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

**III B.Tech II Semester Regular Examinations, Apr/May 2006**
**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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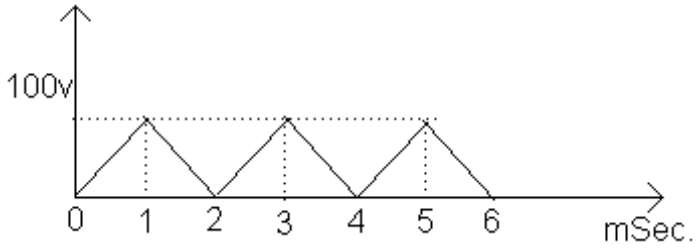
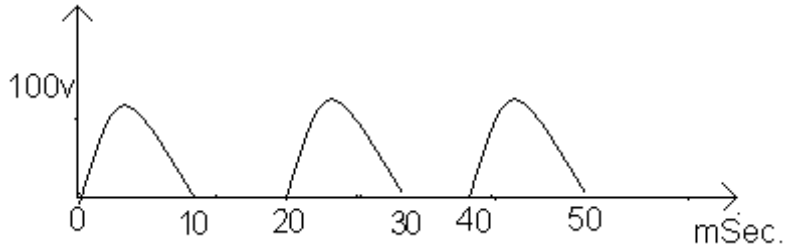
1. (a) A d'Arsonval movement is used to construct a D.C. Voltmeter 0-100V. Calculate deflection

   i. if the triangular wave is given as shown below :




   ii. Half sine wave is given as shown below :




   (b) What are differences between analog meters and digital meters from point of view of display and portability and ruggedity, immunity. [8+8]

2. (a) Draw the Anderson bridge and derive the balancing conditions.

   (b) An ac bridge is fed with a source of frequency 1 kHz, acorss BD. The detector is connected across AB. The arm AB has R = 450 ohm; arm BC has R = 300 ohm in series with C = 0.256$\mu$ f; arm CD has the unknown component; arm DA has R = 200 ohm in series with L = 15.9 mHo Find the constants of arm CD. [8+8]

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. [8+8]

4. (a) What is digital frequency meter? Draw the basic circuit of a digital frequency meter.

   (b) What is time base? Why is it needed? Draw the circuit of a time base selector and explain. [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 $\mu$ 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 K$\Omega$, C = 0.2 $\mu$F.

   (c) Discuss the relationship between the bandwidth and rise time in CRO. [5+5+6]

6. (a) Draw the block diagram of a spectrum analyzer of the swept-receiver design and explain it. [4+6]

   (b) Discuss the applications of Spectrum analyzer. [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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Code No: RR320403 **Set No. 2**

**III B.Tech II Semester Regular Examinations, Apr/May 2006**
**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 what is meant by true R.M.S. responding voltmeter and why is it a must in certain applications. Name them.
   (b) Distinguish between functions of the following
      i. Electronic analog voltmeter
      ii. Digital multimeter
      iii. a.c. milli voltmeter and
      iv. true RMS voltmeter. [8+8]

2. (a) A sheet of Bakelite 4.5 mm thick is tested at 50 Hz between electrodes 0.12 m in diameter. The Schering bridge employs a standard air capacitor of 106 pF capacitance, a non-reactive resistance$R_4$ of 1000 Ω in parallel with a variable capacitance $C_4$ and variable resistance$R_3$ . If balance is obtained with $C_4$ = 0.4 $\mu$ F and $R_2$ = 400 Ω . Calculate the capacitance , PF, and relative permittivity of the sheet.
   (b) Explain the differences in balancing dc and ac bridges. [8+8]

3. (a) With the help of relevant curves, discuss the effects of variations in burden, Power Factor and frequency on the performance of a CT
   (b) Define Ratio error and phase angle errors in a CT. [10+6]

4. (a) Give the block diagram of a multiplexed display used in frequency counter and explain briefly.
   (b) What is meant by long term and short-term stability of a crystal? [10+6]

5. (a) Compare the output voltage of the voltage divider attenuator (Compensated Attenuator) for a dc voltage and a 10 MHZ ac signal.
   (b) Write short notes on delay line construction techniques.
   (c) How do we measure voltage and time using CRO? [5+5+6]

6. (a) What are the advantages and disadvantages of direct recording. [4+4=8]
   (b) Explain the following two terms in FM recording. [4+4=8]
      i. percentage deviation.
      ii. deviation ratio.

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

**III B.Tech II Semester Regular Examinations, Apr/May 2006**
**ELECTRONIC MEASUREMENTS & INSTRUMENTATION**
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**Time: 3 hours** **Max Marks: 80**

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

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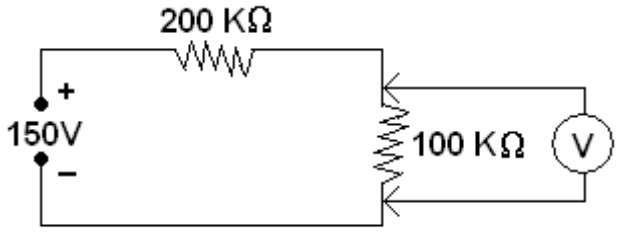
1. (a) What is meant by voltmeter sensitivity? Explain its relevance in circuit applications. What is meant by loading effect? What circuit arrangement is done to avoid the same.

   (b) It is desired to measure the voltage across the 100KΩ resistor in the circuit given below. Two voltmeters are available for this measurement. Voltmeter 1 with a sensitivity of 1000Ω/V and voltmeter 2 with a sensitivity of 20,000Ω/V. Both meters are used on their 50V range. Calculate i) the reading of each meter ii) error in each reading, expressed as a percentage of the true value. [8+8]




2. (a) A Maxwell bridge is used to measure an inductive impedance at a frequency of 3 kHz. The bridge constants at balance are arm 1: a capacitor of value 0.02 $\mu$ F in shunt with 390 kohm; arm 3 opposite to the arm 1 is having the unknown component; the other arms have each 18 kohm resistor. Find the equivalent series circuit of the unknown impedance. What is the value af the quality factor?

   (b) What is the usual procedure for balancing the Maxwell bridge? What is the necessity for following such a procedure? Explain with the circuit diagram. [8+8]

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. [7+9]

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. (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. [8+8]

6. (a) Draw the block diagram of a spectrum analyzer of the swept-receiver design and explain it. [4+6]

   (b) Discuss the applications of Spectrum analyzer. [6]

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) Define gauge factor for a transducer? [4]

   (b) Derive an expression for this factor for a strain gauge? [4]

   (c) What is the main factor desirable for a strain gauge? [4]

   (d) How will you achieve it? [4]

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

**III B.Tech II Semester Regular Examinations, Apr/May 2006**
**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) What is meant by precision rectifier? Explain its working principle and its suitability in measurement applications.
   (b) How minimum voltage ranges are limited in low cost (AVO) voltmeter in a.c. range. What circuit arrangement is used to convert a.c. to d.c. in such voltmeters. [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 $\Omega$ and 200 $\Omega$ , Outer ratio arms = 100.25$\Omega$ and 200 $\Omega$ . 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) What are the problems associated with grounding? How are they handled?
   (b) Explain how can a Q meter be used for the measurement of stray capacitance? [8+8]

4. (a) Give the block diagram of a multiplexed display used in frequency counter and explain briefly.
   (b) What is meant by long term and short-term stability of a crystal? [10+6]

5. (a) Draw the neat block diagram of a general purpose oscilloscope and explain its basic operation.
   (b) Explain the following terms:
      i. Fluorescence
      ii. Phosphorescence
      iii. Persistence. [7+9]

6. (a) Discuss the elements of a Tape Recorder.
   (b) Explain the direct recording method in detail. [8+8]

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) 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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