Code No: R203104B **R20** SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, December -2023

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

*****

UNIT-I

1.	a)	Differentiate between a series type ohmmeter and a shunt type ohmmeter.	[7M]
	b)	How do random errors differ from systematic errors?	[7M]
		(OR)	
2.	a)	Briefly define and explain all the static characteristics of measuring instruments.	[7M]
	b)	Compare a multirange voltmeter with the Aryton shunt voltmeter.	[7M]
		UNIT-II	
3.		Where is spectrum analyzers commonly used? Explain with the help of a block diagram the working of a spectrum analyzer.	[14M]
		(OR)	
4.	a)	Explain the working of a heterodyne type wave analyzer with neat sketch.	[7M]
	b)	Explain the random noise generator can be used in the audio frequency ranges with a neat sketch.	[7M]
		UNIT-III	
5.	a)	What is a sampling oscilloscope? Which oscilloscope is used in a digital storage oscilloscope? What is the main advantage of using a digital storage oscilloscope?	[10M]
	b)	State the standard specifications of CRO.	[4M]
		(OR)	
6.	a)	Explain the functions of various controls on the front panel of a CRO.	[7M]
	b)	Differentiate between the active probe and passive probe.	[7M]
		UNIT-IV	
7.	a)	Obtain the balanced condition of Andersons bridge in measurement of inductance.	[7M]
	b)	Explain how Wien's bridge can be used for experimental determination of frequency. Derive the expression for frequency in terms of bridge parameters.	[7M]
		(OR)	
8.	a)	What are the errors made in the measurement of resistance using Wheatstone bridge? What are the ways of minimizing them?	[7M]
	b)	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 μ F in shunt with 390 kΩ; arm 3 opposite to the arm 1 is having the unknown component; the other arms have each 18 kΩ resistor. Find the equivalent series circuit of the unknown impedance. What is the value of the quality factor?	[7M]

Code No: R203104B **R20** SET - 1

UNIT-V

9. a) Describe the principle of operation of Resistance transducer. [7M]
   b) Explain the transducer that are used for measurement of displacement and explain the procedure of measurement. [7M]

(OR)

10. a) Describe the principle of operation of inductance transducer. [7M]
    b) Discuss the transducer that are used for measurement of acceleration and explain the procedure of measurement. [7M]

Code No: R203104B **R20** SET - 2

III B. Tech I Semester Regular/Supplementary Examinations, December -2023
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. a) What are the different types of errors? Describe their sources briefly. [7M]
   b) The series type ohmmeter uses a 50 Ω basic movement requiring a full scale current of 1 mA. The internal battery voltage is 3 V. The desired scale marking for half scale deflection is 2000 Ω. Calculate (a) the values of R_1 and R_2 (b) the maximum value of R_2 to compensate for a 10% drop in battery voltage [7M]

(OR)

2. a) How are judged the performance characteristics of an instrumentation system? [7M]
   b) Compare a true rms meter with an average responding meter. [7M]

UNIT-II

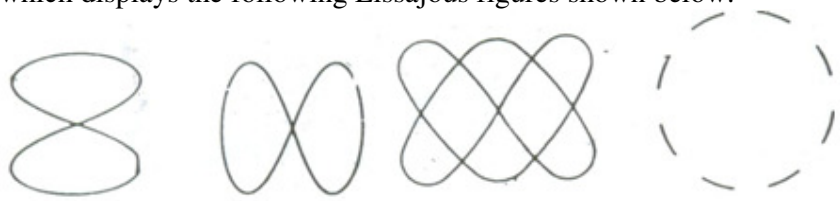
3. a) What principle is employed for the operation of a function generator? [7M]
   b) Write about the AF sine and square wave generator. [7M]

(OR)

4. a) What is the difference between a wave analyzer and a harmonic distortion analyzer? [7M]
   b) Discuss the working of digital fourier analyzers [7M]

UNIT-III

5. a) Calculate the ratio of vertical to horizontal frequencies for an oscilloscope which displays the following Lissajous figures shown below. [7M]



   b) Enumerate the comparisons between analog and digital storage oscilloscope. [7M]

(OR)

6. a) With neat diagram, explain digital storage oscilloscope. [7M]
   b) What are the various probes used in CRO's? Explain. [7M]

UNIT-IV

7. Derive the equations of balance for an Anderson bridge? Discuss the advantages and disadvantages of the bridge. [14M]

(OR)

8. a) The arms of Five node bridge are as follows, arm ab : an unknown impedance (R_1, L_1) in series with a non-inductive variable resistor r_1, arm bc : a non-inductive resistor R_3 = 100 Ω arm cd : a non-inductive resistor R_4=200Ω, arm da : a non-inductive resistor R_2=250Ω arm de : a non inductive variable resistor r, arm ec : a loss-less capacitor C=1 μF and arm be : a detector an a.c. supply is connected between a and c. Calculate the resistance and inductance R_1,L_1, when under balanced conditionsr_1=43.1Ωand r=229.7 Ω [10M]

b) Explain the basic principle of counters and its modes of operation. [4M]

UNIT-V

9. a) What are the functions of a transducer? List five physical quantities that transducer measures. [7M]

b) List three types of temperature transducers and describe the applications of each. [7M]

(OR)

10. Describe the construction and working of LVDT and also discuss their advantages and disadvantages. [14M]

Code No: R203104B **R20** SET - 3

III B. Tech I Semester Regular/Supplementary Examinations, December -2023
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. a) Define the terms accuracy, error, precision, resolution, expected value and sensitivity. [7M]
   b) Explain about the multirange ammeter with neat circuit diagram. [7M]

(OR)

2. a) State the three types of systematic errors, giving examples of each. [7M]
   b) Design a multirange ammeter with ranges of 0-1 A, 5 A, 25 A and 125 A, employing individual shunts in each. A D'Arsonval movement with an internal resistance of 730 Ω and a full scale current of 5 mA is available. [7M]

UNIT-II

3. a) Draw the block diagram of a function generator and explain the method of producing sine waves. [7M]
   b) Discuss the random noise generator with neat schematic. [7M]

(OR)

4. a) Explain the purpose of signal generator? Discuss the requirements of signal generator? [9M]
   b) List out the applications of a spectrum analyzer. [5M]

UNIT-III

5. a) What do you mean by Lissajous pattern? Explain the measurement of frequency using Lissajous pattern. [7M]
   b) Discuss the advantages and disadvantages of analog and digital type of oscilloscope. [7M]

(OR)

6. a) Draw the block diagram of a general purpose CRO and explain the functions of each block. [7M]
   b) Describe how the phase angle measurement can be made with the use of a CRO. [7M]

UNIT-IV

7. Derive the expression for bridge sensitivity for a Wheatstone bridge with equal arms. Find also the expression for current through the galvanometer for a small unbalance. [14M]

(OR)

8. a) What are the different sources of errors in a.c bridge? Explain the precautions taken and the techniques used for elimination of these errors. [5 M]

   b) A capacitor bushing forms arm ab of a Schering bridge and a standard capacitor of 500 pF capacitance and negligible loss, forms arm ad. Arm bc consists of a non-inductive resistance of 300 Ω. When the bridge is balanced arm cd has a resistance of 72.6 Ω in parallel with capacitance of 0.148 μF. The supply frequency is 50 Hz. Calculate the capacitance and dielectric loss angle of capacitor. [9M]

UNIT-V

9. Describe the working of Piezo Electric transducers and also discuss their advantages and disadvantages. [14M]

(OR)

10. Write short note on the following [14M]
    a) Strain Gauges
    b) Capacitive Transducer

Code No: R203104B **R20** SET - 4

III B. Tech I Semester Regular/Supplementary Examinations, December -2023
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1.	a)	Define the terms speed of response, fidelity, lag and dynamic error.	[7M]
	b)	Discuss the working of true RMS meter with neat sketch.	[7M]
		(OR)	
2.	a)	State the difference between accuracy and precision of a measurement.	[7M]
	b)	A basic D'Arsonal movement with a full scale deflection of 50 μA and an internal resistance of 1800 Ω is available. It is to be converted into a 0-1 V, 0-5 V, 0-25 V and 0-225 V multirange voltmeter using individual multipliers for each range. Calculate the values of the individual resistors.	[7M]

UNIT-II

3.		Draw a circuit of basic wave analyzer? Explain in detail about the frequency selective wave analyzer with neat sketch?	[14M]
		(OR)	
4.	a)	Explain the working of Arbitrary waveform generator with neat sketch.	[7M]
	b)	Draw and explain the block diagram of AF sine and square wave generator.	[7M]

UNIT-III

5.		Describe in details the construction and working of an analog type storage oscilloscope. Explain the principle of secondary emission.	[14M]
		(OR)	
6.	a)	Explain the working of sampling oscilloscope with neat sketch.	[7M]
	b)	How is magnitude and phase measured on a CRO for two different waves?	[7M]

UNIT-IV

7.	a)	Derive the general equations for balance of an a.c. bridge. Prove that "For balance in an a.c. bridge, both magnitude and phase have to be satisfied unlike a d.c. bridge where in only the magnitude condition is to be satisfied".	[7M]
	b)	The four arms of a wheat stone bridge have the following resistances: AB=100 Ω, BC=10Ω, CD=4Ω, DA=50ΩA galvanometer of 20 ohms resistance is connected across BD. Calculate the current through the galvanometer when a potential difference of 10 volts is maintained across AC.	[7M]
		(OR)	

8. Explain how Q meter can be used for the measurement of resistance and inductance of an unknown coil. What are the necessary precautions to be taken while using a Q-meter? [14M]

UNIT-V

9. a) Discuss about the working of LVDT with neat sketch? [7M]
   b) A resistance strain gauge with a gauge factor 2.04 is fastened to a beam which is subjected to a strain of 1×10^{-6}.If the original resistance of the gauge is 120 Ω. Calculate the change in resistance? [7M]

(OR)

10. a) Discuss the transducer that are used for measurement of force and explain the procedure of measurement. [7M]
    b) Comparison between active and passive transducers. [7M]