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QUESTION BANK (DESCRIPTIVE)

Subject with Code : Electrical Measurements and Instrumentation (20EE0216)

Course & Branch: B.Tech - EEE **Year & Sem:** III-B.Tech & I-Sem

Regulation: R20

UNIT –I
MEASURING INSTRUMENTS

1	a	Define the terms "Indicating instruments", "Recording instruments" and integrating Instruments". Give examples of each.	[L1][CO1][8M]
	b	What are the different types of Ammeters and Voltmeters?	[L1][CO1][4M]
2		What are the different types of damping systems? Explain them with neat diagram.	[L2][CO1][12M]
3	a	Illustrate the construction and working of permanent magnet moving coil instruments.	[L3][CO1][8M]
	b	List the advantages and disadvantages of PMMC type instruments.	[L1][CO1][4M]
4	a	Explain Dynamometer type instruments with neat sketch.	[L1][CO1][6M]
	b	Derive torque equations of Dynamometer type instruments	[L3][CO1][6M]
5	a	Describe the construction and working of attraction type MI instrument?	[L2[CO1]][6M]
	b	List the advantages & disadvantages of MI type instruments	[L1][CO1][6M]
6	a	Derive an expression for the Deflecting torque in MI type instruments	[L3][CO1][6M]
	b	Examine about errors and compensations of measuring instruments.	[L4][CO1][6M]
7	a	Justify, how do you extend the range of an Ammeter? Explain Aryton Shunt with diagram.	[L5][CO1][8M]
	b	A moving coil instrument gives a full -scale deflection of 10mA when the potential across its terminals is 100mV. Calculate shunt resistance for a full -scale deflection corresponding to 100 A	[L3][CO1][4M]
8	a	Choose a design for Aryton shunt to provide an ammeter with the current ranges 1 A, 5 A and 10 A. The basic meter resistance is 50 ohm and full scale deflection current is 1 mA.	[L5][CO1][6M]
	b	A moving coil instrument has a resistance of 10 ohm and gives a full scale deflection When carrying 50mA. Show how it can be adopted to measure voltage upto 750 V and current of 100 A.	[L3][CO1][6M]
9		Sketch Quadrant type Electrostatic voltmeter meter. Explain Heterostatic or Idiostatic Connections.	[L3][CO1][12M]
10		Explain the working of Kelvin Absolute Voltmeter. What are the advantages and disadvantages of Electrostatic Instruments?	[L2][CO1][12M]

UNIT –II

DC & AC BRIDGES

1	a	Explain classification of resistances. What are the different types of methods used for measurement of low, medium and high resistance?	[L2] [CO2] [6M]
	b	Draw the circuit diagram of a Wheatstone bridge and derive the condition for balance.	[L3] [CO2] [6M]
2	a	What is the sensitivity of the Wheatstone bridge?	[L1] [CO2] [4M]
	b	The four arms of Wheatstone bridge as follows: AB = 5Kohm ; BC =? ; CD = 10ohm ;DA = 2Kohm .What should be the resistance in the arm for no current through the Galvanometer?	[L3] [CO2] [8M]
3		Correlate substitution method and potentiometer method for measuring medium resistances.	[L4] [CO2] [12M]
4	a	Draw the circuit of a Kelvin‟s double bridge used for measurement of low resistances. Derive the condition for balance.	[L3] [CO2] [8M]
	b	Explain how insulation resistance of a cable can be measured with a help of Loss of charge method?	[L2] [CO2] [4M]
5	a	Justify how the inductance is measured in terms of known capacitance using Maxwell‟s bridge	[L5] [CO2] [8M]
	b	List the advantages and disadvantages of Maxwell‟s Bridge.	[L1] [CO2] [4M]
6		An ac bridge circuit working at 1 KHz has its arms as follows: Arm AB: 0.2 µf capacitance Arm BC: 500 ohm resistor Arm CD: unknown impedance Arm DA: 300 ohm resistor in parallel with 0.1µf capacitor Find R and L or C constants of the Arm CD considering it as a series circuit.	[L3] [CO2] [12M]
7		Explain the construction and working of Anderson Bridge with suitable diagrams.	[L2] [CO2] [12M]
8		Explain the features of De-Sauty‟s Bridge with a neat sketch.	[L2] [CO2] [12M]
9		Explain Wien‟s bridge can be used for experimental determination of frequency. Derive the expression to measure frequency in terms of bridge parameters.	[L5] [CO2] [12M]
10		Draw the circuit diagram of Schering Bridge. Derive the conditions for balancing the bridge and draw the phasor diagram during balanced condition.	[L3] [CO2] [12M]

UNIT –III

MEASUREMENT OF POWER AND ENERGY

1	a	Explain the constructional details of electro dynamometer type wattmeter with a neat sketch.	[L2][CO3][8M]
	b	Explain the advantages and disadvantages of single phase Induction type Energy meter.	[L2] [CO3][4M]
2	a	A 5 A, 110 V electrodynamic type wattmeter has a scale having 110 divisions. Its pressure coil is fed by a voltage of [110 √2 cos314) + √2sin(942t) V and its current coil carries a current of [5√ 2cos(314t + 60) + 2√ 2sin (628t + 90) + √2cos(642t + 90)] A. Find the needle movement from zero position.	[L3] [CO3] [6M]
	b	Explain stray magnetic field errors in electro dynamometer type wattmeter.	[L2] [CO3] [6M]
3	a	Correlate how the measurements are made using LPF and UPF wattmeters.	[L5] [CO3] [6M]
	b	Explain errors caused by vibration of moving system electro dynamometer type wattmeter.	[L2] [CO3] [6M]
4	a	Explain how power can be measured in a 3 – phase circuit with help of two element method with neat sketch.	[L2] [CO3] [6M]
	b	Explain how power can be measured in a 3 – phase circuit with help of three element method with neat sketch.	[L2] [CO3] [6M]
5		Derive the torque equation for single phase electro dynamometer type wattmeter.	[L3][CO3][12M]
6		With a neat construction diagram, explain the operation of single phase induction type energy Meters	[L2][CO3][12M]
7	a	Derive the torque equation for single phase induction type energy meter.	[L3][CO3][6M]
	b	Explain driving system, moving system and braking system in a single phase induction	[L2][CO3][6M]
8	a	A single phase kilo watt hour meter makes 500 revolutions per kilo watt hour. It is found on testing as making 40 revolutions in 58.1 seconds at 5KW full load. Find the percentage error	[L3] [CO3] [4M]
	b	Explain creeping and justify how it can be compensated in 1-Ø induction type energy meter.	[L2] [CO3] [4M]
	c	The reading of a dynamometer type wattmeter with pressure coil phase angle of 2° is 700 watts, when it is used to measure power of a single phase inductive load supplied by 240 V single phase ac. source. When the wattmeter is replaced by a second wattmeter with a phase angle of 1° for the pressure coil circuit, a reading of 620 watts is obtained. Assuming all errors of the wattmeter, except those due to pressure coil inductance are neglected. Calculate the actual power.	[L3][CO3][4M]
9	a	Discuss the errors of single phase energy meter.	[L2][CO3][6M]
	b	Explain the friction compensation in single phase induction type Energy Meter.	[L2][CO3] [2M]
	c	Examine in a 50A , 230 V meter on full load test makes 61 revolutions in 37 seconds . If the normal disc speed is 520 revolutions per Kwh , find the	[L4][CO3][6M]

		percentage error .	
10	a	Explain with a neat sketch the construction and working of a Three phase energy meter.	[L2][CO3][6M]
	b	Explain the working of 2 element energy meter with a neat diagram.	[L2] [CO3] [6M]

UNIT –IV

INSTRUMENT TRANSFORMERS AND TRANSDUCER

1	a	Discuss C T and P T.	[L2] [CO4] [6M]
	b	Why secondary of C.T should not be open?	[L4] [CO4] [6M]
2		Explain the construction of (i) Current transformer (ii) Potential transformer.	[L2] [CO4] [12M]
3		Draw the phasor diagram of PT. Derive the expression for its transformation ratio and phase angleerrors.	[L3] [CO4] [12M]
4		Draw the equivalent circuit and phasor diagram of CT. Derive its transformation ratio.	[L3] [CO4] [12M]
5	a	What is a transducer? Explain classification of transducers	[L1] [CO5] [6M]
	b	Explain the advantages of electrical transducer	[L2] [CO5] [6M]
5	a	What are the parameters to be considered in selecting a transducer for a particular application?	[L1] [CO5] [6M]
	b	Illustrate the method for measurement of temperature with use of a) RTD b) IC Sensor	[L2] [CO5] [6M]
6	a	Describe the principle and operation of capacitive transducer	[L2] [CO5] [4M]
	b	Explain about inductive displacement transducers.	[L2] [CO5] [4M]
	c	Describe the principle and operation of capacitive transducer for angular displacement measurement	[L2] [CO5] [4M]
7	a	Describe the construction and working of LVDT with a neat schematic	[L2] [CO5] [6M]
	b	Explain the principle of operation of strain gauge and gauge factor	[L2] [CO5] [6M]
8	a	Discuss in detail about Thermistors.	
	b	Describe the working principle of thermocouples	[L2] [CO5] [6M]
9		Describe the working principle of piezo electric transducers	[L2][CO5][12M]
10	a	Discuss in detail about photovoltaic cells	[L2] [CO5] [4M]
	b	Discuss in detail about photo conductive cells	[L2] [CO5] [4M]
	c	Discuss in detail about photo diodes.	[L2] [CO5] [4M]

UNIT –V
MAGNETIC MEASUREMENTS

1		Describe the construction and working of a moving coil ballistic galvanometer.	[L2] [CO6] [12M]
2		Derive the eqution of motion of balastic galvanometer.	[L3][CO6][12M]
3	a	Describe the construction and working of Flux meter.	[L2] [CO6] [6M]
	b	Determine leakage factor with flux meter.	[L3] [CO6] [6M]
4	a	Justify how the flux can be measured by using Flux meter.	[L5] [CO6] [4M]
	b	A certain flux meter has the following specifications: Air gap flux density = 0.05 Wb/m^2 Number of turns on moving coil = 40 Area of moving coil = 750 mm^2. If the flux linking 10 turns of a search coil of 200 mm2 area connected to the flux meter is reversed in a uniform field of 0.5 Wb/m2, then calculate the deflection of the flux meter.	[L3] [CO6] [4M]
	c	Compare flux meter and Ballistic Galvanometer	[L2] [CO6] [4M]
5		Determine the B -H loop using method of reversals and Six point method	[L3] [CO6] [12M]
6		Describe briefly how the following measurements can be made with the use of CRO (i) Frequency. (ii) Phase angle. (iii) Voltage.	[L2][CO6][12M]
7	a	List the advantages & applications of C R O.	[L1][CO6][6M]
	b	Draw a neat figure and explain the working of a C R O.	[L2] [CO6][6M]
8	a	Explain the functions of time base generator in a CRO	[L2][CO6][6M]
	b	Analyze the Lissajous patterns.	[L4] [CO6][6M]
9	a	What are the uses of Ballistic Galvanometer?	[L1][CO6][6M]
	b	Describe the functions of attenuators in CRO.	[L2] [CO6] [6M]
10		Explain the internal structure of CRT with a neat diagram	[L2][CO6][12M]