

Code No: R31044

R10

Set No: 1

III B.Tech. I Semester Supplementary Examinations, May 2013
ELECTRONIC MEASUREMENTS AND INSTRUMENTATIONS

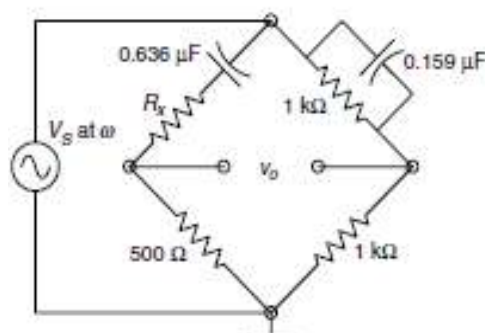
(Common to Electronics and Communication Engineering & Electronics and Instrumentation Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
 All Questions carry equal marks

- (a) Explain why a PMMC movement is shunted by a resistor when used as a AC voltmeter.
 (b) Explain the principle and operation of a thermocouple type RF ammeter.
 (c) A voltmeter is accurate to 97% of its full scale reading, if it is used to read 200V on a 400V scale calculate the absolute error and the percentage of error. (3+6+6)
- (a) Draw the block diagram of a pulse generator and explain the operating principle.
 (b) Draw the block diagram of AF square wave generator and explain the operation. (9+6)
- (a) Explain the differences between a wave analyzer and harmonic distortion analyzer.
 (b) What is distortion factor and Explain the measurement of distortion factor with a neat diagram. (4+11)
- (a) Draw the block diagram of dual beam CRO and explain the operation of each block.
 (b) Explain the operation of vertical amplifier in CRT.
 (c) Why are the operating voltages of CRT arranged so that the deflection plates are nearly at the ground potential. (7+4+4)
- (a) Draw the block diagram of Dual trace oscilloscope and explain the operation. Use relevant wave forms if necessary.
 (b) Draw the block diagram of a digital readout oscilloscope when used for voltage to time conversion and explain. (9+6)
- (a) Derive the expression for capacitance to be measured using Schering's bridge.
 (b) For the bridge show in figure below find frequency of the source and the resistance R_x that will give the null across v_o . (9+6)



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7. (a) Describe the construction and working principle of LVDT.
(b) Classify wire strain gauges and explain the construction and working of each one of them. (6+9)
8. Write notes on
(a) Force measurement.
(b) Humidity measurement. (8+7)

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Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
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- (a) List and define the dynamic characteristics of an instrument. Explain the dynamic response of a second order instrument.

(b) A $260\Omega \pm 10\%$ resistance is connected to a power supply source operating at 300V dc. What range of current would flow if the resistor varied over the range of $\pm 10\%$ of its expected value? Also find the range of error in the current. (7+8)
- (a) Explain the working of a standard sweep generator with a diagram.

(b) What are the requirements of a pulse with reference to generator. (8+7)
- (a) Explain the working principle of a digital Fourier analyzer.

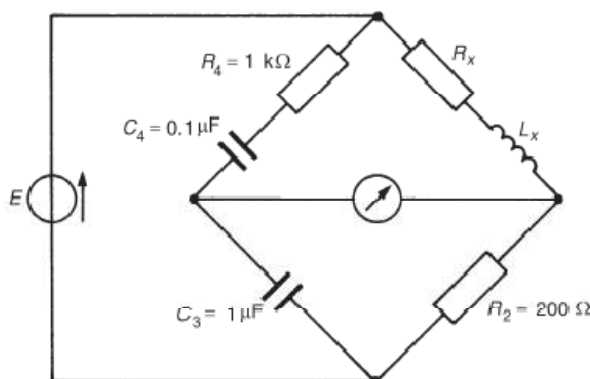
(b) Draw and explain the block diagram of digital signal analyzer. Discuss the processing of one and two channel systems using relevant expressions for correlation functions, spectral densities and Transfer function. (5+10)
- (a) Explain the operation of time base generator in horizontal deflecting system of CRO.

(b) Draw the diagram of sync selector and explain.

(c) Why is a delay line used in the vertical section of the oscilloscope? (7+4+4)
- (a) Explain the operation of sampling oscilloscope using relevant diagrams and wave forms.

(b) State the function and explain the working of a 10:1 probe for a CRO. (9+6)
- (a) Explain the operation of Maxwell's bridge using relevant diagram. Derive the expressions for unknown inductance and Q.

(b) The a.c bridge shown in figure below is balanced. Determine the values of R_x and L_x . (9+6)



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7. (a) State the main advantages and disadvantages of semiconductor strain gauges compared to metallic wire strain gauge.
(b) Describe the construction and working of thermocouple.
(c) State the limitations of thermocouple. (4+7+4)
8. Write notes on
(a) Pressure measurement
(b) Velocity measurement. (7+8)



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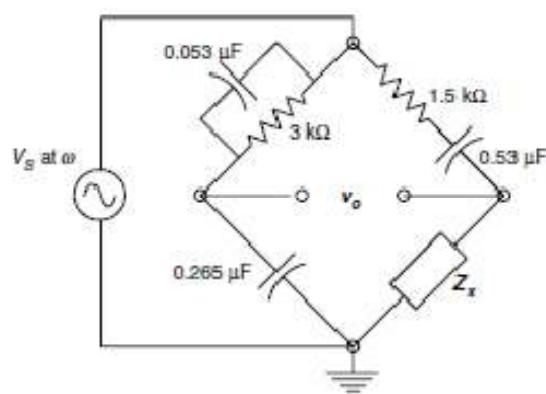
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Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
 All Questions carry equal marks

- Define the sensitivity of a multimeter. Explain the operation of a multimeter using a simple block diagram.
 - A person using an ohmmeter reads the measured value as 470Ω instead of 47Ω . What kind of error does this represent? Justify.
 - The output voltage of an amplifier measured at eight different intervals using the same digital voltmeter has the following readings in Volts 20.00, 19.80, 19.85, 20.05, 20.10, 19.90, 20.25, 19.95. Which is the most precise measurement? Justify (7+4+4)
- Draw the block schematic of a AF sine and square wave generator and explain the operating principle.
 - How are broadband sweep frequencies generated using a sweep generator. (9+6)
- Explain the working of harmonic distortion analyzer employing resonance bridge and Wien's bridge methods and compare them.
 - Explain the working of a heterodyne analyzer using a block diagram. (8+7)
- What is the need for a time base generator in a CRO?
 - Explain the operation of trigger pulse circuit.
 - What are the advantages of using $-ve$ HV supply in CRO?
 - Discuss intensity modulation with reference to a CRT. (4+4+4+3)
- Explain measurement of frequency by Lissajous method.
 - Classify CRO probes and explain direct probes. (9+6)
- Derive the expression for unknown resistance in Kelvin double bridge. Mention the applications of a Kelvin bridge.
 - For the bridge shown in figure below $f=1000$ Hz, assuming null across V_o find Z_x (9+6)



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7. (a) Explain the properties of thermistors. Draw and explain resistance versus temperature graph. Describe the different types of thermistors and suggest an application of each one of them.
(b) State the advantages and limitations of thermistors (11+4)
8. Write notes on
(a) Data acquisition system.
(b) Proximity and displacement measurement. (7+8)

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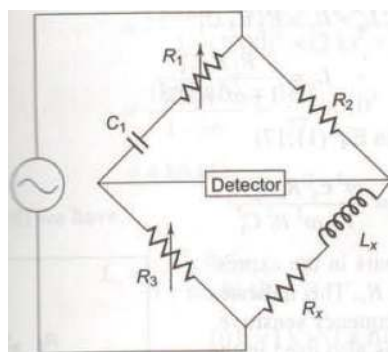
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Answer any FIVE Questions
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- Explain the operation of series type ohmmeter and also present the calibration of shunt type ohmmeter.
 - The current passing through a resistor of $100 \pm 0.2 \Omega$ is 2.00 ± 0.01 A .Calculate the limiting error in the computed value of powerdissipation (I^2R).
 - A digital voltmeter has a read-out range from 0 to 9,999 counts. Determine the resolution of the instrument in Volts when the fullscale reading is 9.999V. (9+4+2)
- Explain the working of a basic generating loop of a pulse generator.
 - Explain the working of random noise generator with the help of a block diagram. (8+7)
- Explain the working of a frequency selective wave analyzer using a block diagram.
 - Explain the working of harmonic distortion analyser using bridged-T network. (9+6)
- Explain the important features of CRT
 - Explain the function of delay line in triggered sweep. (8+7)
- What are the advantages of using an active probe? Explain the operation of an active probe using a FET.
 - Explain the operation of a digital readout oscilloscope. (8+7)
- Find the series equivalent inductance and resistance of the network that causes an opposite angle to null with the bridge arms, $R_1=2K\Omega, R_2=10K\Omega, C_1=1\mu F, R_3=1K\Omega$ of the figure shown below. Use $\omega=4000$ rad/s.



- Mention the precautions to be used in using bridges.
- Mention the applications and reasons for such application for Wheatstone bridge and Kelvin's bridge. (8+3+4)



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7. (a) Explain the construction and working of a resistance thermometer.
(b) Explain cold junction compensation and reference junction compensation of thermocouple with relevant diagrams. (8+7)
8. Write notes on
(a) Humidity and moisture measurement.
(b) Force measurement. (8+7)

FirstRanker

