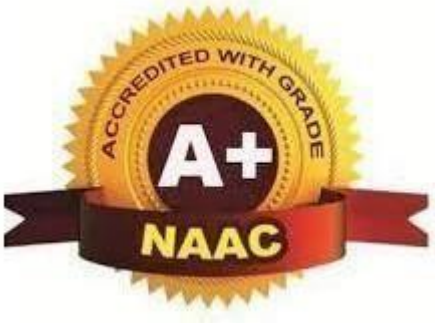
TULSIRAMJI GAIKWAD-PATIL College of Engineering & Technology

Mohgaon, Wardha Road, Nagpur - 441 108

An Autonomous Institute



DEPARTMENT OF ELECTRICAL ENGINEERING

B.Tech. Electrical Engineering

Syllabus

From

Academic Year 2022-23

Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur)

Programme: Electrical Engineering

Scheme of Instructions: Second Year B.Tech. in Electrical Engineering

Semester – III

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME				
									CT-1	CT-2	TA/CA	ESE	TOTAL
1	BSC	BEE2301	Electrical Engineering Mathematics	3	-	-	3	3	15	15	10	60	100
2	BSC	BEE2302	Analog & Digital Electronics	3	-	-	3	3	15	15	10	60	100
3	ESC	BEE2303	Electrical & Electronics Measurement	3	-	-	3	3	15	15	10	60	100
4	PCC	BEE2304	Electrical Circuit Analysis	3	1	-	4	4	15	15	10	60	100
5	PCC	BEE2305	DC Machines & Transformer	3		-	3	3	15	15	10	60	100
6	HSMC	BSH2301	Human Values for Professional Society	3	-	-	3	3	15	15	10	60	100
7	BSC	BEE2307	Analog & Digital Electronics Lab	-	-	2	2	1	-	-	25	25	50
8	ESC	BEE2308	Electrical & Electronics Measurement Lab	-	-	2	2	1	-	-	25	25	50
9	PCC	BEE2309	Electrical Circuit Analysis Lab	-	-	2	2	1	-	-	25	25	50
10	PCC	BEE2310	DC Machines & Transformer Lab	-	-	2	2	1	-	-	25	25	50
11	MCC	BAU2303	Environmental Science	2	-	-	2	Audit	-	-	-	-	-
			Total	**20**	**01**	**08**	**29**	**23**	**90**	**90**	**160**	**460**	**800**

L- Lecture T-Tutorial P-Practical

CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2 ESE- End Semester Examination (For Laboratory End Semester performance)

Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core Courses)	PEC (Programme Elective Courses)	OEC (Open Elective courses from other discipline)	Project / Seminar /Industrial Training	MCC (Mandatory Courses)
Credits	03	07	04	9	--	--	--	Yes
Cumulative Sum	06	25	18	9	--	--	--	--

PROGRESSIVE TOTAL CREDITS :35+23 = 58

BoS Chairman
HOD
Department of Electrical Engineering
Tulsiramji Gaikwad Patil College of Engineering & Technology, Nagpur

Dean Academics
Dean Academics
Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur

Principal
Principal
Tulsiramji Gaikwad Patil College Of Engineering and Technology Nagpur

Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC Accredited (A+ Grade)
An Autonomous Institute affiliated to RTMNU Nagpur

Second Year (Semester-III) B.Tech. Electrical Engineering

BEE2301: Electrical Engineering Mathematics

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	**CT-1**	15 Marks
Tutorial	0 Hrs/week	**CT-2**	15 Marks
Total Credit	3	**TA**	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 03 Hrs 00 Min.	

Course Outcomes:

Student will be able to

1	**Analyze** numerical techniques to find the roots of equations different types of equations.
2	**Apply** the concept of Laplace Transform for Solving differential equation
3	**Apply** the knowledge of Fourier series and Transform for understanding periodic signals and solve integral equations.
4	**Solve** Partial Differential Equation using appropriate method
5	**Apply** the concept of Z-Transform for solving difference equation

	Course Contents	Hours
Unit I	**Numerical Methods:** Error in numerical calculations, Errors in series approximation, Rounding of errors, Solution of Algebraic and Transcendental Equation: Bisection method, False position method, Newton –Raphson method and their convergence, Solution of system of simultaneous linear equations: Gauss elimination method, Gauss Jordon method. Gauss Seidel method, Crout's method.	**(9)**
Unit II	**Laplace Transform**: Definition, Properties, Evaluation of integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution theorem (statement only), Laplace Transform of Periodic Functions (statement only), Unit Step Function and Unit Impulse Function, Applications of Laplace Transform to solve Ordinary Differential Equations.	**(9)**
Unit III	**Fourier Series & Fourier Transform**: Periodic functions and their Fourier Expansions, Even and Odd functions, Change of interval, Half Range Expansions. Fourier Transform: Definition and Properties (excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equation.	**(9)**

Unit IV	**Partial Differential Equations**: Partial Differential Equations of First Order First degree i.e. Lagrange's form, Linear Homogeneous Equations of Higher order with constant coefficients, Method of separation of variables, Applications of Partial Differential Equations, Introduction to Mathematical Modelling	**(9)**
Unit V	**Z-Transform** Definition, Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Residue Method (Inversion Integral Method) and Power Partial Fraction Method, Convolution of two sequences. Solutions of Difference Equations with Constant Coefficients by Z- transform.	**(9)**
Text Books		
1	Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication	
2	Advanced Engineering Mathematics by Erwin Kreysizig, 8th Edition, Wiley India	
3	Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville.	
Reference Books		
1	A Text Book of applied Mathematics, Volume II , by P.N. Wartikar& J.N. Wartikar, Poona Vidyarthi Griha Prakashan	
2	Introductory methods of Numerical Analysis, by S.S. Sastry, PHI	
3	Mathematics for Engineers by Chandrika Prasad John wiley & son	

Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC Accredited (A+ Grade)
An Autonomous Institute affiliated to RTMNU Nagpur

Second Year (Semester-III) B.Tech. Electrical Engineering

BEE2302: Analog & Digital Electronics

Teaching Scheme	
Lectures	3 Hrs/week
Tutorial	0 Hrs/week
Total Credit	3

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
TA	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of ESE: 03 Hrs 00 Min.	

Course Outcomes (CO)

Students will be able to

1	**Describe** the working principle of amplifiers and oscillators
2	**Obtain** output power, power dissipation and efficiency of power amplifiers.
3	**Illustrate** the differential, multi-stage and operational amplifier
4	**Elaborate** the working principle of combinational circuits and verify Logic Gates
5	**Classify** sequential circuits using flip/flop and counters

Course Contents		Hours
Unit I	**Feedback Amplifiers & Oscillators:** Introduction of Amplifiers, Feedback concept, Feedback Topologies, Gain-Bandwidth product graph, General Characteristics of negative feedback-Amplifiers. Classification of oscillator, General Characteristics of positive feedback-Amplifiers Criterion for oscillation. Hartley, Collpitts, RC Phase shift, Wien Bridge and crystal oscillators.	**(9)**
Unit II	**Power Amplifiers:** Introduction and Classification of Power Amplifiers, Output power, power dissipation and efficiency analysis of Class A, class B, class AB, class C, class D and class E amplifiers as output stages. Application of Amplifiers. Analog to Digital Conversion (A/D Real time Applications).	**(9)**
Unit III	**Differential, Multi-stage and Operational Amplifier :** Differential amplifier, direct coupled multi-stage amplifier, internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product) Inverting and Non – inverting Amplifiers, Differentiator, Integrator, Instrumentation Amplifier and its Application of Operational Amplifiers. Analog to Digital Conversion	**(9)**
Unit IV	**Combinational Digital Circuits**: Introduction to Digital Circuits, Features and Application of Combinational Digital Circuits, De'morgan theorem. POS/SOP, Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, multiplexer, De-Multiplexer/Decoders, Adders, Sub tractors.	**(9)**
Unit V	**Sequential Circuits and Systems:** Introduction to Sequential Circuits , Features and Application of Sequential Circuits, Flip –Flop (one bit memory) the circuit properties of Flip-Flop, Types of various F/F, Working of the	**(9)**

	clocked SR flip flop, J- K-T and D types flip-flops, Applications of flip-flops, shift registers, applications of shift registers, Introduction to counters, Difference between Asynchronous synchronous counters.	

Text Books	
1	Millman, Integrated Electronics, ed. 2, TMH. 2010
2	A. S. Sedra, Kenneth C. Smith, Microelectronic Circuits, Oxford university press. 2009
3	Herbert Taub, Donald L. Schilling, Digital Integrated Electronics, TMH 2008
4	Modern Digital Electronics – R. P. Jain, 3rd Edition, Tata McGraw-Hill, 2007.
5	A. Anandkumar, Fundamentals of Digital circuits, PHI 2009
6	M. Morris Mano, Digital Logic and Computer Design, Pearson Edu. 2014
Reference Books	
1	M. H. Rashid, Microelectronic Circuits Analysis and design, Cengage Learning. 2009
2	David A. BELL, Electronic Devices and Circuits, Oxford university press. 2009
3	A. Anandkumar, Fundamentals of Digital circuits, PHI 2009
Useful Links	
1	http://www-mdp.eng.cam.ac.uk/web/library/enginfo/electrical/hong1.pdf
2	https://archive.org/details/ElectronicDevicesCircuits
3	http://nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/BASIC ELECTRONICS
4	http://worldclassprogramme.com

Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC Accredited (A+ Grade)
An Autonomous Institute affiliated to RTMNU Nagpur

Second Year (Semester-III) B.Tech. Electrical Engineering

BEE2303:Electrical & Electronics Measurement

Teaching Scheme	
Lectures	3 Hrs/week
Tutorial	0 Hrs/week
Total Credit	3

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
TA	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of ESE: 03 Hrs 00 Min.	

Course Outcomes (CO)

Students will be able to

1	**Implement** the use of different electrical instruments for electrical measurement system.
2	**Measure** the resistance, inductance and capacitance by using different bridges.
3	**Carry out** Power and Energy measurement.
4	**Interpret** the instrument transformers with respect to their Burdon, ratios and characteristics.
5	**Utilize** basic idea about transducer& analyze static and dynamic characteristics of instruments.

	Course Contents	Hours
Unit I	**Generalized Measuring Instruments:** Classification of Instruments, forces acting in Indicating instruments, Types of damping methods, Principle & operation of Moving iron &PMMC type instruments, their torque equations, Static and Dynamic characteristics and performance of instruments, Errors in measurements, loading effect of instruments	**(9)**
Unit II	**Measurement of RLC Elements** Measurement of Resistance: classification, Measurement of medium resistance :- Wheatstone Bridge. Low resistance: - Kelvin's Double Bridge. High resistance:- Ohm meter, Megger & loss of charge method. Measurement of inductance using Maxwell's inductance-capacitance bridge, Measurement of Capacitance using Schering bridge , Hays Bridge.	**(9)**
Unit III	**Measurement of Power and Energy** True RMS Measurement, Blondel's Theorem and Measurement of active, reactive and apparent power in polyphase circuits. Electrodynamometer type wattmeter, Measurement of Energy in single and polyphase circuits, Induction type Energy meter, digital energy meters. Special Instruments: Power factor meter, frequency meter, synchronoscope	**(9)**
Unit IV	**Instrument Transformers** General theory of Instrument transformers, various ratios, burden, characteristics and Phasor diagram of Current transformer and potential transformers & extension of range using C.T. & P.T., errors in instrument transformers.	**(9)**
Unit V	**Analog Transducer :** Transducers : Types of Transducers , Transducers required for the measurement of non-electrical quantities, Measurement of Non-electric quantities like Displacement, pressure, Torque, Flow	**(9)**

	(Part B) Digital Measuring Instruments Definition of Digital transducer, Classification, Introduction to digital measurement, Measurement of Electric quantities like Digital Encoder, Hall effect sensor, Latest trends of measurement in power sector like SCADA, EMS.	
Text Books		
1	A.K. Sawhney, "A Course in Electrical & Electronics Measurement and Instrumentation", Dhanpat Rai & Sons, 2015	
2	Electronic Instrumentation & Measurement Technique - W.D. Cooper , Prentice Hall	
3	C.S. Rangan, G.R. Sharma, V.A.V. Mani, "Instrumentation, Devices and Systems", TMH, 2nd edition	
Reference Books		
1	Measurement System Application and Design - E.O. Doeblin, McGraw Hill	
2	H.S. Kalsi, "Electronic Instrumentation", 6th Edition McGraw Hill	
3	Electrical Instrumentation - H. S. Kalsi - TATA MCGRAW-HILL EDUCATION PVT. LTD.2nd revised	
Useful Links		
1	https://nptel.ac.in/courses/108/105/108105153/	
2	https://nptel.ac.in/courses/108/105/108105112/	
3	https://nptel.ac.in/courses/108/105/108105064/	

Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC Accredited (A+ Grade)
An Autonomous Institute affiliated to RTMNU Nagpur

Second Year (Semester-III) B.Tech. Electrical Engineering

BEE2304: Electrical Circuit Analysis

Teaching Scheme	
Lectures	3 Hrs/week
Tutorial	1 Hrs/week
Total Credit	4

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
TA	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of ESE: 03 Hrs 00 Min.	

Course Outcomes (CO)

Students will be able to

1	**Apply** mesh and nodal analysis to AC circuits in sinusoidal steady state.
2	**Use** network theorems for analysis and design of A.C. & DC circuits.
3	**Evaluate** the parameter of energy storage elements with and without initial conditions.
4	**Find** out transient behaviors, driving points and transfer functions, poles, zeros of transfer function
5	**Solve** two port networks and relationships between parameter sets.

	Course Contents	Hours
Unit I	**Electrical Circuit Analysis:** Equilibrium Equations with Nodal & Mesh Analysis on electrical networks, Concept of Super-node, super-mesh, source transformations, Dot conventions in coupled circuits, Solutions of Mutually coupled Networks, Duality.	**(9)**
Unit II	**Application of Network Theorem in DC & AC Circuits:** Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem. Analysis with and without controlled sources.	**(9)**
Unit III	**Initial and Final Conditions, Impedance Functions And Circuit Analysis With Laplace Transform**: Concept of initial and final conditions, behavior of resistor, inductor and capacitor at t = 0- and at t = 0+, Concept of complex frequency, Partial fractions, Singularity functions, Waveforms Synthesis, Steady state and transient state analysis of RL, RC, RLC network with initial & final conditions using Laplace Transformation.	**(9)**
Unit IV	**Network Functions:** Transient Response, Driving points and transfer functions, Poles, Zeros of network function, their properties, Time response from Pole-Zero locations on s-plane, convolution integral solution.	**(9)**
Unit V	**Two Port Network:** Network Parameters and Inter-connections, Conditions of Reciprocity and Symmetry, Inter-relations between parameter sets. **Three Phase Circuit:**-Three phase unbalanced and balanced circuits and power calculations, Resonance in series & parallel RLC circuits.	**(9)**

Text Books

1	A.Chakrabarty, “Circuit Theory (Analysis & Synthesis)”, Dhanpat Rai & Co. 2015

2	C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education, 2004.
3	W. H. Hayt and J. E. Kemmerly, “Engineering Circuit Analysis”, McGraw Hill Education, 2013.
Reference Books	
1	Allan H. Robbins, Wilhelm C. Miller, “Circuit Analysis Theory and Practice”, Cengage Learning India, 2013
2	M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006.
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc22_ee93/preview
2	https://onlinecourses.nptel.ac.in/noc22_ee90/preview

Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC Accredited (A+ Grade)
An Autonomous Institute affiliated to RTMNU Nagpur

Second Year (Semester-III) B.Tech. Electrical Engineering

BEE2305: DC Machines & Transformer

Teaching Scheme	
Lectures	3 Hrs/week
Tutorial	0 Hrs/week
Total Credit	3

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
TA	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of ESE: 03 Hrs 00 Min.	

Course Outcomes (CO)

Students will be able to

1	**Explain** the principle and working of Electric Motors.
2	**Discriminate** the principle and working of basic DC Generator
3	**Analyze** the different Characteristics of a DC Motors
4	**Demonstrate** of working Principle, Operation, control & application of transformer
5	**Examine** different parameters of transformers.

	Course Contents	Hours
Unit I	**Introduction to Electric Motors-** Electric Motors-Principle of operation of different Motors, construction and representation of parts with their materials, schematic diagrams, Functions of the various parts of Motors	**(6)**
Unit II	**D.C. Generators** Construction of D.C. Machines, Types of D.C. Machines, Working principle of D.C. Generators, EMF Equation of DC Generator, Lap and Wave Windings, Armature Reaction in D.C. Generators, Characteristics of D.C. Generators, Separately Excited DC Generator, Voltage Build-up in Self-Excited Generator, D.C. Shunt, D.C. Series and D.C. Compound Generator Characteristics, Power Flow in D.C. Generator, Losses and Efficiency in D.C. Generator and Their Examples.	**(9)**
Unit III	**D.C. Motors** Overview of Construction, Working principle of Motor, Back E.M.F. and its equations, Types of DC Motors, Torque of DC Motor, Armature Reaction in DC Motor, Characteristics of a DC Shunt Motor, Characteristics of a DC Series Motor, Characteristics of a DC Compound Motor, Need of DC Motor Starter, Starting of DC Motors, Three Point and Four Point Starter with its advantages and disadvantages, Speed control of a DC Motor, Losses in DC Machines and their Examples.	**(9)**
Unit IV	**Single Phase Transformer**:-Transformer Phasor diagram, equivalent circuit diagram. Transformer equivalent circuit parameter calculation using O.C. & S.C. test. Polarity test and parallel operation of single phase transformer. **3-Phase Transformer**: principle and operation of three phase transformer and, O.C. & S.C. test on three phase transformer, determination of equivalent	**(12)**

	circuit parameters, Regulation, Efficiency.	
Unit V	Three phase to two phase conversion, parallel operation of three phase transformer, methods of cooling, back to back test, maintenance of transformer, insulation of transformer.	**(9)**

Text Books	
1	A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2	A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3	M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002
Reference Books	
1	P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2	I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010
Useful Links	
1	https://nptel.ac.in/courses/117/106/117106034/
2	https://nptel.ac.in/courses/108108076/
3	https://nptel.ac.in/courses/108105062/

Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC Accredited (A+ Grade)
An Autonomous Institute affiliated to RTMNU Nagpur

Second Year (Semester-III) B.Tech. Electrical Engineering

BSH2301: Human Values for Professional Society

Teaching Scheme	
Lectures	3 Hrs/week
Tutorial	0 Hrs/week
Total Credit	3

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
TA	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of ESE: 03 Hrs 00 Min.	

Course Outcomes:

Student will be able to

1	**Describe** Value Education and its role for Self-exploration.
2	**Illustrate** the Harmony in the Human Being and Society.
3	**Examine** the Ethical Human Conduct along with Universal Order.
4	**Use** of various theories of Basic Ethical principles.
5	**Predict** Global Issues in Professional Ethics and Sustainable Development.

	Course Contents	Hours
Unit I	**Introduction to Value Education** Value Education, Definition, Concept and Need for Value Education, The Content and Process of Value Education, Basic Guidelines for Value Education, Self-exploration as a means of Value Education.	**(9)**
Unit II	**Harmony in the Human Being, Family, Society and Nature** Human Being is more than just the Body, Understanding Myself as Co-existence of the Self and the Body, Understanding the activities in the Self and the activities in the Body, Family as a basic unit of Human Interaction and Values in Relationships, The Basics for Respect and today's Crisis: Affection, Guidance, Reverence, Glory.	**(9)**
Unit III	**Social Ethics** The Basics for Ethical Human Conduct, Defects in Ethical Human Conduct, Holistic Alternative and Universal Order, Universal Human Order and Ethical Conduct.	**(9)**
Unit IV	**Basic Theories** Basic Ethical principles, Moral Developments, Deontology, Utilitarianism, Virtue theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.	**(9)**

Unit V	**Global Issues in Professional Ethics:** Introduction- Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.	**(9)**

Text Books	
T.1	A.N Tripathy, New Age International Publishers, 2003.
T.2	Bajpai. B. L, New Royal Book Co, Lucknow, Reprinted, 2004.
T.3	Bertrand Russell Human Society in Ethics & Politics.
T.4	Professional Ethics: R. Subramanian, Oxford University Press, 2015.
Reference Books	
R.1	Corliss Lamont, Philosophy of Humanism.
R.2	Gaur. R.R, Sangal. R, Bagaria. G.P, A Foundation Course in Value Education, Excel Books, 2009.
R.3	Gaur. R.R, Sangal. R, Bagaria. G.P, Teachers Manual Excel Books, 2009.
R.4	I.C. Sharma. Ethical Philosophy of India Nagin & co Julundhar.
R.5	Mortimer. J. Adler, – Whatman has made of man.
R.6	Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, Cengage Learning, 2015.

Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC Accredited (A+ Grade)
An Autonomous Institute affiliated to RTMNU Nagpur

Second Year (Semester-III) B.Tech. Electrical Engineering

BEE2307:Analog & Digital Electronics Lab

Teaching Scheme		Examination Scheme	
Practical	2 Hrs/week	**CA**	25 Marks
Total Credit	1	**ESE**	25 Marks
		Total	50 Marks
		Duration of ESE: 02 Hrs 00 Min.	

Course Outcomes (CO)

Students will be able to

1	**Develop** & **Analyze** feedback Amplifier
2	**Illustrate** the need of digitalization for modern communication.
3	**Develop** & Analysis various linear integrated circuits
4	**Construct** and illustrate combinational circuit
5	**Demonstrate** and **analyze** sequential circuits for digital input.

Sr. No.	List of Experiment	CO
1	Demonstrate RC Phase shift Oscillator and obtain oscillating frequency	**CO1**
2	Develop & Analysis Analog to Digital Converter.	**CO2**
3	Compare Inverting, Non–Inverting **&** Differential amplifier using different parameters.	**CO3**
4	Verify Integrator & Differentiator circuit with different inputs.	**CO3**
5	Develop & Verify AND, OR, NOR,NAND logic GATE	**CO4**
6	Verify Half and Full Adder circuit with truth table.	**CO4**
7	Demonstrate Multiplexer using Encoder IC 74138.	**CO5**
8	Develop S-R, T, D Flip/Flop and verify its truth table.	**CO5**

Text Books

1	Millman, Integrated Electronics, ed. 2, TMH. 2010
2	A. S. Sedra, Kenneth C. Smith, Microelectronic Circuits, Oxford university press. 2009
3	Herbert Taub, Donald L. Schilling, Digital Integrated Electronics, TMH 2008

Reference Books

1	M. H. Rashid, Microelectronic Circuits Analysis and design, Cengage Learning. 2009
2	David A. BELL, Electronic Devices and Circuits, Oxford university press. 2009

Useful Links

1	http://www-mdp.eng.cam.ac.uk/web/library/enginfo/electrical/hong1.pdf
2	https://archive.org/details/ElectronicDevicesCircuits

Tulsiramji Gaikwad-Patil College of Engineering and Technology

Wardha Road, Nagpur-441 108

NAAC Accredited (A+ Grade)

Second Year (Semester-III) B.Tech. Electrical Engineering

BEE2308:Electrical & Electronics Measurement Lab

Teaching Scheme		Examination Scheme	
Practical	2Hrs/week	**CA**	25 Marks
Total Credit	1	**ESE**	25 Marks
		Total	50 Marks
		Duration of ESE: 02 Hrs 00 Min.	

Course Outcomes (CO)

Students will be able to

1	**Apply** different methods for measurement of resistance
2	**Use** different techniques for measurement of inductance & capacitance
3	**Measure** three phase power by using different technique
4	**Calibrate** the single phase energy meter & dynamometer type wattmeter
5	**Apply** proper methods for measurement of displacement

Sr. No.	List of Experiment	CO
1	Measurement of mediumresistance by voltmeter Ammeter method	**CO1**
2	Measurement of the medium resistance by using Wheatstone bridge	**CO1**
3	Measurement of the low resistance by kelvin's Double bridge	**CO1**
4	Measurement of inductance by using Maxwell's bridge	**CO2**
5	Measurement of the unknown capacitance by using Schering bridge	**CO2**
6	Measurement of the 3-phase power by the two watt meter method	**CO3**
7	Calibration and testing of single phase energy meter	**CO4**
8	Calibration of dynamometer type wattmeter using phantom loading UPF	**CO4**
9	To perform displacement measurement by using LVDT	**CO5**
10	To perform displacement measurement by using potentiometer as a transducer	**CO5**

Text Books

1	Electrical & Electronics Measurements & Instrumentation - A. K. Sawhney, DHANPAT RAI & SONS, 5th REVISE
2	Electronic Instrumentation & Measurement Technique- W.D. Cooper, Prentice Hall

Reference Books

1	Measurement System Application and Design- E.O. Doeblin, McGraw Hill
2	Electrical Instrumentation- H. S. Kalsi, TATA MCGRAW-HILL EDUCATION PVT. LTD.2nd revised
3	Instrumentation for Engineering Measurements - DalleyRailey, Mc Connel ,John Wiley & Son

Useful Links

1	https://nptel.ac.in/courses/108/105/108105064/
2	https://nptel.ac.in/courses/108/105/108105153/

Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC Accredited (A+ Grade)
An Autonomous Institute affiliated to RTMNU Nagpur

Second Year (Semester-III) B.Tech. Electrical Engineering

BEE2309: Electrical Circuit Analysis Lab

Teaching Scheme		Examination Scheme	
Practical	2 Hrs/week	**CA**	25 Marks
Total Credit	1	**ESE**	25 Marks
		Total	50 Marks
		Duration of ESE: 02 Hrs 00 Min.	

Course Outcomes (CO)

Students will be able to

1	**Apply** mesh and nodal analysis to AC circuits in sinusoidal steady state.
2	**Use** network theorems for analysis and design of A.C. & DC circuits.
3	**Evaluate** the parameter of energy storage elements with and without initial conditions.
4	**Find** out transient behaviors, driving points and transfer functions, poles, zeros of transfer function
5	**Solve** two port networks and relationships between parameter sets.

Sr. No.	List of Experiment	CO
1	Determine current through the given branch of electric network by applying mesh analysis.	**CO1**
2	Determine current through the given branch of electric network by applying nodal analysis.	**CO1**
3	Determine current through the given branch of electric network by applying Superposition Theorem and reciprocity theorem	**CO2**
4	Determine equivalent circuit parameter in a given circuit by applying Thevenin's & Norton's Theorem.	**CO2**
5	Determine load resistance for maximum power transfer for a given circuit by applying Maximum Power Transfer Theorem	**CO2**
6	Find the parameter in a series RL circuit when a variable DC voltage is applied.	**CO3**
7	Obtain the simulation result of a given series RC circuit with different inputs using PSPICE programming	**CO3**
8	Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values.	**CO4**
9	Plot the poles and zeros of the continuous-time system represented by the given transfer function using SCILAB software.	**CO4**
10	Evaluate the Z-Parameter & Y –Parameter of a given Two Port Network.	**CO5**
11	Evaluate the Transmission-Parameter & h –Parameter of a given Two Port Network.	**CO5**

Text Books

1	A.Chakrabarty, "Circuit Theory (Analysis & Synthesis)", Dhanpat Rai & Co. 2015
2	C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.
3	W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.

Reference Books

1	Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013
2	M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.

Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC Accredited (A+ Grade)
An Autonomous Institute affiliated to RTMNU Nagpur

Second Year (Semester-III) B.Tech. Electrical Engineering

BEE2310: DC Machine & Transformer Lab

Teaching Scheme	
Practical	2 Hrs/week
Total Credit	1

Examination Scheme	
CA	25 Marks
ESE	25 Marks
Total	50 Marks
Duration of ESE: 02 Hrs 00 Min.	

Course Outcomes (CO)

Students will be able to

1	**Explain** the principle and working of DC machine.
2	**Discriminate** the principle and working of DC motor
3	**Analyze** starting methods and speed control methods of DC Machine
4	**Monitor** the different parameters of 1 Phase Transformer
5	**Visualize** the principle and to check performance of transformer.

Sr. No.	List of Experiment	CO
1	Demonstrate the construction details of DC Machine	**CO1**
2	Measure armature and field resistance of direct current (DC) shunt generator and to obtain its open circuit characteristics.	**CO1**
3	Perform Load test on DC Motor	**CO2**
4	Examine the construction and working of Three point DC Machine Starter	**CO2**
5	Apply armature voltage control method for Speed Control of DC Shunt Motor	**CO3**
6	Determine Transformer Parameters by Short circuit and Open Circuit test	**CO4**
7	Find out the transformer losses by Sumpner Test	**CO4**
8	Convert three phase System in to two phase by Scott Connection	**CO4**
9	Apply direct loading test on single phase transformer.	**CO5**
10	Perform open circuit test and short circuit test on three phase transformer.	**CO5**

Text Books

1	A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2	A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3	M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002

Reference Books

1	P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2	I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010

Useful Links

1	https://nptel.ac.in/courses/117/106/117106034/
2	https://nptel.ac.in/courses/108108076/
3	https://nptel.ac.in/courses/108105062/

HOD
Department of Electrical Engineering
Tulsiramji Gaikwad Patil College of Engineering & Technology, Nagpur

Dean Academics
Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur

Principal
Tulsiramji Gaikwad Patil College of Engineering and Technology, Nagpur

Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC Accredited (A+ Grade)
An Autonomous Institute affiliated to RTMNU Nagpur

Second Year (Semester-III) B.Tech. Electrical Engineering

BAU2303: Environmental Science

Teaching Scheme			Examination Scheme	
Lectures	2 Hrs/week		**ESE**	50 Marks (MCQ)
Tutorial	0 Hrs/week		**Total**	50 Marks
Total Credit	Audit		Duration of ESE: 02 Hrs 00 Min	

Course Outcomes:

Student will be able to

1	**Examine** natural resources and their importance.
2	**Illustrate** the energy flow in the ecosystem.
3	**Predict** the causes of environmental pollution and preventive measures.

	Course Contents	Hours
Unit I	**Natural Resources:** Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Energy resources: Growing energy needs, use of alternate energy sources. Forest resources: Use and over-exploitation, deforestation, mining, dams and their effects on forest. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.	**(8)**
Unit II	**Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems.	**(8)**
Unit III	**Environmental Pollution:** Definition, Cause, effects and control measures of: - a. Air pollution, b. Water pollution, c. Noise pollution, d. nuclear hazards. E-Solid waste Management: Causes, effects and control measures of urban and industrial wastes.	**(8)**

Text Books

T.1	Ecology and Environmental Science, Rana S.V.S, PHI Learning Private Ltd.
T.2	Environmental Science and Engineering, Anjali Bagad, PHI Learning Private Ltd.
T.3	Environmental Science, Fundamentals, Ethics & Laws, Shulka, Ashish & Others, I. K. International P. Ltd.

Reference Books	
R.1	Environmental Science and Demystified, William Linda, Tata MCgraw Hill
R.2	Essential of Ecology and Environmental Science, RanaSVS, Prentice Hall Of India.
R.3	Environmental Pollution Control Engineering, C S Rap, New Age International Publishers.
Useful Links	
1	https://youtu.be/NRoFvz8Ugeo
2	https://youtu.be/iMSwvJhIIA8
3	https://youtu.be/eIs4M_2QG0

HOD
Department of Electrical Engineering
Tulsiramji Gaikwad Patil College of
Engineering & Technology, Nagpur

Dean Academics
Tulsiramji Gaikwad-Patil
College Of Engineering
and Technology, Nagpur

Principal
Tulsiramji Gaikwad Patil College O
Engineering and Technology, Nagpur