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

III B.Tech. II Semester Regular Examinations, April/May -2005
ELECTRONIC MEASUREMENTS & 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 systematic errors clearly with the help of examples.
   (b) A resistor is measured by the voltmeter and ammeter method, the voltmeter reading is 125.4V on the 250V scale and the ammeter reading is 288.5mA on 500mA scale. Both meters guaranteed to accurate within ±1 percent of full-scale reading. Calculate
      i. the indicated value of the resistor
      ii. the limits within which you can guarantee the result.

2. The standard resistor arm of a Wheatstone bridge has a range from 0 to 100 ohm with a resolution of 0.001 ohm. The galvanometer has an internal resistance of 100 ohm and can be read to 0.5 μA. The other two arms have each 1 kohm. The bridge is supplied with a 10 V DC source. When the unknown resistance is 50 ohm, what is the resolution of the bridge in
   (a) ohms and
   (b) per cent of the unknown.

3. (a) With suitable circuits and derivations explain how inductance and capacitance can be measured at high frequencies using resonance method.
   (b) A coil of unknown inductance and self-capacitance is connected in series with a standard variable capacitor C. An electronic voltmeter is connected across C. A variable frequency oscillator is loosely coupled to the coil and the circuit is adjusted to resonance for each different oscillator frequency by adjusting C, as shown below:

f	KHz:	350	400	450	500	600
C	pF:	132	98	74	55	31

   If input capacitance of the voltmeter is 4.5 pF and the lead capacitance is 1.5 pF, determine the inductance and self capacitance of the coil.

4. Explain a digital method of measurement of frequency. Explain how the frequency range of measurement can be increased without affecting the accuracy of the measurement.

5. (a) Draw the neat sketch of triggered sweep circuit and explain it. Draw the trigger pulse and sweep waveforms.
   (b) Draw the block diagram of a dual beam oscilloscope and explain its working.

6. (a) Draw the block diagram of a spectrum analyzer of the swept-receiver design and explain it.
   (b) Discuss the applications of Spectrum analyzer.
7. (a) Illustrate the principle of force summing devices using suitable examples and sketches.
   (b) What are the main elements of velocity transducer?
8. (a) What is an LVDT? Where is it used? Explain its operating principle
   (b) What are linearity and sensitivity of resistance transducers?

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Code No: RR320403 **Set No.2**

III B.Tech. II Semester Regular Examinations, April/May -2005
ELECTRONIC MEASUREMENTS & 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 systematic errors clearly with the help of examples.
   (b) A resistor is measured by the voltmeter and ammeter method, the voltmeter reading is 125.4V on the 250V scale and the ammeter reading is 288.5mA on 500mA scale. Both meters guaranteed to accurate within ±1 percent of full-scale reading. Calculate
      i. the indicated value of the resistor
      ii. the limits within which you can guarantee the result.
2. (a) Explain the technique of measuring resistance using Wheatstone bridge.
   (b) Express the unknown resistance value in terms of the other circuit elements.
   (c) Compare the measuring accuracy of a Wheatstone bridge with the accuracy of an ordinary ammeter.
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.
4. What is a programmable decade synthesizer? Explain with the circuit.
5. (a) A high-impedance probe with 9 Mμ resistance and 4 pF capacitance is connected to CRO with an i/p resistance of 1 Mμ if the effective capacitance decreased to 3.6 pF when the probe was connected. What is the capacitance of CRO alone?
   (b) Describe the different types of phosphorous materials used in a CRO and list their applications?
   (c) The input attenuator in the vertical amplifier of a general purpose CRO is generally followed by an emitter follower or cathode follower circuit. Suggest three possible reasons for using this circuit.
6. (a) Explain the reproducing process of analog recording .
   (b) Discuss about magnetic materials for tape.
7. (a) Explain piezoelectric effect.
   (b) What are the materials that show piezoelectric effect?

(c) What are the materials belonging to natural and synthetic group of piezo electric materials?

(d) Draw the structure of piezoelectric crystal.

8. (a) How will you apply microelectronic circuit technology for solid state transducers, especially for pressure measurements- Explain.

(b) Write short notes on resistive transducer.

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

III B.Tech. II Semester Regular Examinations, April/May -2005
ELECTRONIC MEASUREMENTS & 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 the working principle of a Dual slope integrator type of DVM with the help of neat block diagram.
   (b) Explain the importance of thermocouples in the construction of true RMS type of voltmeter.
2. (a) Draw the circuit of a Schering bridge and discuss its principle with the help of suitable derivations and phasor diagram at balance.
   (b) Write a note on the 'dissipation factor' of a capacitor.
3. (a) With suitable circuits and derivations explain how inductance and capacitance can be measured at high frequencies using resonance method.
   (b) A coil of unknown inductance and self-capacitance is connected in series with a standard variable capacitor C. An electronic voltmeter is connected across C. A variable frequency oscillator is loosely coupled to the coil and the circuit is adjusted to resonance for each different oscillator frequency by adjusting C, as shown below:

f	KHz:	350	400	450	500	600
C	pF:	132	98	74	55	31

   If input capacitance of the voltmeter is 4.5 pF and the lead capacitance is 1.5 pF, determine the inductance and self capacitance of the coil.
4. Draw the block schematic of a frequency counter set for period measurement and explain how period is measured.
5. Describe the following:
   (a) Sources of Synchronisation.
   (b) Blanking circuit
   (c) Focus control
6. (a) Explain the Digital data recording technique.
   (b) Explain the tracking generator counter applications.
7. (a) Explain the equivalent circuit of piezoelectric crystal under conditions of load.
   (b) What are the uses of piezoelectric transducers?
   (c) Draw the experimental set up measuring force using piezoelectric crystal.

8. (a) What are the main characteristics of a high vacuum gauge? How are they used for measurement?

   (b) Enumerate the principles behind an inductive transducer.

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Code No: RR320403 **Set No.4**

III B.Tech. II Semester Regular Examinations, April/May -2005
ELECTRONIC MEASUREMENTS & 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 the following
   i. Accuracy
   ii. Error
   iii. Linearity
   iv. Precision
   (b) Discus main differences between accuracy and precision.
   (c) Explain about peak responding voltmeter.
2. The standard resistor arm of a Wheatstone bridge has a range from 0 to 100 ohm with a resolution of 0.001 ohm. The galvanometer has an internal resistance of 100 ohm and can be read to 0.5 μA. The other two arms have each 1 kohm. The bridge is supplied with a 10 V DC source. When the unknown resistance is 50 ohm, what is the resolution of the bridge in
   (a) ohms and
   (b) per cent of the unknown.
3. (a) What are the causes that can cause permanent magnetization of the core in a CT.
   (b) Briefly discuss the two techniques employed for the demagnetization of the core of a CT.
   (c) A CT with a bar primary has 300 turns in its secondary winding . The resistance and reactance of the secondary circuit are 1.5 Ω and 1.0 Ω respectively including the transformer winding. With 5 Amps flowing in the secondary winding, the magnetizing mmf is 100 A and the iron loss is 1.25 W . Determine the ratio and phase angle error.
4. Describe with the help of suitable circuit diagrams, how the following types of measurements are carried out using a digital frequency meter.
   (a) Time interval measurement
   (b) Multiple ratio measurement
5. Describe the following:
   (a) Sources of Synchronisation.

(b) Blanking circuit

(c) Focus control

6. (a) Draw the block diagram of a spectrum analyzer of the swept-receiver design and explain it.

   (b) Discuss the applications of Spectrum analyzer.

7. (a) What are the crystalline materials used as transducers. What are their merits and demerits?

   (b) Derive an expression for finding the voltage developed across a crystal. Explain how temperature affects it?

8. (a) Name some common types of strain gauges?

   (b) What characteristics determine the size of the strain gauge?

   (c) Explain the functioning of a foil type strain gauge.

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