TULSIRAMJI GAIKWAD-PATIL College of Engineering & Technology

Mohgaon, Wardha Road, Nagpur - 441 108

An Autonomous Institute

DEPARTMENT OF ELECTRICAL ENGINEERING

B.Tech. Electrical Engineering

III Semester

Teaching Scheme & Syllabus

Considering

National Education Policy 2020

From

Academic Year 2024-25

Vision of Institute

To emerge as a learning Center of Excellence in the National Ethos in domains of Science, Technology and Management.

Mission of Institute

1. To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.
2. To provide facilities and services to meet the challenges of Industry and Society.
3. To facilitate socially responsive research, innovation and entrepreneurship.
4. To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.

Vision of the Department

To emerge as a learning hub and center of excellence in the domain of Electrical Engineering.

Mission of the Department

1. To disseminate knowledge replete with quality education in the field of Electrical Engineering in meticulous and methodical manner.
2. To provide platform to address societal issues as well as challenges faced by industries.
3. To develop research culture and inculcate innovative and entrepreneurial skills.
4. To ensure overall development of students and staff by instilling knowledge and professional ethics as a part of lifelong learning.

Program Education Objectives (PEO)

1. Demonstrate and analyze the fundamental knowledge with respect to the various domains of Electrical Engineering.
2. Investigate and apply modern tools to develop innovativeness in different applications of Electrical Engineering domain.
3. Integrate new emerging trends and concepts in Electrical Engineering profession for sustainable development.
4. Develop professionals having managerial and administrative Qualities for Electrical Engineering related industries.
5. Promote lifelong learning, to prepare for the next challenges in the field of Electrical Engineering.

Program Outcomes (PO)

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of Complex Problems:** Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and software tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Program Specific Outcomes (PSO)

PSO1: Formulate the solutions to Electrical and Electronics Engineering problems using the basic concepts.

PSO2: Develop the process to interpret networks parameters in power system operation and control with their protection and driving mechanisms.

PSO3: Apply project based learning to conduct experiments with Electrical Machines, Power Electronics to develop energy efficient systems.

Tulsiramji Gaikwad -Patil College of Engineering andTechnology

Wardha Road, Nagpur - 441 108 Accredited with NAAC A+ Grade

Approved by AICTE, New Delhi, Govt. of Maharashtra

(An Autonomous Institution Affiliated to RTM Nagpur University)

Scheme of Instruction for First Year of B. Tech. (UG) Programme

Group-B Semester – I EE/ME/CE/AE/BT

Mandatory 03-Weeks Induction Program in the First Semester for every student

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE DurationHours
							L	SL	P	Hrs		CT/IA	CA	ESE	
FIRST SEMESTER (GROUP-B)															
1	1	**BSC**	**S&H**	BSH31101	Algebra and Calculus	T	4	2	0	6	4	30	10	60	3
2	1	**BSC**	**S&H**	BSH31104	Chemical Process in Engineering	T	3	2	0	5	3	30	10	60	3
3	1	**BSC**	**S&H**	BSH31105	Chemical Process in Engineering -Lab	P	0	0	2	2	1	25	-	25	-
4	1	**ESC**	**CE/BT**	BCE31101/ BBT31101	Engineering Mechanics / Fundamentals of Biotechnology	T	3	2	0	5	3	30	10	60	3
5	1	**ESC**	**ME**	BEE31101	Engineering Workshop	P	0	0	2	2	1	25	-	25	-
6	1	**BSC**	**S&H**	BSH31X08	Introduction to Indian Knowledge System	T	2	2	0	0	2	14	6	30	2
7	1	**ESC**	**ME**	BME31X01	Engineering and Computer Graphics Lab	P	0	0	2	2	1	25	-	25	-
8	1	**PCC**	**EE/ME /CE/AE / BT**	BEE31101/ BME31102/ BCE31102/ BAE31101/ BBT31102	Electrical Wiring and Installations / Computer Aided Design/ CAD for Civil Engineers/ CAD for Aircraft Component/ Biotechnological Skill Lab	P	0	0	4	4	2	25	-	25	-
9	1	**VSEC**	**CS**	BCS31102	Web Designing	P	0	2	4	4	2	25	-	25	-
10	1	**CC**	**S&H**	BSH31X09	Business Communication	P		0	4	4	2	25	-	25	-
TOTAL FIRST SEM							**12**	**10**	**18**	**34**	**21**				
SECOND SEMESTER (GROUP-B)															
1	2	**BSC**	**S&H**	BSH31201	Differential Equation and Statistics	T	4	2	0	6	4	30	10	60	3
2	2	**BSC**	**S&H**	BSH31208	Quantum Physics & Optics	T	3	2	0	5	3	30	10	60	3
3	2	**BSC**	**S&H**	BSH31209	Quantum Physics & Optics-Lab	P	0	0	2	2	1	25	-	25	-
4	2	**ESC**	**EE**	BEE31202	Principles of Electrical Engineering	T	3	2	0	5	3	30	10	60	3
5	2	**ESC**	**EE**	BEE31203	Principles of Electrical Engineering-Lab	P	0	0	2	2	1	25	-	25	-
6	2	**ESC**	**IT**	BIT31103	Programming for Problem Solving using 'C'	T	3	2	0	5	3	30	10	60	3
7	2	**ESC**	**IT**	BIT31104	Programming for Problem Solving using 'C'-Lab	P	0	0	2	2	1	25	-	25	-
8	2	**VSEC**	**EE/ME /CE/AE / BT**	BEE31204/ BME31201/ BCE31201/ BAE31201/ BBT31201	Power SIM / CNC Machine and Programing / Building Maintenance Lab/ Basics of Aircraft Design/ Environmental Biotechnology Lab	P	0	0	4	4	2	25	-	25	-
9	2	**AEC**	**S&H**	BSH31X04	Communication for Personality Development-Lab	P	0	1	4	5	2	25	-	25	-
10	2	**CC**	**S&H**	BSH31X05	Integrated Personality Development Course-I	P	0	0	4	4	2	25	-	25	-
TOTAL SECOND SEM							**13**	**09**	**18**	**40**	**22**				

Course Category	BSC/ ESC (BasicScience Course/ Engineering Science Course.)	PCC (Programme Core courses	Multidisciplinary courses	VSEC (Skill Course)	Humanities Social Science & Management		Experiential Learning Courses	CC (Co-Curricular Courses)
					AEC(Ability Enhancement Course)	IKS(Indian Knowledge System)		
CreditsSEM-I	08 / 05	02	--	02	--	02	--	02
CreditsSEM-II	08 / 08	--	--	02	02	--	--	02
CumulativeSum	16 / 13	02	--	04	02	02	--	04

PROGRESSIVE TOTAL CREDITS :21+22=43

				Aug, 2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	

Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

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

SCHEME OF INSTRUCTION & SYLLABI

Programme: B.Tech Electrical Engineering (NBA Accredited)

Scheme of Instructions: Second Year B.Tech. in Electrical Engineering (As Per NEP 2020)

Semester – III

SN	Sem	Type	BoS/ Dept	Sub Code	Subject	T/ P	Contact Hours			Credits	% Weightage			ESE Duration	Total Marks
							L	P	Hrs		CT/IA	CA	ESE		
1	**III**	**PCC**	**EE**	BEE32301	Electrical Circuits Analysis	T	3	-	3	**3**	30	10	60	3 Hrs	100
2	**III**	**PCC**	**EE**	BEE32302	Electrical & Electronics Measurement	T	3	-	3	**3**	30	10	60	3 Hrs	100
3	**III**	**OEC**	**EE**	B$$323XX	Open Elective-I	T	4	-	4	**4**	30	10	60	3 Hrs	100
4	**III**	EEMC	BA	BBA32302	Entrepreneurship & Skill Development	T	2	-	2	**2**	14	6	30	2 Hrs	50
5	**III**	**VEC**	**SH**	BSH32308	Ethics in Engineering Practice	T	2	-	2	**2**	14	6	30	2 Hrs	50
6	**III**	**MDM**	**SH**	BSH32305	Transformation and its Series	T	2	-	2	**2**	14	6	30	2 Hrs	50
7	**III**	**PCC**	**EE**	BEE32303	Electrical Circuit Analysis Lab	P	-	2	2	**1**	-	25	25	2 Hrs	50
8	**III**	**PCC**	**EE**	BEE32304	Electrical & Electronic Measurement Lab	P	-	2	2	**1**	-	25	25	2 Hrs	50
9	**III**	**CEP**	**EE**	BEE32306	Community Engineering Project	P	-	4	4	**2**	-	50	-	2 Hrs	50
Total							**16**	**08**	**24**	**20**	**132**	**148**	**320**	**21 Hrs**	**600**

Course Category	BSC/ ESC (Basic Science Course/ Engineering Science Course)	PCC (Programme Core courses)	PEC (Programme Elective courses)	Multidisciplinary courses	SEC (Skill Course)	Humanities Social Science & Management	Experiential Learning Courses	CC (Liberal Learning Courses
Credits	--	08	--	06	--	04	02	--
Cumulative Sum	16 / 13	11	--	06	04	08	02	04

PROGRESSIVE TOTAL CREDITS: 43+20=63

Chairperson	Dean Academics	Vice Principal	Principal	June, 2024	1.00	Applicable for AY 2024-25 Onwards
				Date of Release	Version	

Program: Electrical Engineering

List of **Program Electives** offered By Electrical Engineering Department (NBA Accredited)

Program Elective- I	Program Elective-II	Program Elective- III	Program Elective- IV	Program Elective- V
Semester V	**Semester VI**	**Semester VI**	**Semester VII**	**Semester VIII**
BEE33505-Solar Energy Utilization	**BEE33604-**Wind Energy Utilization	**BEE33607-**Biomass Energy and its Utilization	**BEE34703–**Technologies for Clean and Renewable Energy Production	**BEE34804 –**Energy Audit and Management
BEE33506- Utilization of Electrical Energy	**BEE33605 –** Power Plant Engineering	**BEE33608-** Electrical Distribution System	**BEE34704 -** Elementsof Substation Design	**BEE34805-**Power System Operation &Control
BEE33507-High Voltage Engineering	**BEE33606-** Flexible AC Transmission System	**BEE33609–**Electric Vehicles	**BEE34705-** Introduction to Smart Grid	**BEE34806 –**Power System Deregulation

Program: Electrical Engineering

List of **Open Electives** offered By Electrical Engineering Department (NBA Accredited)

Open Elective-I	Open Elective-II	Open Elective-III
Semester-III	**Semester-IV**	**Semester-V**
BEE32307: Introduction toRenewable Energy Sources	**BEE32404**: Power Plant Engineering	**BEE33504:** Energy Audit

Course Category	BSC (Basic Science Course)	ESC (Engineering Science Course.)	PCC (Programme Core courses	PEC (Programme Elective courses)	Multidisciplinary courses	VSEC (Skill Course)	Humanities SocialScience & Management	Experiential Learning Courses	CC (Liberal Learning Courses	Semester Wise Credits
Semester -I	10	05	02	--	--	02	--	--	02	**21**
Semester -II	08	08	--	--	--	02	02	--	02	**22**
Semester -III	--	--	08	--	06	01	04	02	--	**21**
Semester -IV	--	--	10	--	04	02	06	--	--	**22**
Semester -V	--	--	11	04	06	--	--	--	--	**21**
Semester -VI	--	--	08	08	02	02	--	--	--	**20**
Semester -VII	--	--	04	02	02	--	--	12	--	**20**
Semester -VIII	--	--	04	06	02	--	--	08	--	**20**
Cumulative Sum	**18**	**13**	**47**	**20**	**22**	**08**	**12**	**22**	**04**	**166**

Chairperson	Dean Academics	Vice Principal	Principal	June, 2024	1.00	Applicable for AY 2024-25 Onwards
				Date of Release	Version	

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

BEE32301: Electrical Circuit Analysis

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

Examination Scheme	
CT	30 Marks
CA	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of ESE: 03 Hrs. 00 Min.	

Course Objective:

1	To make students able to apply different analytical tools on electrical networks for solving them
2	To analyze the behavior of the circuit's response in time domain and frequency domain.
3	To know the students how to apply the frequency analysis to circuit with different input signals.

	Course Contents	Hours
Unit I	**Equilibrium Equations:** Equilibrium Equations with Nodal & Mesh Analysis on electrical networks, source transformations, Dot conventions in coupled circuits, Solutions of Mutually coupled Networks, Duality.	**(9)**
Unit II	**Network Theorems:** Superposition, Thevenin's, Norton's. Maximum Power Transfer, Reciprocity, Compensation, Tellegen's theorem as applied to DC & A.C. circuits.	**(9)**
Unit III	**Laplace Transform & Applications:** Evaluation of initial & final condition, 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 Networks:** Network Parameters and Inter-connections, Conditions of Reciprocity and Symmetry, Inter-relations between parameter sets.	**(9)**

Text Books

1	W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
2	C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.
3	A. Chakrabarty, "Circuit Theory (Analysis & Synthesis)", Dhanpat Rai & Co. 2006

Reference Books

1	M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
2	Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", McGraw Hill, 2015

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Useful Links
https://archive.nptel.ac.in/courses/108/105/108105159/
Basic Electric Circuits - Course (nptel.ac.in)

	Course Outcomes	CL
BEE32301.1	**Apply** mesh and nodal analysis to AC circuits in sinusoidal steady state.	**3**
BEE32301.2	**Use** network theorems for analysis and design of A.C. & DC circuits	**3**
BEE32301.3	**Evaluate** the parameter of energy storage elements with and without initial conditions	**3**
BEE32301.4	**Find out** transient behaviors, driving points and transfer functions, poles, zeros of transfer function	**3**
BEE32301.5	**Solve** two port networks and relationships between parameter sets	**3**

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

BEE32302: Electrical & Electronics Measurement

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

Examination Scheme	
CT	30 Marks
CA	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of ESE: 03 Hrs. 00 Min.	

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, reactiveand 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:** 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)**

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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
https://nptel.ac.in/courses/108/105/108105153/
https://nptel.ac.in/courses/108/105/108105112/
https://nptel.ac.in/courses/108/105/108105064/

	Course Outcomes	CL
BEE32302.1	**Implement** the use of electrical instruments for electrical measurement system.	**2**
BEE32302.2	**Measure** the resistance, inductance and capacitance by using AC & DC bridges.	**3**
BEE32302.3	**Carry out** Power and Energy measurement.	**3**
BEE32302.4	**Interpret** the instrument transformers with respect to their burdon, ratios and characteristics.	**4**
BEE32302.5	**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

Open Elective Course – I: BEE32307: Introduction to Renewable Energy Sources

Teaching Scheme	
Lectures	4 Hrs./week
Tutorial	0 Hrs./week
Total Credit	4

Examination Scheme	
CT	30 Marks
CA	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of ESE: 03 Hrs. 00 Min.	

Course Objective:

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 SpaceCooling, 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)**

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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)**

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.
3	Freris. L.L., "Wind Energy Conversion Systems", Prentice Hall, UK, 1990.

Useful Links

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

	Course Outcomes	CL
BEE32307.1	Able to understand the renewable energy sources available at present	**3**
BEE32307.2	Able to understand the renewable energy sources available at present	**3**
BEE32307.3	To educate the wind energy operation and its types	**3**
BEE32307.4	To educate the tidal and geothermal energy principles and its operation.	**3**
BEE32307.5	Able to understand the biomass energy generation and its technologies.	**3**

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

BBA32302: Entrepreneurship and Skill Development

Teaching Scheme	
Lectures	2 Hrs./week
Tutorial	--
Total Credit	2

Examination Scheme	
CT	14 Marks
CA	06 Marks
ESE	30 Marks
Total	50 Marks
Duration of ESE: 02 Hrs.	

Course Objective:

1	To know the students about basic concept of economics.
2	To aware the students about competitions and entrepreneurship.
3	To get the knowledge of sales and marketing.

	Course Contents	Hours
Unit I	**Theory of Demand & Utility:** Law of Demand. Types of Demand, Elasticity of demand, methods of measurement of elasticity of demand, law of diminishing marginal utility. **Theory of Production**: factors of production. (meaning & characteristics of Land, Labour, capital & entrepreneur).	**(8)**
Unit II	**Price Determination & depreciation:** Laws of return, Average cost, Marginal cost, fixed cost, variable cost, Depreciation, Methods to calculate depreciation **Market**: perfect competition. Imperfect competition (monopoly, oligopoly, monopolistic competition).	**(8)**
Unit III	**Entrepreneurship, Business Plan and Idea Presentation:** Definition, Steps towards successful enterprise, opportunity identification, various analytics to be performed for idea validation. **Business Plan and Idea Presentation:** Transforming idea to plan on paper, various reports for validation of business, presenting and pitching idea. Stages of idea stage to fully scaled corporation, types of company and their difference in specifications, legislation and legal precautions, funding sources, stages of funding, various methods of collaborations, disinvestment, winding company.	**(8)**

Text Books

1	O.P. Khanna, “Industrial Engineering and Management”, Dhanpat Rai& sons,1999
2	R. Panner Selvam, “Production and Operations Management”, PHI Learning, 2002
3	Mart and Telsang – Industrial Engineering and Production Management, S. Chand and Co., 1998
4	Poornima M Charantimath, “Entrepreneurship development small business enterprises”, Pearson

Reference Books

1	Shailendra Kale– Production and Operations Management, McGraw Hill, India 2013

2	Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins, S.P. and Decenzo David A.
3	Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning.
4	Principles and Practices of Management by L.M. Prasad.
5	Principles of Management by Tripathy and Reddy.
6	Modern Economic Theory, By Dr. K. K. Dewett & M. H. Navalur, S. Chand Publications.

Useful Links
1. https://onlinecourses.nptel.ac.in/noc21_mg70/preview
2. https://onlinecourses.nptel.ac.in/noc22_de08/preview

	Course Outcomes	**CL**
BBA33301.1	**Describe** demand & Utility of product in industries.	2
BBA33301.2	**Discuss** the terms Price determinations. Depreciation and Market.	2
BBA33301.3	**Apply** the elements of a business plan required to set up and start a business.	3

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

BSH32308: Ethics in Engineering Practice

Teaching Scheme		Examination Scheme	
Lectures	2 Hrs./week	**CT**	14 Marks
Practical	--	**CA**	06 Marks
Total Credit	2	**ESE**	30 Marks
		Total	50 Marks
		Duration of ESE: 02 Hrs.	

Course Objective:

1	To understand the Human Values, Ethics and Engineering Ethics.
2	To understand Professional practices in Engineering for Engineers.
3	To understand types of ethical violations and consequence of their influence on business practice, economy and society in general.

Course Contents		Hours
Unit I	**Introduction to Engineer Ethics:** Morals, Values, Integrity & Ethics, What is Engineering Ethics, Importance of Engineering Ethics, Code of Ethics, Potential Moral Problems of Engineering Ethics.	**(8)**
Unit II	**Professional Practices in Engineering:** Happiness, Prosperity & Harmony, Professional Ethics, Engineering Ethics, Principles of Engineering Ethics, Environmental Ethics, Public Interest Litigation (PIL), Intellectual property Rights (IPR).	**(8)**
Unit III	**An Overview of Engineering Ethics:** Ethics in Industry, Professional Practices in Engineering, Ethical behavior, Industry professional malpractices , Workplace Safety, Responsibility and Rights, Basics of business ethics - Corporate Social Responsibility – Issues of Management – Crisis Management.	**(8)**

Text Books

1.	A New Look into Social Science : Shabbir, Sheikh and Dwadashiwar, S. Chand Publisher
2.	Constitution of India and Professional Ethics: Reddy, G.B. and Mohd. Suhaib, IK International Publishing House. 2006
3.	Introduction to Engineering Ethics : Martin, Mik , Roland Schinzinger, 2nd edition (16 February 2009) McGraw-Hill Education;

Reference Books

1	"Case study in Information Technology Ethics" :Richard A. Spinello, 2nd Edition PHI Publications.
2	"Internet Ethics": Duncan Lanford, Macmillan Education UK.
3	"Computer and Ethics in the Cyber age": D. Micah Hester and Paul J. Ford.

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Useful Links
https://nptel.ac.in/courses/110/105/110105079/
https:://nptel/courses/video/1101323279/L54.html

	Course Outcomes	CL
BSH32308.1	**Describe** Basic Human Values, Ethics & Importance of Engineering Ethics.	2
BSH32308.2	**Illustrate the** Basic Ethics for Engineers, Principles of Engineering Ethics & Fundamental Rights of individuals of society.	2
BSH32308.3	**Discuss** Ethics for Engineer Professionals, and their Safety, Responsibility & Rights.	2

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

BSH32305: Transformation and Its Series

Teaching Scheme	
Lectures	2 Hrs./week
Tutorial	--
Total Credit	2

Examination Scheme	
CT	14 Marks
CA	06 Marks
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 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 I &II, by P.N. Wartikar& J.N. Wartikar, Poona Vidyarthi GrihaPrakashan
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
BSH32305.1	**Apply** the concept of Laplace Transform for Solving differential equation	3
BSH32305.2	**Apply** the knowledge of Fourier series and Transform for understanding periodic signals and solve integral equations	3
BSH32305.3	**Apply** the concept of Z-Transform for solving difference equation	3

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BEE32303: Electrical Circuit Analysis 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	**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 Superposition Theorem and reciprocity theorem	**CO1**
3	Determine equivalent circuit parameter in a given circuit by applying Thevenin's & Norton's Theorem	**CO2**
4	Determine load resistance for maximum power transfer for a given circuit by applying Maximum Power Transfer Theorem	**CO2**
5	Find the parameter in a series RL circuit when a variable AC voltage is applied.	**CO3**
6	Determination of driving point and transfer functions of a two-port ladder network and verify with theoretical values	**CO4**
7	Plot the poles and zeros of the continuous-time system represented by the given transfer function using SCILAB software.	**CO4**
8	Evaluate the Z-Parameter & Y –Parameter of a given Two Port Network.	**CO5**
9	Evaluate the Transmission-Parameter & h –Parameter of a given Two Port Network.	**CO5**

Text Books

1	W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
2	C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.
3	Chakrabarty, "Circuit Theory (Analysis & Synthesis)", Dhanpat Rai & Co. 2006

Reference Books

1	M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
2	Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", McGraw Hill, 2015

Useful Links

1	https://archive.nptel.ac.in/courses/108/105/108105159/
2	Basic Electric Circuits - Course (nptel.ac.in)

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

BEE32304: Electrical & Electronics Measurements 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	**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 given instruments.
5	**Apply** different methods for measurement of displacement.

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 Sauty'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. Doeblin, 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/

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