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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: III**

Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**

Course Code: 22EE3PCEEM **Max Marks: 100**

Course: Electrical and Electronic Measurements

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Derive the equations for balance in case of Maxwell's Inductance capacitance bridge. Draw the phasor diagram for balance condition.	*CO2*	*PO2*	**07**
	b)	A condenser forms the arm AB of Schering bridge and a standard capacitance of $500x10^{-12}$F form arm AD. The arm BC consists of resistance of 300Ω. When the bridge is balanced, the arm CD has resistance of 72.6Ω in parallel with a capacitor of 0.148μF. A detector is connected in the arm BD. The supply of frequency 50Hz is connected across A and B. Determine the capacitance, dielectric loss of the capacitor in arm AB.	*CO3*	*PO2*	**07**
	c)	Describe the various factors that causes errors in AC bridges measurements and suggest the method of minimization for the same.	*CO2*	*PO1*	**06**
		OR			
2	a)	Derive the expression for the current through the galvanometer and bridge sensitivity S_B in case of unbalanced Wheatstone bridge.	*CO2*	*PO2*	**07**
	b)	A Maxwell's LC bridge is used to measure an inductive impedance. The bridge constants at balance are C1=1μF in parallel with R1=500 kΩ, R2=5 kΩ and R3 =1 kΩ. Compute the series equivalent of the unknown impedance and quality factor of the coil, when the source frequency is 1Hz	*CO3*	*PO2*	**06**
	c)	Derive the equations for balance in case of modified desauty's bridge. Draw the phasor diagram for balance condition.	*CO2*	*PO2*	**07**

			UNIT - II			
	3	a)	Explain the special features incorporated in the dynamometer wattmeter when used to measure power in circuits of low power factor.	*CO2*	*PO1*	**07**
		b)	Explain the Construction and operation of single-phase dynamometer type power factor meter.	*CO2*	*PO1*	**07**
		c)	A wattmeter has a current coil of resistance 0.03 ohm and a pressure coil of resistance 6000 ohms is connected to measure the power consumed by a load. Determine the percentage error if the wattmeter is so connected that: 1) the current coil is on the load side 2) the pressure coil is on the load side If the load takes 20A at a voltage of 220V and 0.6 power factor	*CO3*	*PO2*	**06**
			OR			
	4	a)	Justify with relevant derivations that dynamometer type wattmeter can be used for both AC and DC power measurements.	*CO2*	*PO2*	**06**
		b)	A wattmeter connected to read the power consumed by an inductive load reads 28W. The voltmeter connected across the supply and the pressure coil circuit reads 250V. The ammeter connected in series with the current coil and the load reads 5A. The impedance of the pressure coil circuit is (2160 + j6) Ω. The voltage drops across the ammeter and the voltmeter are neglected. Determine the percentage error in the wattmeter reading.	*CO2*	*PO2*	**07**
		c)	With a neat diagram explain the Construction and operation of dynamometer type wattmeter.	*CO2*	*PO1*	**07**
			UNIT - III			
	5	a)	Define the following terms as used for current transformers. a. Transformation ratio b. Turns ratio	*CO1*	*PO1*	**04**
		b)	Describe how a DC potentiometer can be used for a) Calibration of dc voltmeter & b) Calibration of dc Ammeter.	*CO2*	*PO1*	**08**
		c)	Draw the equivalent circuit and phasor diagram of a current transformer and derive the expression for phase angle error.	*CO2*	*PO2*	**08**
			OR			
	6	a)	With the circuit diagram explain the steps used for measurement using Crompton's type dc potentiometer	*CO2*	*PO1*	**08**
		b)	A 1000/5A ,50Hz current transformer has a secondary burden comprising a non-inductive impedance of 1.6Ω. The primary winding has one turn. Determine the flux in the core and ratio error	*3*	*PO2*	**08**

			at full load. Neglect leakage reactance and assume iron loss in the core to be 1.5W at full load. The magnetizing mmF is 100A.			
		c)	Summarize the use of instrument transformer for range extension	*CO2*	*PO1*	**04**
			UNIT - IV			
	7	a)	Enumerate the advantages of digital instruments over analog instruments.	*CO2*	*PO1*	**05**
		b)	With a neat block diagram explain the working of digital storage oscilloscope.	*CO2*	*PO1*	**08**
		c)	Explain the working of Ramp type DVM using necessary block diagram.	*CO2*	*PO1*	**07**
			OR			
	8	a)	Define Sensitivity and Resolution w.r.t to digital instruments	*CO1*	*PO1*	**04**
		b)	With a neat block diagram explain the construction and working of LCR Meter	*CO2*	*PO1*	**08**
		c)	Explain the operation of Digital Multimeter with a neat diagram.	*CO2*	*PO1*	**08**
			UNIT - V			
	9	a)	Explain the factors to be considered while selecting a transducer.	*CO2*	*PO1*	**07**
		b)	With necessary diagram explain the construction and working of LVDT	*CO2*	*PO1*	**07**
		c)	Explain the operation of Hall effect Transducer.	*CO2*	*PO1*	**06**
			OR			
	10	a)	Discuss the classification of Active and Passive transducers	*CO1*	*PO1*	**06**
		b)	Give the comparison of resistance thermometer and thermistor	*CO2*	*PO1*	**06**
		c)	Derive an expression for gauge factor of a bonded resistance wire strain gauge	*CO2*	*PO2*	**08**

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