Shri Vaishnav VidyapeethVishwavidyalaya, Indore

Diploma in (Electronics and Instrumentation)

SUBJECT CODE	Category	SUBJECT NAME	THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTEI301		MEASUREMENT & INSTRUMENTATION	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
1. To introduce the basic functional elements of instrumentation

2. To introduce the fundamentals of electrical and electronic instruments
3. To educate on the comparison between various measurement techniques
4. To introduce various storage and display devices
5. To introduce various transducers and the data acquisition system

Course Outcomes (COs):
After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes,
The students will be able to : –
1. To apply knowledge of measurement system.

2. To identify, formulate, and solve the fundamentals of electrical and electronic instruments

3. Demonstrate various types of introduce various storage and display devices.

4. Demonstrate various types of transducers and the data acquisition system.

Syllabus

Unit-I
Introduction to measurement: Definition, application and types of measurement System,Accuracy, Precision, sensitivity, Resolution. Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement –Statistical evaluation of measurement data – Standards and calibration.

Unit-II
ELECTRICAL AND ELECTRONICS INSTRUMENTS:
Construction and operation of moving coil, moving iron,Theory and Operation of D'arsonval.

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Principle and types of analog and digital voltmeters, ammeters. Determination of B-H curve and measurements of iron loss – Instrument transformers – Instruments for measurement of frequency and phase.

Unit III
COMPARISON METHODS OF MEASUREMENTS

D.C & A.C potentiometers, D.C & A.C bridges, transformer ratio bridges, self-balancing bridges. Interference & screening – Multiple earth and earth loops – Electrostatic and electromagnetic interference – Grounding techniques.

Unit-IV
STORAGE AND DISPLAY DEVICES

Magnetic disk and tape – Recorders, digital plotters and printers. CRT display, digital CRO, LED, LCD & dot matrix display – Data Loggers.

Unit-V
TRANSDUCERS AND DATA ACQUISITION SYSTEMS

Classification of transducers – Selection of transducers – Resistive, capacitive & inductive transducers – Piezoelectric, Hall effect, optical and digital transducers – Elements of data acquisition system – A/D, D/A converters – Smart sensors.

Text Books:
1. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw Hill, II Edition 2004.
2. D.V.S. Moorthy, 'Transducers and Instrumentation', Prentice Hall of India Pvt Ltd, 2007.

References :
1. A.J. Bouwens, 'Digital Instrumentation', Tata McGraw Hill, 1997.
2. Martin Reissland, 'Electrical Measurements', New Age International (P) Ltd., Delhi, 2001.
3. Alan. S. Morris, Principles of Measurements and Instrumentation, 2nd Edition, Prentice Halln of India,

List of Experiments:

1. Study of CRO and perform component testing using CRO.
2. Study of phase & frequency using Lissajous pattern with help of CRO.
3. To Study and Perform Strain using staing gauge.
4. To study and perform LVDT (Linear Variable Differential Transformer) characteristics.
5. Study of function generator with its application.
6. To study and find out the balance condition for the Maxwell's bridge.
7. To study and find out the balance condition for the Schering bridge.
8. To study and find out the balance condition for the Hay's Bridge.
9. To study and find out the balance condition for the Wein's bridge.
10. To study and find out the balance condition for the Anderson's Bridge.

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Diploma Electronics and Instrumentation

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTEI302		Digital Electronics	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The Students Will Be Able to
1. To explain and illustrate the concepts of digital Electronics.
2. To have problem solving techniques for various Digital circuits.
3. To analyze the operation of sequential circuits

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

The students will be able to

1. Develop the understanding of the Digital systems
2. To develop the research work, about the design methods.
3. Awareness of latest technologies and developments.
4. Implement various methods used to design the digital circuit for future application.
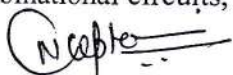
Syllabus

Unit-I
Number Systems: Decimal, binary, octal, hexadecimal number system and conversion, binary weighted codes, error detecting and correcting codes. Signed numbers, 1s and 2s complement codes, Binary arithmetic. Boolean algebra: Binary logic functions, Boolean laws, truth tables, associative and distributive properties, DeMorgans theorems, realization of switching functions using logic gates.

Unit-II
Combinational Logic: Switching equations, canonical logic forms, sum of product & product of sums, Karnaugh maps, two, three and four variable Karnaugh maps, simplification of expressions, Quine-McCluskey minimization technique, mixed logic combinational circuits, multiple output functions.

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Analysis & design of Combinational Logic: Introduction to combinational circuits, code conversions, decoder, encoder, priority encoder, multiplexers as function generators, binary adder, substractor, BCD adder, Binary comparator, arithmetic logic units

Unit-III

Sequential Logic: Sequential circuits, flip-flops, clocked and edge triggered flipflops, timing specifications, asynchronous and synchronous counters counter design with state equations, Registers, serial in serial out shift registers, timing considerations.

Unit-IV

Programmable Logic: Programmable logic devices, programmable read only memory, programmable logic arrays and programmable array logic, Design using PLA, field programmable gate a arrays.
Introduction to various semiconductor memories.

Unit-V

Digital integrated circuits: Logic levels, propagation delay time, power dissipation fan-out and fan-in, noise margin, logic families and their characteristics TTL, LSTTL CMOS and ECL integrated circuits and their performance comparison, open collector and tristate gates and buffers.
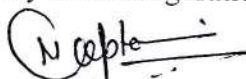Introduction to A/D and D/A converters. Various types of Analog Digital & Digital to Analog converters.

References

1. M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.. Mano; "Digital Logic & Computer Design"; PHI.

2. R.J. Tocci, "Digital Systems Principles & Applications".

3. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2006

4. S Salivahanan,"Digital Circuits And Design"

5. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008

6. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.

7. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.

List of Experiments.

1. Getting familiar with various digital integrated circuits of different logic families. Study of data sheet of these circuits and see how to test these circuits using Digital IC Tester.
2. Configure diodes and transistor as logic gates and Digital ICs for verification of truth table of logic gates.
3. Configuring NAND and NOR logic gates as universal gates.
4. Verification & Implementation of Adders and Subtractors.
5. Study and configurations of Encoder and Decoder circuits.

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6. Study and configurations of multiplexer and demultiplexer circuits.
7. . Study and configure of various digital circuits such as code converters& parity generator.
8. Study and configure of flip-flop, registers and counters.

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Diploma in Electronics and Instrumentation Engineering

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTEI 303		Analog Electronics	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical;   **C** - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Eduction Objectives (CEO's):-
The subject aims to provide the student with:

- An understanding of basic Electronics Engg. abstractions on which analysis and design of electronic circuits and systems are based, basic devices(analog and digital) and instrumentation abstractions.
- The capability to use abstractions to analyze and design simple electronic circuits.
- An understanding of how devices such as semiconductor diodes, rectifiers, and bi-polar junction transistors are working and how they are used in the design of useful circuits.

Course Outcomes:-
1. Students will: Learn how to develop and employ circuit models for elementary electronic components, e.g., resistors, sources, inductors, capacitors, diodes and transistors;
2. Become adept at using various methods of circuit analysis, including simplified methods such as series-parallel reductions, voltage and current dividers, etc.
3. Develop the capability to analyze and design simple circuits containing non-linear elements such as transistors using the concepts of load lines, operating points and incremental analysis;
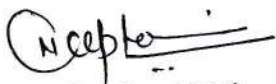
Syllabus

UNIT-I
Electrons and holes in semiconductors, Carrier Statistics, Energy bands in intrinsic and extrinsic silicon; Mechanism of current flow in a semiconductor; Carrier transport: diffusion current, drift current, mobility and resistivity; Generation and recombination of carriers; Poisson and continuity equations, Hall Effects.

UNIT-II
Evolution and Impact of Electronics in industries and in society, Familiarization of Resistors, Capacitors, Inductors, Transformers and Electro mechanical components, PN Junction diode: Structure, Principle of operation, Photo diode, LED, Solar cell.

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UNIT-III

Rectifiers and power supplies: Half wave and full wave rectifier, capacitor filter, Zener voltage regulator

UNIT-IV

Bipolar junction transistor: basic operation, current components and equations, CB, CE and CC configuration, input and output characteristics, Early effect, Region of operations: active, cut-off and saturation region. BJT as an amplifier.

UNIT-V

FET: JFET- Construction, n-channel and p-channel transistors, drain and transfer characteristics, parameters, Equivalent model and voltage gain, analysis of FET in CG, CS and CD configuration. Enhancement and Depletion MOSFET drain and transfer Characteristics.

References

1. Bell, D. A., Electronic Devices and Circuits, Oxford University Press
2. Boylested, R. L. and Nashelsky, L., Electronic Devices and Circuit Theory, Pearson Education
3. Millman and Halkias: Integrated electronics, TMH
4. Graham Bell: Electronic Devices and Circuits, PHI.
5. Vijay Baru, Rajendra Kaduskar, Sunil T. Gaikwad, Basics of Electronics Engineering, Wiley India Pvt. Ltd

List of experiments.

1. Familiarization with Laboratory Instruments (Oscilloscope, Function Generator, Digital Multimeter, DC Power Supply)
2. Characterization of Passive Circuit Elements (R, L, C)
3. Time & Frequency Response of RC and RL Circuits
4. V-I curve for P-N Junction Diodes.
5. V-I curve for Zener Diode.
6. Zener as a voltage regulator
7. Half-Wave and Full-Wave(Center tapped and Bridge) Rectifiers
8. Bipolar Junction Transistor (BJT) Circuits (Inverter, Common Emitter Amplifier)
9. To determine Drain and Transfer Characteristics of JFET Amplifier.
10. To determine Drain and Transfer Characteristics of MOSFET Amplifier

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Diploma in (Electronics and Instrumentation)

SUBJECT CODE	Category	SUBJECT NAME	THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTEI304		Electro Magnetic Theory	60	20	20	0	0	2	1	0	3

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:-

1. Obtain an understanding of physical laws governing electromagnetic effects in the form of Maxwell's equations
2. Understand the concepts of static and time varying fields with an emphasis on wave propagation

Course Outcomes:-

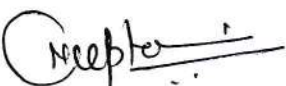After completion of this course students should be able to

1. Apply vector calculus to determine the electric and magnetic fields and energy stored due to specified charge and current distribution.
2. Apply Maxwell's equation in Differential and integral forms for the solution of appropriate problems involving static as well as time varying fields.
3. Discuss and analyze propagation of electromagnetic waves in free space, dielectric and conducting media

Syllabus

UNIT I – ELECTROSTATICS I

Introduction to various Co-ordinate systems and Co-ordinate transformations, Vector calculus, Divergence and Stokes theorem, Laplacian of a scalar and vector, Coulomb's law, Electric field intensity, Electric fields due to: point, line, surface and volume charge distributions, Electric flux density, Gauss's law and its application, Electric potential, Potential gradient, Electric dipole: dipole moment, potential & electric field intensity due to dipole, Energy stored in electrostatic fields, Method of images.

UNIT II – ELECTROSTATICS II

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Poisson's and Laplace's equations, Solution of Laplace's equation, Uniqueness theorem, Capacitor and capacitance, Electric boundary conditions, Different electric currents and current densities , Behavior of different electrical materials in electric field, Equation of continuity and relaxation time, Ohms law in point form.

UNIT III – MAGNETOSTATICS

Magnetic field intensity, Magnetic flux, Magnetic flux density, Biot-Savart Law, Magnetic field due to: straight conductors, circular loop, infinite sheet of current, Ampere's circuital law and its application, Magnetic scalar and vector potential, Force on a moving charge and current elements, Force and torque on closed circuit, Magnetic dipole, Magnetic polarization, Self and mutual inductance, Energy stored in magnetic fields, Magnetic boundary conditions.

UNIT IV – TIME VARYING FIELDS

Faraday's Law, Induced EMF for time varying fields, Displacement current, Maxwell's equation in point form, Maxwell's equation in integral form, Concept of retarded potential, Poynting vector theorem, Complex poynting vector.
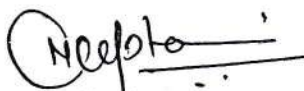
UNIT V – ELECTROMAGNETIC WAVES

Solution of wave equation, Propagation of plane EM wave in: perfect dielectric, lossy medium and good conductor, Media-attenuation, Phase velocity, Group velocity, Skin depth. Reflection and refraction of plane electromagnetic waves at boundaries for normal & oblique incidence, Snell's law of refraction, Brewster angle, Polarization of electromagnetic wave: linear, circular and elliptical polarization.

TEXT BOOKS

1. Matthew. N.O. Sadiku, "Elements of Electromagnetics", Oxford University Press, First Indian Edition, 2010.
2. Shankar Prasad Ghosh, Lipika Datta, "Electromagnetic Field Theory", McGraw Hill,1st edition, 2012
3. William Hayt, "Engineering Electromagnetics", McGraw Hill, 7th edition, 2011.
4. Gangadhar.K.A, "Field theory", Khanna Publishers, New Delhi, 15th edition, 2004.

REFERENCES

1. David K Cheng, "Field and Wave Electromagnetics",Pearson Education, 2nd edition, 2004.
2. John D. Kraus, "Electromagnetics" McGraw Hill, 5th edition, 1999.
3. Narayana Rao N, "Elements of Engineering Electro Magnetics", Prentice Hall of India, 6th edition, 2008.

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Diploma [Electronics and Instrumentation]   w.e.f. July2017

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			University Exam	Exam	Assessment*	University Exam	Assessment*				
DTEI305	Electronics	PLC Lab	0	0	0	30	20	0	0	4	2

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical;   C - Credit;
Q/A – Quiz/Assignment/Attendance, MST Mid Sem Test.

Course Objectives: -

1. To be familiar with PLC and design processes involved.
2. To provide in depth knowledge of PLC programming.
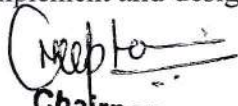3. To learn the testing of the PLC based programs.

Course Outcomes:-

Students will be able to:

1. Apply the knowledge of engineering to design and conduct experiments using PLC software.
2. Identify, formulate, and solve engineering problems related hydraulic and pneumatic.
3. Design and simulate various PLC programs and implement it on a process.
4. Identify, formulate, and solve engineering problems associated with PLC design software.

List of Experiments:

11. To understand PLC and its types with their applications.

12. To introduce ladder logic, its hardware and software terminology.

13. To implement the basic logic gates using universal logic gates through PLC.

14. To analyze Boolean logic expression and program it through PLC.

15. Implement half adder, full adder, and subtractors.

16. Design multiplexers and Demultiplexer through PLC ladder logic.

17. Design Encoder and Decoder through PLC.

18. To implement and design timer and counter logic functions using PLC.

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19. To analyze various pneumatic control valve and design its ladder logic.
20. Design and program ladder logic for traffic controller.

Text Books:

1. Madhuchhanda Mitra and Samarjit Sen Gupta, "Programmable Logic Controllers (PLC) and Industrial Automation", Penram International Publishing (India) Pvt. Ltd. 2007.

References:

1. Gary Dunning, 'Introduction to Programmable logic Controllers',(Delmar Publisher),19 July 2011.
2. Webb & Reis, Programmable logic Controllers: Principles and Applications',(Prentice Hall of India), fifth edition, 25 march 2002

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Diploma in Electronics and Instrumentation Engineering

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME					Th	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment *	END SEM University Exam	Teachers Assessment *				
DTEI 306		Electronics workshop	0	0	0	30	20	0	0	4	2

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives: -
1. To provide basic introduction of electronic and electrical hardware systems.
2. To provide hands-on training with familiarization, identification, testing and assembling.
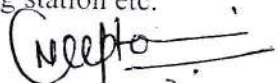
Course Outcomes:-
Students will be able to:
1. Learn and identify the active and passive electronic components.
2. Perform testing of electronic components
3. Analyze Inter-connection methods and perform soldering practice.
4. Use different software tools for PCB design.
5. Design of electronic circuits.

List of Experiments:

1. Familiarization/Identification of all active and passive electronic components with specification (Functionality, type, size, color coding, package, symbol, cost etc).

2. Familiarization/Identification of Electrical devices, Electronic devices, Electro-mechanical devices, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.).

3. Demonstration of various testing instruments such as multi-meter, Function generator, Power supply, CRO etc.

4. Demonstration of various commonly used tools Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de-soldering station etc.

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5. Perform the testing of different electronic components (Resistor, Capacitor, Diode, Transistor) using Multi-meter and CRO and draw the characteristics of these electronic components.

6. Demonstration of Breadboard and design of basic circuits using Breadboard (Rectifier, Clippers, and Clampers etc.).

7. Introduction and Comparison of various types of PCBs.

8. Introduction and perform of PCB design techniques (itching, drilling, and soldering).

9. Design of Power Supply on general purpose PCB.

10. Develop clipper and clamper circuit on using PCB design techniques (itching, drilling, and soldering).

Text Books:

1. Electronic Devices, Thomas L. Floyd, Pearson (9th Edition), 9-Jan-2011.
2. Electronic Devices and Circuits, David A. Bell, Oxford Press (5th Edition) 30- April-2008.

References:

1 Printed Circuit Boards: Design, Fabrication, Assembly and Testing R.S. Khandpur Tata McGraw-Hill Education, 24-Feb-2005.

2 Printed Circuits Handbook Clyde Coombs McGraw Hill Professional, 22-May-2007.

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Diploma in Electronics and Instrumentation Engineering

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME							
			THEORY			PRACTICAL				
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	Th	T	P	CREDITS
DTEI307		Network Analysis	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

Being one of the fundamental course Electronics stream its prime objective is to make the students capable of analyzing any given electrical network composed by passive network and some active network. Understand the fundamental concepts and theories about networks. - Apply this knowledge to solve real-world, network-centric problems. - Use advanced network analysis methods and tools to visualize and analyze networks. Interpret the results with respect to exploratory, quantitative and substantive questions. - Design and execute a small-scale network analysis project in a systematic manner. To make the students learn how to synthesize an electrical network from a given impedance/admittance function.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes
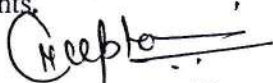
The students will be able to
1. To apply knowledge of mathematics, science in engineering.
2. To identify, formulate, and solve engineering problems.
3. Apply the fundamental concepts in solving and analyzing different Electrical networks
4. Select appropriate and relevant technique for solving the Electrical network in different conditions
5. Apply mathematics in analyzing and synthesizing the networks in time and frequency domain
6. Estimate the performance of a particular network from its analysis.

Syllabus

Unit-I
Preliminaries of Electrical elements R, L, C, and circuits; Kirchhoff's laws Basic elements: Voltage and current sources, M; Linearity of elements, Elements in series and parallel Controlled sources. Source transformations – Star Delta conversion, Power and energy in electrical elements.

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Unit-II

Circuit Analysis Methods: Nodal analysis, Mesh analysis, Circuit Theorems: Therenins' theorem, Norton's theorem, Maximum power transfer theorem, superposition theorem, Reciprocity theorem,
Network topology.

Unit-III

Transient Analysis: Source free RL and RC circuits, Elementary function unit step, unit ramp, unit impulse function and synthesis from source free parallel and series RLC circuit, complete response of the RLC circuit, lossless LC circuit.

Unit-IV

Frequency Domain Analysis: The phasor concept, sinusoidal steady state analysis; Network theorem in ac domain. AC circuit power analysis. Resonance. Laplace transform, initial and final value theorem, circuit analysis in s-domain, frequency response of simple passive filters.
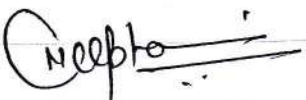
Unit-V

Two Port Networks: Z, Y, h and ABCD parameters, analysis of interconnected (magnetically coupled) two port, three terminal networks. Transfer function, immittance function.

Text Books:

1. M.E. Van Valkenburg, Network Analysis, (Pearson)
2. S P Ghosh A K Chakraborty Network Analysis & Synth. (MGH).

References Books:

1. Fundamentals of Electric Circuits, Gordon J Alexander and Matthew N.O. Sadiku.
2. Engineering Circuit Analysis, Jack Ellsworth Kemmerly and William H. Hayt
3. Linear Circuit Analysis, Pen-Min Lin and Raymond A DeCarlo.
4. http://www.nptelvideos.in/2012/11/networks-and-systems.html

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