U.S.N.										

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

Autonomous Institute Affiliated to VTU

April 2025 Semester End Make-Up Examinations

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

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

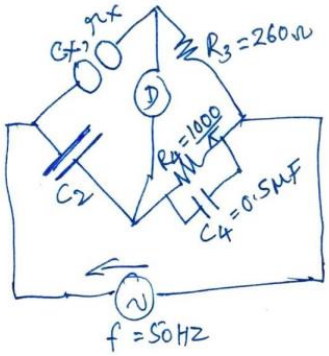
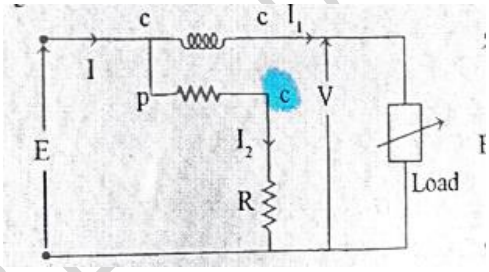
Course Code: 23EE3PCMNI **Max Marks: 100**

Course: Measurements and Instrumentation

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)	What bridge is used to measure unknown medium resistance? Derive and explain the bridge balance condition. Also derive the expression for the bridge sensitivity.	CO2	PO2	**10**
	b)	With the help of a neat diagram, explain the basic circuit of a DC potentiometer and explain its operation.	CO2	PO1	**10**
		OR			
2	a)	List and explain briefly the various types of errors in measurement system.	CO1	PO1	**10**
	b)	What are the limitations of Wheatstone bridge? Which bridge is most suitable to measure low resistance? Derive the balance condition of that bridge.	CO2	PO2	**10**
		UNIT - II			
3	a)	Four arms of the bridge are Arm AB: an imperfect capacitor of C_1 with equivalent resistance of r_1. Arm BC: A non-inductive resistor of R3. Arm CD: A non reactive resistor of R4 Arm DA: An imperfect capacitor of C2 with equivalent resistance r2 in series with a resistor R2. A source frequency of 450Hz is given to the terminals of A & C and the detector is connected between B & D. At balance R2 = 4.8Ω, R3 = 200Ω, R4= 2850Ω, C2 = 0.5 μF, r2= 0.4 Ω. Calculate c1, r1 and dissipation factor of the capacitor.	CO2	PO2	**10**
	b)	With the help of circuit diagram and phasor diagram, derive the bridge condition for measurement of Rx and Lx of a coil using Maxwell bridge.	CO2	PO2	**10**
		OR			
4	a)	A sheet of Bakelite 4.5mm thick is tested at 50Hz between the electrodes 0.12m diameter. An ac bridge employs a standard air	CO2	PO2	**10**

			capacitor of 106pF, a resistance R_4 of $(1000/\pi)\Omega$ in parallel with variable capacitor C_4 and variable resistor R_3. Balance is obtained when C_4 = 0.04μFand R_3 = 260Ω. Calculate capacitance, Power factor, Loss factor, Loss angle and relative permittivity of the Bakelite sheet.  			
		b)	With the help of circuit diagram and phasor diagram, derive the bridge condition for measurement of Cx , loss factor, Cos ϕ of a capacitor using Schering bridge.	*CO2*	*PO2*	**10**
			UNIT - III			
	5	a)	With the help of a block diagram, briefly explain the working of an electronic energy meter.	*CO2*	*PO1*	**10**
		b)	Consider the following circuit  A wattmeter has a current coil of resistance 0.2Ω and a pressure coil of resistance 2000 Ω is connected to measure the power consumed by the load. Calculate the percentage error in the reading of the wattmeter when the load takes 20A at 250V with 0.8 power factor, when i) the pressure coil is connected on the supply side ii) When the current coil is connected on the supply side iii) What load current would give equal errors with the two connections?	*CO2*	*PO2*	**10**
			OR			
	6	a)	Explain the construction and working of Dynamometer type wattmeter.	*CO2*	*PO1*	**10**
		b)	With the help of equivalent circuit and phasor diagram, derive the expression for ratio error and phase angle of a current transformer.	*CO2*	*PO2*	**10**
			UNIT - IV			
	7	a)	List and mention the classification of DVMs. With the help of block diagram, explain the working of Ramp type DVM.	*CO2*	*PO1*	**10**

		b)	With the help of block diagram, explain the working of a Digital Storage Oscilloscope	*CO2*	*PO1*	**10**
			OR			
	8	a)	With the help of a diagram, explain the working of an Electronic Multimeter. Mention its advantages and disadvantages.	*CO2*	*PO1*	**10**
		b)	Enumerate the advantages of digital voltmeters over conventional voltmeters.	*CO1*	*PO1*	**10**
			UNIT - V			
	9	a)	List the basic characteristics of transducer & Identify the selection factors of the transducers.	*CO1*	*PO1*	**10**
		b)	With a neat diagram explain the working of LVDT	*CO2*	*PO1*	**10**
			OR			
	10	a)	Derive the expression of Gauge factor in Strain gauge	*CO2*	*PO2*	**10**
		b)	Describe the working of Data Acquisition System with the help of a block diagram	*CO2*	*PO1*	**10**

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