Subject Code	CH201	Subject Title	ENVIRONMENTAL SCIENCE					
LTP	2 0 0	Credit	0	Subject Category	AC	Year	2nd	Semester	III

OBJECTIVE

To impart basic knowledge about the environment and its allied problems and to develop an attitude of concern for the environment. Further the course structure will create the awareness about environmental problems among students and motivate the students to participate in environment protection and environment improvement programs. The course aims to develop skills to help the concerned individuals in identifying and solving environmental problems.

Unit 1: Basics of Environment and Natural Resources: 04 Hrs

Definition and Concept of Environment, Multidisciplinary nature of environmental studies. Scope and importance of environmental studies, Need for public awareness, Environmental concerns and people. Introduction and classification of natural resources. Energy Resources, Water Resources, Land Resources, Forest Resources, Food Resources, Mineral Resources, Case studies related to over exploitation of resources and their impacts. Role of an individual in conservation of natural resources, Sustainable lifestyles.

Unit 2: Ecosystems: 04 Hrs

Definition and concept of ecology, Structure and Function of an Ecosystem, Energy Flow in Ecosystems, Biogeochemical cycles (Nitrogen, Carbon, Phosphorus, Oxygen, Hydrological). Species interactions in ecosystems. Ecological succession and ecological pyramids. Characteristic features of grassland, pond, desert and forest ecosystems. Ecosystem services and conservation.

Unit 3: Biodiversity and its conservation: 04 Hrs

Introduction and types of biodiversity. Bio-geographic classification of India, Value and significance of biodiversity, Biodiversity at global, national and local levels, India: A mega-diversity nation, Biodiversity hotspots, Threats to Biodiversity: Poaching and man-wildlife conflicts, IUCN Red Data Book and endangered & endemic species of India. Biodiversity conservation strategies, Institutes and organizations.

Unit-4 Environmental Pollutions: 05 Hrs

Introduction and Definition. Causes, consequences and control measures of: Air pollution, Water pollution, Noise pollution, Nuclear pollution, Soil pollution, Thermal and Marine pollution. Solid waste management, Bio-medical waste management. Disasters and its mitigation strategies, Global warming, Climate change, Acid rain, Ozone depletion and Smog. Pollution case studies. Role of an individual in pollution prevention.

Unit-5 Social Issues and Environment: 04 Hrs

Sustainable Development: Concept and importance, Environmental Impact Assessment (EIA), GIS, Remote sensing. Water conservation and rain water harvesting. Resettlement and rehabilitation problems, Environmental audit, eco-labeling and eco-friendly business. Environmental Legislation in India, Population explosion and its impact on environment and human health, Value Education and environmental ethics.

Field work: 03 Hrs

- Visit to a local area to document environmental asset: river/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common flora and fauna.
- Study of a common ecosystem-pond, river, hill slopes, etc.

Course Outcome:

At the end of the course, the student will be able to:

CO1. Demonstrate depleting nature of Environmental Resources and Ecosystem concepts.
CO2. Able to identify the structure and functioning of natural ecosystems.
CO3. Establish man-wildlife harmonious relationship.
CO4. Adapt to 3R (Reuse, Recovery, Recycle).Identify the causes and control measures related to Pollutions.
CO 5. Illustrate and analyse various Case Studies related to Environmental issues and Env. Legislation.

TEXT BOOKS

1. BharuchaErach, 2004. Textbook for Environmental Studies, University Grants Commission, New Delhi.
2. Kaushik A & Kaushik C P. 2007. Perspectives in Environmental Studies, New Age International Publ.
3. S. Deswal & A. Deswal 2015. A Basic Course in Environmental Studies. Dhanpat Rai & Co.

REFERENCES

1. Miller T.G. Jr. 2002. Environmental Science, Wadsworth Publishing Co. (TB).
2. De A.K.,1996. Environmental Chemistry, Wiley Eastern Ltd.
3. Sharma, P.D. 2005. Ecology and environment, Rastogi Publication.

Subject Code	HS244	Subject Title	INDIAN CONSTITUTION					
LTP	2 0 0	Credit	0	Subject Category	AC	Year	2nd	Semester	III

OBJECTIVE

To familiarize the students with the features of the Indian Constitution
To provide a knowledge of their constitutional rights

Unit 1 Introduction **5 Hrs**

Constitution- meaning of the term, basic features Indian Constitution: Sources and constitutional history.
Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive, Principles of State Policy, debates on Fundamental Rights and Directive. 1 Hr

Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive, Principles of State Policy, debates on Fundamental Rights and Directive. 4 Hrs

Unit 2 Union Government and its Administration **6 Hrs**

Structure of the Indian Union: Federalism, Centre- State relationship, 2 Hrs

President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha 2 Hrs

Institutional Functioning: Prime Minister, Parliament and Judiciary, Power Structure in India: Caste, class and patriarchy 2 Hrs

Unit 3 State Government and its Administration **3 Hrs**

Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions 3 Hrs

Unit-4 Local Administration **7 Hrs**

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected, Representative, CEO of Municipal Corporation. 3 Hrs

Pachayati Raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy 4 Hrs

Unit V: Election Commission **5 Hrs**

Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

COURSE OUTCOME:

CO 1 Enable the students to protect their rights
CO 2 The students will be engaged in the political system of India

TEXT BOOKS

- Abbas, H., Kumar, R. & Alam, M. A. (2011) Indian Government and Politics. New Delhi: Pearson, 2011.
- Chandhoke, N. & Priyadarshi, P. (eds.) (2009) Contemporary India: Economy, Society, Politics. New Delhi: Pearson.

REFERENCE BOOKS

- Chakravarty, B. & Pandey, K. P. (2006) Indian Government and Politics. New Delhi: Sage.

- Chandra, B., Mukherjee, A. & Mukherjee, M. (2010) India after Independence. New Delhi: Penguin.
- Singh, M.P. & Saxena, R. (2008) Indian Politics: Contemporary Issues and Concerns. New Delhi: PHI Learning.
- Vanaik, A. & Bhargava, R. (eds.) (2010) Understanding Contemporary India: Critical Perspectives. New Delhi: Orient Blackswan.
- Menon, N. and Nigam, A. (2007) Power and Contestation: India since 1989. London: Zed Book.
- Austin, G. (1999) Indian Constitution: Corner Stone of a Nation. New Delhi: Oxford University Press.
- Austin, G. (2004) Working of a Democratic Constitution of India. New Delhi: Oxford University Press.
- Jayal, N. G. & Maheta, P. B. (eds.) (2010) Oxford Companion to Indian Politics. New Delhi: Oxford University Press.

Subject Code	MA201	Subject Title	ENGINEERING MATHEMATICS – III						
LTP	3 1 0	Credit	4	Subject Category	SC	Year	2nd	Semester	III

Objective:

- Introduce the fundamentals in Complex variable.
- Solving Partial Differential Equations.
- Legendre polynomial of first kind with properties.
- Bessel function of first kind and its properties.

UNIT I: Complex variable- I (8)

Elementary functions, limit, continuity & differentiability, Analytic Functions; Cauchy – Riemann equations, Harmonic functions, Line integral in the complex plane, Cauchy's Integral theorem, Cauchy's Integral formula for derivatives of analytic function.

UNIT II: Complex Variables -II (6)

Power series, Taylor's series, Laurent's series, Poles, Zeros, Singularities, Residue Theorem, Evaluation of real integrals of the type $\int_0^{2\pi} f(\cos\theta,\sin\theta)d\theta$ and $\int_{-\infty}^{\infty} f(x)dx$.

UNIT III: Special Functions (8)

Series solution of ODE of 2nd order with variable coefficient with special emphasis to Legendre and Bessel differential equation by Frobenious method, Legendre polynomial of first kind, Bessel function of first kind and their properties.

UNIT IV: Fourier Transform & Z-transform (8)

Fourier integral, Fourier transform, Fourier sine and cosine transforms, Linearity, Scaling, frequency shifting and time shifting properties, Convolution theorem and its application.

Z – Transform, Properties of Z-transforms, Convolution of two sequences, Inverse Z-transform, Solution of difference equations.

UNIT V: Partial differential equations and its Applications (8)

Introduction to partial differential equations; Linear partial differential equations with constant coefficients of second order and their classification; Method of Separation of Variables for solving Partial Differential Equations, One-Dimensional Wave Equation, One Dimensional heat equation.

Course Outcomes:

- Familiarity with methods of solving partial differential equations.
- Learn differentiation and Integration of complex functions.
- Solving real integrals with complex integration.
- Learn Fourier and Z-transform rules with applications.

Text Books:

1. J.W. Brown & R. V. Churchill: Complex Variables & Applications, 9th edition, McGraw-Hill, 2013.
2. R. K. Jain & S. R. K. Iyenger, Advanced Engineering Mathematics, 2nd Edition, Narosa Publishing House, New Delhi, India, 2014.

Reference Books:

1. B. S. Grewal, Higher Engineering Mathematics, 42th Edition, Khanna publication, New Delhi, India, 2012.
2. E. Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, U.K., 2006.

Syllabus of B.Tech – Electrical Engineering

Subject Code	EE201	Subject Title	BASIC NETWORK ANALYSIS						
LTP	3 1 2	Credit	5	Subject Category	DC	Year	2nd	Semester	3rd

Objectives of the Course

- *This course aims to provide basic understanding of the different types of continuous time signals and systems and their mathematical representation.*
- *The students will get understanding of different network theorems with their application to ac networks.*
- *The course will provide knowledge of transforming the continuous time domain signal into frequency domain signal by the application of Laplace transform, Fourier transform and Z transform.*

Unit 1 **INTRODUCTION TO CONTINUOUS TIME SIGNALS AND SYSTEMS:**

Basic continuous time signals, unit step, unit ramp, unit impulse and periodic signals with their mathematical representation and characteristics. Waveform synthesis. Introduction to various types of systems, Causal and Non-causal, Stable and Unstable, Linear and Non-linear, Time invariant and Time varying systems. **8L**

ANALOGOUS SYSTEM: Mechanical elements for translational and rotational systems, force-voltage and force-current analogy, torque-voltage and torque-current analogy.

Unit 2 **NETWORK THEOREMS (APPLICATIONS TO AC NETWORKS) :**

Super- position theorem, Thevenin‟s theorem, Norton‟s theorem, maximum power transfer theorem, Reciprocity theorem. Millman‟s theorem, compensation theorem, Tellegen‟s theorem. **8L**

Unit 3 **LAPLACE TRANSFORM ANALYSIS**:

Laplace Transform, Laplace Transform of periodic functions, Initial and Final Value Theorems, Inverse Laplace Transform, Convolution Theorem, Superposition Integral, Application of Laplace Transform to analysis of networks, waveform synthesis and Laplace Transform of complex waveforms. **8L**

Unit 4 **FOURIER SERIES AND FOURIER TRANSFORM ANALYSIS:**

Exponential form and Trigonometric form of Fourier series, Fourier symmetry, Fourier Integral and Fourier Transform. Transform of common functions and periodic wave forms: Applications of Fourier Transform to network analysis. **8L**

Unit 5 **Z TRANSFORM ANALYSIS:**

Introduction, Spectrum analysis of sampling process, Signal reconstruction, Difference equation, Z- transform, Z-transform function, Inverse Z-transform, Relation of z- and s-transform, Stability analysis, Application of z-transform. **8L**

Text Books:

1. William Hayt, Jack Kemmerly, Steven Durbin, “Engineering Circuit Analysis”, Tata McGraw Hill, 8th Edition
2. B.P. Lathi, “Linear Systems & Signals” Oxford University Press, 2008.

Reference Books

1. .Kuo, “Network Analysis & Synthesis”, Wiley India.
2. ME Van-Valkenberg; “Network Analysis”, Prentice Hall of India

Outcome of the Course:

Having successfully completed this course, the student will demonstrate:

- An ability to design and analyse electrical circuits.
- An ability to control AC and DC circuits by using Basic Electrical devices.
- An ability to visualize and work on laboratory and multi-disciplinary tasks.

List of Experiments

1. Verification of principle of superposition with dc and ac sources.
2. Verification of Thevenin’s theorem with dc and ac sources.

3. Verification of Norton's theorem with dc and ac sources.
4. Verification of Maximum power transfer theorems in ac circuits.
5. Verification of Tellegen's theorem for two networks of the same topology.
6. Determination of transient response of current in RL circuit with step voltage input.
7. Determination of transient response of current in RC circuit with step voltage input.
8. Determination of frequency response of current in RLC circuit with sinusoidal ac input.
9. Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values.
10. Determination of frequency response of a Twin – T notch filter.

Value Added Experiments

1. Verification of Thevenin's theorem and Norton's theorem ac source in MATLAB/Simulink.
2. Verification of Maximum power transfer theorems for ac circuit in MATLAB/Simulink.

Syllabus of B.Tech – Electrical Engineering

Subject Code	EE202	Subject Title	ELECTROMECHANICAL ENERGY CONVERSION- I						
LTP	3 1 2	Credit	5	Subject Category	DC	Year	2nd	Semester	3rd

Objectives of the Course

- To empower students to understand the basics of electro mechanical energy conversion & transformer

Unit 1 **Principles of Electro-mechanical Energy Conversion**

Introduction, Flow of Energy in Electromechanical Devices, Energy in magnetic systems (defining energy & Co-energy), Singly Excited Systems; determination of mechanical force, mechanical energy, torque equation, Doubly excited Systems; Energy stored in magnetic field, electromagnetic torque, Generated emf in machines; torque in machines with cylindrical air gap . **8L**

Unit 2 **D.C. Machines**

Construction of DC Machines, Armature winding, Emf and torque equation Armature Reaction, Commutation, Interpoles and Compensating Windings, Performance Characteristics of D.C. generators. **8L**

Unit 3 **D.C. Machines (Contd.)**

Performance Characteristics of D.C. motors, Starting of D.C. motors; 3- point and 4-point starters, Speed control of D.C. motors: Field Control, armature control and Voltage Control (Ward Leonard method); Efficiency and Testing of D.C. machines (Hopkinson's and Swinburne's Test). **8L**

Unit 4 **Single Phase Transformer**

Phasor diagram, efficiency and voltage regulation, all day efficiency, Testing of Transformers: O.C. and S.C. tests, Sumpner's test, polarity test. Auto Transformer: Single phase and three phase auto transformers, volt-amp relationship, efficiency, merits & demerits and applications. **8L**

Unit 5 **Three Phase Transformers**

Construction, three phase transformer phasor groups and their connections, open delta connection, three phase to 2 phase (Scott connection), 6 phase or 12 phase connections, and their applications, parallel operation and load sharing of single phase and three phase transformers, excitation phenomenon and harmonics in transformers. **8L**

Text Books:

1. P.S.Bhimbra, "Electrical Machinery", Khanna publication.
2. I.J. Nagrath & D.P.Kothari, "Electrical Machines". Tata McGraw Hill

Reference Books

1. Charles Gross, Electric Machines, T & F, Delhi

Outcome of the Course:

- To familiarise students about dc machines, transformer, current, voltage and various circuit laws involved in analysis.
- To provide students with the basic knowledge of operation and working of DC machines & transformer and their application

List of Experiments

1. To obtain magnetization characteristics of a d.c. shunt generator.
2. To obtain external characteristics of a d.c. shunt generator and compound generator.
3. To obtain efficiency of a dc shunt machine using Swinburne's test.
4. To perform Hopkinson's test and determine losses and efficiency of DC machine.
5. To obtain speed-torque characteristics of a dc shunt motor.
6. To obtain speed control of dc shunt motor using (a) armature resistance control (b) field control.
7. To obtain speed control of dc separately excited motor using Conventional Ward-Leonard.
8. To study polarity and ratio test of single phase and 3-phase transformers.
9. To obtain equivalent circuit, efficiency and voltage regulation of a single phase transformer using O.C. and S.C. tests.

Value Added Experiments

- To obtain efficiency and voltage regulation of a single phase transformer by Sumpner's test.

- To obtain 3-phase to 2-phase conversion by Scott connection.
- To determine excitation phenomenon (B.H. loop) of single phase transformer using C.R.O.

Syllabus of B.Tech – Electrical Engineering

Subject Code	EE203	Subject Title	MEASUREMENTS & INSTRUMENTATION						
LTP	3 0 2	Credit	4	Subject Category	DC	Year	2nd	Semester	3rd

Objectives of the Course

- *To acquire knowledge regarding the use, measure and analyse the instruments.*
- *To be able to calculate all the parameters related to measurements.*
- *To develop an understanding about different instruments that are used for measurement purpose.*
- *To have knowledge about digital methods used for measurement of different quantities.*

Unit 1	**Philosophy Of Measurement:** Methods of Measurement, Measurement System, Classification of instrument system, Characteristics of instruments & measurement system, Errors in measurement & its analysis, Standards. Analog Measurement of Electrical Quantities: Electrodynamic, Thermocouple, Electrostatic & Rectifier type Ammeters & Voltmeters, Electrodynamic Wattmeter, Three Phase Wattmeter, Power in three phase system, errors & remedies in wattmeter and energy meter	**8L**
Unit 2	**Instrument transformers:** Instrument Transformer and their applications in the extension of instrument range, Introduction to measurement of speed, frequency and power factor.	**8L**
Unit 3	**Measurement of Parameters:** Different methods of measuring low, medium and high resistances, measurement of inductance & capacitance with the help of AC Bridges, Q Meter.	**8L**
Unit 4	**AC Potentiometer:** Polar type & Co-ordinate type AC potentiometers, application of AC Potentiometers in electrical measurement **Magnetic Measurement:** Ballistic Galvanometer, flux meter, determination of hysteresis loop, Measurement of iron losses.	**8L**
Unit 5	**Digital Measurement of Electrical Quantities:** Concept of digital measurement, block Diagram, Study of digital voltmeter, frequency meter Power Analyzer and Harmonics Analyzer; Electronic Multimeter.	**8L**

Text Books:

1. E.W. Golding & F.C. Widdis, "Electrical Measurement &Measuring Instrument", A.W. Wheeler & Co.Pvt. Ltd..
2. A.K. Sawhney ,"Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons , India .

Reference Books

Forest K. Harries,"Electrical Measurement", Willey Eastern Pvt. Ltd. India .

M.B. Stout ,"Basic Electrical Measurement" ,Prentice hall of India,India.

3. W.D.Cooper, "Electronic Instrument & Measurement Technique", Prentice Hall International.

Outcome of the Course:

Develop an understanding of construction and working of different measuring instruments

Develop an understanding of construction and working of different AC and DC bridges and its applications

Develop an ability to use measuring instruments and AC and DC bridges for measurement

List of Experiments

1. Calibration of ac voltmeter and ac ammeter
2. Measurement of phase difference and frequency of a sinusoidal ac voltage using C.R.O.
3. Measurement of low resistance by Kelvin's double bridge
4. Measurement of voltage, current and resistance using dc potentiometer
5. Measurement of inductance by Maxwell's bridge
6. Measurement of inductance by Hay's bridge
7. Measurement of inductance by Anderson's bridge
8. Measurement of capacitance by Owen's bridge
9. Measurement of capacitance by De Sauty Bridge
10. Measurement of capacitance by Schering Bridge

Value added Experiments:

1. Measurement of power and power factor of a single phase inductive load and to study effect of capacitance connected across the load on the power factor
2. Measurement of form factor of a rectified sine wave and determine source of error if r.m.s.value is measured by a multi-meter

3. Study of Frequency and differential time counter

Syllabus of B.Tech – Electrical Engineering

Subject Code	EC211	Subject Title	ANALOG AND DIGITAL ELECTRONICS						
LTP	3 0 2	Credit	4	Subject Category	DC	Year	2nd	Semester	3rd

Objectives of the Course

- To teach the basic concept of various analog and digital electronic devices, circuits and their application
- To develop ability among students for problem formulation, system design and solving skills
- To have basic knowledge of amplifiers and oscillators

Unit 1	**FUNDAMENTALS OF SEMICONDUCTORS AND DIODES:** Review of energy bands in solids, Intrinsic and Extrinsic semiconductors, Fermi Level, Transport phenomenon in semiconductors: diffusion current, drift current, mobility, conductivity. The Hall Effect. Generation and recombination of carriers. Special Diodes- LED, Varactor diode, Photo diode, Schottky diode, Tunnel diode; their characteristics and applications.	**8L**
Unit 2	**BJTs AND FET**s : Construction and characteristics of transistor, Transistor biasing and stability factor analysis. Transistor application as an amplifier and as a switch. Small signal analysis of BJT using re and h-parameter model. Types, construction and characteristics of JFET, Biasing of JFET, FET small signal analysis. Construction and characteristics of Depletion and Enhancement types of MOSFET. Low and High frequency response of BJT and FET amplifiers.	**8L**
Unit 3	**FEEDBACK AMPLIFIERS AND OSCILLATORS CIRCUITS:** Introduction to positive and negative feedback: Negative feedback -current, voltage, Series and Shunt type. It's effect on input impedance, output impedance, voltage gain, current gain and bandwidth. Oscillators circuits: Frequency of oscillation and condition for sustained oscillations. Types of oscillator circuits-RC-phase shift, Wein-Bridge, Hartley, Clapp, Colpitt and Crystal Oscillators.	**8L**
Unit 4	**FUNDAMENTALS OF DIGITAL SYSTEMS:** Combinational Logic Circuits: Review of logic gates and Boolean Algebra, Adder, Subtractor. Introduction to Multiplexers and Demultiplexers & Encoders andDecoders. Sequential Logic Circuits: Introduction to latches, Flip-flops, Registers and Counters.	**8L**
Unit 5	**OPERATIONAL AMPLIFIERS AND SEMICONDUCTOR MEMORIES** : Introduction to Operational Amplifiers, Characteristics of an ideal op-amp, Inverting and Non-inverting amplifier, Application of op-amp as summer, differential amplifier, Integrator and Differentiator. Semiconductor Memories: Memory organization and classification of memories.	**8L**

Text Books:

Boylstead and Neshelsky, ," Electronic Devices and Circuits", PHI

Jacob Millman & Christos C. Halkias," Integrated Electronics" Tata McGraw Hill, 1991.

Malvino & Leach, "Digital Principles and applications" Tata Mc. Graw Hill

R.A. Gayakwad "Op amps and Linear Integrated Circuits" Prentice Hall of India.

Reference Books

Taub & Schilling "Digital Electronics"- Tata Mc Graw Hill

Anil K. Maini, "Digital Electronics: Principles and Integrated circuits" Wiley India Ltd, 2008.

Millman, J. and Grabel A, "Microelectronics" Mc Graw Hill

S Salivahanan, N Suresh Kumar, "Electronic Devices and Circuits", 3rd edition, McGraw Hill Publication, 2013.

Outcome of the Course:

- **Students will be able to build analog and digital electronics circuits**
- **Students should be able to design and analyze amplifiers**
- **Students should be able to develop model and analyze oscillators**

List of Experiments

To Plot V-I characteristics of junction diode and zener diode.