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CIRCUITS & NETWORKS **Course Code : 313325**

Programme Name/s	**: Digital Electronics/ Electronics & Tele-communication Engg./ Electrical and Electronics Engineering/ Electronics & Communication Engg./ Electronics Engineering/ Industrial Electronics**
Programme Code	**: DE/ EJ/ EK/ ET/ EX/ IE**
Semester	**: Third**
Course Title	**: CIRCUITS & NETWORKS**
Course Code	**: 313325**

I. RATIONALE

Diploma engineers must deal with the electronic circuit while maintaining various electronic equipment/systems in the industry. This course will help the students to use principles of circuit and analyse to maintain the electric circuit/network.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry/ employer expected outcome through various teaching learning experiences

Measure and interpret Electric circuits/networks parameters.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Calculate voltage and current of the given circuit using nodal and mesh analysis.
- CO2 - Use various network theorems to calculate circuit parameters.
- CO3 - Determine the circuit parameters of two port network.
- CO4 - Calculate the electrical parameters of single phase A.C. circuit.
- CO5 - Find the resonance condition of electric/electronic circuits.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
313325	CIRCUITS & NETWORKS	CKN	DSC	3	-	4	1	8	4	3	30	70	100	40	25	10	25@	10	25	10	175

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Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Define various terms related to circuit and network. TLO 1.2 Use KCL and KVL to calculate voltage and current in the given resistive circuit. TLO 1.3 Apply nodal analysis to find voltage and current of the given network. TLO 1.4 Apply mesh analysis to determine voltage and current of the given network. TLO 1.5 Convert the given star connection to delta connection and vice versa. TLO 1.6 Use source conversion techniques to simplify the given circuit. TLO 1.7 Analyze the transient response of RL, RC and RLC series circuit.	**Unit - I DC Network Analysis** 1.1 Terms related to circuit and network: Node, Branch, Loop, Mesh 1.2 Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL) 1.3 Nodal Analysis 1.4 Mesh Analysis 1.5 Star-delta and delta- star conversion 1.6 Conversion of voltage to current source and current to voltage source 1.7 Transient Response : RL series circuit, RC series circuit , RLC Series circuit	Lecture Using Chalk-Board Video Demonstrations Assignments

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Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
2	TLO 2.1 Use superposition theorem to calculate voltage and current in the given multisource circuit. TLO 2.2 Use Thevenin's theorem to simplify the complex circuit. TLO 2.3 Use Norton's theorem to simplify the complex circuit. TLO 2.4 Calculate load impedance using maximum power transfer theorem for the given circuit. TLO 2.5 Use reciprocity theorem to analyse the given circuit.	**Unit - II Network Theorems** 2.1 Superposition theorem for both AC voltage and DC source 2.2 Thevenin' s theorem 2.3 Norton's theorem 2.4 Maximum power transfer theorem 2.5 Reciprocity theorem	Lecture Using Chalk-Board Video Demonstrations Blended learning Assignments
3	TLO 3.1 Differentiate the given types of networks. TLO 3.2 Calculate Z, Y parameters of the given circuit. TLO 3.3 Find the ABCD parameters of the given circuit. TLO 3.4 Connect two port networks in series, parallel and cascade configuration and analyze the output. TLO 3.5 List the types and applications of attenuator. TLO 3.6 List the types and applications of passive filters.	**Unit - III Analysis of two port network** 3.1 Network Types: Active and Passive, Bilateral and Unilateral, Linear and Nonlinear, Symmetrical and Asymmetrical, Single port and Two port network 3.2 Open circuit(Z) and short circuit(Y) parameters 3.3 Transmission (ABCD) parameters 3.4 Interconnection of two port network- series, parallel and cascade configuration 3.5 Attenuators: Definition, types-T and Pi, features, frequency response, applications, comparison 3.6 Passive Filters: Definition, types- Low pass filter (LPF),high pass filter (HPF), band pass filter(BPF) and band stop filter (BSF), features, frequency response, applications, comparison	Lecture Using Chalk-Board Video Demonstrations Assignments
4	TLO 4.1 Analyze the phasor diagram of series A.C. circuit. TLO 4.2 Calculate active, reactive, apparent power and power factor for the specified circuit. TLO 4.3 Analyze the phasor diagram of parallel A.C. circuit. TLO 4.4 Determine admittance, conductance and susceptance for the given circuit. TLO 4.5 Interpret the output of the given R, L and C component at initial and final condition.	**Unit - IV Single Phase A.C. Circuit** 4.1 AC circuit with series element: R-L, R-C and R-L-C circuits, voltage and current waveform, impedance, reactance, phasor diagram, impedance triangle 4.2 Different types of Power: power factor, active (real) power, apparent power, reactive power, power triangle, power triangle of series AC circuit 4.3 AC circuit with parallel element: Resistance in parallel with pure inductance and capacitance and for series combination of resistance and inductance in parallel with capacitance, voltage and current waveform, impedance, reactance, phasor diagram, impedance triangle, power triangle for above circuit 4.4 Definition of admittance, conductance and susceptance 4.5 Initial and final conditions in switching circuits, meaning of t=0-, t=0+, t= infinity, R, L and C at initial and final conditions	Lecture Using Chalk-Board Video Demonstrations Assignment

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Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 Find the resonance condition for the specified series RLC circuit and calculate current, voltage, bandwidth, quality factor at resonant condition. TLO 5.2 Interpret the behaviour of series circuit with change in frequency. TLO 5.3 Find the resonance condition for the specified parallel RLC circuit and calculate current, voltage, bandwidth, quality factor at resonant condition. TLO 5.4 Interpret the behaviour of parallel RLC circuit with change input frequency. TLO 5.5 Describe the procedure to tune the given electrical circuit to achieve the resonance in the circuit.	**Unit - V Resonance in Series and Parallel circuits** 5.1 Resonance in series circuit: Impedance, phase angle, voltage, current, bandwidth, Quality factor (Q), magnification factor for series resonance circuit 5.2 Behaviour of RLC series circuit with change in input frequency 5.3 Resonance in Parallel Circuit: Impedance, phase angle, voltage, current, bandwidth, Quality factor (Q), magnification factor for parallel resonance circuit 5.4 Behaviour of RLC parallel circuit with change in input frequency	Lecture Using Chalk-Board Blended learning tools Assignments

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Identify the loops in the given circuit. LLO 1.2 Verify KVL to find out the voltage across the element.	1	* Measure the voltage across resistive circuit and verify it, using Kirchhoff's Voltage law (KVL).	2	CO1
LLO 2.1 Identify the nodes in the given circuit. LLO 2.2 Verify KCL at given node.	2	Measure current in various branches of the given circuit and verify it, using Kirchhoff's current law (KCL).	2	CO1
LLO 3.1 Identify the meshes in given circuit. LLO 3.2 Use mesh analysis to calculate current through given branch.	3	* Measure current through and voltage across given branch of electric network and verify it by mesh analysis.	2	CO1
LLO 4.1 Identify the nodes in the given circuit. LLO 4.2 Use nodal analysis to calculate node voltage.	4	* Measure voltage at particular node and current through branch of network and verify it by nodal analysis.	2	CO1
LLO 5.1 Measure the current of the RL series circuit. LLO 5.2 Plot and interpret the transient response of given circuit on graph paper.	5	Observe transient response of RL series circuit with DC excitation.	2	CO1

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 6.1 Measure the voltage across capacitor in RC series circuit. LLO 6.2 Plot and interpret transient response of given circuit on graph paper.	6	* Observe transient response of RC series circuit with DC excitation.	2	CO1
LLO 7.1 Measure voltage and current of the given circuit. LLO 7.2 Verify Superposition theorem.	7	* Measure current through given branch of network and voltage across given element of the circuit and verify it applying Superposition theorem.	2	CO2
LLO 8.1 Measure load current of the given circuit. LLO 8.2 Verify Norton’s theorem.	8	Measure short circuit current and Norton's resistance of the given circuit and verify it using Norton’s theorem.	2	CO2
LLO 9.1 Measure load current of the given circuit. LLO 9.2 Verify Thevenin’s theorem.	9	* Measure open circuit voltage and thevenin's resistance of the given circuit and verify it using Thevenin’s theorem.	2	CO2
LLO 10.1 Verify Maximum power transfer theorem and calculate current ,voltage and power.	10	* Vary load resistance to transfer Maximum power in the given circuit using maximum power transfer theorem.	2	CO2
LLO 11.1 Verify the concept of interchangeability of sources and detectors in the given circuit.	11	Measure voltage to current ratio before and after interchanging the position of voltage source and current in the given circuit to verify reciprocity theorem.	2	CO2
LLO 12.1 Calculate input and output impedances of given network. LLO 12.2 Interpret the Z-parameters matrix.	12	* Measure input and output voltages and currents of the given two port network and calculate open circuit(Z) parameters for the given circuit.	2	CO3
LLO 13.1 Calculate Y parameters of given network. LLO 13.2 Interpret the Y parameters matrix.	13	Measure input and output voltages and currents of the given two port network and calculate short circuit(Y) parameters for given circuit.	2	CO3
LLO 14.1 Calculate ABCD parameters of given network. LLO 14.2 Interpret the ABCD parameters matrix.	14	Measure input and output voltages and currents of the given two port network calculate transmission(ABCD) parameters for given circuit.	2	CO3
LLO 15.1 Construct low pass filter using R and C and interpret the frequency response of RC Low Pass Filter.	15	Develop RC low pass filter on breadboard and plot its frequency response.	2	CO3

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 16.1 Construct high pass using R and C and interpret the frequency response of RC high pass filter.	16	* Develop RC high pass filter on breadboard and plot its frequency response.	2	CO3
LLO 17.1 Construct band pass filter using R and C and interpret the frequency response of RC band pass filter.	17	Develop RC band pass filter on breadboard and plot it's frequency response.	2	CO3
LLO 18.1 Construct symmetrical T attenuator. LLO 18.2 Interpret I/O of symmetrical T type attenuator.	18	* Test the performance of Symmetrical T attenuator.	2	CO3
LLO 19.1 Construct symmetrical Pi attenuator. LLO 19.2 Interpret I/O of PI type attenuator.	19	Test the performance of Symmetrical Pi attenuator.	2	CO3
LLO 20.1 Connect the R and L in series with A.C. supply and measure current and voltage across the circuit element. LLO 20.2 Interpret the phasor diagram of given RL series circuit for various input A.C. supply.	20	* Measure voltage and current in the given R-L series circuit and calculate active, reactive and apparent power consumed in the circuit.	2	CO4
LLO 21.1 Connect the R and C in series with A. C. supply. LLO 21.2 Interpret the phasor diagram of given RC series circuit for various input A.C. supply.	21	Measure voltage and current in the given R-C series circuit and calculate active, reactive and apparent power consumed in the circuit.	2	CO4
LLO 22.1 Connect the R, L and C in series with supply. LLO 22.2 Interpret the phasor diagram of given RLC circuit for various input A.C. supply	22	* Measure voltage and current in the given R-L-C series circuit and calculate active, reactive and apparent power consumed in the circuit.	2	CO4
LLO 23.1 Connect the R and C in parallel with supply. LLO 23.2 Interpret the phasor diagram of given RC parallel circuit for various input A.C. supply.	23	*Measure voltage and current in the given R-C parallel circuit and calculate power factor, active, reactive and apparent power consumed in the circuit.	2	CO4

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 24.1 Connect the R, L and C in parallel with supply. LLO 24.2 Interpret the phasor diagram of given R-L-C parallel circuit for various input A.C. supply.	24	Measure voltage and current in the given R-L-C parallel circuit and calculate power factor, active, reactive and apparent power consumed in the circuit.	2	CO4
LLO 25.1 Connect series connection of resistor and inductor in parallel with capacitor. LLO 25.2 Interpret the phasor diagram of given RL series circuit in parallel with C, for various input A.C. supply.	25	* Measure voltage and current in the given R-L-C parallel circuit consists of series connection of resistor and inductor in parallel with capacitor and calculate power factor, active, reactive and apparent power consumed in the circuit.	2	CO4
LLO 26.1 Measure and interpret initial and final condition of the capacitor in the given DC circuit.	26	Measure initial and final voltage across the capacitor before and after swicthing input supply.	2	CO4
LLO 27.1 Measure and interpret initial and final condition of the Inductor in the given DC circuit.	27	Measure initial and final current flowing through the inductive coil before and after switching the supply.	2	CO4
LLO 28.1 Tune the supply frequency to create resonance in given RLC series circuit.	28	* Measure voltage and current in the given RLC series circuit and calculate resonance frequency and impedance at resonance using variable supply frequency.	2	CO5
LLO 29.1 Tune the circuit parameters (L or C) and measure the resonance frequency of RLC series circuit .	29	Measure voltage and current in the given RLC series circuit and calculate resonance frequency and impedance at resonance by varying L or C.	2	CO5
LLO 30.1 Tune the supply frequency to create resonance in given RLC parallel circuit.	30	* Measure current of given RLC parallel circuit and calculate resonance frequency and impedance at resonance by varying supply frequency.	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Prepare a report on real life applications of resonance (e.g. musical instruments)

- Prepare power point presentation on source transformation, star- delta transformation, mesh and nodal analysis and give presentation in the class.
- Build a circuit on breadboard with multiple resistors connected in series and measure voltage across each resistor. Verify using KVL.
- Prepare a chart for comparison of single phase series RLC and parallel RLC circuit and draw input and output waveforms also.
- Build a circuit to change brightness of lamp/change the speed of fan/ change the temperature of heater using basic components.
- Build a circuit on breadboard with multiple resistors connected in parallel and measure current across each resistor. Verify using KCL.

Assignment

- Calculate the Z, Y and ABCD parameters for the given two port network.
- Find circuit parameters of Single Phase AC series(R-L, R-C,R-L-C) and parallel (R-L, R-C,R-L-C) circuit, also draw its phasor diagram.
- Find the resonance condition for the specified series and RLC circuit and calculate current, voltage, bandwidth, quality factor .Observe the behaviour of R, L and C with change in frequency for series circuit.
- Identify the number of loops and nodes in the given circuit and solve the circuit using Nodal analysis and Mesh analysis.
- Simplify complex circuit using Thevenin's theorem, Norton's theorem and draw equivalent circuit for given circuit.

Activities For Specific Learning / Skills Development

- Verification of various network analysis and theorems in Virtual Laboratory (https://asnm-iitkgp.vlabs.ac.in/).
- Verification of various network analysis and theorems using Simulation Software (MATLAB, PSPICE).
- Perform R-L-C circuit analysis in Virtual Laboratory (https://asnm-iitkgp.vlabs.ac.in/exp/rlc-circuit-analysis/).
- Experimental verification of frequency response of R-L-C series Circuit (https://asnm-iitkgp.vlabs.ac.in/exp/rlc-series-circuit/).
- Test the resonance in Series RLC circuit using Simulation Software (MATLAB, PSPICE).

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Voltmeter PMMC Type: DC, 0-150/300 V, 0-250/500 V, 0-75/150 V	11,12,13,14,16
2	Ammeter PMMC Type: DC, 0-1.5/3 Amp, 0-2.5/5 Amp, 0-5/10 Amp	12
3	Single phase Autotransformer 0-270 V,50Hz,10 A	20,21,22,23,24,25
4	Digital Storage Oscilloscope: 2 and 4 analog channel models 100 and 70 MHz bandwidth models Up to 1 GS/s sampling rate.	26,27,28

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Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
5	Signal Generator, Frequency : 0.1Hz ~ 5MHz ; Output waveforms : Sine, triangle, square, positive and negative pulse	26,27,28
6	Decade capacitor Box with Decades of 1nF, 10nF, 100nF, 1µF, 10µF	28,29,30
7	Decade Resistance Box with range 1 ohm to 1000 M ohm	28,29,30
8	Decade Inductor Box with Decades of 10µH, 100µH, 1mH, 10mH, 100mH	28,29,30
9	Ammeters MI type: AC/DC, 0-1 Amp, 0-1.5 Amp, 0-2.5 Amp, 0-5 Amp	All
10	Voltmeter MI Type: AC/DC, 0-150/300 V, 0-250/500 V, 0-75/150 V	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	DC Network Analysis	CO1	8	4	4	6	14
2	II	Network Theorems	CO2	12	2	6	10	18
3	III	Analysis of two port network	CO3	8	2	4	6	12
4	IV	Single Phase A.C. Circuit	CO4	11	4	4	6	14
5	V	Resonance in Series and Parallel circuits	CO5	6	2	4	6	12
Grand Total				**45**	**14**	**22**	**34**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two offline unit tests of 30 marks and average of two-unit test marks will be consider for out of 30 marks.
- Each practical will be assessed considering 60% weightage to process, 40% weightage to product.
- For formative assessment of laboratory learning 25 marks

Summative Assessment (Assessment of Learning)

- End semester summative assessment is of 25 marks for laboratory learning.
- End semester assessment is of 70 marks.

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	3	2	1	1	1	1			
CO2	3	3	2	1	1	1	1			
CO3	2	2	3	1	1	1	1			

CO4	2	2	3	1	-	1	-			
CO5	2	1	2	1	-	1	-			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Mittal V.N., Mittal Arvind	Basic Electrical Engineering	McGraw Hill Education, Noida,2005,ISBN: 978007093572
2	Paranjothi S.R.	Electric Circuit Analysis	New Age Publisher, New Delhi , 2011, ISBN:978-81-224-3154-4
3	Theraja B.L.,Theraja A.K.	A Text book of Electrical Technology Vol-I	S. Chand and Co. New Delhi, 2006 ISBN:978-81-219-2440-5
4	Boylested R.L.	Introductory Circuit Analysis	Wheeler New Delhi, 2013,ISBN: 978-0023131615
5	P. Ramesh Babu	Electric Circuit Analysis	Scitech Publication (India) Pvt. Ltd ISBN : 978 81 8371 078 7
6	Ravish R Sihngh	Network Analysis and Synthesis	Mc Graw Hill Education (India) Pvt. Ltd. ISBN: 978-1-25-906295-7
7	Richard C. Doorf, James A. Svaboda	Introduction to electric Circuit	Wiley India Pvt. Ltd. ISBN: 978-81-265-5344-0
8	Sudhakar, A., Palli Shyammohan, S	Circuit and network	McGraw Hill, New Delhi, 2006 ISBN: 978-0-07-340458-5

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	www.scilab.org/scilab	Open source simulator for simulation of theorems
2	www.ni.com/multisim	Open source simulator for simulation of theorems and circuit analysis
3	https://www.nptelvideos.com/course.php?id=462	NPTEL Circuit Theory Video Lectures
4	https://asnm-iitkgp.vlabs.ac.in/	Virtual laboratory link for theorems, R-L-C circuit analysis and its frequency response
5	https://www.udemy.com/course/electrical-circuit-for-electric al-electronics-engineering/	Basics, circuit element, circuit solving, network theorems, transient analysis
6	https://everycircuit.com/app	Online and mobile app to design and simulate electronic circuits

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students