

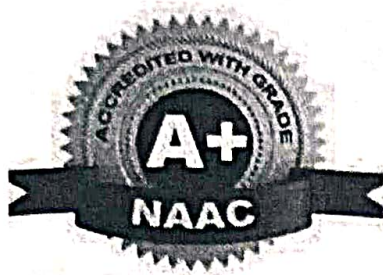


TULSIRAMJI GAIKWAD-PATIL

College of Engineering & Technology

Mohgaon, Wardha Road, Nagpur - 441 108

An Autonomous Institute



DEPARTMENT OF ELECTRICAL ENGINEERING

B.Tech. Electrical Engineering

Teaching Scheme

Considering

**National Education
Policy 2020**

From

Academic Year 2026-27

		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					
BEE42301: Network Theory & Analysis					
Teaching Scheme				Examination Scheme	
Lectures	3 Hrs/week			CT-1	15 Marks
Tutorial	1 Hrs/week			CT-2	15 Marks
Total Credit	4			TA	10 Marks
				ESE	60 Marks
				Total	100 Marks
Duration of ESE: 03 Hrs. 00 Min.					
Course Objectives (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

BEE42301	Course Outcomes	CL
BEE42301.1	Understand and apply basic circuit laws such as KCL, KVL, and network theorems to analyze electrical circuits.	3
BEE42301.2	Analyze DC and AC circuits using various techniques like mesh analysis, nodal analysis, and superposition theorem.	4
BEE42301.3	Evaluate transient and steady-state responses of electrical networks using differential equations and Laplace transforms.	5
BEE42301.4	Apply network theorems such as Thevenin's, Norton's, Maximum Power Transfer, and Reciprocity in circuit simplification.	4
BEE42301.5	Analyze two-port networks and determine parameters such as Z, Y, ABCD, and h-parameters for system representation.	4

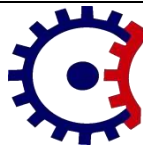



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Second Year (Semester III) B. Tech. Electrical Engineering					
BEE42302: Fundamentals of Electrical Measurement					
Teaching Scheme			Examination Scheme		
Lectures	3 Hrs./week		CT1	15 Marks	
Tutorial	0 Hrs./week		CT2	15 Marks	
Total Credit	3		CA	10 Marks	
			ESE	60 Marks	
			Total	100 Marks	
			Duration of ESE:03 Hrs.00Min.		
Course Objective:					
1	To introduce the basic principles of all measuring instruments				
2	To know about the methods of measurement of resistance, inductance & capacitance				
3	To deal with the measurement of Power, Energy, Power factor & frequency in electrical networks				
4	To know the applications of instrument transformers in measurement systems				
5	To provide detailed study of analog & digital transducers & their applications				
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				(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, 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. (Part B) Digital Measuring Instruments Definition of Digital transducer, Classification, Introduction to digital measurement, Measurement of Electric quantities using Digital Encoder, Hall effect sensor, Latest trends of measurement in power sector like SCADA, EMS.	(9)
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. Doebelin, 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/	

BEE42302	Course Outcomes	CL
BEE42302.1	Implement the use of electrical instruments for electrical measurement system.	3
BEE42302.2	Measure the resistance, inductance and capacitance by using AC & DC bridges.	4
BEE42302.3	Carry out Power and Energy measurement.	3
BEE42302.4	Interpret the instrument transformers with respect to their burden, ratios and characteristics.	5
BEE42302.5	Utilize basic idea about transducers & analyze static and dynamic characteristics of instruments.	3

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Second Year (Semester-III) B.Tech. Electrical Engineering			
BEE32303: Open Elective-:Principles of Renewable Energy Sources			
Teaching Scheme		Examination Scheme	
Lectures	3 Hrs./week	CT-1	15 Marks
Tutorial	1 Hrs./week	CT-2	15 Marks
Total Credit	4	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	To develop in-depth knowledge for the following: Various renewable energy resources available at a location		
2	Assessments of its potential, using tools and techniques. photosynthesis.		
3	Estimation of woody biomass, non woody biomass and wastes, ASTM standards		
Course Contents			Hours
Unit I	Introduction: Causes of Energy Scarcity, Solution to Energy Scarcity, Factors Affecting Energy Resource Development, Energy Resources and Classification, Renewable Energy – Worldwide Renewable Energy Availability, Renewable Energy in India. Energy from Sun: Sun- earth Geometric Relationship, Layer of the Sun, Earth – Sun Angles and their Relationships, Solar Energy Reaching the Earth’s Surface, Solar Thermal Energy Applications		(9)
Unit II	Solar Thermal Energy Collectors: Types of Solar Collectors, Configurations of Certain Practical Solar Thermal Collectors, Material Aspects of Solar Collectors, Concentrating Collectors, Parabolic Dish – Stirling Engine System, Working of Stirling or Brayton Heat Engine, Solar Collector Systems into Building Services, Solar Water Heating Systems, Passive Solar Water Heating Systems, Applications of Solar Water Heating Systems, Active Solar Space Cooling, Solar Air Heating, Solar Dryers, Crop Drying, Space Cooing, Solar Cookers, Solar pond. Solar Cells: Components of Solar Cell System, Elements of Silicon Solar Cell, Solar Cell materials, Practical Solar Cells, I – V Characteristics of Solar Cells, Efficiency of Solar Cells, Photovoltaic Panels, Applications of Solar Cell Systems, Photovoltaic System		(9)
Unit III	Wind Energy: Fundamentals of Wind Technology Windmills, Wind Turbines, Wind Resources, Wind Turbine Site Selection. Geothermal Energy: Geothermal Systems, Classifications, Geothermal Resource Utilization, Resource Exploration, Geothermal Based Electric Power Generation, Associated Problems, environmental Effects		(9)
Unit IV	Biomass Energy: Biomass Production, Energy Plantation, Biomass Gasification, Theory of Gasification, Gasifier and Their Classifications, Chemistry of Reaction Process in Gasification, Updraft, Downdraft and Cross- draft Gasifiers, Fluidized Bed Gasification, Use of Biomass Gasifier, Gasifier Biomass Feed Characteristics, Applications of Biomass Gasifier, Cooling and Cleaning of Gasifiers. Biogas Energy: Introduction, Biogas and its Composition, Anaerobic Digestion, Biogas Production, Benefits of Biogas, Factors Affecting the Selection of a Particular Model of a Biogas Plant, Biogas Plant Feeds and their Characteristics		(9)

Unit V	Tidal Energy: Introduction, Tidal Energy Resource, Tidal Energy Availability, Tidal Power Generation in India, Leading Country in Tidal Power Plant Installation, Energy Availability in Tides, Tidal Power Basin, Turbines for Tidal Power, Advantages and Disadvantages of Tidal Power.	(9)
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Text Books

1	Rai. G.D., “Non-Conventional Energy Sources”, Khanna Publishers, New Delhi, 2011.
2	Twidell, J.W. & Weir, A., “Renewable Energy Sources”, EFN Spon Ltd., UK, 2006.
3	Sukhatme. S.P., “Solar Energy”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997

Reference Books

1	Godfrey Boyle, “Renewable Energy, Power For A Sustainable Future”, Oxford University Press, U.K., 1996.
2	Tiwari. G.N., Solar Energy – “Fundamentals Design, Modelling& Applications”, Narosa Publishing House, New Delhi, 2002.

Useful Links

1	https://nptel.ac.in/courses/103103206
2	https://archive.nptel.ac.in/courses/103/103/103103206

BEE32303	Course Outcomes	CL
BEE32303.1	Able to understand the renewable energy sources available at present	3
BEE32303.2	Able to understand the renewable energy sources available at present	3
BEE32303.3	To educate the wind energy operation and its types	3
BEE32303.4	To educate the tidal and geothermal energy principles and its operation	3
BEE32303.5	Able to understand the biomass energy generation and its technologies	3




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Second Year (Semester-III) B.Tech. Electrical Engineering					
BSH42305: Transformation and Its Series					
Teaching Scheme			Examination Scheme		
Lectures	2 Hrs./week		CT	14 Marks	
Tutorial	--		CA	06 Marks	
Total Credit	2		ESE	30 Marks	
			Total	50 Marks	
			Duration of ESE: 02 Hrs.		
Course Objective:					
1	To develop the knowledge of different transforms and its applications among students.				
2	Learn to solve systems of linear equations and application problems requiring them.				
Course Contents					Hours
Unit I	Laplace transform: Definition Standard form, properties of Laplace transform, inverse Laplace transform of unit step Function, Laplace Transform of periodic function, application of Laplace transformation to linear differential equation with constant coefficient				(8)
Unit II	Fourier Series and Fourier Transform (FT): Introduction of Fourier Series, Even and Odd functions, change of interval, Half Range Expansions, Fourier transform, Fourier Sine & Cosine transforms, Application of Fourier Transform to solve Integral equation.				(8)
Unit III	A) Difference equation: solution of difference equation of first order, solution of difference equation of higher order with constant equation B) Z- transform: definition, standard form, Z- transform of impulse FN, Z – transform with FN, properties of Z – transform (linearly, shifting, multiplication by K change of scale) inverse Z- transform (by direct division and partial fraction), solution of difference equation by Z-transform.				(8)
Text Books					
1	Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication				
2	Advanced Engineering Mathematics by Erwin Kreyszig, 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 I &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				
4	A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication				




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Useful Links

1. <https://archive.nptel.ac.in/courses/111/106/111106111/>
2. <https://archive.nptel.ac.in/courses/111/105/111105123/>

	Course Outcomes	CL
BSH42305.1	Apply the concept of Laplace Transform for Solving differential equation	3
BSH42305.2	Apply the knowledge of Fourier series and Transform for understanding periodic signals and solve integral equations	3
BSH42305.3	Apply the concept of Z-Transform for solving difference equation	3




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Second Year (Semester-III) B. Tech. Electrical Engineering					
BBA42308 :Engineering Economics and Management					
Teaching Scheme			Examination Scheme		
Lectures	2Hrs./week		CT	15 Marks	
Tutorial	0 Hrs./week		CA	05 Marks	
Total Credit	2		ESE	30 Marks	
			Total	50 Marks	
			Duration of ESE : 02Hrs.		
Course Objective:					
1	To Understand fundamental economic concepts such as demand, supply, elasticity, and market structures relevant to engineering decisions				
2	To Apply economic analysis techniques (like cost analysis, break-even analysis, and time value of money) to solve engineering problems.				
3	To understand basic management principles in engineering.				
4	To Apply management and leadership skills in project execution and team coordination..				
5	To Assess financial and business risks and make effective managerial decisions in engineering projects.				
Course Contents					Hours
Unit I	Concept of Economics And Digital Economy Concept of Economics and Concept of Digital economy ,Types of demand ,Determinants of demand , Law of Demand ,Elasticity of demand , Law of supply , Total utility and Marginal utility, E- business Infrastructure, E-commerce , Merits and Demerit of Digital economy.				(8)
Unit II	Concept of cost And Small Business Concept of cost, Law of returns, Forward and Backward Integration, Merge and Acquisition , Types of merger and acquisition , advantages of merger and acquisition, Technical consultancy organizations, Government Policies for Small Scale Enterprises, Tax Holidays.				(8)
Unit III	Introduction to Management Definition and functions of management , Principles of management , Role of managers in engineering Different Types of Management , Organizational structure ,Authority, responsibility, and delegation ,Recruitment and selection , Training and development , Basics of financial management.				(8)
Text Books					
1	William G. Sullivan, Wicks & Koelling One of the most widely used global textbooks for engineering economics				
2	R. Panneerselvam Very popular in Indian universities; includes numerical problems and case studies				

3	G. N. Srinivasan Principles of Engineering Management”
4	O.P. Khanna Industrial Engineering and Management”

Reference Books		
1	Principles of Engineering Economic Analysis” John A. White Covers time value of money, depreciation, and capital budgeting	
2	Principles of Management” P.C. Tripathi & P.N. Reddy.	
Useful Links		
https://bobolinks.org/free-pdf-books/engineering/economic-engineering		
https://nptel.ac.in/courses/112107209		
BBA42308	Course Outcomes	CL
BBA42308.1	To Develop knowledge of economic theories and share market , Identify key trends in Digital economy .	4
BBA42308.2	To Acquire knowledge of business strategies and the problems of Small Scale Industries	4
BBA42308.3	To Understand fundamentals of management and organizational structure and Manage projects and teams effectively	4




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Second Year (Semester-III)B. Tech. Electrical Engineering				
BCE42309 :Sustainable Development and Goals				
Teaching Scheme			Examination Scheme	
Lectures	2 Hrs./week		CT	15 Marks
Tutorial	0 Hrs./week		CA	05 Marks
Total Credit	2		ESE	30 Marks
			Total	50Marks
		Duration of ESE:02Hrs.		
Course Objective:				
1	To develop a comprehensive understanding of the UN Sustainable Development Goals (SDGs) and their interconnections.			
2	To analyze the global challenges addressed by the SDGs and their impact on various sectors.			
3	To explore innovative solutions and best practices for implementing the SDGs.			
4	To evaluate the progress made towards achieving the SDGs at national and international levels.			
5	To foster a sense of global citizenship and social responsibility among students.			
Course Contents				Hours
Unit I	Introduction to Sustainable Development Meaning, Definition, Brief Historical background of Sustainable Development, Features and Principles of Sustainable Development, Sustainable Development Goals (SDGs), United Nations Global Compact, Significance and Challenges of Sustainable Development, Sustainability as a key driver of Innovation ,Introduction to National and Global Reporting Standards			(8)
Unit II	Framework & Structuring of the 17 SDGs: SDG 1: No Poverty, SDG 2: Zero Hunger, SDG 3: Good Health and Well-being, SDG 4: Quality Education, SDG 5: Gender Equality, SDG 6: Clean Water and Sanitation, SDG 7: Affordable and Clean Energy, SDG 8: Decent Work and Economic Growth, SDG 9: Industry, Innovation and Infrastructure, SDG 10: Reduced Inequalities, SDG 11: Sustainable Cities and Communities, SDG 12: Responsible Consumption and Production, SDG 13: Climate Action, SDG 14: Life below Water, SDG 15: Life on Land, SDG 16: Peace, Justice and Strong Institutions, SDG 17: Partnerships for the Goal			(8)
Unit III	SDGs Implementation and Future Perspectives: Interconnections between the SDGs, the role of technology and innovation in SDG implementation, financing the SDGs, measuring SDG progress, future challenges and opportunities, Climate change and its impact on sustainable development, Case studies of successful SDG implementation – India. Environmental Ethics and Sustainability: Climate change, carbon credits, biodiversity, waste management, renewable energy, and ecological footprint analysis, Economic and Corporate Sustainability: Circular economy, green finance, Triple Bottom Line approach (People, Planet, Profit), and corporate social responsibility.			(8)

	Social Sustainability and Ethics: Social equity, human rights, poverty reduction, and ethical issues in business (whistleblowing, worker rights, marketing ethics). Technology and Sustainable Development: Engineering ethics, green technologies, life cycle assessment, and sustainable urbanization	
TextBooks		
1	Hazra, Somnath., Bhukta, Anindya (2020) Sustainable Development Goals An Indian Perspective, Springer International Publishing, Switzerland	
2	Ziai, Aram (2016) Development Discourse and Global History from colonialism to the sustainable development goals. Routledge, London & New York	
3	Raj Kumar Sen Kartik C.Roy Atlatic Sustainable Economic Development & Environment Publishers & Distributors Pvt Ltd	
4	Khai Ern Lee Concepts & Approaches for Sustainability Management Springer International Publishing	

Reference Books		
1	Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G., Woelm, F. 2020. The Sustainable Development Goals and COVID-19. Sustainable Development Report 2020. Cambridge: Cambridge University Press.	
2	OECD (2019), Sustainable Results in Development: Using the SDGs for Shared Results and Impact, OECD Publishing, Paris, https://doi.org/10.1787/368cf8b4-en .	
Useful Links		
https://nptel.ac.in/courses/109106200		
https://www.un.org/sustainabledevelopment/		
BCE42309	Course Outcomes	CL
BCE42309.1	To explore the historical origins and evolution of the UN-SDGs.	4
BCE42309.2	To analyze the 17 SDGs and their interlink ages.	4
BCE42309.3	To analyze the role of technology and innovation in achieving the SDGs along with future challenges and opportunities. and social responsibility among students.	4




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

BEE42303: Network Theory & Analysis 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 loop (mesh) analysis to AC circuits in sinusoidal steady state.
- 2 Apply node analysis to AC circuits in sinusoidal steady state.
- 3 Use various network theorems for analysis and design of A.C. & DC circuits.
- 4 Learn Energy storage elements with and without initial conditions.
- 5 Find out transient behaviors, driving points and transfer functions, poles, zeros of transfer function
- 6 Solve two port networks and resonance circuit.

Sr. No.	List of Experiment	CO
1	Verification of KCL (Kirchhoff's Current Law) and KVL (Kirchhoff's Voltage Law)	CO1
2	Determination of currents using mesh analysis	CO2
3	Determination of voltages using nodal analysis	CO2
4	Verification of Superposition Theorem	CO1
5	Verification of Thevenin's Theorem	CO1
6	Verification of Norton's Theorem	CO1
7	Verification of Maximum Power Transfer Theorem	CO1
8	Verification of Reciprocity Theorem	CO1
9	Determination of Z-parameters	CO5
10	Determination of Y-parameters	CO5

Text Books

1	Electric Circuits - C. K. Alexander and M. N. O. Sadiku, McGraw Hill Education, 2004
2	Network Analysis - Van Valkenburg, Pearson Education, 3 rd edition.

Reference Books

1	Network and System - D.P. Roychoudhary, New Age International Pvt. Ltd, 3rd Edition.
2	Electrical Circuit - Del Toro, Prentice Hall

Useful Links

1	https://nptel.ac.in/courses/108/104/108104139/
2	http://nptel.ac.in/courses/117107095

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Second Year (Semester-III) B. Tech. Electrical Engineering				
BEE42304: Fundamentals of Electrical Measurement 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 Objectives				
1	To explain various methods for measuring electrical resistance across different ranges.			
2	To analyze techniques used for measurement of inductance and capacitance.			
3	To demonstrate different methods for measuring three-phase power.			
4	To perform calibration of measuring instruments and interpret results.			
5	To apply displacement measurement techniques using suitable sensors and transducers.			
Sr. No.	List of Experiment			CO
1	Measurement of high resistance by loss of charge 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 De Santy's 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. Doebelin, McGraw Hill			
2	Electrical Instrumentation- H. S. Kalsi, TATA MCGRAW-HILL EDUCATION PVT. LTD.2nd revised			
3	Instrumentation for Engineering Measurements - Dalley Railey, 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/			

BEE42304	Course Outcomes	CL
	Students will be able to	
BEE42304.1	Apply appropriate methods to measure low, medium, and high values of electrical resistance under different operating conditions.	3
BEE42304.2	Analyze and determine inductance and capacitance using suitable measurement techniques and bridge circuits.	4
BEE42304.3	Evaluate three-phase power using measurement techniques under balanced and unbalanced load conditions	5
BEE42304.4	Calibrate electrical measuring instruments using standard procedures and assess their accuracy and performance.	5
BEE42304.5	Apply and compare methods for measuring displacement using electrical transducers and sensors.	3




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