Question Paper

Exam Date & Time: 10-Dec-2022 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

Manipal Institute of Technology
III Semester B. Tech. End Semester Examination DEC 2022

ELECTRONIC MEASUREMENTS [ICE 2153]

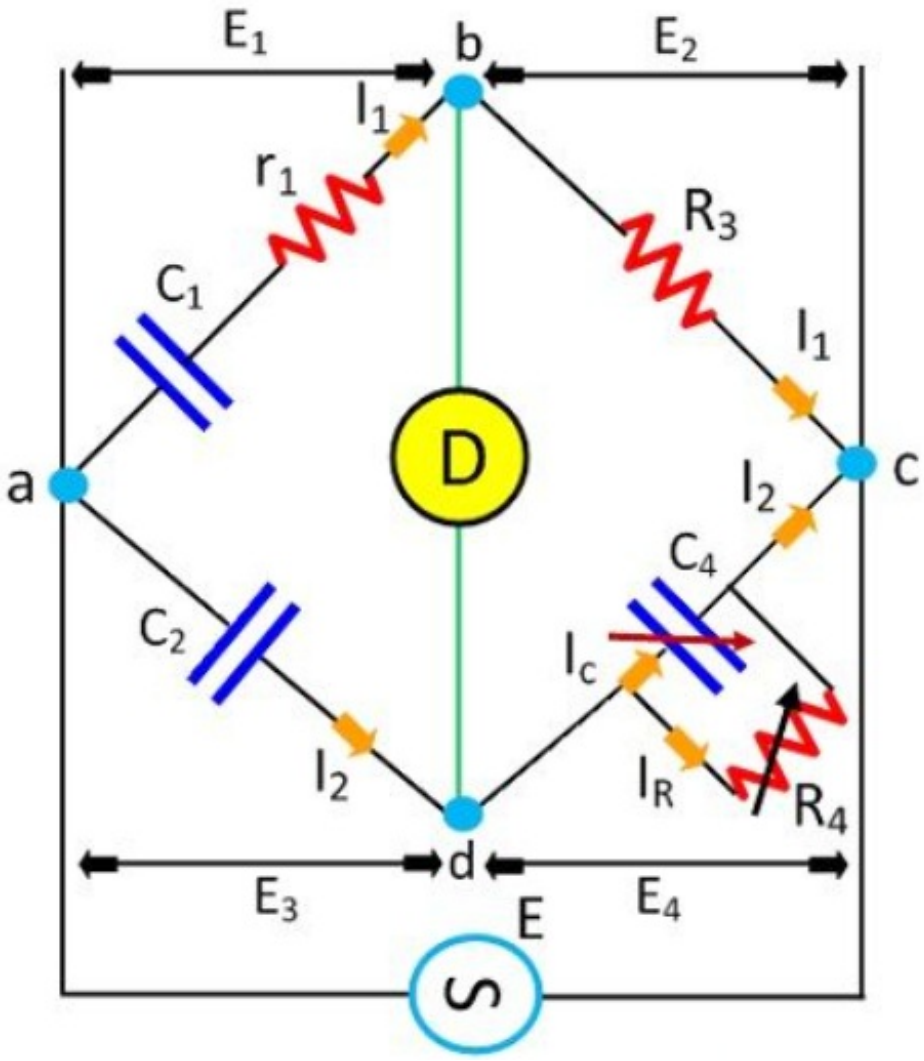
Marks: 50 **Duration: 180 mins.**

Descriptive Questions

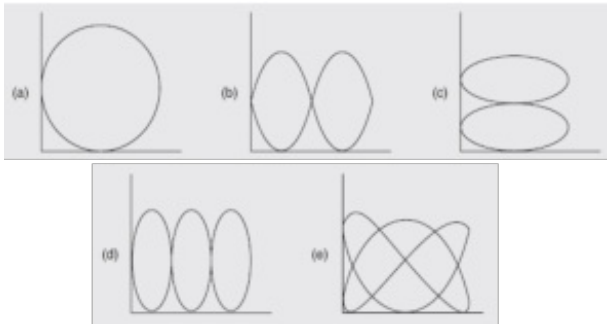
Answer all the questions. Section Duration: 180 mins

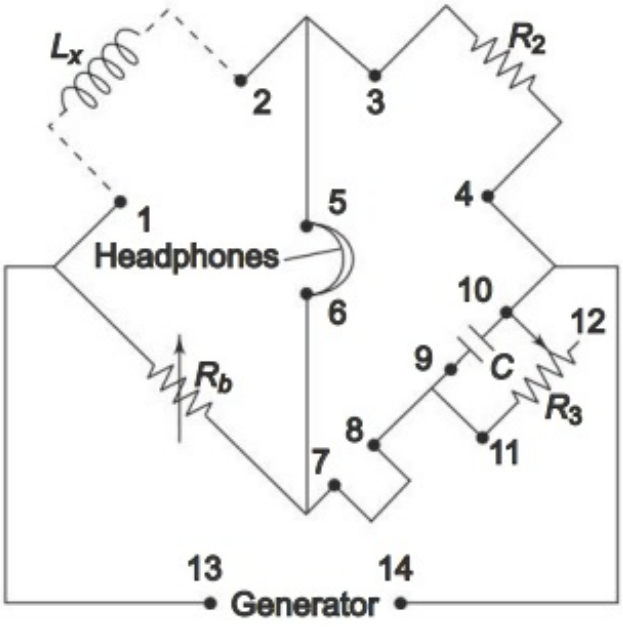
1) For the bridge shown in the figure below, derive the expression for C_1 and r_1. Calculate C_1 when R_4= 2 Ohm, R_3= 4 Ohm and C_2= 10 micro-Farad. (4)

A)



[CO1, PO1, PO2, PO3, P12 BL3]

	B)	Draw the circuit diagram of a bridge circuit, which is appropriate for frequency measurement and derive the expression for frequency. [CO1, PO1, PO2, PO3, P12, BL3**]**	(3)
	C)	Explain the working principle of digital energy meter with appropriate block diagram. [CO1, PO1, PO2, PO3, P12, BL2**]**	(3)
2)		Various Lissajous patterns obtained on the CRO screen and are given below. Signal connected to the horizontal channel has a frequency of 1 kHZ. Determine the unknown frequency of the signal connected to the vertical channel in each case.	(5)
	A)	 [CO2, PO5, PO12, BL3]	
	B)	Draw the block diagram of Cathode Ray Oscilloscope (CRO) and explain the function of all the components in the block diagram. [CO2, PO5, PO12, BL2]	(3)
	C)	With an appropriate circuit diagram explain the working of induction type three phase energy meter. [CO1, PO1, PO2, PO3, BL2]	(2)
3)		Draw the block diagram of digital frequency meter and explain its working. How it handles the non-square wave and noisy signal? Calculate the frequency of the signal when the reading of counter C= 20, T= 10 microsecond. [CO3, PO3, PO5, BL4]	(5)
	A)		
	B)	Draw the circuit diagram of a 4-bit DAC with 5V reference voltage and derive the equationfor conversion using R-2R ladder DAC and binary weighted DAC. Compute the output in each case for binary input of 1010. [CO3, PO3, PO5, BL4]	(3)
	C)	Draw the block diagram of a sample and hold circuit. Explain its working using waveforms. [CO3, PO3, PO5, BL2]	(2)
4)		Draw the circuit diagram of Q meter. Explain the working principle of Q-meter with appropriate mathematical derivation. Explain the cause of error in Q meter.[CO4, PO5, BL2]	(4)
	A)		
	B)	Explain the working principle of magnetic type recorder. Why is HDD preferred over SDD? [CO4, PO5, BL2]	(3)
	C)	Derived the expression for Lx. Calculate Lx, when C= 2 micro-Farad, R_2 = 1000 Ohm, R_b = 2000 Ohm.	(3)



[CO4, PO5, BL3]

5) Draw the block diagram of frequency selective wave analyser and explain its working. [CO5, PO1, PO2, PO3, PO5, BL2] (2)

A)

B) Explain the working of a heterodyne wave analyser along with a block diagram. Explain working of balance mixer with numerical examples. [CO5, PO1, PO2, PO3, PO5, BL3] (3)

C) What is a spectrum analyser? Explain the filter bank concept with a diagram. Draw a sine wave and its second harmonic in time and frequency domain. Draw waveforms of amplitude modulation (AM), frequency modulation (FM), and pulse amplitude modulation. Draw frequency spectrum of AM and FM signals. Explain all the graphs in brief. [CO5, PO1, PO2, PO3, PO5, BL4] (5)

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