SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

QUESTION BANK

18ECE325 – ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Question No.	Questions	PO Attainment
	UNIT – 1 MEASUREMENTS AND INSTRUMENTS	
	PART A (2 Marks)	
1	Define any two dynamic characteristics of an instrument.	PO1
2	State the importance of sensitivity while selecting voltmeters of an instrument.	PO1
3	A 500 volts voltmeter is accurate with +/-1% at full scale. Calculate the limiting error when the instrument is used to measure a voltage of 200 volts.	PO1,PO2
4	What are the limitations of thermo couples used in RF ammeter?	PO1
5	Compare the terms "Accuracy and Precision".	PO1
6	Define the term instrument and give the function of ohm meter.	PO1
7	Enumerate the salient features of a measurement system.	PO1
8	Define accuracy and precision.	PO1
9	What is loading effect in voltmeter?	PO1
10	What is meant by D'Arsonval movement?	PO1
11	What are the indications of precision? Explain	PO1
12	Define and derive static and dynamic error.	PO1
13	Give a classification of voltmeters.	PO1
14	Define the performance characteristics of an instrument?	PO1
15	Distinguish between static and dynamic characteristics?	PO1
16	List out the characteristics of a precision.	PO1
17	Explain ohm meter and its classification.	PO1
18	Define static characteristics.	PO1
19	Explain briefly about AC and DC voltmeters.	PO1
20	List the classification of performance characteristics of an instrument?	PO1
	PART-B (10 Marks)	
1		PO1, PO2
2	Draw the block diagram of multimeter and explain its operation for the measurement for voltage, current and resistance.	PO1
3	With necessary block diagram, explain the function of differential voltmeter.	PO1
4	Explain in detail about the static and dynamic calibrations. Also explain about the lag and dynamic error.	PO1
5	Discuss the various steps involved for multimeter for voltage, current and resistance measurements.	PO1
6	(a) How do you extend the range of a given ammeter and voltmeter? (b) Explain about source for different types of errors and precautions to minimize them	PO1
7	PMMC instrument has FSD of 100uA and a coil resistance of 1Kohm. Calculate required shunt resistance value to convert the instrument into an ammeter with (i) FSD=100mA and (ii) FSD=1A.	PO1, PO2
8	Explain the following terms in detail: (a) Accuracy (b) Resolution	PO1

	(c) Precision (d) Expected value	
9	Explain the following terms in detail (a) Speed of response (b) Fidelity (c) Lag and dynamic error.	PO1
10	A) List out different DC voltmeters and explain any one voltmeter in detail. B) A Voltmeter having a sensitivity of 30k/V reads 80V on a 100V scale, when connected across an unknown resistor. The current through the resistor is 2mA.Calculate the % of error due to loading effect.	PO1,PO2
11	(A) What is the principle and operation of a thermocouple type RF ammeter. (B) A voltmeter having a sensitivity of qkohm/v is connected across an unknown resistance in series with a milli ammeter reading 80V on 150V scale. When the milli ammeter reads 10mA, Calculate the (i) apparent resistance of the unknown resistor (ii) Actual resistance of the unknown resistor, and (iii) Error due to the loading effect of the voltmeter?	PO1,PO2
Question No.	Questions	PO Attainment
UNIT – IV: SIGNAL GENERATORS & ANALYZERS		
PART A (2 Marks)		
1	What are harmonic distortion analyzers?	PO1
2	Differentiate function generators from signal generators.	PO1
3	What are the basic characteristics of a pulse?	PO1
4	What is the function of spectrum analyzer?	PO1
5	What are the limitations of AF Oscillators?	PO1
6	Draw the block diagram of spectrum analyzer?	PO1
7	What is sweep frequency generator?	PO1
8	Distinguish between spectrum analyzer and harmonic distortion analyzer.	PO1
9	List out the differences between fixed frequency and variable AF oscillator.	PO1
10	Define wave analyzers?	PO1
11	List out the applications of wave analyzers?	PO1
12	List out the applications of spectrum analyzers?	PO1
13	Distinguish between square and pulse wave generators?	PO1
14	Define a function generator?	PO1
15	List out the applications of function generator?	PO1
16	What are the advantages incurred on spectrum analysis?	PO1
17	Distinguish between oscillator and function generator?	PO1
18	What is meant by harmonic distortion?	PO1
19	Define spectrum analyzer?	PO1
20	Draw the block diagram of digital data acquisition system?	PO1
PART-B (10 Marks)		
1	Discuss about basic principle of AF wave analyzer with neat sketch.	PO1

2	(A) Describe the generation of square and pulse in laboratory type generator. (B) Write short notes on Sweep generator.	PO1
3	Draw the block diagram of logic analyzer and explain its operation.	PO1
4	Draw the block diagram of pulse generator and explain its operation	PO1
5	With a neat block diagram, explain the operation, advantages and limitations of Harmonic Distortion analyzer.	PO1
6	Discuss in detail about the fixed and variable type of signal generators.	PO1
7	(A) State the application of a spectrum analyzer. (B) Draw the block diagram of a distortion measuring component type meter and explain its working.	PO1
8	Discuss the following with neat block diagram. (A)Pulse wave generator (B) Square wave generator.	PO1
9	(A) What is the principle of harmonic distortion analyzer? Explain its operation with the help of a functional block diagram. (B) Compare the selectivity characteristics of the Spectrum Analyzer and Heterodyne Wave Analyzer.	PO1
10	(A) With a neat sketch explain the operation of a heterodyne type wave analyzer. (B) Explain the following terms associated with Spectrum Analyzer: i) Sensitivity ii) Dynamic Range iii) Harmonic Mixing	PO1
11	Differentiate between wave analyzer and harmonic distortion analyzer?	PO1
12	Explain the principle of operation and generation of pulse and square wave?	PO1
13	Explain Arbitrary Waveform Generator	PO1
14	Explain the working principle of wave analyzer with neat block diagram	PO1

Question No.	Questions	PO Attainment
	UNIT – V: OSCILLOSCOPES	
	PART A (2 Marks)	
1	Why delay line is used in CRO?	PO1
2	Distinguish between analog and digital storage oscilloscope?	PO1
3	What are the applications of CRO?	PO1
4	What is the function of X – Y mode on CRO front panel?	PO1
5	List out the standard specifications of CRO.	PO1
6	What are the various probes of CRO?	PO1
7	What will happen when sweep signal is applied to horizontal plates of CRO?	PO1
8	Draw the internal structure of CRT and list its functions.	PO1
9	List the different control knobs available on the front panel of the CRO.	PO1
10	Define deflection sensitivity of a CRT?	PO1
11	Summarize the advantages of dual beam for multiple trace oscilloscopes.	PO1

12	Define CRO?	PO1
13	Discuss vertical amplifier with a neat block diagram?	PO1
14	Describe the roles of horizontal and vertical amplifiers?	PO1
15	Explain vertical section of CRT?	PO1
16	Explain about horizontal section of CRT.	PO1
17	Discuss about dual beam CRO?	PO1
18	Define dual trace oscilloscope?	PO1
19	Define sampling oscilloscope?	PO1
20	Write briefly about storage oscilloscope?	PO1
PART-B (10 Marks)		
1	Elaborate the different modes of operation in Dual Trace Oscilloscope	PO1
2	Explain the principle of time period measurement with a basic block diagram and show how its accuracy can be improved.	PO1
3	Derive the expression for deflection sensitivity of CRT	PO1
4	Explain the working principle of sampling and storage oscilloscopes.	PO1
5	Draw the block diagram of sampling oscilloscope and explain the operation of this oscilloscope. Also, explain how the sampling oscilloscope is different from general purpose oscilloscope.	PO1
6	With a neat block diagram, explain the operating principles of Dual trace CRO. Also, give the significance of vertical deflection plates in a CRT.	PO1
7	How does the Digital storage Oscilloscope differ from the conventional storage oscilloscope using a storage cathode ray tube? What are the advantages of each?	PO1
8	(A) Draw the block diagram of storage oscilloscope and explain the function of each block. (B) Derive the expression for vertical deflection of electron beam in CRT	PO1
9	(A) What is sampling oscilloscope? Mention its advantages and disadvantages. (B) Explain how time and frequency is measured using CRO.	PO1
10	Draw the block diagram of general purpose CRO and explain its working.	PO1
11	Explain with neat Block Diagram of Digital Storage oscilloscope?	PO1
12	Explain the method of finding phase relationship of two waveforms using Lissajous figures?	PO1
13	Explain the working of Dual Beam CRO with neat block diagram.	PO1
14	Explain about Delay lines in CROs.	PO1
Question No.		**PO Attainment**
UNIT – III: BRIDGES		
PART A (2 Marks)		
1	Interpret the applications of Wheatstone bridge? Depict Anderson bridge with its components illustrated.	PO1

2	If the bridge arms are connected with R1 = 2.2 K, R2 = 3.9 K, R3 = 10 K, find R4.	PO1,PO2
3	What is the significance of Q-meter?	PO1
4	Give the significance of Kelvin Bridge.	PO1
5	List the advantages of Wheatstone bridge.	PO1
6	Derive the balancing condition of bridge.	PO1
7	List out the different precautions to be taken when using a bridge with one example.	PO1
8	Discuss the principle of Maxwell's bridge?	PO1
9	Explain the basic principle of Kelvin bridge?	PO1
10	Describe the operation of the wheat stone bridge?	PO1
11	Why Wagner ground connection is used in bridges?	PO1
12	Explain the basic principle of Schering bridge?	PO1
13	What are the various sources of errors in Q-Meter?	PO1
PART-B (10 Marks)		
1	(A) Depict the determination of Q factor of a coil using Q meters. (B) Outline the factors that cause error during Q measurement.	PO1
2	(A) With a suitable bridge determine the self inductance of a coil in terms of standard fixed capacitance. (B) A Schering bridge has the following constants - Capacitor of 0.5µF in parallel with 1 kO resistance in arm AB, resistance of 2 kO in arm AD, capacitor of 0.5µF in arm BC and unknown capacitor Cx anb RX in series. Assume frequency 1 kHz. Determine the unknown capacitance and dissipation factor.	PO1,PO2
3	Draw the circuit of Schering bridge and explain its utility, also derive expressions for unknown components.	PO1
4	Discuss about the construction, operation and applications of Anderson Bridge, with a neat diagram.	PO1
5	Identify the bridge used for measurement of inductance and explain the construction and operation of this bridge.	PO1
6	(A) The basic AC bridge consists of the following constants: AB: R=400 ? , BC: R=150 ? , CD: unknown and DA: R=100 ? in series with L=10mH. Oscillator frequency is 1KHz. Determine the constants of arm CD. (B) What is Wien's bridge? Derive the expression for the frequency.	PO1,PO2
7	Draw and explain the Maxwell Bridge with neat diagram and derive the expression for unknown inductance.	PO1

8	Explain the Kelvin Bridge with neat diagram and derive the expression for unknown resistance.	PO1
9	Explain the basic principle of wheat stone bridge and derive the expression for unknown resistance.	PO1
10	(A)Explain the sources of errors and their minimizing methods. (B)Discuss various methods of connecting components to a Q-meter for measurement?	PO1
Question No.	Questions	PO Attainment
	UNIT II: TRANSDUCERS	
	PART A (2 Marks)	
1	Summarize the advantages and disadvantages of thermocouple.	PO1
2	A resistance strain gauge with gauge factor of 2 is cemented to a steel member, which is subjected to a strain of 1x106. If the original resistance value of the gauge is 130 Ω, calculate the change in resistance.	PO1,PO2
3	Name one passive and active sensor.	PO1
4	Categorize photo electric transducers.	PO1
5	What are active transducers and give its examples?	PO1
6	Give the operating principle involved in piezoelectric transducers.	PO1
7	What are the factors to be considered for selections of transducers?	PO1
8	What are the applications of LVDT?	PO1
9	State the LVDT principle.	PO1
10	Name the different temperature sensors and their advantages.	PO1
11	Define Gauge factor.	PO1
12	Summarize the main elements of velocity transducer.	PO1
13	List the applications of inductive transducers.	PO1
14	Define a transducer? Write the classifications of transducers?	PO1
15	Explain about Piezo-electric effect?	PO1
16	Explain the desirable characteristics of thermocouples?	PO1
17	Explain about Displacement transducers.	PO1
18	Describe about resistance thermometers.	PO1
19	Distinguish between thermocouple and thermistor?	PO1
20	Discuss the advantages and disadvantages of LVDT.	PO1
21	Discus the difference between active and passive transducers?	PO1
22	Discuss the advantages and disadvantages of LVDT.	PO1
	PART-B (10 Marks)	
1	Illustrate the operation of LVDT and explain how residual voltage is eliminated using a circuit.	PO1
2	(A) Describe the operation of Piezo-electric transducer with neat sketches (B) A platinum thermometer has a resistance of 100 Ω at 25C. (i) Find its resistance at 65 C if the platinum resistance temperature co-efficient of 0.00392/C. (ii) If the thermometer has a resistance of 150Ω, calculate the temperature.	PO1,PO2

3	Explain strain construction principle and also derive expression for gauge factor.	PO1
4	With a neat diagram, explain the construction operation and applications of LVDT.	PO1
5	Derive the expression for gauge factor of a strain gauge. Also, explain about the thermocouples.	PO1
6	What is meant by Piezo electric transducer? Explain its working with a neat block diagram.	PO1
7	A resistance strain gauge with a gauge factor of 2 is cemented to a steel member, which is subjected to a strain of 1x10-6 . If original resistance value of the gauge is 130 Ω, calculate the change in resistance.	PO1
8	An ac LVDT has the following data. Input = 6.3V, Output = 5.2V, range ±0.5 in. Determine (a)Calculate the output voltage vs core position for a core movement going from +0.45in. to -0.30 in. (b)The output voltage when the core is -0.25 in. from the centre.	PO1,PO2
9	A resistance strain gage with a gage factor of 2 is fastened to a steel member subjected to a stress of 1050 kg/cm2 . The modulus of elasticity of steel is approximately 2.1x106 kg/cm2 . Calculate the change in resistance ΔR, of the strain-gage element due to the applied stress.	PO1
10	(a) Explain how LVDT is used to measure linear displacement. (b) Show that a parallel plate capacitor serves as the most suitable transducer for measurement of linear and angular displacements.	PO1
11	(a) What is a transducer? Explain the working of Variable Capacitance transducer. (b) A 100Ω strain gauge with a gauge factor of 1 is affixed to a metal bar. The bar is stretched and this causes a change in resistance of 0.001Ω. Find the change in length if the original length is 10cm.	PO1,PO2
12	(a) What are the factors to be considered for the selection of better transducer? Explain. (b) Explain the principle and working of an LVDT.	PO1