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QUESTION BANK (DESCRIPTIVE)

Subject with Code: EMI (20EC0430)

Course & Branch: B. Tech – ECE

Year & Sem: III-B. Tech & I-Sem

Regulation: R20

UNIT –I

PERFORMANCE CHARACTERISTICS OF INSTRUMENTS

1	(a)	Define and explain the importance of the following terms i) Accuracy ii) Precision iii) Resolution iv) Sensitivity	[L2][CO1]	[8M]																						
	(b)	The expected value of the voltage across a resistor is 80 V. However, the measurement gives a value of 79 V. Calculate (i) Absolute error (ii) % Error (iii) Relative accuracy and (iv) % of Accuracy.	[L3][CO3]	[4M]																						
2	(a)	A set of 10 measurements that were recorded in the laboratory are presented in the table. Calculate the precision of the 6th measurement.	[L3][CO2]	[8M]																						
		<table border="1"> <thead> <tr> <th>Measurement Number</th> <th>Measurement value (X_n)</th> </tr> </thead> <tbody> <tr><td>1</td><td>98</td></tr> <tr><td>2</td><td>101</td></tr> <tr><td>3</td><td>102</td></tr> <tr><td>4</td><td>97</td></tr> <tr><td>5</td><td>101</td></tr> <tr><td>6</td><td>100</td></tr> <tr><td>7</td><td>103</td></tr> <tr><td>8</td><td>98</td></tr> <tr><td>9</td><td>106</td></tr> <tr><td>10</td><td>99</td></tr> </tbody> </table>	Measurement Number	Measurement value (X_n)	1	98	2	101	3	102	4	97	5	101	6	100	7	103	8	98	9	106	10	99		
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	(b)	Define Calibration and write a short note on Static and Dynamic Calibration.	[L1][CO1]	[4M]																						
3	(a)	Write a short note on (i) Gross Errors (ii) Systematic errors (iii) Random errors.	[L1][CO1]	[6M]																						
	(b)	Illustrate in detail about the statistical analysis of measurement data.	[L2][CO3]	[6M]																						
4	(a)	For the following measured data $X_1 = 49.7$; $X_2 = 50.1$; $X_3 = 50.2$; $X_4 = 49.6$; $X_5 = 49.7$, calculate (i) Arithmetic mean (ii) Deviation of each value (iii) Algebraic sum of the Deviations.	[L3][CO1]	[6M]																						
	(b)	Describe in brief about the Dynamic characteristics of an instrument.	[L2][CO2]	[6M]																						
5	a)	Explain in brief about the working of basic DC Ammeter.	[L2][CO1]	[6M]																						
	b)	A 1 mA meter movement with an internal resistance of 100Ω is to be converted into a 0 – 100 mA. Calculate the value of shunt resistance required.	[L3][CO3]	[6M]																						
6	a)	Using a neat diagram, explain the working principle of Multirange Ammeters.	[L2][CO3]	[6M]																						
	b)	A 1 mA meter movement having an internal resistance of 100Ω is used to convert into a multirange ammeter having the range of 0–10 mA, 0–20 mA and 0–50 mA. Determine the value of the shunt resistance required.	[L3][CO3]	[6M]																						
7	a)	Explain in detail about the working principle of a Differential Voltmeter.	[L2][CO2]	[6M]																						
	b)	Explain how a multimeter can be used as (i) DC voltmeter and (ii) AC voltmeter.	[L2][CO2]	[6M]																						
8	a)	Explain in detail about multirange DC voltmeter & AC voltmeter.	[L2][CO2]	[6M]																						
	b)	With a neat sketch, explain about thermocouple type RF ammeter.	[L2][CO2]	[6M]																						
9		With the help of circuit diagram, describe the construction & working of a Series type Ohmmeter.	[L1][CO6]	[12M]																						
10	a)	With the help of circuit diagram, describe the construction & working of a Shunt type Ohmmeter.	[L2][CO6]	[6M]																						
	b)	Describe the construction and working of a Multimeter using a neat circuit diagram.	[L1][CO2]	[6M]																						

UNIT –II

OSCILLOSCOPES

1	a)	What are the Standard Specifications of CRO?	[L1] [CO1]	[4M]
	b)	Explain in detail the important features of CRT.	[L2] [CO1]	[8M]
2		Derive the Deflection of Sensitivity.	[L3] [CO1]	[12M]
3	a)	Describe the working principle of vertical amplifier using a neat sketch.	[L2] [CO1]	[6M]
	b)	With neat sketch, explain in detail about Horizontal amplifier.	[L2] [CO2]	[6M]
4	a)	Sketch the horizontal deflection systems and explain it's working principle.	[L2] [CO3]	[6M]
	b)	Sketch the Vertical deflection systems and explain it's working principle.	[L3] [CO3]	[6M]
5	a)	Describe the working principle of a Sweep Trigger Pulse generator using a neat sketch.	[L2] [CO1]	[6M]
	b)	Draw the block diagram of Delay line circuit and explain its working.	[L2] [CO1]	[6M]
6	a)	Draw and explain the block diagram of CRO Probe.	[L1] [CO2]	[4M]
	b)	Write a short notes on CRO Probes.	[L1] [CO2]	[8M]
7	a)	Describe the working principle of a Triggered sweep CRO with a neat sketch.	[L2] [CO1]	[8M]
	b)	Write a short notes on Delayed Sweep	[L1] [CO2]	[4M]
8		With the neat sketch, explain the working principle of Dual beam oscilloscope.	[L2] [CO1]	[12M]
9	a)	Explain the procedure of signal's Amplitude, Frequency and Phase measurement using a Lissajous method using neat diagrams.	[L2] [CO2]	[6M]
	b)	Describe in detail the construction and working of a Digital Storage Oscilloscope.	[L2] [CO1]	[6M]
10	a)	Write the advantages of Digital Storage Oscilloscope.	[L1] [CO1]	[4M]
	b)	Explain the operation of Digital frequency Meter/ counter and write it's applications.	[L2] [CO2]	[8M]

UNIT –III
SIGNAL GENERATORS

1	a)	Define Oscillator and Explain in detail about fixed and variable AF oscillators.	[L2] [CO4]	[6M]
	b)	Using a neat block diagram explain the operation of a function generator.	[L1] [CO4]	[6M]
2	a)	List the Specifications of function generator.	[L1] [CO3]	[4M]
	b)	With a neat diagram, illustrate the operation of a Pulse generator.	[L3] [CO3]	[8M]
3	a)	List the Specifications of Pulse generator.	[L1] [CO3]	[4M]
	b)	Explain the method to generate random noise.	[L2] [CO3]	[8M]
4	a)	List the Specifications of random noise generator.	[L1] [CO3]	[4M]
	b)	What is a sweep generator? Explain in detail about its working.	[L1] [CO3]	[8M]
5	a)	List the Specifications of sweep generator.	[L1] [CO3]	[4M]
	b)	With a neat sketch, explain the operation of arbitrary waveform generator.	[L2] [CO5]	[8M]
6	a)	What are the different specifications of arbitrary waveform generator?	[L1] [CO3]	[4M]
	b)	Define Wave Analyzer and Explain it's working principle.	[L1] [CO3]	[8M]
7	a)	Describe the operation of Frequency selective type wave Analyzer using a neat diagram.	[L2] [CO3]	[6M]
	b)	Describe the operation of Heterodyne Wave Analyzer using a neat diagram.	[L2] [CO3]	[6M]
8	a)	Explain the working principle of Harmonic distortion analyzer.	[L2] [CO3]	[6M]
	b)	Write a short note on distortions caused by Amplifiers.	[L2] [CO3]	[6M]
9	a)	Explain the working principle of spectrum analyzer.	[L2] [CO3]	[8M]
	b)	Write the applications of spectrum analyzer	[L1] [CO3]	[4M]
10	a)	Draw the block diagram of logic analyzer and explain its working.	[L1] [CO4]	[8M]
	b)	Write the applications of logic analyzer	[L1] [CO3]	[4M]

UNIT –IV

REVIEW OF DC & AC BRIDGES

1	a)	Describe the operation of the Wheatstone bridge and derive the expression for current when the bridge is unbalanced.	[L3] [CO3]	[6M]
	b)	For an unbalanced Wheatstone bridge given in figure below, calculate the current through the galvanometer.	[L3] [CO4]	[6M]
2		Describe the operation of the Wheatstone bridge and derive the expression for DC resistance.	[L3] [CO3]	[12M]
3	a)	Derive an expression of frequency measurement using Wein's Bridge.	[L3] [CO3]	[6M]
	b)	A Wein bridge circuit consists of the following: $R_1=4.7K\Omega$, $C_1=5nf$, $R_2=20K\Omega$, $C_3=10nf$, $R_3=10K\Omega$, $R_4=100K\Omega$. Determine the frequency of the circuit.	[L3] [CO4]	[6M]
4	a)	What are the errors and precautions to be taken while using the Bridge circuits?	[L1] [CO6]	[6M]
	b)	What are the different types of AC bridges? Explain any one type of bridge.	[L1] [CO4]	[6M]
5	a)	Explain briefly how a Maxwell Bridge is used for measuring an unknown inductance.	[L2] [CO2]	[6M]
	b)	A Maxwell bridge is used to measure an inductive impedance. The bridge constants at balance are $C_1= 0.01\mu F$, $R_1=470k\Omega$, $R_2=5.1k\Omega$ and $R_3=100k\Omega$. Find the series equivalent of unknown impedance.	[L3] [CO4]	[6M]
6	a)	Describe the operation of the Anderson's bridge circuit.	[L2] [CO3]	[8M]
	b)	Write the advantages and disadvantages Anderson's bridge circuit.	[L2] [CO3]	[4M]
7	a)	Derive the expression of unknown resistance of a Schering bridge circuit.	[L3] [CO4]	[6M]
	b)	An A.C bridge has Arm AB-capacitor of $0.2\mu F$ in parallel with $3k\Omega$ resistor, Arm AD-resistance of $5k\Omega$, Arm BC capacitor of $0.15 \mu F$, Arm CD-unknown capacitor C_X and R_X in series f-3KHz. Determine the unknown capacitance.	[L3] [CO4]	[6M]
8	a)	Explain the working principle of Schering bridge circuit.	[L2] [CO3]	[6M]
	b)	An A.C bridge has Arm AB-capacitor of $0.1\mu F$ in parallel with $2K\Omega$ resistor, Arm AD-resistance of $5K\Omega$, Arm BC capacitor of $0.25 \mu F$, Arm CD-unknown capacitor C_X and R_X in series and frequency 2KHz. Determine the unknown capacitance.	[L3] [CO4]	[6M]
9	a)	What are the advantages of Kelvin's bridge?	[L1] [CO3]	[4M]
	b)	Derive the expression of an unknown resistance using Kelvin's bridge.	[L3] [CO3]	[8M]
10	a)	Discuss in detail about the working principle of Q-meter & its applications.	[L2] [CO4]	[8M]
	b)	Write the advantages and disadvantages of Q-meter.	[L1] [CO1]	[4M]

UNIT –V
SENSORS & TRANSDUCERS

1	a)	Define a transducer. What are the different types of Transducers?	[L1] [CO1]	[6M]
	b)	Discuss in brief about Sensors and Transducers.	[L2] [CO1]	[6M]
2		Describe the operation of i) Resistive transducers ii) Capacitive transducers iii) Inductive transducers	[L2] [CO5]	[12M]
3	a)	Write a short notes on Measurement of Displacement using Resistive transducers.	[L2] [CO5]	[6M]
	b)	Write a short notes on Measurement of Displacement using Capacitive transducers.	[L2] [CO5]	[6M]
4	a)	With a neat sketch, explain the operation of LVDT.	[L1] [CO5]	[6M]
	b)	Write the advantages & disadvantages of LVDT.	[L1] [CO6]	[6M]
5	a)	Explain in detail about the Strain gauge Transducer.	[L2] [CO1]	[6M]
	b)	Write the advantages & disadvantages of Strain gauge.	[L1] [CO6]	[6M]
6	a)	Distinguish between the Active & Passive transducers.	[L4] [CO5]	[6M]
	b)	With a neat sketch, explain the operation of piezo-electric transducers in detail.	[L2] [CO1]	[6M]
7	a)	Draw the diagram of Resistance Thermometer and explain briefly.	[L2] [CO5]	[8M]
	b)	What are the advantages & disadvantages of Resistance thermometer?	[L1] [CO5]	[4M]
8	a)	Explain about thermocouple. List its advantages and applications.	[L2] [CO3]	[6M]
	b)	Explain the operation of thermistors and write its limitations.	[L2] [CO1]	[6M]
9	a)	Discuss in brief about Moving Coil type Velocity transducers.	[L2] [CO1]	[6M]
	b)	Discuss in brief about Moving Magnetic type Velocity transducers	[L2] [CO1]	[6M]
10	a)	Explain in brief about Accelerometer Transducer.	[L2] [CO1]	[6M]
	b)	Explain in detail about Vibration Transducer.	[L2] [CO1]	[6M]

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