Shri Vaishnav VidyapeethVishwavidyalaya, Indore

Diploma in (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*				
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 oftransducers 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~~ determine the Strain using staing gauge.
4. To study and ~~perform~~ determine the 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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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	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, BCD Code, Gray Code, Excess -3 Code, Parity bit generator, Hamming Code, Signed numbers, 1s and 2s complement codes, Binary arithmetic, Boolean algebra: Binary logic functions, Boolean laws, associative and distributive properties, De-Morgans theorems.

Unit-II

Logic gates and their applications, universal gates, NAND-NOR implementation of logic functions, canonical logic forms, sum of product & product of sums. Karnaugh maps: two, three and four variables.

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Unit-III

Combinational Logic: Full Adder, Half Adder, Full Subtractor, Half Subtractor, code conversions(Binary to Gray & Gray to Binary), decoder, encoder, multiplexers, BCD adder.

Unit-IV

Sequential Logic: Latch and Flip Flop-S-R, D, JK and T, characteristic equation, state table and excitation table, asynchronous and synchronous counters, Shift Register & its Types.

Unit-V

Programmable Logic: Programmable logic devices, programmable read only memory, programmable logic arrays and programmable array logic. Introduction to various semiconductor memories.

Text Books:

1. M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008.
2. R.J. Tocci, "Digital Systems Principles & Applications", Pearson publication, 11th editions, 2010.

References:

1. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2006
2. S. Salivahanan, "Digital Circuits and Design", Vikas Publishing House; Fourth Edition, 2012
3. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
4. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.
5. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.

List of Experiments:

1. Configure diodes and transistor as logic gates and Digital ICs for verification of truth table of logic gates.
2. Configuring NAND and NOR logic gates as universal gates.
3. Verification & Implementation of Adders and Subtractors.
4. Design and verify Encoder and Decoder circuits.
5. Design and verify multiplexer and de-multiplexer circuits.
6. Study and configure of various digital circuits such as code converters & parity generator.
7. Study and configure of flip-flop, registers and counters.

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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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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*				
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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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			University Exam	Exam Teachers 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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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 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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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
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 Objectives:

1. This course provides an overall exposure about the different circuit elements and their characteristics.
2. To analyze the different methods/tools for solving electrical circuit.
3. To get a throughout knowledge of designing of electrical circuit.
4. To familiar with the time domain and frequency domain approach.
5. To analyze the network topology.

Course Outcomes:

The students will be able to:

1. Understand the concept of different circuit elements, AC and DC circuits and sources.
2. Learn about different Network Theorems for AC & DC circuits and how to use these networks for solving complicated networks.
3. Learn about important tool for solution of Integral-differential equations and also analysis of circuit in the time domain and frequency domain.
4. Solve two port networks and analyze two port networks.
5. Understand the concept of network topology.

Syllabus

Unit-I

Introduction to circuit elements R, L, C and their characteristics, ideal and practical sources and their characteristics, voltage and current division rule, source transformation technique, controlled & uncontrolled sources, dependent & independent sources, star- delta conversion, KCL and KVL analysis, Nodal & mesh analysis.

Unit-II

Network Theorems for AC & DC circuits: Superposition, Thevenin's & Norton's, Maximum power transfer, Reciprocity theorem.

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Unit-III

Laplace transform, solution of Integro-differential equations, Initial & final value theorem, Time response analysis in RL, RC & RLC Circuits, Transient analysis in RL, RC & RLC Circuits, initial conditions, Steady state analysis.

Unit-IV

Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters–Z, Y, ABCD, Hybrid parameters, relationship between parameters.

Unit-V

Network topology: concept of Network graph, Tree, Tree branch & link, and Incidence matrix, cut set and tie set matrices, dual networks, and Dot convention, coupling co-efficient.

Text Books:

1. M.E. VanValkenburg, "Network Analysis", (PHI), 3rd edition, 01 January 2006.
2. Roy Choudhary D, "Network and systems", New Age Pub, 2nd edition, 2010.

References:

1. Chakraborti, "Circuit theory", Dhanpat Rai publication, 7th edition revised, 2018.
2. Sudhakar & Pillai, "Circuit & Networks-Analysis and Synthesis", TMH, 5th edition, 01 july 2017.
3. Pankaj Swarnkar,"Network Analysis and synthesis", satya prakashan New Dehli, 8th edition, 2013-14 .

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