyzer: [3×2=6]
   i. Sensitivity
   ii. Dynamic Range
   iii. Harmonic Mixing.

(c) Compare the selectivity characteristics of the Spectrum Analyzer and Wave Analyzer. [4]

7. (a) Illustrate the principle of force summing devices using suitable examples and sketches.

   (b) What are the main elements of velocity transducer? [8+8]

8. (a) Where does the variable capacitance transducer finds suitable usage? [5]

   (b) Discuss their working principle of a variable capacitance transducer? [5]

   (c) Write short notes on LVDT. [6]

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

Answer any FIVE Questions
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1. (a) Explain about each block of DVM and mention advantages of them.
   (b) Explain the bridge type of thermocouple arrangement and mention its applications. [8+8]
2. An unbalanced Wheatstone bridge is supplied with a 10 V DC and the resistances are 2.7 kohm, 12 kohm, 3.3 kohm and 2 kohm in the anticlockwise direction starting from the junction of resistors connected to positive terminal of the DC supply. If the galvanometer has an internal resistance of 100 ohm, calculate
   (a) the current through the meter
   (b) the current through each branch [8+8]
3. (a) Discuss the general classification of experimental methods used to test CTs and PTs.
   (b) With the help of suitable circuit, phasor diagram, and equations, explain the mutual inductance method of testing CTs. [8+8]
4. (a) Explain the use of zero crossing detectors in time period measurements.
   (b) Explain with waveforms the functioning of the control circuit in time interval mode. [8+8]
5. (a) Draw the block diagram of a basic horizontal Deflection section and explain each and every block.
   (b) Write short notes on the synchronization of the sweep. [8+8]
6. (a) Explain the Digital data recording technique.
   (b) Explain the tracking generator counter applications. [8+8]
7. (a) What are the modes of operation of piezoelectric crystals? Explain in detail. [2+4=6]
   (b) Draw the equivalent circuit of piezoelectric transducer. [4]
   (c) Explain the properties of piezoelectric crystals. [6]
8. (a) Draw the cross sectional view of LVDT and explain its operation. [3+5=8]
   (b) Explain the applications of LVDT with neat sketches. [5+3=8]

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