**CHALAPATHI INSTITUTE OF ENGINEERING & TECHNOLOGY**

**(Accredited by NBA, NAAC with 'A' grade,, Approved AICTE & Affiliated to ANU)(An ISO 9001-2015 Certified Institution)**

**Chalapathi Nagar, LAM, Guntur-522 034, Andhra Pradesh, INDIA**


# (Autonomous)

## Scheme of Instruction, Examination and Detailed Syllabi of

# Electrical and Electronics Engineering

# II Year Syllabus

**SEMESTER III (SECOND YEAR 1ST SEM)**

| SI.NO | CATEGORY | CODE | SUBJECT NAME | HOURS PER WEEK | | | SCHEME OF EXAMINATION | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | INT | EXT | CREDITS |
| 1 | BSC | EE 211 | Mathematics – III | 3 | 1 | 0 | 30 | 70 | 3 |
| 2 | PCC | EE 212 | Network Analysis | 3 | 1 | 0 | 30 | 70 | 3 |
| 3 | PCC | EE 213 | Analog Electronics | 3 | 0 | 0 | 30 | 70 | 3 |
| 4 | PCC | EE 214 | Electromagnetic Field Theory | 3 | 1 | 0 | 30 | 70 | 3 |
| 5 | PCC | EE 215 | Electrical Machines – I | 3 | 1 | 0 | 30 | 70 | 3 |
| 6 | MC | MC 150 | Environmental Studies | 3 | 0 | 0 | 30 | 70 | 0 |
| 7 | PCC LAB | EE 251 | Networks Lab | 0 | 0 | 3 | 30 | 70 | 1.5 |
| 8 | PCC LAB | EE 252 | Analog Electronics Lab | 0 | 0 | 3 | 30 | 70 | 1.5 |
| 9 | PCC LAB | EE 253 | Electrical Machines Lab – I | 0 | 0 | 3 | 30 | 70 | 1.5 |
| 10 | Skill oriented course | EE 254 | As Suggested By APSCHE | 1 | 0 | 2 | 30 | 70 | 2 |
| | | | TOTAL | **19** | **4** | **11** | **300** | **700** | **21.5** |

**SEMESTER IV (SECOND YEAR 2ND SEM)**

| SI.NO. | CATEGORY | CODE | SUBJECT NAME | HOURS PER WEEK | | | SCHEME OF EXAMINATION | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | INT | EXT | CREDITS |
| 1 | ESC | EE 221 | Mathematics -IV | 3 | 1 | 0 | 30 | 70 | 3 |
| 2 | PCC | EE 222 | Python Programming | 3 | 0 | 0 | 30 | 70 | 3 |
| 3 | PCC | EE 223 | Digital Electronics | 3 | 1 | 0 | 30 | 70 | 3 |
| 4 | PCC | EE 224 | Electrical Machines – II | 3 | 1 | 0 | 30 | 70 | 3 |
| 5 | HSS | EE 225 | Professional Ethics and Human Values | 3 | 0 | 0 | 30 | 70 | 3 |
| 6 | MC | MC 160 | Constitution of India | 3 | 0 | 0 | 30 | 70 | 0 |
| 7 | PCC LAB | EE 261 | Python Programming Lab | 0 | 0 | 3 | 30 | 70 | 1.5 |
| 8 | PCC LAB | EE 262 | Digital Electronics Lab | 0 | 0 | 3 | 30 | 70 | 1.5 |
| 9 | PCC LAB | EE 263 | Electrical Machines Lab – II | 0 | 0 | 3 | 30 | 70 | 1.5 |
| 10 | Skill oriented course | EE 264 | As Suggested By APSCHE | 1 | 0 | 2 | 30 | 70 | 2 |
| | | | TOTAL | **19** | **3** | **11** | **300** | **700** | **21.5** |
| **HONORS / MINOR COURSES** | | | | **4** | **0** | **0** | **30** | **70** | **4** |
| | | | | | | | | | |
| **SUMMER INTERSHIP 1 MONTH MANDATORY** | | | | | | | | | |
| | | | | | | | | | |

## EE/CE 211 - MATHEMATICS-III: TRANSFORMS & PROBABILITY ANDSTATISTICS

**L T P C**
**3 1 0 3**

**COURSE OBJECTIVES**

- To study the transform techniques such as Fourier series and Fourier transforms forsolving advanced Engineering problems.
- To teach the learners with the foundations of probability theory.
- To impart the concepts of statistical methods to solve engineering applications.
- To make the students aware about the importance of statistical techniques inengineering.

### UNIT I

**Fourier Series**:

Introduction and Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Even and Odd functions, Half range series, Typical wave forms and Parseval's formulae, Complex form of the Fourier series.

### UNIT II

**Fourier Integral Transforms:**

Introduction- Definition – Fourier integrals – Fourier integral theorem (without proof)-Fourier sine and cosine integrals – complex form of Fourier integral – Fourier Transforms - Properties of Fourier Transforms - Finite Fourier sine and cosine transforms -Convolution theorem (without proof), Parsevals Identity for Fourier Transforms(without proof)

### UNIT III

**Probability and Distributions:**

Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

### UNIT IV

**Sampling Theory:**

Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to t, $\chi^2$ and F-distributions – Point and Interval estimations – Maximum error of estimate.

## UNIT V

**Tests of Hypothesis:**

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Tests concerning one mean and two means (Large and Small samples) – Tests on proportions.

**COURSE OUTCOMES**

Student will be able to

- Find Fourier series expansion for periodic functions
- Examine the properties of Fourier transformation.
- Classify Discrete and Continuous distributions of random variables
- Apply Central limit theorem for Sampling
- Use the concept of testing of hypothesis for large and small samples to draw the inferences.

**TEXT BOOK**


1. B.S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2014.
2. Miller and Freund, Probability and Statistics for Engineers, 7th Edition, Pearson, 2008.


**REFERENCES**


1. Erwin Kreyszig Advanced Engineering Mathematics, 8th Edition, and New Age International,2012.
2. N.P. Bali, A textbook of Engineering Mathematics, Laxmi publications, 2016.
3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11th Edition, SultanChand & Sons Publications, 2012.

## EE 212 - NETWORK ANALYSIS

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

**COURSE OBJECTIVES**

1. To know the statement and application of various theorems.
2. To know the methods of analysis of electrical circuits and apply circuit analysis to DC &AC circuits
3. To analyze two port networks.
4. To apply circuit analysis to AC circuits and to introduce the concept of poly phasesystems.

**UNIT I: Network Theorems**

Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem. Analysis with dependent current and voltagesources. Node and Mesh Analysis. Concept of duality and dual networks.

**UNIT II: Solution of First and Second order networks**

Solution of first and second order differential equations for Series and parallel R-L, R-C, RLC circuits, initial and final conditions in network elements, forced and free response, timeconstants,steady state and transient state response.

**UNIT III: Sinusoidal steady state analysis**

Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complexpower. Three-phasecircuits. Mutual coupled circuits, Dot Convention in coupled circuits.

**UNIT IV:Electrical Circuit Analysis Using Laplace Transforms**

Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform forstandard inputs, convolution integral, inverse Laplace transform, transformed network withinitial conditions. Transfer function representation. Poles and Zeros. Frequency response(magnitude and phase plots), series and parallel resonances

**Two Port Network and Network Functions**

Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters,admittance parameters, transmission parameters and hybrid parameters, interconnections oftwo port networks.

**UNIT V: Poly phase circuits**

Advantages of 3-phase systems, generation of 3-phase voltages - phase sequence - star & delta connections - interconnection of 3-phase sources and loads - voltage, current & power in star & delta connected systems - analysis of 3-phase balanced circuit - measurement of 3-phase power- 2 wattmeter method. Analysis of 3-phase unbalanced systems – star / delta transformation method - application of Millman’s method.

**COURSE OUTCOMES**

Upon successful completion of the course, students will be able to

**1.** Apply network theorems for the analysis of electrical circuits.
**2.** Analyze various types of R,L,C networks
**3.** Analyze Networks using Laplace Transformation
**4.** Calculate the different two port network parameters.
**5.** Analyze 3-phase systems for different loads

**TEXT BOOKS**


1. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
2. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw HillEducation,2013.
3. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education,2004.


**REFERENCE BOOKS**


1. D. Roy Choudhury, "Networks and Systems", New Age International Publications,1998.
2. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education,2004.
3. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.


**WEB RESOURCES**

1. http://www.egate.ws/
2. http://cosmolearning.org/courses/circuit-theory/
3. http://www.nptelvideos.in/2012/11/circuit-theory.html
4. http://pbtstudies.blogspot.in/

## EE 213 - ANALOG ELECTRONICS

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVES**

1. To gain the knowledge in low frequency and high frequency Transistor amplifier analysis.
2. To understand the principle of operation and characteristics of MOSFET.
3. To acquire knowledge on feedback topologies
4. To understand the fundamentals of OP-AMP and designing electronic circuits using it

**UNIT- 1: BJT circuits**

**Single stage amplifiers:** Small Signal Low Frequency Amplifier Circuits: CE, CB, CC Amplifier Circuits, Small Signal Analysis of Junction Transistor: Analysis of CE, CB, CC using Hybrid Model, Analysis of CE Amplifier with Collector to Base Bias, Millers Theorem, Analysis of CE Amplifier with Emitter Resistance: Exact and Approximate Analysis, Current mirror.

**Multi stage amplifiers:** Need for cascading, Methods of Inter stage Coupling, Gain, Selection of Configuration in cascading Amplifiers, RC Coupled CE-CE Amplifier, CE-CB Cascode Amplifier, CE-CC Amplifier, Effect of cascading on Bandwidth and Gain.

**UNIT- 2: MOSFET circuits**

MOSFET structure and I-V characteristics. MOSFET as a switch. Depletion MOSFET, Enhancement MOSFET, Comparison of BJT, JFET and MOSFET, MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans conductance, high frequency equivalent circuit.

**UNIT-3 Operational Amplifiers**: Operational amplifier and block diagram representation, op- amp with negative feedback. Block diagram representation of feedback configurations, differential amplifier with one op-amp, input offset voltage, input bias current, input offset current, total output offset voltage, stability, CMRR, slew rate.

**UNIT-4 Op-Amp Applications**: Virtual ground concept, The summing amplifier, Differential and instrumentation amplifiers, Voltage to current and current to voltage conversion, The Op- amp with complex impedances, Differentiators and integrators, Non Linear Op Amp circuits, Precision rectifiers. Comparators: Introduction to comparator, Basic comparator, Zero-crossing detector, Schmitt Trigger.

**UNIT- 5: Feedback Amplifiers**: Concepts of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of feedback on amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative examples. Oscillators: Classification of oscillators, Condition for oscillations, RC Phase shift Oscillators, Generalized analysis of LC Oscillators-Hartley and Colpitts Oscillators, Wien Bridge and crystal Oscillators.

**COURSE OUTCOMES**

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

1. Design single stage and multi stage amplifiers using transistors.
2. Evaluate the MOSFET configurations, and plot their characteristics
3. Explain the operation of amplifiers.
4. Applying the concepts of Op-Amp in various electronic circuits.
5. Explain and applying the concepts of feedback in various electronic circuits

**TEXT BOOKS**


1. Jacob Millman and Christos C. Halkias, "Integrated Electronics", TMH, 1972
2. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford UniversityPress, 1998.
3. RamaKant A. Gayakwad, Op-Amps and Linear Integrated Circuits, 4 th Edition, PHI/Pearson Education, 2003.
4. D.Roy and Choudhury, Shail B.Jain, Linear Integrated Circuits, 2nd Edition, New AgeInternational, 2003.


**REFERENCE BOOKS**


1. Donald A. Neamen," Electronic Circuits Analysis and Design", 3rd Edition, TMH, 2007.
2. Jacob Millman, Arvin Grabel (2003), Microelectronics, 2nd edition, Tata McGraw Hill,New Delhi.
3. Electronic Devices and Circuits – S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, 2Ed.,2009, TMH.
4. J.Michael Jacob, Applications and Design with Analog Integrated Circuits, 2nd Edition,PHI, 2003.


**WEB RESOURCES**

1.https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and- electronics-spring-2007/video-lectures/

2. https://nptel.ac.in/courses/108/102/108102112/

3. http://www.electronics-tutorials.ws/opamp/

4.http://www.radio-electronics.com/info/circuits/opamp_basics/operational-amplifier-basics tutorial.php

**EE 214 ELECTROMAGNETIC FIELD THEORY**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

**COURSE OBJECTIVES**

1. To understand the basic laws of electromagnetism.
2. To obtain the electric and magnetic fields for simple configurations understaticconditions.
3. To analyze time varying electric and magnetic fields.
4. To understand Maxwell's equation in different forms and different media.
5. To understand the propagation of EM waves

**UNIT-I**: **Review of Vector Calculus (6 hours)**
Vector algebra-addition, subtraction, components of vectors, scalar and vector multiplications, triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical). Vector calculus differentiation, partial differentiation, integration, vector operator Del, gradient, divergence and curl; integral theorems of vectors. Conversion of a vector from one coordinate system to another.

**UNIT-II: Static Electric Field (6 Hours)**
Coulomb's law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

**UNIT-III: Conductors, Dielectrics and Capacitance (6 Hours)**
Current and current density, Ohms Law in Point form, Continuity of current, Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials, Capacitance, Capacitance of a two wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation, Application of Laplace's and Poisson's equations.

**UNIT-IV: Static Magnetic Fields (6 Hours)**
Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors.
**Magnetic Forces, Materials and Inductance (6 Hours)**
Force on a moving charge, Force on a differential current element, Force between differential current elements, Nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, Magnetic circuits, inductances and mutual inductances.

**UNIT-V: Time Varying Fields and Maxwell's Equations (6 Hours)**
Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive forces. Boundary Conditions ,Wave equation.

## COURSE OUTCOMES

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

1. Define gradient, divergence and curl.
2. Explain laws of electromagnetics.
3. Compute electric field intensity, displacement and potential for various charge distributions.
4. Compare the relations between Electrostatics and Magneto-statics.
5. Analyze time-varying behaviour of electromagnetic wave.

## TEXT BOOKS


1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014
2. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012
3. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
4. Engineering Electromagnetics, Narayana Rao, PHI


## REFERENCE BOOKS


1. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd,NewDelhi, 2009.
2. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
3. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.


## WEB RESOURCES

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/em/index.htm
2. http://www.mike-willis.com/Tutorial/PF2.htm

**EE 215 ELECTRICAL MACHINES** – I

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

**COURSE OBJECTIVES**

**1.** To study the concepts related to Magnetic and Electromagnetic Circuits.
**2.** To familiarize with the constructional details, principle of operation, prediction of performance, the methods of testing of dc generator.
**3.** To impart knowledge on construction, principle of operation and control of DC motors.
**4.** To acquaint with the constructional details, the principle of operation, prediction of performance, the methods of testing the Single-phase transformer and Autotransformer.
**5.** Inference the operation of three phase transformers circuits.

**UNIT I: MAGNETIC FIELDS AND ELECTROMAGNETIC CIRCUIT'S, FORCE ANDTORQUE**

Review of magnetic field - MMF, flux, reluctance, inductance; Visualization of magnetic fields produced by a bar magnet and a current carrying coil; influence of highly permeable materials onthe magnetic flux lines. Magnetic circuits - energy stored in the magnetic circuit linear and nonlinear circuits; Force and Torque - force as a partial derivative of stored energy with respectto position of a moving element; torque as a partial derivative of stored energy with respect to angular position of a rotating element.

**UNIT II: DC GENERATOR**

Basic construction, Operation and magnetic structure of a DC Generator- visualization, Demonstration of magnetic field produced by the field winding excitation with armature winding open, Armature winding and commutation – Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation. Induced EMF in an armature coil; Armature Reaction; Open circuit characteristic of separately excited DC generator; Types offield excitations – separately excited, shunt, series and Compound; Testing - voltage build-up ina shunt generator, critical field resistance and critical speed.

**UNIT III: DC MOTOR**

Basic construction, Operation and magnetic structure of a DC motor - air gap flux density distribution, Back EMF in an armature coil. Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, Types of field excitations – separately excited, shunt, series and Compound; V-I characteristics and torque-speed characteristics of separately excited, shunt, series and Compound motors; Testing - starting of DC Motors, Speed control, Losses, load testing, Swinburne's test and back-to-back testing of DC machines.

**UNIT IV: SINGLE PHASE TRANSFORMER AND AUTOTRANSFORMER**

Single Phase Transformers- Principle, construction and operation, EMF equation, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency; Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses, Parallel operation; Autotransformers - construction, principle, applications and comparison with two winding transformers.

**UNIT V: THREE-PHASE TRANSFORMER**

construction, Principle and operation, types of connection and their comparative features, Cooling of transformers; Testing - Parallel operation of three-phase transformers, Phase conversion – Scott connection, three-phase to six-phase conversion, Tap-changing transformers -No-load and on load tap changing of transformers, Three-winding transformers.

**COURSE OUTCOMES**

At the end of this course, students will demonstrate the ability to

**1.** Demonstrate the concepts of magnetic circuits.
**2.** Evaluate the application of magnetic circuits in dc machines
**3.** Understand the operation of dc machine as Motor and Generator.
**4.** Analyze the differences in operation of different dc machine configurations.
**5.** Inference the operation of single phase and three phase transformers circuits.

**TEXT BOOKS**


1. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education,2013.
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
3. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.


**REFERENCE BOOKS**


1. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
2. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers,2004.


**WEB REFERENCES**

1. www.nptel.iitm.ac.in/courses/iit-madras/electrical_machines
2. www.freevideolectures.com
3. www.swe.siemens.com/spain/web/.../Catalogo%20motores%20cc.pdf

**MC 150 - ENVIRONMENTAL SCIENCE**

**(Common to all branches)** **L T P C**

**3 0 0 0**

**COURSE OBJECTIVE**

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for futuregenerations.
- To identify the causes for pollution due to the day to day activities of human life tosave earth from the inventions by the engineers.
- To make the students aware of Solid Waste Management.
- To Familiarize the Environmental Acts.

**UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES**

Definition, Scope and Importance – Need for Public Awareness.

**NATURAL RESOURCES :**

Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timberextraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

**UNIT – II: ECOSYSTEMS, BIODIVERSITY AND ITS CONSERVATIONECOSYSTEMS:**

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 (ponds, streams, lakes, rivers, oceans, estuaries)

**BIODIVERSITY AND ITS CONSERVATION :**

Definition: genetic, species and ecosystem diversity – Bio- geographical classificationof India – Value of biodiversity: consumptive use, Productive use, social, ethical,

aesthetic and option values – Biodiversity at global, National and local levels – India as a mega- diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife,

Man - wild life conflicts – Endangered and endemic species of India – Conservationof biodiversity: In-situ and Ex-situ conservation of biodiversity.

**UNIT – III: ENVIRONMENTAL POLLUTION AND SOLID WASTE MANAGEMENT ENVIRONMENTAL POLLUTION:**

Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

**SOLID WASTE MANAGEMENT:**

Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

**UNIT – IV: SOCIAL ISSUES AND THE ENVIRONMENT**

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

**UNIT – V: HUMAN POPULATION AND THE ENVIRONMENT**

Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education –HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

**FIELD WORK:**

Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river,hill slopes, etc.

**COURSE OUTCOMES**

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

**CO1** Gain a higher level of personal involvement and interest in understanding and solving environmental problems.

**CO2** Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities

**CO3** Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century

**CO4** Recognize the interconnectedness of human dependence on the earth's ecosystems

**CO5** Influence their society in proper utilization of goods and services.

**CO6** Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices.

**TEXT BOOKS**


1. Text book of Environmental Studies for Undergraduate Courses - Erach Bharuchafor University Grants Commission, Universities Press.
2. Environmental Studies - Palaniswamy – Pearson education
3. Environmental Studies - Dr.S.Azeem Unnisa, Academic Publishing Company


**REFERENCES**


1. Textbook of Environmental Science - Deeksha Dave and E.Saibaba Reddy, CengagePublications.
2. Text book of Environmental Science and Technology - M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies - J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke –PHI
5. A Text Book of Environmental Studies - G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science - Gilbert M. Masters andWendell P. Ela- PHI.

## EE 251 NETWORKS LAB

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**COURSE OBJECTIVES**

The main objectives of this lab course are

1. To conduct experiments on theory taught in electrical circuits.
2. To design experimental setups for theorems.
3. To introduce simulation tool for circuits.

**LIST OF EXPERIMENTS**

1. Verification of Maximum power transfer theorem
2. Verification of reciprocity theorem
3. Frequency response of RL circuits
4. Frequency response of RC circuits
5. Frequency response of RLC circuits
6. Time response of RL circuits
7. Time response of RC circuits
8. Time response of RLC circuits
9. Steady state analysis of RLC circuits using software
10. Transient analysis of RLC circuits using software
11. Verification of Kirchoff's Laws using software
12. Verification of Thevenin's Theorem using software
13. Verification of Superposition Theorem using software
14. Verification of Maximum power transfer theorem using software
15. Verification of reciprocity theorem using software

**COURSE OUTCOMES**

The student will be able to

1. Design circuits and analyze them with theorems.
2. Determine Frequency response of RLC circuits
3. Determine Time response of RLC circuits.
4. Develop programs for Transient analysis of RLC circuits using software
5. Analyze network theorems using software

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## EE 252 ANALOG ELECTRONICS LAB

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**COURSE OBJECTIVES**

1. To be familiar with the structure of basic electronic devices
2. To be exposed to the operation and application of electronic devices and their circuits
3. To analyze circuit characteristics with signal analysis using Op-amp Ics.
4. To design and construct application circuits with ICs as Op-amp, 555, etc.

**LIST OF EXPERIMENTS**

1. Study of Cathode Ray Oscilloscope
2. Verify the V-I characteristics of PN Junction diode.
3. Verify the V-I and regulation characteristics of Zener diode.
4. Obtain the input and output characteristics of Common Base configuration.
5. Obtain the input and output Characteristics of Common Emitter configuration
6. Obtain the input and output Characteristics of Emitter follower circuit
7. Plot the Drain and Transfer Characteristics of Depletion MOSFET.
8. Plot the Drain and Transfer Characteristics of Enhancement MOSFET.
9. Design and verification of Self bias circuit.
10. OPAMP based amplifier circuits :
    i) Inverting amplifier.
    ii) Non-inverting amplifier and voltage follower
    iii) Differential amplifier and Instrumentation amplifier.
11. Square wave oscillator/ tri-angular wave oscillator.
12. OPAMP based RC –phase shift oscillator
13. OPAMP based precision rectifier circuit/ clipper circuits
14. UJT – relaxation oscillator circuit
15. Wien bridge oscillator

**COURSE OUTCOME**

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

1. verify characteristics of diode
2. Verify characteristics of BJT for different configurations.
3. Verify characteristics of MOSFET for different configurations.
4. Analyse the operation of amplifier circuits.
5. Design and analyze of oscillators.

## EE 253 ELECTRICAL MACHINES LAB-I

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**COURSE OBJECTIVES**

1. To analyze the Open circuit and load. Characteristics of DC separately excited shuntgenerator.
2. To conduct and analyse the load test on DC shunt, series and compound motors.
3. To examine the self-excitation in DC generators.
4. To Pre-determine and determine the efficiency of different DC machines.
5. To conduct various tests on transformers.

**LIST OF EXPERIMENTS**

1. Open circuit characteristics of separately excited / self-excited D.C shunt generator
2. Load test on D.C Shunt Generator
3. Load test on D.C Compound Generator
4. Load test on D.C series generator
5. Swinburne's Test
6. Speed control of DC shunt motor
7. Brake test on D.C Shunt Motor
8. Hopkinson's test on D.C Machines
9. Retardation test on D.C. Machine
10. Brake test on D.C Series Motor
11. OC & SC tests on single - phase transformer
12. Load test on single - phase transformer
13. Sumpner's test on Transformers
14. Scott Connection of Transformers
15. Parallel Operation of Two Single - Phase Transformers

**COURSE OUTCOMES**

At the end of this lab, student will able to

**1.** Start and control the Different DC Machines.

**2.** Assess the performance of different machines using different testing methods

**3.** Analyse the Open circuit and load. Characteristics of DC separately and self-excited shuntgenerator

**4.** Conduct various tests on Transformer

**5.** Analyse various method to determine the efficiency of DC machine.

**SEMESTER IV (SECOND YEAR 2ND SEM)**

| SI.NO. | CATEGORY | CODE | SUBJECT NAME | HOURS PER WEEK | | | SCHEME OF EXAMINATION | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | INT | EXT | CREDITS |
| 1 | ESC | EE 221 | Mathematics -IV | 3 | 1 | 0 | 30 | 70 | 3 |
| 2 | PCC | EE 222 | Python Programming | 3 | 0 | 0 | 30 | 70 | 3 |
| 3 | PCC | EE 223 | Digital Electronics | 3 | 1 | 0 | 30 | 70 | 3 |
| 4 | PCC | EE 224 | Electrical Machines – II | 3 | 1 | 0 | 30 | 70 | 3 |
| 5 | HSS | EE 225 | Professional Ethics and Human Values | 3 | 0 | 0 | 30 | 70 | 3 |
| 6 | MC | MC 160 | Constitution of India | 3 | 0 | 0 | 30 | 70 | 0 |
| 7 | PCC LAB | EE 261 | Python Programming Lab | 0 | 0 | 3 | 30 | 70 | 1.5 |
| 8 | PCC LAB | EE 262 | Digital Electronics Lab | 0 | 0 | 3 | 30 | 70 | 1.5 |
| 9 | PCC LAB | EE 263 | Electrical Machines Lab – II | 0 | 0 | 3 | 30 | 70 | 1.5 |
| 10 | Skill oriented course | EE 264 | As Suggested By APSCHE | 1 | 0 | 2 | 30 | 70 | 2 |
| | | | TOTAL | **19** | **3** | **11** | **300** | **700** | **21.5** |
| **HONORS / MINOR COURSES** | | | | **4** | **0** | **0** | **30** | **70** | **4** |
| | | | | | | | | | |
| **SUMMER INTERSHIP 1 MONTH MANDATORY** | | | | | | | | | |
| | | | | | | | | | |

**CE/CS/CI/DS/AI/EC/EE-221 MATHEMATICS-IV**
**(Common to all branches of Engineering)**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

**COURSE OBJECTIVES**

- To study the concepts of curvature, envelopes and curve tracing.
- To introduce Laplacian transformation techniques for solving ordinary differentialequations.
- To educate the students about Z-transforms and its applications in engineering.
- To learn different numerical methods to solve nonlinear algebraic equations
- To provide the learners with basic concepts and techniques of numerical computing todeal with real world application.

**UNIT I: Radius of Curvature and Curve Tracing**

Curvature: Radius of curvature - Cartesian curves - parametric equations - at origin - Newton's formula - polar curves - pedal curves - centre of curvature - circle of curvature- Evaluates - Envelopes. Increasing and decreasing functions - Maxima and Minima - practical problems - Asymptotes - Curve tracing- Cartesian- parametric and polar curves.

**UNIT II : Laplace Transforms**

Laplace transforms of standard functions – shifting theorems – transforms of derivative's and integrals – Unit step function – Dirac's delta function. Inverse Laplace transforms - convolution theorem (without proof) – solving ordinary differential equations (Initial value problems) using Laplace transforms.

**UNIT III : Z-Transforms**

Definition of Z-transform, elementary properties, linearity property, damping rule, shifting to the right and left, multiplication by n, initial value theorem, final value theorem, inverse Z-transform, convolution theorem, solution of difference equations using Z-transforms.

**UNIT IV :**

**Numerical Solutions of Equations:**

Introduction - Solution of Algebraic and Transcendental Equations - Bisection method-Newton- Raphson Method - iterative Methods.

**Finite Differences and Interpolation:**

Finite Differences – Differences of a polynomial – factorial notation – relations between operators – Newton's Interpolation formulae – central difference interpolation formulae - Gauss interpolation formulae – stirlings formula - interpolation with unequal intervals – Lagrange's interpolation – inverse interpolation.

**UNIT V : Numerical Integration and Solution of Ordinary Differential Equations**

Numerical Integration: Trapezoidal rule - Simpson's one-third rule - Simpson's three-eighth.

Numerical Solution of Ordinary Differential Equations: Introduction – Picard's Method- Euler's Method Runge- Kutta Method of fourth order.

**COURSE OUTCOMES**

Student will able to

1. Define the concepts of radius of curvature and envelopes.
2. Apply Laplace and Z transforms for solving differential and difference equations.
3. Compare the properties of Laplace and Z transforms.
4. Develop curve tracing methods in Cartesian, Polar, Parametric forms.
5. Demonstrate the method of computing the rate of change of physical variables inEngineering using numerical methods.

**TEXT BOOKS:**


1. B. S. Grewal, Higher Engineering Mathematics, 43 edition, Khanna Publishers
2. Erwin Kreyszig, Advanced Engineering Mathematics, 8th edition, New Age International (P) Ltd


**REFERENCES:**


1. N. P. Bali, A text book of Engineering Mathematics, Lakshmi publications
2. S. S. Sastry, Introductory Methods of Numerical Analysis, 5th edition, PHI learning (P)Ltd
3. N. P. Bali, Satyanarayana Bhvanari and Indrani Keller, Lakshmi Publications, NewDelhi.
4. Anthony C. Grove, An introduction to Laplace transform and the Z-transform, PrenticeHall, New York. (1991).

## EE 222 PYTHON PROGRAMMING

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVES**

1. To understand programming skills on python
2. To understand the concepts of functions
3. To learn how to use data types in python
4. To acquire object oriented skills in python

**UNIT- I**

**Context of software development:** Software, Development tools, Learning programming withPython, Writing a python program.

**Values and Variables:** Variables and assignments, identifier, Control codes within Strings, UserInput, The eval function, the print function.

**Expressions and Arithmetic:** Expressions, Operator precedence and Associatively, Comments,Errors, More arithmetic operators.

**UNIT-II**

**Conditional Execution:** Boolean Expressions, Simple if and if else, nested conditionals, multi-way decision statements, conditional expressions, errors in conditional statements.

**Iteration:** While statements, for statement, definite loops and indefinite loops, nested loops,abnormal loop termination, infinite loops.

**Data Structures**: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions

**UNIT- III**

**Functions:** Introduction, standard mathematical functions, time functions, Random numbers,main function, parameter passing, Function examples: Better organized prime number.

**More on Functions:** Global variables, Default Parameters, recursion, Making functionsreusable, documenting functions and modules, functions as data.

**Modules:** Creating modules, import statement, from. Import statement, name spacing,

**Python packages:** Introduction to PIP, Installing Packages via PIP, Using Python Packages

**UNIT- IV**

**Lists processing**: Sorting, flexible sorting, search.

**Object Oriented Programming OOP in Python:** Classes, 'self variable', Abstract classes and Interfaces, Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, **Error and Exceptions:** Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

**UNIT- V**

**PYTHON:-**OS and SYS, multithreading , date and time, Graphical user interface.

**File Handling**:-open(), read(), create(), and delete ()

## COURSE OUTCOMES

Upon completion of this course, students will acquire knowledge about:

1 Identify the basic python constructs with a view of using them in problem solving.

2. Apply control structures and use python lists in examples of problem solving

3 Explore the utility of strings and functions in modular programming using python4 Apply tuple, set and file operations to organize the data in real world problems

5 Analyze various searching and sorting techniques using python and apply exception Handling,database operations in python

## TEXT BOOKS

1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House

2. Learning To Program With Python Richard L. Halterman

3. Core Python Programming by Dr. R.Nageswara Rao, dream tech, second edition

## REFERENCE BOOKS

1. Introduction to Computing and Problem Solving with Python, J. Jose, Khanna Publications

2. Python Programming, Seema Thareja, Pearson.

## WEB RESOURCES

1.https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction- to-computer-science-and-programming-in-python-fall-2016/

2. https://www.w3schools.com/python/

3. https://nptel.ac.in/courses/106/106/106106145/

## EE 223 DIGITAL ELECTRONICS

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

**COURSE OBJECTIVES**

1. To impart the essential knowledge on the fundamentals and applications of digital circuits anddigital computing principles.
2. To provide an overview on the design principles of digital computing systems.
3. To provide technical knowledge about various digital hardware components.
4. To identify basic requirements for a design application and propose cost effective solutions.

**UNIT-I Number System and Boolean algebra And Switching Functions**: Review of number systems, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes.Boolean Algebra: Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

**UNIT-II Minimization and Design of Combinational Circuits**: Introduction, The Minimization of switching function using theorem, The Karnaugh Map Method-Up to Five Variable Maps, Don't Care Map Entries, Tabular Method, Design of Combinational Logic: Adders, Subtractors, comparators, Multiplexers, Demultiplexers, Decoders, Encoders and Code converters, Hazards and Hazard Free Relations.

**UNIT–III Sequential Machines Fundamentals and Applications**: Introduction, Basic Architectural Distinctions between Combinational and Sequential circuits, The Binary Cell, Fundamentals of Sequential Machine Operation, Latches, Flip Flops: SR, JK, Race Around Condition in JK,JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Design of a Clocked Flip- Flop, Timing and Triggering consideration, Clock Skew, Conversion from one type of Flip-Flop to another.Registers and Counters: Shift Registers, Data Transmission in Shift Registers, Operation of Shift registers, Shift Register Configuration, Bidirectional Shift Registers, Applications of Shift Registers, Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

**UNIT–IV Sequential Circuits - I**: Introduction, State Diagram, Analysis of Synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Synthesis of Synchronous Sequential Circuits, Serial Binary Adder, Sequence Detector, Parity- bit Generator, Design of Asynchronous Counters, Design of Synchronous Modulo N –Counters.

**UNIT–V Sequential Circuits - II**: Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques, and Merger chart methods-concept of minimal cover table.

**COURSE OUTCOMES**

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

1. Explain number systems and arithmetic operations.
2. Identify the importance of SOP and POS canonical forms in the minimization or otheroptimization of Boolean functions.
3. Evaluate functions using various types of minimizing algorithms like Boolean algebra, Karnaugh map or tabulation method.
4. Design the combinational & sequential logic circuits.
5. Apply the concepts of finite state machines to design complex digital circuits.

**TEXT BOOKS**

1. Switching and Finite Automata Theory- Zvi Kohavi Niraj K. Jha, 3rdEdition, Cambridge
2. Digital Design- Morris Mano, 5rd Edition, Pearson

**REFERENCES**

1. Modern Digital electronics RP Jain 4th Edition, McGraw Hill
2. Switching Theory and Logic Design – A Anand Kumar, 3rd Edition, PHI, 2013

**WEB RESOURCES**

1.https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematicsfor-computer-science-spring-2015/proofs/tp2-2/digital-logic-video/digital-logic/
2. https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-cs74/
3.https://www.pdfdrive.com/fundamentals-of-switching-theory-and-logic-design- d17528650.html

**EE 224 ELECTRICAL MACHINES – II**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

## COURSE OBJECTIVES

1. To provide students with strong foundation on the classification, construction, performance, testing and applications of Induction Motors.
2. To provide students with strong foundation on Control of 3 phase induction motors&single phase Induction Motors
3. To provide students with strong foundation on the classification, construction, performance, testing and applications of alternators.
4. To enable the students to have a fair knowledge about construction, working principle,operation and applications of Special Machines

**UNIT – I: Poly Phase Induction Motors**

Rotating magnetic field in two phase & three phase systems - construction and operation of squirrel cage and slip ring 3-phase induction motors - torque equation and torque slip characteristics - equivalent circuit - Power losses – efficiency - testing of induction motors and circle diagrams.

**UNIT – II: Control of 3 phase induction motors & single phase Induction Motors**

Types of starters - speed control of induction motors - Crawling and Cogging - Double cagerotors - Induction generators and their applications.

Single Phase Induction Motors:

Double field revolving theory - starting methods Split phase - capacitor start and run - shadedpole motors - characteristics and their applications.

**UNIT – III: Synchronous Generators**

Construction - E.M.F. equation with sinusoidal flux -winding factors - harmonics in generated voltage and their suppression - armature reaction - synchronous impedance - vector diagram - load characteristics - methods of determining regulation – direct load - EMF, MMF, ZPF and ASA.

Blondel two reaction method for salient pole machine - phasor diagram - slip test - regulation of salient pole machines - parallel operation - synchronizing with infinite bus bars

- synchronizing power - effect of variation of excitation and mechanical input on paralleloperation - load sharing – losses and efficiency.

**UNIT – IV Synchronous Motor *(*10 Hours)**

Theory of operation - starting methods - phasor diagrams -variation of current and power factor with excitation - minimum and maximum power for a given excitation and power circles - V and inverted V curves - hunting and its prevention – synchronous condenser and its applications.

**UNIT – V: Synchronous Special Machines**

Operation and characteristic of Universal motors - Repulsion motors and its applications. Operation and characteristics of reluctance motor and hysteresis motor. Variable reluctance stepper motor - Principle of operation of Brushless DC Motor.

## COURSE OUTCOMES

After the completion of the course the student should be able to:

1. Explain the operation and performance of three phase induction motor.
2. Analyze the torque-speed relation, performance of induction motor.
3. Implement the starting of single phase induction motors.
4. Perform winding design and predetermine the regulation of synchronous generators.
5. Understand the operation of special electrical machines.

## TEXT BOOKS


1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
3. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.


## REFERENCE BOOKS


1. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
2. P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons,2007.


## WEB RESOURCES

1. www.electrical4u.com/electrical-transformer/three-phase-transformer.php % reference forsingle phase & three transformers
2. www.electrotechnik.net/2006/08/in-autotransformer-primary-and.html % for autotransformers
3. www.allaboutcircuits.com/vol_2/chpt_13/7.html % poly phase induction
4.http://nptel.iitg.ernet.in/courses/Elec_Engg/IIT%20Roorkee/Electrical%20Machines%202%20
%28Video%29.html
5. http://www.creativeworld9.com/2011/02/learn-electrical-machines-iiithrough.html

**EE 225 PROFESSIONAL ETHICS AND HUMAN VALUES**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVES**

1. To provide essential complementarily between "VALUES" and "SKILLS" to ensure sustained happiness and prosperity.
2. To introduce Ethical concepts that are relevant to resolving Moral issues in Engineering and to impart reasoning and analytical skills needed to apply ethical concepts to Engineering decisions.
3. To facilitate the development of a Holistic perspective towards life, profession and happiness, based on a correct understanding of the Human reality.
4. To understand the need for lifelong learning and have the knowledge and skills that prepare them to identify the moral issues involved in engineering areas

**UNIT – I: Human Values**

Morals, Values and Ethics – Integrity – Work Ethic – ServiceLearning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – honesty –Courage – Valuing Time – Co- operation – Commitment – Empathy – Self – Confidence – Character – Spirituality.

**UNIT – II: Engineering Ethics**

Senses of 'Engineering Ethics' – Variety of model issues –Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy –Professions and Professionalism – Professional Ideals and Virtues – Theories about right action –Self-interest – customs and Religion – Uses of Ethical Theories.

**UNIT – III: Engineering as Social Experimentation**

Engineering as Experimentation –Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.Safety, Responsibility and Rights: Safety and Risk-Assessment of Safety andRisk – risk Benefit analysis and reducing risk. Collegiality and Loyalty – Respect for Authority – Collective Bargaining - Confidentiality – Conflicts of Interest – Occupational Crime
– Professional Rights – employee Rights – Intellectual Property Rights (IIPR) – Discrimination.

**UNIT – IV: Global Issues**

Multinational Corporations – Environmental Ethics – ComputerEthics – Weapons Development – Engineers as Managers – consulting Engineering – Engineers as Expert Witnesses and Advisors – Moral Leadership

**UNIT – V: Sample Code**

Sample Code of Ethics like ASME, ASCE, IEEE, Institution of engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE), India, etc.

**COURSE OUTCOMES**

After successful completion of the course, the students are able to

1. Comprehend a specific set of behaviors and values the professional interpreter must know andmust abide by, including confidentiality, honesty and integrity.
2. Strive to achieve the highest quality, effectiveness and dignity in both the process andproducts of professional work
3. Understand the moral requirements of engineering experiments, and have the ability to applytheir knowledge to the solution of practical and useful problems;
4. Understand Lack of communication, prejudice in not asking for clarification, fear of law andplain neglect will lead to the occurrence of many repetitions of past mistakes.
5. Know and respect existing laws pertaining to professional work. The students can speak outagainst abuses in these areas affecting the public interest.

**TEXT BOOKS**


1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York1996.
2. Govindarajan. M, Natarajan. S, Senthilkumar. V.S, "Engineering Ethics", Prentice Hall ofInida, 2004.
3. Charles D Fleddermann, "engineering Ethics", Prentice Hall, New Jersey, 2004 (Indian Reprint).


**REFERENCE BOOKS**


1. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics Conceptsand Cases", Thompson Learning, United States, 2000 (Indian Reprint now available).
2. John R Boatright, "ethics and the Conduct of Business", Pearson Educaiton, New Delhi,2003.
3. Edmund G Seebauer and Robert L Barry, "fundamentals of ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001

# MC-160 CONSTITUTION OF INDIA

**L T P C**
**3 0 0 0**

**COURSE OBJECTIVES**

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court andhigh court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative.

**UNIT-I**

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

**UNIT-II**

Union Government and its Administration Structure of the Indian Union: Federalism, Centre-State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

**UNIT-III**

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

**UNIT-IV**

Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

**UNIT-V**

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission, Functions of Commissions for the welfare of SC/ST/OBC and women

## COURSE OUTCOMES

At the end of the semester/course, the student will be able to have a clear knowledge on the following:

1. Understand historical background of the constitution making and its importance for building a democratic India.
2. Understand the functioning of three wings of the government ie., executive, legislativeand judiciary.
3. Understand the value of the fundamental rights and duties for becoming good citizen ofIndia.
4. Analyze the decentralization of power between central, state and local self-government.
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

## REFERENCES


1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal LawPublication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law,Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to CivilRight), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012


## E-RESOURCES

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

**EE 261 PYTHON PROGRAMMING LAB**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**COURSE OBJECTIVES**

1. To interpret the use of procedural statements like assignments, conditional statements, loopsand function calls.
2. To infer the supported data structures like lists, dictionaries and tuples in python.
3. To describe the importance of object-oriented programming concepts in python.

**LIST OF EXPERIMENTS**

1. Design a Python script to convert a Binary number to Decimal number and verify if it is aPerfect number.
2. Design a Python script to determine if a given string is a Palindrome using recursion
3. Design a Python script to sort numbers specified in a text file using lists.
4. Design a Python Script to determine the Square Root of a given number without usinginbuilt functions in Python.
5. Design a Python Script to convert a given number to words
6. Design a Python Script to convert a given number to roman number.
7. Design a Python script to generate statistical reports(Minimum, Maximum, Count,Average, Sum etc) on public datasets.
8. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorizing them intodistinction, first class, second class, third class and failed.
9. Design a Python script to search an element in the given list.10.Design a Python script on str methods and list methods.

**COURSE OUTCOMES**

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

1. Evaluate the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python.
2. Express different Decision-Making statements and Functions.
3. Interpret Object oriented programming methodology in Python.
4. Implement string and list manipulations.
5. Demonstrate Graphic libraries.

## EE 262 DIGITAL ELECTRONICS LAB

**L T P C**
**0 0 3 1.5**

**COURSE OBJECTIVES**

**1.** To conduct experiments on logic gates and verify their truth tables.
**2.** To design and construct adder and subtractor circuits using logic gates.
**3.** To design & implement code converter circuits and verify the truth table.
**4.** To verify the truth tables of different flip flops, realize different Shift Registers and counters.

**LIST OF EXPERIMENTS**

1. Realization of Gates using Discrete Components.
2. Realization of Gates using Universal Building Block(NAND only).
3. Design of Combinational Logic Circuits like Half-adder, Full-adder, Half- Subtractor and Full- Subtractor.
4. Verification of 4-bit Magnitude Comparator.
5. Design of Decoders like BCD-Decimal decoder.
6. Applications of IC Parallel Adder (1's&2'scomplimentaddition).
7. Design of Code Converters (Binary to Gray).
8. Design of Multiplexers/De-Multiplexers.
9. Verification of Truth-Table of Flip-Flops using Gates.
10. Design of Shift registers (To Verify Serial to parallel, parallel to Serial, Serial to Serial andparallel to parallel Converters) using Flip-Flops.
11. Design of Ring & Johnson counters using flip-flops.
12. Conversion of flip-flops (JK-T, JK-D).
13. Design of binary/decade counter
14. Design of Asynchronous counter, mod counter**,** up counter**,** down counter & up/down counter.
15. Design of synchronous counter, mod counter, up counter, down counter& up/down counter.

**COURSE OUTCOMES**

At the end of course, the student will be able to
1. Verify Boolean expressions using digital logic gates.
2. Design the combinational circuits using logic gates.
3. Construct different sequential circuits using flip-flops and gates.
4. Experiment and verify the operation of counters and shift registers.
5. Design digital logic systems involving both combinational and sequential circuits.

**EE 263 ELECTRICAL MACHINES LAB – II**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

## COURSE OBJECTIVES

1. To develop experimental setups for studying the performance and operation of squirrelcage and slip ring induction motors.
2. To separate the losses of an Induction motor.
3. To develop experimental setups for studying the performance and operation ofsynchronous generators.
4. To develop experimental setups for studying the performance and operation ofsynchronous motors.
5. To develop experimental setups for studying the performance and operation of specialmachines.

## LIST OF EXPERIMENTS

1. Load test on 3 - phase squirrel cage induction motor
2. No load and Blocked rotor test on 3 - phase induction motor
3. Brake test on single - phase induction motor
4. Determination of Equivalent Circuit of Single - Phase Induction Motor
5. Separation of losses of 3-phase Induction motor
6. Load test on alternator – for UPF, Inductive and capacitive loads
7. Regulation of alternator by synchronous impedance and MMF methods
8. Regulation of alternator by ZPF & ASA methods
9. V and inverted V curves of synchronous motor
10. Synchronous motor performance with constant excitation
11. Separation of losses in single phase transformer by v/f method
12. Measurement of Xd and Xq of a three-phase alternator by slip test
13. Measurement of Xd" and Xq" of a three-phase alternator
14. Load test on Universal motor
15. Load test on 1phase repulsion motor

## COURSE OUTCOMES

After completion of this lab course, the student able to

1. Analyze the performance characteristics of Induction motors.
2. Assess the performance of the Induction motors.
3. Calculate the regulation of alternators by various methods.
4. Know the performance of special motors.
5. Know the performance of synchronous motors.