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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations Decemebr-2025

ELECTRICAL CIRCUIT ANALYSIS-I

(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

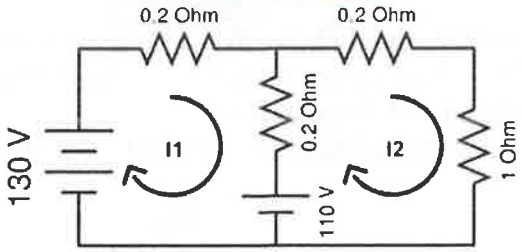
1	a	Define potential difference.	CO1	L2	2M
	b	Define practical voltage source.	CO1	L2	2M
	c	How to know the Direction of the Magnetic Field?	CO2	L3	2M
	d	Define mutual inductance.	CO2	L2	2M
	e	Write the sinusoidal voltage and current equation for series RL, RC, RLC and parallel RL, RC, RLC.	CO3	L1	2M
	f	Determine the power factor of RLC series circuit with R=5Ω, XL=8Ω and XC=12 Ω.	CO3	L4	2M
	g	Write the expression for the bandwidth of the RLC series and parallel circuit.	CO4	L1	2M
	h	Define quality factor.	CO4	L2	2M
	i	What is the property of additivity and homogeneity?	CO5	L2	2M
	j	What is the current formula for the Maximum power transfer theorem and load current in Norton's Theorem?	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

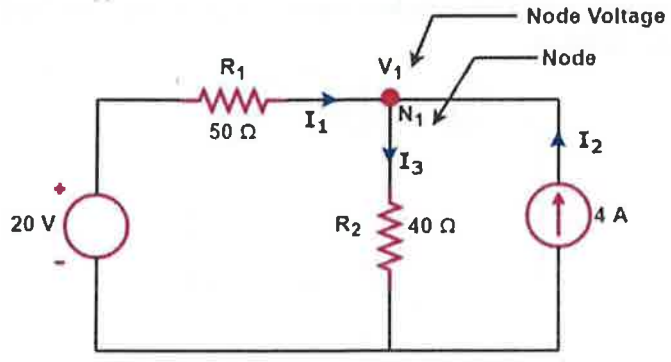
UNIT-I

2	a	What are the V-I relationships for the elements R, L, and C? and explain briefly.	CO1	L1	5M
	b	Define Kirchoff's voltage law. Find the current flowing through 1 Ω resistance by using Kirchhoff's voltage law.	CO1	L2	5M



OR

3	a	Define Kirchoff's current law. find the current through R1 and R2 resistance using KCL.	CO1	L2	5M



	b	Develop transformation formulae for Delta to Star transformation.	CO1	L1	5M

UNIT-II

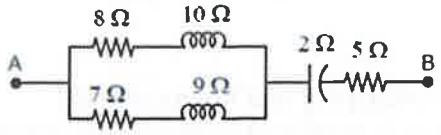
4	a	State Faraday's law of electromagnetic induction.	CO2	L1	5M
	b	Calculate the magneto motive force required to produce a flux of 0.015Wb across an air gap 2.5mm long, having an effective area of 200cm2.	CO2	L2	5M

OR

5	a	Derive an expression for composite magnetic circuits.	CO2	L3	5M
	b	A closed magnetic circuit of cast steel contains a 6 cm long path of cross sectional area 1 cm2 and a 2 cm path of cross-sectional area 0.5 cm2. A coil of 200 turns is wound around the 6 cm length of the circuit and a current of 0.4 A flows. Determine the flux density in the 2 cm path, if the relative permeability of the cast steel is 750.	CO2	L2	5M

UNIT-III

6	a	Determine the series RL and RC circuit excited by a sinusoidal source	CO3	L4	5M
	b	In the arrangement shown in the figure. Calculate the impedance between AB and the phase angle between voltage and current. Also calculate the total power consumed, if the applied voltage between AB is 200∠30°.	CO3	L2	5M



OR

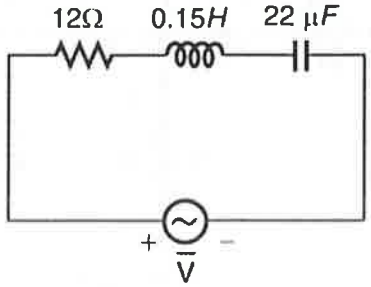
7	a	Derive an expression for the average value and RMS value of Sinusoidal Current or Voltage.	CO3	L2	6M
	b	An alternating current carrying sinusoidally with a frequency of 50 Hz has a maximum value of 100 A. Calculating time from the instant when the current is zero and is becoming positive, calculate i) the instantaneous value after 1/300 sec. ii) the time taken for the current to reach 80 A for the first time.	CO3	L2	4M

UNIT-IV

8	a	The parameters of an RLC parallel circuit excited by a current source are R=40 Ω, L=2 mH, C= 3 μF. Determine the resonant frequency, quality factor, bandwidth and cut-off frequencies.	CO4	L2	6M
	b	Write the expression for admittance of RLC parallel circuit at ha frequencies.	CO4	L2	4M

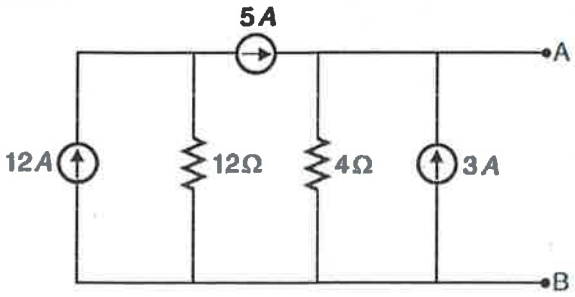
OR

9	a	Derive an expression for half power frequencies and Bandwidth of RLC series circuit.	CO4	L2	5M
	b	For the RLC circuit shown in the figure, Determine the impedance at (i) Resonant frequency, (ii) 10 Hz below resonant frequency, and (iii) 10 Hz above resonant frequency	CO4	L2	5M

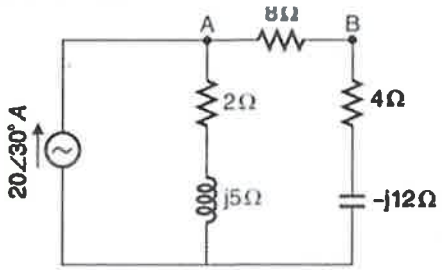


UNIT-V

10 **a** Determine the Thevenin's and Nortons's equivalent of the circuit shown in the circuit below. **CO5 L4 5M**

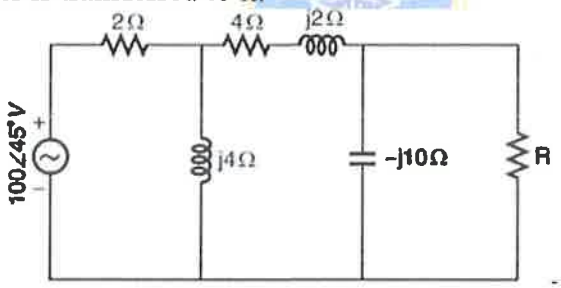


b Determine the voltage terminals A and B at ac excited circuit as shown in the figure by Norton's theorem. **CO5 L4 5M**

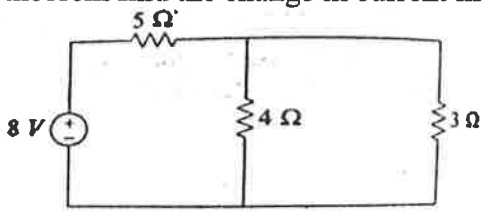


OR

11 **a** Determine the AC excited circuit shown for the value of R so that the maximum power is transferred to it. **CO5 L4 5M**



b In the circuit shown, the 3Ω resistance is changed to 6Ω resistance. Using the compensation theorem find the change in current in 5 Ω resistance. **CO5 L2 5M**



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