# St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## COMMON FOR ELECTRICAL & ELECTRONICS ENGINEERING, COMPUTER SCIENCE ENGINEERING, INFORMATION TECHNOLOGY AND COMPUTER SCIENCE & DESIGN (CSD)

### I YEAR I SEMESTER

| S. No. | Course Code | Course Title | Hours per Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | Internal (CIE) | External (SEE) | Total |
| 1 | MA101BS | Linear Algebra and Calculus | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 2 | CH102BS | Engineering Chemistry | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 3 | EE106ES | Basic Electrical Engineering | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | ME107ES | Engineering Workshop | 1 | 0 | 3 | 2.5 | 30 | 70 | 100 |
| 5 | EN103HS | Professional English | 2 | 0 | 0 | 2 | 30 | 70 | 100 |
| 6 | CH104BS | Engineering Chemistry Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 7 | EN105HS | English Language and Communication Skills Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| 8 | EE108ES | Basic Electrical Engineering Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| | | **Total** | **12** | **2** | **10** | **19** | **240** | **560** | **800** |
| **Mandatory Course (Non-Credit)** | | | | | | | | | |
| 9 | *TS109 | Technical Seminar | 0 | 0 | 2 | - | 100 | - | 100 |
| | | Induction Programme | | | | | | | |

### I YEAR II SEMESTER

| S. No. | Course Code | Course Title | Hours per Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | Internal (CIE) | External (SEE) | Total |
| 1 | MA201BS | Advanced Calculus | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 2 | AP202BS | Applied Physics | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 3 | CS205ES | Programming for Problem Solving | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 4 | ME206ES | Engineering Graphics | 1 | 0 | 4 | 3 | 30 | 70 | 100 |
| 5 | AP203BS | Applied Physics Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 6 | CS207ES | Programming for Problem Solving Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| | | **Total** | **10** | **3** | **10** | **18** | **180** | **420** | **600** |
| **Mandatory Course (Non-Credit)** | | | | | | | | | |
| 7 | *ES204BS | Environmental Science | 3 | 0 | 0 | - | 100 | - | 100 |
| 8 | *MP209 | Micro Project | 0 | 0 | 2 | - | 100 | - | 100 |

***MC – Satisfied/Unsatisfied**

# St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

**II B. Tech-I-Semester**

| S. No. | Course Code | Course Title | Hours Per Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | Internal (CIE) | External (SEE) | Total |
| 1. | EE301PC | Electrical Circuit Analysis | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 2. | EE302PC | Electromagnetic Fields | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | EE303PC | Electrical Machines I | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 4. | ME304ES | Engineering Mechanics | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 5. | EC305PC | Analog Electronics | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | EE306PC | Electrical Machines I Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| 7. | EE307PC | Electrical Circuits Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| 8. | EC308PC | Analog Electronics Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| **Total** | | | **15** | **3** | **6** | **21** | **240** | **560** | **800** |
| Mandatory Course (Non-Credit) | | | | | | | | | |
| 9. | *GS309MC | Gender sensitization Lab | 0 | 0 | 2 | 0 | 100 | - | 100 |

**II B. Tech-II-Semester**

| S. No. | Course Code | Course Title | Hours Per Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | Internal (CIE) | External (SEE) | Total |
| 1. | MA405BS | Transformations, Complex Variables & Numerical Techniques | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 2. | EE401PC | Electrical Machines II | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 3. | EE402PC | Power Electronics | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 4. | EE403PC | Digital Electronics | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5. | EE404PC | Power Systems I | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | EE406PC | Electrical Machines II Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| 7. | EE408PC | Power Electronics Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| 8. | EE409PC | Digital Electronics Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| **Total** | | | **15** | **3** | **6** | **21** | **240** | **560** | **800** |
| Mandatory Course (Non-Credit) | | | | | | | | | |
| 9. | *CI407MC | Constitution of India | 3 | 0 | 0 | 0 | 100 | - | 100 |
| 10. | EE410VC | Electrical Software (Value Added course) | 3 | 0 | 0 | 0 | 100 | - | 100 |

*MC – Satisfied/Unsatisfied

# St. Martin's Engineering College

UGC Autonomous
NBA &NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### III B. Tech-I-Semester

| S. No. | Course Code | Course Title | Hours Per Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | Internal (CIE) | External (SEE) | Total |
| 1. | EE501PC | Control Systems | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 2. | EE502PC | Power Systems II | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 3. | | Professional Elective – I | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | EE503PC | Electrical Measurements and Instrumentation | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 5. | BE504MS | Business Economics and Financial Analysis | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | EE505PC | Electrical Measurements and Instrumentation Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| 7. | EE506PC | Control Systems Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| 8. | EE507PC | Power Systems Simulation Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| 9. | EN506HS | Advanced Communication Skills Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| **Total** | | | **15** | **3** | **8** | **22** | **270** | **630** | **900** |
| Mandatory Course (Non-Credit) | | | | | | | | | |
| 10. | *IP510MC | Intellectual Property Rights | 3 | 0 | 0 | 0 | 100 | - | 100 |

### III B. Tech-II-Semester

| S. No. | Course Code | Course Title | Hours Per Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | Internal (CIE) | External (SEE) | Total |
| 1. | | Open Elective – I | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | | Professional Elective – II | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | EE601PC | Power System Protection | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 4. | EE602PC | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5. | EE603PC | Signals and Systems | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | EE604PC | Electrical Energy Conservation and Auditing | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 7. | EE605PC | Power System Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| 8. | EE606PC | Microprocessors and Microcontrollers Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| 9. | EE607PC | Signals and Systems Lab | 0 | 0 | 2 | 1 | 30 | 70 | 100 |
| **Total** | | | **18** | **1** | **6** | **22** | **270** | **630** | **900** |
| Mandatory Course (Non-Credit) | | | | | | | | | |
| 10. | *ES608BS | Environmental Science | 3 | 0 | 0 | 0 | 100 | - | 100 |

*MC – Satisfied/Unsatisfied

# St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

**IV B. Tech-I-Semester**

| S. No. | Course Code | Course Title | Hours Per Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | Internal (CIE) | External (SEE) | Total |
| 1. | | Professional Elective III | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | | Professional Elective IV | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | | Open Elective II | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | FM702MS | Fundamentals of Management for Engineers | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5. | EE701PC | Electrical and Electronics Design Lab | 0 | 0 | 3 | 3 | 30 | 70 | 100 |
| 6. | EE702PC | Industry Oriented Mini Project | 0 | 0 | 4 | 2 | - | 100 | 100 |
| 7. | EE703PC | Seminar | 0 | 0 | 2 | 1 | 100 | - | 100 |
| 8. | EE704PC | Project Stage - I | 0 | 0 | 6 | 3 | 30 | 70 | 100 |
| **Total** | | | **12** | **0** | **15** | **21** | **280** | **520** | **800** |

**IV B. Tech-II-Semester**

| S. No. | Course Code | Course Title | Hours Per Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | Internal (CIE) | External (SEE) | Total |
| 1. | | Open Elective – III | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | | Professional Elective – V | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | | Professional Elective - VI | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | EE801PC | Project Stage II | 0 | 0 | 14 | 7 | 30 | 70 | 100 |
| **Total** | | | **9** | **0** | **14** | **16** | **120** | **280** | **400** |

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# LINEAR ALGEBRA AND CALCULUS

**I B. TECH- I SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| MA101BS | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To learn

1. Types of matrices and their properties.
2. Concept of a rank of the matrix which is used to know the consistency of system of linear equations.
3. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
4. Determine the maxima and minima of functions of several variables by using partial differential coefficients.
5. Evaluation of improper integrals using Beta and Gamma functions.

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
2. Find the Eigen values and Eigen vectors, reduce the quadratic form to canonical form using orthogonal transformations.
3. Apply the Mean value theorems for the single variable functions.
4. Apply maxima and minima for functions of several variables and Lagrange's method of multipliers.
5. Evaluate the improper integrals using Beta and Gamma functions.

| UNIT-I | MATRICES | Classes: 12 |
|---|---|---|

Matrices: Types of Matrices, Symmetric, Hermitian, Skew-symmetric, Skew-Hermitian, orthogonal matrices, Unitary Matrices, rank of a matrix by Echelon form and Normal form, Inverse of Non-singular Matrices by Gauss-Jordan method, System of linear equations, solving system of Homogeneous and Non- Homogeneous equations. Gauss elimination method, Gauss Seidel Iteration Method.

| UNIT-II | EIGEN VALUES AND EIGEN VECTORS | Classes:12 |
|---|---|---|

Linear Transformation and Orthogonal Transformation, Eigen values and Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

| UNIT-III | MEAN VALUE THEOREMS | Classes:12 |
|---|---|---|

Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean Value Theorem. Taylor's Series. Applications: Finding areas, volumes of revolutions of curves (Only in Cartesian coordinates)

| UNIT-IV | FUNCTIONS OF SEVERAL VARIABLES | Classes: 12 |
|---|---|---|

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative, Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers. Application: Errors and approximations.

| UNIT-V | FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS AND SPECIAL FUNCTIONS | Classes: 12 |
|---|---|---|

First Order linear and non linear Partial Differential Equations, Method of separation of variables.

Beta and Gamma functions, properties, relation between Beta and Gamma functions, evaluation of integrals using Beta and Gamma functions.

**TEXT BOOKS**


1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition.
2. Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2017.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.


**REFERENCE BOOKS**


1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
2. B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.


**WEB REFERENCES**

1. https://www.efunda.com/math/gamma/index.cfm
2. https://ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

**E -TEXT BOOKS**

1. https://www.e-booksdirectory.com/listing.php?category=4
2. https://www.e-booksdirectory.com/details.php?ebook=10830

**MOOCS COURSE**

1. https://swayam.gov.in/
2. https://swayam.gov.in/NPTEL

# St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## ENGINEERING CHEMISTRY

**I B. TECH- I SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| CH102BS | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To provide basic knowledge on atomic, molecular orbitals and the bonding interaction between atoms
2. To analyze the impact of water hardness and its various methods for removal of hardness of water, numerical problems to calculate the hardness of water in a given sample
3. To discover the importance of electrical energy which originates from chemical reactions essential for industrial needs
4. To understand the basic concepts of spectroscopy and drug molecules to extrapolate their chemical knowledge in day to day life
5. To enable the students to understand the use of engineering materials such as polymers, lubricants and study the industrial applications in the field of engineering and technology

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Achieve the basic concepts of atomic, molecular and electronic changes related to molecular bonding and magnetism
2. Familiarize with fundamentals of treatment technologies and considerations for its design and implementation in water treatment plants
3. To extrapolate the knowledge of cell, electrode, electrolysis, electromotive force. To analyze and develop a technical solution to corrosion problems related to engineering materials
4. Acquire the significant knowledge about basic concepts of spectroscopy and synthesis of drug molecules would be known to the students
5. Comprehended and explore engineering applications of polymers and lubricants

| UNIT-I | MOLECULAR STRUCTURE AND THEORIES OF BONDING | Classes: 10 |
|---|---|---|

Introduction to VBT, Postulates and draw backs of VBT- Atomic and Molecular orbitals, Linear Combination of Atomic Orbitals (LCAO), Introduction to Crystal Field Theory (CFT): Salient features of CFT- Crystal Field Splitting of transition metal ion d-orbitals in tetrahedral, octahedral and square planar geometries. Applications of CFT- color and magnetic properties.

Postulates of MOT, molecular orbitals of diatomic molecules-molecular orbital energy level diagrams of $N_2$, $O_2$ and CO molecules.

| UNIT-II | WATER AND ITS TREATMENT | Classes: 12 |
|---|---|---|

Introduction-hardness of water-causes of hardness. Types of harness: Temporary and Permanent. Expression and units of hardness. Estimation of hardness of water by complexometric method (EDTA method), Numerical problems. Boiler troubles- scales, sludges, carryover and caustic embrittlement. Internal treatment- Calgon conditioning, phosphate conditioning and colloidal conditioning. External treatment of water- Ion exchange process. Desalination of brackish water- Reverse osmosis. Potable water and its specifications. Steps involved in the treatment of water by chlorination and ozonization.

| UNIT-III | ELECTROCHEMISTRY AND CORROSION | Classes: 14 |
|---|---|---|

**Electrochemical cells**- electrode potential, standard electrode potential, Galvanic cell, Nernst equation- Applications. EMF of a cell. Types of electrodes- standard hydrogen electrode, calomel and glass electrode- construction and working. Numerical problems.

**Batteries** - Primary (Lithium cell) and secondary batteries (Lithium ion, Lead acid storage cell)- Applications.

**Corrosion**: Introduction, Causes and effects of corrosion- theories of chemical and electrochemical corrosion- mechanism of electrochemical corrosion. Corrosion control methods- Cathodic protection- sacrificial anode and impressed current cathodic methods. Metallic coatings- Methods of preparation of surface- Hot dipping- Galvanization and tinning. Electro plating and electroless plating.

| UNIT-IV | SPECTROSCOPY AND SYNTHESIS OF DRUG MOLECULES | Classes: 08 |
|---|---|---|

**Spectroscopy**- Introduction, electromagnetic spectrum, principles of UV-visible, IR spectroscopy- selection rules and applications. Basic concepts of Nuclear magnetic resonance spectroscopy, chemical shift, spin-spin splitting. Magnetic resonance imaging.

Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

| UNIT-V | MATERIAL CHEMISTRY | Classes: 12 |
|---|---|---|

**Polymers:** Introduction, Classification of polymers with examples. Types of polymerization: Addition and Condensation polymerization with examples.
**Plastics:** Introduction, Characteristics. Thermoplastic and thermosetting plastics. Compounding and fabrication of plastics (compression and injection molding). Preparation, properties and engineering applications of PVC, Teflon and Bakelite.
**Lubricants:** Introduction, Characteristics, mechanism-thick film, thin film, extreme pressure lubrication, properties- flash point, fire point, cloud point, pour point, mechanical stability and their significance- applications of lubricants.

## TEXT BOOKS


1. P. C. Jain and M. Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company Ltd., New Delhi,18th edition (2018)
2. Prasanta Rath, B. Rama Devi, Ch. Venkataramana Reddy, S. Chakrovarthy, "A Text book of Engineering Chemistry", Cengage publications (2019)
3. Shashi Chawla, "Engineering Chemistry", Dhanpat Rai & Co. Publishers., New Delhi,15th edition (2015)
4. C.N. Banwell, "Fundamentals of Molecular Spectroscopy"


## REFERENCE BOOKS


1. B. H. Mahan, "University Chemistry", Narosa Publishing house, New Delhi, 3rd edition (2013)
2. B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", S. Nagin Chand & Company Ltd., 46th edition (2013)
3. J.D. Lee, "Concise Inorganic Chemistry", Willey Publications, 5th edition (2008)
4. P.W. Atkins, J.D. Paula, "Physical Chemistry", Oxford, 8th edition (2006)
5. G. L. David Krupadanam, D. Vijaya Prasad, K. Varaprasad Rao, K.L.N. Reddy and C. Sudhakar, "Drugs", Universities Press (India) Limited, Hyderabad (2007)


## WEB REFERENCES

1. Chemistry: foundations and applications. J. J. Lagowski, editor in chief. New York, Macmillan Reference USA, c2004. 4v
2. Polymer data handbook. Edited by James E. Mark. 2nd ed. Oxford, New York, Oxford University Press, 2009
3. https://www.wyzant.com/resources/lessons/science/chemistry
4. http://www.chem1.com/acad/webtext/virtualtextbook.html

## E -TEXT BOOKS

1. Krishnamurthy, N., Vallinayagam, P., Madhavan, D., Engineering Chemistry, ISBN: 9789389347005, eBook ISBN: 9789389347012, Edition: Fourth Edition
2. Vijayasarathy, P. R., Engineering Chemistry, Print Book ISBN : 9789387472778, eBook ISBN : 9789387472785, Edition : Third Edition

## MOOCS COURSE

1. https://onlinecourses-archive.nptel.ac.in
2. https://www.mooc-list.com/tags/chemistry

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

BASIC ELECTRICAL ENGINEERING

**I B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE106ES | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSEOBJECTIVES

To learn

1. To introduce the concepts of electrical circuits and its components
2. To understand magnetic circuits, DC circuits and AC single phase &three phase circuits
3. To study and understand the different types of DC/AC machines and Transformers.
4. To import the knowledge of various electrical installations.
5. To introduce the concept of power, power factor and its improvement.

## COURSEOUTCOMES

Upon successful completion of the course, the student is able to

1. To analyze and solve electrical circuits using network laws.
2. To analyze and solve electrical circuits using theorems.
3. To understand and analyze basic Electric and Magnetic circuits.
4. To study the working principles of Electrical Machines.
5. To introduce components of Low Voltage Electrical Installations.

| UNIT-I | D.C.CIRCUITS | Classes:15 |
|---|---|---|

Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, The venin's and Norton's Theorems.

Time-domain analysis of first-order RL and RC circuits.

| UNIT-II | A.C.CIRCUITS | Classes:10 |
|---|---|---|

Representationofsinusoidalwaveforms,peakandrmsvalues,phasorrepresentation,realpower, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L,C,RL,RC,RLCcombinations(seriesandparallel),resonanceinseriesRL-Ccircuit.

| UNIT-III | TRANSFORMERS | Classes:15 |
|---|---|---|

Ideal and practical transformer, EMF equation, operation on no load and on load, OC and SC tests, phasor diagrams equivalent circuit, losses in transformers, regulation, Efficiency and condition for maximum efficiency, Auto-transformer.

| UNIT-IV | ELECTRICALMACHINES | Classes:15 |
|---|---|---|

Generation of rotating magnetic fields, Construction and working of a three-phase induction Motor, Significance of torque-slip characteristics. Loss components and efficiency. Construction, working, Torque-speed characteristics of separately excited, shunt, series, compound dc motors.

| UNIT-V | ELECTRICALINSTALLATIONS | Classes:10 |
|---|---|---|

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, electrical Safety precautions in handling electrical appliances, electric shock, first aid for electric shock, safety rules.

**TEXTBOOKS**


1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata, McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill,2009.
3. L.S.Bobrow,FundamentalsofElectricalEngineering",OxfordUniversityPress,2011
4. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson,2010


**REFERENCEBOOKS**


1. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.
2. P. V. Prasad, S. Sivanagaraju, R. Prasad, "Basic Electrical and Electronics Engineering" Cengage Learning, 1st Edition,2013.
3. V. D. Toro, – Electrical Engineering Fundamentals Prentice Hall India,1989.


**WEBREFERENCES**

1. https://www.electrical4u.com/
2. http://www.basicsofelectricalengineering.com/
3. https://www.khanacademy.org/science/physics/circuits-topic/circuits-
4. resistance/a/ee-voltage-and-current
5. https://circuitglobe.com/

**E -TEXTBOOKS**

1. https://easyengineering.net/basic-electrical-engineering-by-wadhwa/
2. https://easyengineering.net/objective-electrical-technology-by-mehta/

**MOOCSCOURSE**

1. https://nptel.ac.in/courses/108108076/1
2. https://nptel.ac.in/courses/108102146/
3. https://nptel.ac.in/courses/108108076/35

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

ENGINEERING WORKSHOP

**I B. TECH- I SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| ME107ES | B.Tech | 1 | 0 | 3 | 2.5 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To learn

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Study and practice on machine tools and their operations
2. Practice on manufacturing of components using workshop trades including Fitting, Carpentry, Foundry, Tin-smithy, House Wiring and Welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.

## LIST OF EXPERIMENTS

**TRADES FOR EXERCISES (**Any two exercises from each trade)

1. Tin-Smithy – (Square Tin, Cone and Cylinder)
2. Carpentry – (T-Lap Joint, Planning Sawing & Dovetail Joint)
3. Welding Practice – (Arc Welding-Butt Joint, Lap Joint &T-Joint)
4. Black Smithy – (Round to Square, S-Hook &U-Clamp)
5. Foundry – (Mould using Single Piece and Split Pattern)
6. Fitting – (V-Fit, Square Filing & Semi-circular fit)
7. House-wiring – (Two-way Switch and one-way switch in series)

**TRADES FOR DEMONSTRATION**

8. Plumbing, Machine Shop, Power tools in construction, Wood turning lathe and Casting Process.

**Note: At least perform 10 Exercises out of 14 Exercises.**

## TEXT BOOKS

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
2. Workshop Manual / Venkat Reddy/ BS Publications/Sixth Edition
3. Workshop Technology by Chapman
4. A Textbook Of Workshop Technology : Manufacturing Processes/J. K GUPTA

| REFERENCE BOOKS |
| --- |
| 1. Work shop Manual - P. Kannaiah/ K. L. Narayana/ SciTech<br>2. Workshop Manual / Venkat Reddy/ BSP<br>3. Workshop Technology by Hazra-Chowdhary<br>4. Production Engineering by R.K.Jain |
| **WEB REFERENCES** |
| 1. https://nptel.ac.in/courses/112105126/<br>2. https://nptel.ac.in/downloads/112105127/<br>3. https://nptel.ac.in/courses/112107145/<br>4. https://nptel.ac.in/courses/122104015/ |
| **E -TEXT BOOKS** |
| 1. http://103.135.169.82:81/fdScript/RootOfEBooks/MED/Introduction Workshop%20Technology<br>2. https://www.quora.com/Download-free-mechanical-engineering-ebooks-sites |
| **MOOCS Course** |
| 1. http://www.nits.ac.in/workshops/Workshop_on_MOOCS_26082017.pdf<br>2. https://www.nitttrc.ac.in/swayam/index.html |

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

PROFESSIONAL ENGLISH

**I B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EN103HS | B. Tech | 2 | 0 | 0 | 2 | 30 | 70 | 100 |

## COURSE OBJECTIVES:

To enable students

1. To enhance their vocabulary and basic grammar rules for communicative competence.
2. To hone their comprehensive skills through various reading techniques.
3. To develop the professional writing with the practice of formal letters, e-mails, reports, resumes, etc.
4. To use various sentence structures effectively in formal and informal contexts.
5. To improve scientific and technical communication skills through technical vocabulary and appropriate prose texts.

## COURSE OUTCOMES:

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

1. Use vocabulary effectively and syntactically.
2. Translate the reading techniques and apply them in literary texts.
3. Demonstrate enhanced competence in standard Written English.
4. Develop the competence in writing professional documents.
5. Exhibit appropriate communicative approaches to suit various contexts.

| UNIT-I | THE RAMAN EFFECT | Classes:7 |
|---|---|---|

Vocabulary: Word Formation, Use of affixes,
Grammar: Articles, Prepositions
Writing: Paragraph Writing, Organizing principles of Paragraphs in documents

| UNIT-II | THE LOST CHILD | Classes:9 |
|---|---|---|

Vocabulary: Synonyms and Antonyms
Grammar: Noun – Pronoun Agreement and Concord
Reading: Significance & Techniques of reading; Skimming – Reading for the gist of a text; Scanning– Reading for specific information; Intensive; Extensive reading; SQ3R Technique; Reading Comprehension;
Reading Poetry -The Road Not Taken
Writing: Narrative Writing

| UNIT-III | SATYA NADELLA'S EMAIL TO HIS EMPLOYEES | Classes:10 |
|---|---|---|

Vocabulary: Homonyms-Homophones-Homographs
Grammar: Tenses
Writing : Significance & Effectiveness of Writing; Writing Descriptions;
Letter writing; E-mail writing

| UNIT-IV | WHAT SHOULD YOU BE EATING? | Classes:10 |
|---|---|---|
| Vocabulary: Technical vocabulary; Words from Foreign Languages; abbreviations and acronyms<br>Grammar: Misplaced Modifiers; Redundancies and Cliches<br>Writing: Information Transfer, Note Making, Writing an Abstract and Report Writing | | |
| **UNIT-V** | **HOW A CHINESE BILLIONAIRE BUILT HER FORTUNE** | **Classes:9** |
| Vocabulary: Words often Confused; Idioms and Phrasal verbs, One- word Substitutes;<br>Grammar: Conditional Sentences; Degrees of Comparison; Simple-Complex-Compound Sentences and Common errors<br>Writing: Essay writing | | |

**TEXTBOOKS:**

1. Sudarshana, N.P. and Savitha, C. (2018). English forEngineers. Cambridge University Press.
2. Education for Life and Work – English Workbook prepared by English Faculty of St. Martin's Engineering College.

**REFERENCE BOOKS:**

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Zinsser, William. (2001). On Writing Well. Harper Resource Book.

**WEB REFERENCES:**

1. www.edufind.com
2. www.myenglishpages.com
3. http://grammar.ccc.comment.edu
4. http://owl.english.prudue.edu

**E –TEXTBOOKS:**

1. http://bookboon.com/en/communication-ebooks-zip
2. http://learningenglishvocabularygrammar.com/files/idiomsandphraseswithmeaningsandexamlespdf.pdf

**MOOCS COURSE:**

1. https://mooec.com/courses/grammar-guru-1
2. https://mooec.com/courses/learning-styles

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## ENGINEERING CHEMISTRY LAB

**I B. TECH- I SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| CH104BS | B. Tech | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose
2. To find the concentration of ions present in an unknown solution
3. To know the handling procedure of colorimetric and conductometric instruments
4. The fundamentals of drug synthesis
5. The measurement of physical properties like surface tension, viscosity and acid value

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the total dissolved salts present in a sample of water
2. Determine the concentration of ions existing in a solution
3. Find the strength of an acid by conductometric methods
4. Acquire basic knowledge on the chemical reaction used to synthesize drug molecules like aspirin and Paracetamol
5. Select lubricants for various purposes such as to reduce the friction between two movable surfaces and to determine the surface tension of a given liquid

### LIST OF EXPERIMENTS

**Volumetric Analysis**

1. Determination of total hardness of water by complexometric method using EDTA.
2. Determination of chloride content of water by Argentometry.
3. Determination of acid value of coconut oil.

**Potentiometry**

4. Determination of $Fe^{2+}$ ions present in the given sample by Potentiometric titration.

**Conductometry**

5. Estimation of HCl by conductometric titration.
6. Estimation of acetic acid by conductometric titration.

**Colorimetry**

7. Estimation of Copper by colorimetric method.

**Synthesis of Drugs**

8. Synthesis of aspirin and Paracetamol.

**Physical constants**

9. Determination of viscosity of the given sample by using Ostwald's Viscometer.
10. Determination of surface tension of a given liquid using stalagmometer.

## TEXT BOOKS


1. Senior practical physical chemistry, B. D. Khosla, A. Gulati and V. Garg (R. Chand and Co., Delhi)
2. Prasanta Rath, B. Rama Devi, Ch. Venkataramana Reddy, S. Chakrovarthy, "A Text book of Engineering Chemistry", Cengage publications (2019)
3. An introduction to practical; chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, New Delhi)
4. Vogel's text book of practical organic chemistry, 5th edition
5. S. S. Dhara, Text book on experiments and calculations in engineering chemistry, B.S Publications


## REFERENCE BOOKS


1. G. H. Jeffery, J. Bassett, J. Mendham and R. C. Denney, "Vogel's Text Book of Quantitative Chemical Analysis"
2. O. P. Vermani & Narula, "Theory and Practice in Applied Chemistry", New Age International Publishers
3. Gary D. Christian, "Analytical chemistry", 6th Edition, Wiley India


## WEB REFERENCES

1. Phillip E. Savage, Industrial & Engineering Chemistry: At the Forefront of Chemical Engineering Research since 1909, *Ind. Eng. Chem.Res.*20195811
2. Elias, AI. Sundar Manoharan S. and Raj, H. "Laboratory Experiments for General Chemistry", I.I.T. Kanpur, 1997

## E -TEXT BOOKS

1. Payal B Joshi, Experiments In Engineering Chemistry, Edition: First, ISBN: 978-93-85909-13-9, Publisher: I.K. International Publishing House Pvt. Ltd
2. Mohapatra, Ranjan Kumar, Engineering Chemistry With Laboratory Experiments, ISBN: 978- 81-203-5158-5, PHI Learning Private Limited

## MOOCS COURSE

1. https://sce.ethz.ch/en/programmes-and-courses/suche-angebote.html?polycourseId=1299
2. https://www.classcentral.com/course/open2study-chemistry-building-blocks-of-the-world-1297

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

**I B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EN105HS | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES:

To train students

1. To use accurate and appropriate pronunciation through the practice of phonetic sounds, symbols, word accent and into nation.
2. To improve their fluency in spoken English and neutralize their mother tongue influence through JAM Sessions, Role-play, etc.
3. To comprehend the speech of people of various regions through Listening practice exercises.
4. To enable students to transfer information verbally with the right usage of Body language through individual and group activities.
5. To understand nuances of English language by practicing various exercises at Multi-media lab.

### COURSE OUTCOMES:

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

1. Differentiate the speech sounds in English and demonstrate accurate pronunciation.
2. Communicate with others in clear and confident manner.
3. Improve their effective and empathetic listening ability.
4. Show the zeal to participate in Public Speaking Sessions.
5. Neutralize the Mother tongue influence in day to communication.

### LIST OF EXPERIMENTS:

**EXERCISE: I**

**CALL LAB:**

Introduction to Phonetics – Speech sounds - vowels and consonants

**ICS LAB:**

Ice-breaking Activity – Non-verbal Communication

**EXERCISE: II**

**CALL LAB:**

Minimal Pairs – Consonant Clusters – Past Tense Marker and Plural Marker Rules

**ICS LAB:**

Role Play – Expressions in various Situations – Making Requests and Seeking Permissions

**EXERCISE: III**

**CALL LAB:**

Structure of Syllables – Word Accent –Stress shift–Intonation

**ICS LAB:**

Telephone Communication –Etiquette

**EXERCISE: IV**

**CALL LAB:**

Listening Comprehension Tests

**ICS LAB:**

Presentations Skills & JAM Session

**EXERCISE: V**

**CALL LAB:**

Mother Tongue Interference – Differences in British and American Pronunciation

**ICS LAB:**

Interview Skills – Mock Interviews

**TEXTBOOKS:**


1. ELCS Lab Manual prepared by English faculty of St. Martin's Engineering College.
2. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.


**REFERENCE BOOKS:**


1. T Balasubramanian. A Textbook of English Phonetics for Indian Students, Macmillan,2008
2. J Sethi et al. A Practical Course in English Pronunciation, Prentice Hall India, 2005.
3. Priyadarshi Patnaik. Group Discussions and Interviews, Cambridge University Press Pvt Ltd2011.
4. Arun Koneru, Professional Speaking Skills, Oxford University Press,2016.


**WEB REFERENCES:**


1. https://www.asha.org/PRPSpecificTopic.aspx?folderid=8589935321&section=References
2. Argyle, Michael F., Alkema, Florisse, & Gilmour, Robin. "The communication of friendly and hostile attitudes: Verbal and nonverbal signals." European Journal of Social Psychology, 1, 385- 402:1971
3. Blumer, Herbert. Symbolic interaction: Perspective and method. Engle wood Cliffs; NJ: Prentice Hall.1969


**E –TEXTBOOKS:**


1. Mc corry Laurie Kelly Mc Corry Jeff Mason, Communication Skills for the Healthcare Professional, 1st edition, ISBN:1582558140, ISBN-13:9781582558141
2. Robert E Owens, Jr, Language Development, 9th edition, ISBN:0133810364, 9780133810363


**MOOCS Course:**

1. https://www.coursera.org/specializations/improve-english
2. https://www.edx.org/professional-certificate/upvalenciax-upper-intermediate-english

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## BASIC ELECTRICAL ENGINEERING LAB

**I B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE108ES | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSEOBJECTIVES:

To learn

1. To analyze a given network by applying various electrical laws
2. To analyze a given network by applying various network theorems
3. To know the response of electrical circuits for different excitations
4. To calculate, measure and know the relation between basic electrical parameters.
5. To analyze the performance characteristics of DC and AC electrical machines

### COURSEOUTCOMES:

Upon successful completion of the course, the student is able to

1. Get an exposure to basic electrical laws.
2. Understand the response of different types of electrical circuits
3. Understand the response of different types of electrical Theorems
4. Understand different types of Excitations.
5. Understand the basic characteristics of transformers and electrical machines.

### LIST OFEXPERIMENTS

**PART-A**

1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits using DC excitation
4. Transient Response of RLC Series circuit using DC excitation
5. Resonance in series RLC circuit.
6. Verification of Super position theorem.
7. Verification of Thevenin's Theorem.
8. Verification of Norton's Theorem.

**PART-B**

9. O.C. & S.C. Tests on Single Phase Transformer.
10. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor

*Note: Any five experiments from Part-A and Part-B.

**TEXTBOOKS**


1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition2010,Tata
2. McGraw Hill.
3. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill,2009.
4. L.S.Bobrow,FundamentalsofElectricalEngineering",OxfordUniversityPress, 2011
5. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson,2010


**REFERENCEBOOKS**


1. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.
2. P.V.Prasad, S.sivanagaraju, R.Prasad, "Basic Electrical and Electronics Engineering" Cengage Learning, 1st Edition,2013.
3. V. D. Toro, – Electrical Engineering Fundamentals Prentice Hall India,1989.


**WEBREFERENCES**

1. https://www.electrical4u.com/
2. http://www.basicsofelectricalengineering.com/
3. https://www.khanacademy.org/science/physics/circuits-topic/circuits-resistance/a/ee-voltage-and-current
4. https://circuitglobe.com/

**E -TEXTBOOKS**

1. https://easyengineering.net/basic-electrical-engineering-by-wadhwa/
2. https://easyengineering.net/objective-electrical-technology-by-mehta/

**MOOCS Course**

1. https://nptel.ac.in/courses/108108076/1
2. https://nptel.ac.in/courses/108102146/
3. https://nptel.ac.in/courses/108108076/35

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## ADVANCED CALCULUS

| I B. TECH- II SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Programme** | **Hours / Week** | | | **Credits** | **Maximum Marks** | | |
| | | **L** | **T** | **P** | **C** | **CIE** | **SEE** | **Total** |
| **MA201BS** | **B. Tech** | **3** | **1** | **0** | **4** | **30** | **70** | **100** |

### COURSE OBJECTIVES

To learn

1. Methods of solving the differential equations of first and higher order
2. Evaluation of multiple integrals and their applications
3. The physical quantities involved in engineering field related to vector valued functions
4. The basic properties of vector valued functions and their applications
5. Vector point functions and scalar point functions

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Identify whether the given differential equation of first order is exact or not.
2. Solve higher order differential equation and apply the concept of differential equation to real problems.
3. Evaluate the multiple integrals and apply the concept to find areas and volumes.
4. Is able to find gradient, directional derivative, divergence and curl.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

| **UNIT-I** | **FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS** | **Classes: 10** |
|---|---|---|

Exact, linear and Bernoulli's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Applications: Newton's law of cooling, Law of natural growth and decay, Simple Harmonic Motion

| **UNIT-II** | **ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER** | **Classes: 12** |
|---|---|---|

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type $e^{ax}$, sin$ax$, cos$ax$, polynomial in $x^m$, $e^{ax}V(x)$ and xV(x),method of variation of parameters, Applications: LCR Circuit.

| UNIT-III | MULTIPLE INTEGRATION | Classes:12 |
|---|---|---|
| Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals) | | |
| **UNIT-IV** | **VECTOR DIFFERENTIATION** | **Classes: 12** |
| Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors | | |
| **UNIT-V** | **VECTOR INTEGRATION** | **Classes: 12** |
| Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications | | |

**TEXT BOOKS**


1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.


**REFERENCE BOOKS**


1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.


**WEB REFERENCES**

1. https://www.efunda.com/math/gamma/index.cfm
2. https://ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

**E -TEXT BOOKS**

1. https://www.e-booksdirectory.com/listing.php?category=4
2. https://www.e-booksdirectory.com/details.php?ebook=10830

**MOOCS COURSE**

1. https://swayam.gov.in/
2. https://swayam.gov.in/NPTEL

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

APPLIED PHYSICS

**I B. TECH- II SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| AP202BS | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To learn

1. The fundamental postulates of quantum mechanics.
2. The concepts related to semiconductors.
3. The concepts related to PN Junction diode and its applications.
4. The basic concepts of laser and optical fiber and its applications.
5. The fundamentals of dielectrics and magnetic materials.

## COURSE OUTCOMES

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

1. Demonstrate the fundamental concepts on Quantum behavior of matter in its microstate.
2. Understand the knowledge of fundamentals of Semiconductor physics.
3. Design and explain the characteristics of Optoelectronic devices.
4. Analyze the properties of Laser and Optical Fibers and its application in engineering fields.
5. Design, characterize and prepare new materials for various engineering applications by using dielectric and magnetic materials.

| UNIT-I | QUANTUM MECHANICS | Classes: 12 |
|---|---|---|

Introduction to quantum physics, Black body radiation, Planck's Law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

| UNIT-II | SEMICONDUCTOR PHYSICS | Classes: 14 |
|---|---|---|

Intrinsic and Extrinsic semiconductors, Carrier Concentration in Intrinsic and Extrinsic semiconductors Dependence of Fermi level on Temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics.

| UNIT-III | OPTOELECTRONICS | Classes: 10 |
|---|---|---|

Radiative and non-radiative recombination mechanisms in semiconductors and LED: Device structure, Materials, Characteristics and figures of merit, Semiconductor photo detectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

| UNIT-IV | LASERS AND FIBRE OPTICS | Classes: 12 |
|---|---|---|

Lasers: Introduction to interaction of radiation with matter, Characteristics, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, He-Ne laser and Semiconductor laser, Applications of laser. Fibre Optics: Introduction, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres in Communication System and Sensors.

| UNIT-V | Dielectric and Magnetic Properties of Materials | Classes: 12 |
|---|---|---|

Introduction to Dielectrics, Polarization, Permittivity and Dielectric constant, Types of Polarization (Qualitative), Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectric. Magnetization, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and Domain theory of ferromagnetism – Hysteresis curve based on domain theory, Applications of magnetic materials.

**TEXT BOOKS**

1. Engineering Physics, B.K. Pandey, S. Chaturvedi – Cengage Learning.
2. Halliday and Resnick, Physics-Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar -S.Chand.
4. Introduction to Solid State Physics by Charles Kittel (Publishers: John Wiley&Sons)

**REFERENCE BOOKS**

1. Richard Robinett ,Quantum Mechanics.
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc.(1995).
3. Online Course: "Optoelectronics Materials and Devices" by Monica Katiyar and Deepak Gupta NPTEL.

**WEB REFERENCES**

1. Introductory Quantum Mechanics:https://nptel.ac.in/courses/115104096/
2. Fundamental concepts of semi conductors:https://nptel.ac.in/courses/115102025/
3. SemiconductorOptoelectronics:https://nptel.ac.in/courses/115102103/
4. Fibre Optics:https://nptel.ac.in/courses/115107095/

**E -TEXT BOOKS**

1. library genesis: https://libgen.is/

**MOOCS COURSE**

1. Swayam: https://swayam.gov.in/nd1_noc19_ph13/preview
2. Alison :https://alison.com/courses?&category=physics

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

PROGRAMMING FOR PROBLEM SOLVING

**I B. TECH- II SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| CS205ES | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

## COURSE OBJECTIVES

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of C programming language.
4. To learn the usage of structured programming approach in solving problems.

## COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. To write algorithms and to draw flowcharts for solving problems.
2. To convert the algorithms/flowcharts to C Programs.
3. To code and test, a given logic in C programming language.
4. To decompose a problem into functions and to develop modular reusable code.
5. To use arrays, pointers, strings and structures to write C programs
6. Searching and sorting problems

| UNIT-I | INTRODUCTION TO C PROGRAMMING LANGUAGE | Classes: 16 |
|---|---|---|

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc. Number systems Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.

Introduction to C Programming Language: I/O: Simple input and output with scanf and printf, variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, type conversion

| UNIT-II | CONDITIONAL BRANCHING, LOOPS, ARRAY AND STRINGS | Classes: 14 |
|---|---|---|

**Conditional Branching and Loops**: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops.

**Arrays:** one- and two-dimensional arrays, creating, accessing and manipulating elements of arrays.

**Strings:** Introduction to strings, handling strings as array of characters, basicstringfunctions available in C (strlen, strcat, strcpy, strstr etc.), arrays ofstrings.

| UNIT-III | STRUCTURE AND POINTER | Classes:10 |
|---|---|---|

**Structures:** Defining structures, initializing structures, unions, Array of structures.
**Pointers:** Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self- referential structures, usage of self referential structures in linked list (no implementation), Enumeration data type.
**Dynamic memory allocation**: Allocating and freeing memory, Allocating memory for arrays of different data types

| UNIT-IV | FUNCTION AND STORAGE CLASSES | Classes: 12 |
|---|---|---|

**Functions:** Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries
**Recursion**: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions
**Storage classes** (auto, extern, static and register)

| UNIT-V | FILES AND PRE-PROCESSOR | Classes: 12 |
|---|---|---|

**Preprocessor:** Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef.
**Files:** Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions

## TEXT BOOKS


1. The C Programming Language by Dennis M Ritchie, Brian W. Kernigham, 1988, PHI
2. Computer System & Programming in C by S Kumar & S Jain, Nano Edge Public publications, Meerut.
3. Fundamentals of Computing and C Programming, R. B. Patel, Khanna Publications, 2010, New Delhi.


## REFERENCE BOOKS


1. Computer Fundamentals and Programming in C, Reema Theraja,Oxford
2. Information technology, Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, 1998,TMH
3. Theory and problem of programming with C, Byron CGottfried, TMH


## WEB REFERENCES

1. https://www.tutorialspoint.com/cprogramming/
2. https://www.tutorialspoint.com/cplusplus/
3. https://www.cprogramming.com/tutorial/c-tutorial.html

## E -TEXT BOOKS

1. https://fresh2refresh.com/c-programming/
2. https://beginnersbook.com/2014/01/c-tutorial-for-beginners-with-examples/
3. https://www.sanfoundry.com/simple-c-programs/

## MOOCS Course

1. nptel.ac.in/courses/106105085/4
2. https://www.quora.com/Are-IIT-NPTEL-videos-good-to-learn-basic-C-programming

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

ENGINEERING GRAPHICS

| I B. TECH- II SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Programme** | **Hours / Week** | | | **Credits** | **Maximum Marks** | | |
| | | **L** | **T** | **P** | **C** | **CIE** | **SEE** | **Total** |
| **ME206ES** | **B.Tech** | **1** | **0** | **4** | **3** | **30** | **70** | **100** |

## COURSE OBJECTIVES

To learn
The course aims at empowering the students with drafting skills and enhancing their visualization capacity in order to draw different views of the given object.
To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
To expose them to existing national standards related to technical drawings.
To impart knowledge about standard principles of orthographic projection of objects.
It will help students to use the techniques, skills, and modern engineering tools and communicate effectively.

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to
Familiarize with the fundamentals and standards of Engineering graphics
Project orthographic projections of lines and plane surfaces.
Convert orthographic views to isometric views and vice-versa and know the basics of AutoCAD.
Preparing working drawings to communicate the ideas and information.
Know and use common drafting tools with the knowledge of drafting standards.

| UNIT-I | INTRODUCTION TO ENGINEERING DRAWING | Classes: 15 |
|---|---|---|

**Introduction to Engineering Graphics:** Principles of Engineering Graphics and their significance, Usage of Drawing instruments, lettering, Conic sections including Rectangular Hyperbola (General method only); Cycloid, Epicycloids and Involutes.

**Scales**: Plain & Diagonal Scales.

| UNIT-II | ORTHOGRAPHIC PROJECTIONS | Classes:15 |
|---|---|---|

**Projections of points:** Principles of orthographic projections – conventions – first and third angle projections. Projection of points in all quadrants.

**Projection Of Lines** – lines inclined to single plane, lines inclined to both the planes.

**Projection of Planes**: Projection of regular planes – planes inclined to one plane, planes inclined to both planes.

| UNIT-III | PROJECTION OF SOLIDS & SECTION OF SOLIDS | Classes:12 |
|---|---|---|

**Projection of Solids**: Projections of regular solids like cube, prism, pyramid, cylinder and cone. Axis inclined to both the reference planes.

**Section of Solids**: Sectioning of above solids in simple vertical position with the cutting plane is inclined to the one plane and perpendicular to the other –true shape of section.

| UNIT-IV | DEVELOPMENT OF SURFACES & ISOMETRIC PROJECTIONS | Classes: 15 |
|---|---|---|

**Development of Surfaces**: Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

**Isometric Projections:** Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions –Plane Figures, Simple and Compound Solids.

| UNIT-V | TRANSFORMATION OF PROJECTIONS & INTRODUCTION AUTO CAD | Classes: 15 |
|---|---|---|

**Transformation of Projections:** Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects.
**Introduction to Auto CAD:** Introduction, Salient features of AutoCAD software, Basic Commands, construction, editing and dimensioning, two dimensional drawings.

## TEXT BOOKS


1 Engineering Drawing - N.D. Bhatt & V.M. Panchal, 50th edition, 2013-Charotar Publishing House, Gujarat.
2 Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3 K.L.Narayana, P. Kannaiah, “Engineering Drawing”, SciTech Publishers. 2nd Edition, 2013
4 Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.


## REFERENCE BOOKS


1 Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited,2011.
2 K. V. Natarajan, “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai,2015.
3 Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore,2007.
4 Trymbaka Murthy, “Computer Aided Engineering Drawing", I.K. international Publishing House, 3rd Edition, 2011.


## WEB REFERENCES

1 http://freevideolectures.com/Course/3420/Engineering-Drawing
2 https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing
3 https://www.wiziq.com/tutorials/engineering-drawing
4 http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineering-graphics

## E -TEXT BOOKS

1 http://rgpv-ed.blogspot.com/2009/09/development-of-surfaces.html
2 http://www.techdrawingtools.com/12/l1201.htm

## MOOCS Course

1 https://nptel.ac.in/course.php
2 https://swayam.gov.in/explorer

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## APPLIED PHYSICS LAB

### I B. TECH- II SEMESTER

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| AP203BS | B. Tech | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To study semiconductor devices.
2. To verify the Biot –Savart law.
3. To experience resonance phenomena.
4. To compare the experimental results with the class room learning.
5. The basic experimental skills which are very essential for an engineering student.

### COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:

1. Learn the working principles of PN Junction diode.
2. Examine the electrical and magnetic properties of materials.
3. Determine the characteristics of Opto-Electronic devices.
4. Understand the basic principles of Optical Fibers.
5. Analyze the basic electronic circuits.

### LIST OF EXPERIMENTS

1. **Energy gap of P-N junction diode**: To determine the energy gap of a semiconductor diode.
2. **Solar Cell**: To study the V-I Characteristics of solar cell.
3. **Light emitting diode**: Plot V-I and P-I characteristics of light emitting diode.
4. **Stewart – Gee's experiment**: Determination of magnetic field along axis of the current carrying coil.
5. **Hall Effect**: To determine Hall co-efficient of given semiconductor.
6. **Photoelectric effect**: To determine work function of a given material.
7. **LASER**: To study the characteristics of LASER sources.
8. **Optical Fibre**: To determine the Numerical aperture and bending losses of optical fibres.
9. **LCR Circuit**: To determine the Quality factor of LCR circuit.
10. **RC Circuit**: To determine the Time constant of RC circuit.

**NOTE: Any 8 experiments are to be performed**

| TEXT BOOKS |
|---|
| 1. Engineering Physics, B.K. Pandey, S. Chaturvedi –Cengage Learning.<br>2. Halliday and Resnick, Physics-Wiley.<br>3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar-S.Chand. |
| **REFERENCE BOOKS** |
| 1. Main, I. G., Vibrations and Waves in Physics. 2nd. edition. Cambridge University Press,1984.<br>2. Eugene Hecht, "Optics" , 5th Edition,AdelphiUnioversity,2016 |
| **WEB REFERENCES** |
| 1. Fundamental concepts of semi conductors :https://nptel.ac.in/courses/115102025/<br>2. Semi conductor Optoelectronics: https://npte l.ac.in/courses/115102103/ |
| **E -TEXT BOOKS** |
| 1. http://www.lehman.edu/faculty/kabat/F2019-166168.pdf<br>2. https://www.scribd.com/doc/143091652/ENGINEERING-PHYSICS-LAB-MANUAL |
| **MOOCS COURSE** |
| 1. Swayam :https://swayam.gov.in/nd1_noc19_ph13/preview<br>2. Alison :https://alison.com/courses?&category=physics |

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## PROGRAMMING FOR PROBLEM SOLVING LAB

**I B. TECH- II SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| CS207ES | B. Tech | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of C programming language.
4. To learn the usage of structured programming approach in solving problems

### COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. To write algorithms and to draw flowcharts for solving problems.
2. To convert the algorithms/flowcharts to C programs.
3. To code and test a given logic in C programming language.
4. To decompose a problem into functions and to develop modular reusable code.
5. To use arrays, pointers, strings and structures to write C programs.
6. Searching and sorting problems

### LIST OF EXPERIMENTS

1. Write a simple program that prints the results of all the operators available in C
2. Write a simple program to convert the temperature from Fahrenheit to Celsius
3. Write a program for find the max and min from the three numbers using if else statement
4. Write a C program to find the roots of a Quadratic equation.
5. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
6. Write a program that finds if a given number is a prime number
7. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
8. Write a C program to generate the Fibonacci sequence of numbers.
9. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
10. Write a C program to find the minimum, maximum and average in an array of integers
11. Write a C program that uses functions to perform the following:1) Addition of Two Matrices 2) Multiplication of Two Matrices
12. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

13. Toinsertasub- string into a given main string from a given position.e.ii. TodeletenCharacters from a given position in a given string
14. WriteaCprogramthatdisplaysthepositionofacharacterchinthestringSor–1ifSdoesn‘tcontain ch
15. Write a C program to count the lines, words and characters in a given text.
16. Define a structure student to store the details like Roll Number, Name, and Marks in three subjects of a student and display the same.
17. Write a C program to perform specified operation on complex numbers.
18. Write a C program to store the information about three students.
19. Write a C Program to illustrate the use of nested structures.
20. Write a C Program to perform arithmetic operations using pointers.
21. Write a C Program to display the array elements in reverse order using pointer.
22. Write a C Program to to find factorial of a number using functions.
23. Write a C Program to find factorial of a number using recursive functions.
24. Write a C Program to implement call by value and call by reference.
25. Write a C Program to copy the data from one file to another
26. Write a C Program to append data to the file
27. Write a C Program to merge the two files
28. Write a C Program to display the file content on reverse order.
29. Write a C Program to count number of vowels, consonants, digits, words in a given file

**TEXT BOOKS**

1. TheCProgrammingLanguagebyDennisMRitchie,BrianW.Kernigham,1988,PHI Publications, 2010, NewDelhi.
2. Computer System & Programming in C by SKumar & SJain, NanoEdgePublic publications, Meerut.
3. 3 Fundamentals of Computing and C Programming, R. B. Patel, Khanna

**REFERENCE BOOKS**

1. Computer Fundamentals and Programming in C, Reema Theraja, Oxford
2. Information technology, Dennis P.Curtin, KimFoley,Kunal Sen,Cathleen Morin, 1998,TMH
3. Theory and problem of programming with C, Byron C Gottfried,TMH.

**TEXT BOOKS**

1. https://www.tutorialspoint.com/cprogramming/
2. https://www.w3schools.in/c-tutorial/
3. https://www.cprogramming.com/tutorial/c-tutorial.html
4. www.studytonight.com/c/

**REFERENCE BOOKS**

1. http:///programming-with-c
2. https://developerinsider.co/best-c-programming-book-for-beginners/

**REFERENCE BOOKS**

1. https://nptel.ac.in/courses/106105085/4
2. https://www.coursera.org/courses?query=c%20programming

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# ENVIRONMENTAL SCIENCE

**I B. TECH- II SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| ES204BS | B. Tech | 3 | 0 | 0 | - | 100 | - | 100 |

## COURSE OBJECTIVES

To learn

1. Analyze the inter relationship between living organism and environment
2. Describe various types of natural resources available on the earth surface
3. Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity
4. Explain the causes, effects and control measures of various types of environmental pollutions
5. Understand the importance of environment by assessing its impact on the human world

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Differentiate between various biotic and abiotic components of ecosystem
2. Describe the various types of natural resources
3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India
4. Illustrate causes, effects, and control measures of various types of environmental pollutions
5. Understand technologies on the basis of ecological principles environmental regulations which in turn helps in sustainable development

## UNIT-I ECOSYSTEMS — Classes: 8

Definition, Scope, and Importance of ecosystem. Classification, structure and function of an ecosystem, food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification.

## UNIT-II NATURAL RESOURCES — Classes: 8

Classification of Resources: Living and Non-Living resources.
Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources
Land resources: Forest resources.
Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

| UNIT-III | BIODIVERSITY AND BIOTIC RESOURCES | Classes: 7 |
|---|---|---|
| Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic, optional values and hotspots of biodiversity. Endangered and endemic species of India, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. | | |
| **UNIT-IV** | **ENVIRONMENTAL POLLUTION** | **Classes: 9** |
| Types of pollution, Causes, effects and prevention and control measures of air, water, soil, noise and thermal pollution. Solid waste and e-waste management. | | |
| **UNIT-V** | **ENVIRONMENTAL POLICY AND SUSTAINABLE DEVELOPEMENT** | **Classes: 10** |
| Concept of sustainable development: Sustainable development goals. Threats to sustainability: Population explosion- crazy consumerism. Green building concept. Water conservation, Rainwater harvesting, watershed management. Environmental Policies and Legislations: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Forest (conservation) Act, 1980. Wildlife Protection Act. | | |

**TEXT BOOKS**

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Textbook of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications
4. Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi, 12th Edition, 2015

**REFERENCE BOOKS**

1. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Pvt. Ltd, New Delhi
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHL Learning Pvt. Ltd, New Delhi
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition

**WEB REFERENCES**

1. https://www.britannica.com/science/ecosystem
2. https://ocw.mit.edu/resources/#EnvironmentandSustainability

**E -TEXT BOOKS**

1. P N Palanisamy Environmental Science ISBN:9788131773253, eISBN:97899332509771 Edition: Second edition
2. Environmental Studies. Author, Dr. J. P. Sharma. Publisher, Laxmi Publications, 2009 ISBN, 8131806413, 9788131806418.

**MOOCS COURSE**

1. https://nptel.ac.in/courses/122103039/38
2. https://nptel.ac.in/courses/106105151/12

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## ELECTRICAL CIRCUIT ANALYSIS

**II B. TECH- I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE301PC | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

### COURSE OBJECTIVES

Objectives of this course are

1. To understand the concepts of network analysis and network theorems
2. To understand Magnetic Circuits, Network Topology
3. To analyze transients in Electrical systems.
4. To analyze three phase circuit
5. To evaluate network parameters

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Apply network theorems for the analysis of electrical circuits.
2. Obtain the transient and steady-state response of electrical circuits.
3. Analyze circuits in the sinusoidal steady-state (single-phase and three-phase).
4. Analyze two port circuit behavior.

| UNIT-I | NETWORK THEOREMS | Classes: 12 |
|---|---|---|

Mesh analysis, Super-mesh analysis, Nodal analysis, , Super-node analysis, NETWORK THEOREMS: Superposition theorem, Thevenin's and Norton's theorems , Maximum power transfer theorem, Millman's theorem, Reciprocity theorem, Tellegen theorem and Compensation theorem with DC excitation and with dependent sources..

| UNIT-II | NETWORK TOPOLOGY AND MAGNETIC CIRCUITS | Classes: 12 |
|---|---|---|

Network Topology: Graph, Tree, Incidence Matrix, Basic cutset and tie set matrices for planar networks, Magnetic Circuits, Self and Mutual inductances, dot convention, Coupled Circuit, Coefficient of coupling, equivalent T for Magnetically coupled circuits, Ideal transformer.

| UNIT-III | SOLUTION FOR FIRST AND SECOND ORDER NETWORKS | Classes: 12 |
|---|---|---|
| Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for D.C. excitations and Sinusoidal excitations, Initial conditions, Solution using differential equation and Laplace transform method. Transfer function representation. Poles and Zeros. Frequency response (magnitude and phase plots) | | |
| **UNIT-IV** | **THREE PHASE CIRCUIT** | **Classes: 10** |
| Phase sequence, Star and delta connection, Relation between line and phase voltages and currents in balanced systems, Analysis of balanced and unbalanced three phase circuits, Measurement of active and reactive power. | | |
| **UNIT-V** | **TWO PORT NETWORK AND NETWORK FUNCTIONS** | **Classes: 12** |
| Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks. | | |

## TEXTBOOKS

1. Electrical Circuit Analysis- Dr.P.Santosh Kumar Patra, Dr.N.Ramchandra, Mrs. T. V. Sai Kalyani, Mr. K. V. Govardhan Rao,1st edition,Sri krishna Techno books,2021.
2. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
3. Network Theory – Sudhakar and Shyam Mohan, McGraw Hill Education.

## REFERENCE BOOKS

1. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, MGH, 5th Edition, 1993.
2. A. Chakrabarthy (2010), Electrical Circuits, 5rd edition, DhanpatRai& Sons Publications, New Delhi.

## WEB REFERENCES

1. https://nptel.ac.in/courses/108102042/
2. https://lecturenotes.in/subject/537/network-analysis-
3. https://nptel.ac.in/courses/108/104/108104139/
4. https://nptel.ac.in/courses/108/105/108105065/

## E -TEXT BOOKS

1. https://bookboon.com/en/electrical-electronic-engineering-ebooks

## MOOCS COURSES

1. https://www.courses.com/electrical-engineering
2. https://www.edx.org/course/circuits-and-electronics-1-basic-circuit-analysis

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## ELECTROMAGNETIC FIELD THEORY

**II B. TECH- I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE302PC | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

Objectives of this course are.

1. To introduce the concepts of electric field and magnetic field.
2. Applications of electric and magnetic fields in the development of the theory for power transmission lines and electrical machines

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the basic laws of electromagnetism.
2. Obtain the electric and magnetic fields for simple configurations under static conditions.
3. analyze time varying electric and magnetic fields.
4. Understand Maxwell's equation in different forms and different media.

| UNIT-I | ELECTROSTATIC FIELDS | Classes: 15 |
|---|---|---|

Review of vector calculus- 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. Poisson's and Laplace's equation, Solution of Laplace and Poisson's equation.

| UNIT-II | CONDUCTORS, DIPOLE, DIELECTRICS AND CAPACITANCE | Classes: 12 |
|---|---|---|

Electric dipole – Dipole moment – potential and EFI due to an electric dipole. Conductors- Properties when placed in electric field, Current and current densities, Ohms Law in Point form-Continuity equation of current-Boundary conditions of conductors and dielectric materials-Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field.

| UNIT-III | MAGNETO STATIC FIELDS | Classes: 12 |
|---|---|---|
| Static magnetic fields – Biot-Savart's law – Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div B=0. | | |
| **UNIT-IV** | **FORCE IN MAGNETIC FIELDS** | **Classes: 15** |
| Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere 's circuital law – Maxwell 's third equation, Curl H=Jc. Magnetic force - Moving charges in a Magnetic field - Lorentz force equation – force on a current element in a magnetic field -Force on a straight and a long current carrying conductor in a magnetic field. | | |
| **UNIT-V** | **TIME VARYING FIELDS AND MAXWELL'S EQUATIONS** | **Classes: 10** |
| Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive forces. | | |

**TEXTBOOKS**

1. Dr.P.Santosh Kumar Patra & Mrs. Sangeetha & Ms. Ch. Nirosha &Dr.N. Ramchandra "Electromagnetic Field Theory", Sunraise International Publications, 1st Edition,2021.
2. M. N. O. Sadiku, "Elements of Electro magnetics", Oxford University Publication, 2014.
3. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012.

**REFERENCE BOOKS**

1. S. Kamakshaiah, Electromagnetics, Right Publishers, 2007.
2. Pramanik, Electromagnetism-Problems with Solution, Prentice Hall India,2012.

**WEB REFERENCES**

1. https://www.khanacademy.org/science/physics/magnetic-forces-and-magnetic-fields/magnetic-field-current-carrying-wire/v/magnetism-6-magnetic-field-due-to-current
2. https://nptel.ac.in/courses/108106073/
3. https://www.youtube.com/watch?v=pGdr9WLto4A

**E-TEXT BOOKS**

1. Electromagnetic Field Theory and Transmission Lines 1st Edition, Kindle Edition.

**MOOCS COURSES**

1. https://www.classcentral.com/course/edx-electricity-and-magnetism-magnetic-fields-and- forces-10280
2. https://www.classcentral.com/course/nptel-electromagnetic-theory-5223

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## ELECTRICAL MACHINES I

**II B. TECH- I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE303PC | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To understand the operation of DC generator.
2. To analyze the characteristics of DC generators
3. To understand the working of DC motor
4. To differentiate the speed control methods in dc motors
5. To understand the different testing methods in DC machine

### COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. To describe the constructional features of DC generator
2. To analyze the characteristics of DC generator
3. To differentiate motor principle from generator
4. To identify the DC motor characteristics
5. To analyze the efficiency of DC machines

| UNIT-I | D.C. GENERATORS, CONSTRUCTION & OPERATION | Classes: 15 |
|---|---|---|

Principle, constructional features and operation, armature windings, E.M.F. Equation, Armature reaction - Cross magnetizing and demagnetizing AT/pole, compensating winding - commutation, reactance voltage, methods of improving commutation.

| UNIT-II | TYPES OF D.C. GENERATORS | Classes: 13 |
|---|---|---|

Methods of Excitation - separately excited and self-excited generators, build-up of E.M.F, critical field resistance and critical speed, causes for failure of self-excited and remedial measures. Load Characteristics Of D.C Generators: Shunt, series and compound generators

| UNIT-III | PARALLEL OPERATION OF D.C GENERATORS AND D.C MOTORS | Classes: 13 |
|---|---|---|
| Parallel operation of D.C generators, use of equalizer bar and cross connection of field windings.<br>D.C Motors: Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation. | | |
| **UNIT-IV** | **SPEED CONTROL METHODS AND EFFICIENCY CALCULATION OF DC MOTOR** | **Classes: 13** |
| Speed control methods of D.C. Motors, Motor starters (3-point and 4-point starters) Losses and efficiency of DC Motors – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency. | | |
| **UNIT-V** | **TESTING OF DC MACHINES** | **Classes: 13** |
| Methods of testing – direct, indirect, and regenerative testing – Brake test – Swinburne's test – Hopkinson's test – Field's test - separation of stray losses in a D.C motor test. | | |

## TEXTBOOKS


1. Dr.N.Ramchandra, Mr.Ch.Srinivas, Mr. V. Bharath Kumar,"Electrical Machines-I" Seven Hills International Publications,1st edition,2021.
2. J. Nagrath& D.P. Kothari", "Electric Machines", Tata McGraw Hill Publishers, 3rd edition,
3. "P.S. Bimbra", "Electrical Machines", Khanna Publishers, 7th Edition, 2014.


## REFERENCE BOOKS


1. "A. E. Fritzgerald, C. Kingsley and S. Umans", "Electric Machinary", McGraw Hill Companies, 6th edition, 2003.
2. "Abhijith Chakrabarthi&Subitha Debnath", "Electrical Machines", McGraw Hill, 2015.


## WEB REFERENCES

1. https://www.oreilly.com › library › view › electrical-machines-2nd › 25_ref
2. https://swayam.gov.in › nd1_noc19_ee602.
3. https://www.sanfoundry.com › best-reference-books-advance-electrical-machines

## E -TEXT BOOKS

1. Electrical Machines-I By U.A.Bakshi, V.U.Bakshi Technical Publications, 2009 PrintISBN:9783527340224 OnlineISBN:9783527698523 |DOI:10.1002/9783527698523

## MOOCS COURSES

1. https://nptel.ac.in/courses/108105017/
2. https://swayam.gov.in/nd1_noc19_ee60/preview

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## ENGINEERING MECHANICS

**II B. TECH- I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| ME304ES | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

### COURSE OBJECTIVES

Objectives of this course are.

1. Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium.
2. Perform analysis of bodies lying on rough surfaces.
3. Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections.
4. Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
5. Explain the concepts of work-energy method and its applications and concept of Mechanical vibrations

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
2. Solve problem of bodies subjected to friction.
3. Find the location of centroid and calculate moment of inertia of a given section.
4. Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
5. Solve problems using work energy equations and solve problems of Mechanical vibration.

| UNIT-I | INTRODUCTION TO ENGINEERING MECHANICS | Classes: 15 |
|---|---|---|

Fundamental of Mechanics Basic Concepts Force System and Equilibrium, Definition of Force, Moment and Couple, Principle of Transmissibility, Varignon's theorem, Resultant of force system – Concurrent and non-concurrent coplanar forces, Condition of static equilibrium for coplanar force system, stability of equilibrium, concept of free body diagrams, applications in solving the problems on static equilibrium of bodies.

| UNIT-II | TRUSSES AND FRICTION | Classes: 15 |
|---|---|---|
| Plane Trusses Degrees of freedom, Types of supports and reactions, Types of loads, Analysis of Trusses method of joints, and method of sections Friction Introduction, Static dry friction, simple contact friction problems, ladders, wedges, screws and belt friction. | | |
| **UNIT-III** | **AREA MOMENT OF INERTIA , MOMENT OF INERTIA OF MASSES** | **Classes: 15** |
| Properties of Surfaces Properties of sections – area, centroids of lines, areas and volumes, moment of inertia first moment of inertia, second moment of inertia and product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia | | |
| **UNIT-IV** | **KINEMATICS & KINETICS** | **Classes: 15** |
| Kinematics: Rectilinear motion - Motion of Rigid Body under uniform and variable accelerations - motion under gravity- curvilinear motion – Projectiles - rotary motion.<br>Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation - D' Alemberts Principle - Connected bodies- Kinetics of rotating bodies | | |
| **UNIT-V** | **WORK, POWER, ENERGY & MECHANICAL VIBRATIONS** | **UNIT-V** |
| Work, Power and Energy: Introduction, work-energy equation - motion of connected bodies - work done by a spring - general plane motion.<br>Mechanical Vibrations: Definitions, concepts - simple harmonic motion - free vibrations - Simple and compound pendulums | | |

**TEXT BOOKS**


1. Dr. D.V. Sreekanth, Mr.T.Paramesh, Mr.B.Ashok Kumar, “Engineering Mechanics”,1st edition, Amaravati Publications,2021.
2. Shames and Rao (2006), Engineering Mechanics, Pearson Education
3. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer’s Engineering Mechanics – Statics & Dynamics


**REFERENCE BOOKS**


1. Timoshenko S.P and Young D.H., “Engineering Mechanics” McGraw Hill International Edition, 1983.
2. Andrew Pytel, JaanKiusalaas, “Engineering Mechanics”, Cengage Learning, 2014.
3. Beer F.P & Johnston E.R Jr. Vector, “Mechanics for Engineers”, TMH, 2004.
4. Hibbeler R.C & Ashok Gupta, “Engineering Mechanics”, Pearson Education, 2010.


**WEB REFERENCES**

1. http://www.mlipsett.com/blog/

| |
|---|
| 2. http://jntuh-elsdm.in/<br>3. https://www.sciencedirect.com/science/book/9781857180336<br>4. https://onlinelibrary.wiley.com/doi/abs/10.1046/j.0266-4909.2002.00225.x<br>5. https://www.coursera.org/learn/3d-cad-fundamental |
| **E -TEXT BOOKS** |
| 1. https://akuengineers.files.wordpress.com/2016/12/engineering-mechanics-rs-khurmi.pdf<br>2. http://clkmein.com/q2KmTm |
| **MOOCS COURSES** |
| 1. https://nptel.ac.in/courses/112103109/2. |

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## ANALOG ELECTRONICS

**II B. TECH- I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EC305PC | B.Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

Objectives of this course are.

1. To introduce components such as diodes, to know the applications of components.
2. To introduce components such as BJTs, to know the applications of components.
3. To introduce components such as FETs, to know the applications of components
4. Understand the functioning of OP-AMP and design OP-AMP basedcircuits.
5. Understand the application of OP-AMP and design OP-AMP based circuits.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the characteristics of transistors.
2. Design and analyse various rectifier and amplifier circuits.
3. Design sinusoidal and non-sinusoidal oscillators.
4. Understand the functioning of OP-AMP and design OP-AMP based circuits.
5. Understand the application of OP-AMP and design OP-AMP based circuits.

| UNIT-I | DIODE CIRCUITS | Classes: 9 |
|---|---|---|

P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits.

| UNIT-II | BJT CIRCUITS | Classes: 9 |
|---|---|---|

Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common-collector amplifiers.

| UNIT-III | JUNCTION FIELD EFFECT TRANSISTOR (FET) | Classes: 9 |
|---|---|---|

**Junction Field Effect Transistor (FET):** Construction,Principle of Operation, Volt-Ampere Characteristic, MOSFETs – Enhancement and depletion types – I – V characteristics, common-source, common-gate and common-drain amplifiers.

| UNIT-IV | DIFFERENTIAL, MULTI-STAGE AND OPERATIONAL AMPLIFIERS | Classes: 9 |
|---|---|---|
| Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product) | | |
| **UNIT-V** | **LINEAR AND NONLINEAR APPLICATIONS OF OP-AMP** | **Classes: 9** |
| Inverting and non-inverting amplifier, instrumentation amplifier, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, Analog to Digital Conversion, Zero Crossing Detector, Square-wave and triangular-wave generators. | | |

## TEXT BOOKS


1. Analog Electronics- Dr.S.V.S.Rama Krishnam Raju, Ms.K.Anitha, Ms.P.Pushpa, Sun Techno Publications,1st edition,2021.
2. Electronic Devices and Circuits- Jacob Millman, McGraw Hill Education
3. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009, Pearson.
4. Y. Tsividis and M. Colin, "Operation and Modelling of the MOS Transistor," Oxford Univ. Press, 2011.


## REFERENCE BOOKS


1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.
3. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
4. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
5. P.R. Gray, R.G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001.


## WEB REFERENCES

1. https://nptel.ac.in/courses/113/106/113106062/
2. https://nptel.ac.in/courses/113/106/113106065/
3. https://nptel.ac.in/courses/108/108/108108122/
4. https://nptel.ac.in/courses/117107094/

## E -TEXT BOOKS

1. ELECTRONIC DEVICES AND CIRCUITS, 2nd Edition Jacob Millmanand Christos C.
2. ELECTRONIC DEVICES AND CIRCUITS, 2nd Edition David A.Bell.

**MOOCS COURSES**

1. https://www.edx.org/course/principle-of-semiconductor-devices-part-ii-field-effect-transistors-and-mosfets-2
2. https://www.coursera.org/lecture/electronics/4-1-introduction-to-pn-junctions-xr0ZQ
3. https://www.coursera.org/lecture/electronics/2-1-introduction-to-op-amps-and-ideal-behavior-Q5Di2

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## ELECTRICAL MACHINES I LAB

**II B. TECH- I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE306PC | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To expose the students to the operation of DC Generator
2. To expose the students to the operation of DC Motor.
3. To examine the self-excitation in DC generators.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Start and control the Different DC Machines.
2. Assess the performance of different machines using different testing methods
3. Identify different conditions required to be satisfied for self - excitation of DC Generators.
4. Separate iron losses of DC machines into different components.

### LIST OF EXPERIMENTS

**The following experiments are required to be conducted compulsory experiments:**

1. Magnetization characteristics of DC shunt generator.
2. Load characteristics of DC shunt generator.
3. Load Test on DC series generator.
4. Load test on DC compound generator.
5. Field's test on DC seriesmachine.
6. Speed control of DC shunt motor.
7. Performance characteristics of DC series motor.
8. Predetermination of efficiency of a DC Shunt machine (Swinburne'stest)

**In addition to the above eight experiments, at least two of the experiments from the following list is required to be conducted:**

9. Hopkinson's test on DC shunts machines.
10. Brake test on DC shunt motor. Determination of performance curves.
11. Retardation test on DC shunt motor. Determination of losses at rated speed.
12. Separation of losses in DC shunts motor.

## TEXTBOOKS

1. J. Nagrath& D.P. Kothari", "Electric Machines", Tata McGraw Hill Publishers, 3rd edition,
2. "P.S. Bimbra", "Electrical Machines", Khanna Publishers, 7th Edition, 2014.

## REFERENCE BOOKS

1. "A. E. Fritzgerald, C. Kingsley and S. Umans", "Electric Machinary", McGraw Hill Companies, 6th edition, 2003.
2. "Abhijith Chakrabarthi &Subitha Debnath", "Electrical Machines", McGraw Hill, 2015.

## WEB REFERENCES

1. https://www.oreilly.com › library › view › electrical-machines-2nd › 25_ref
2. .https://swayam.gov.in › nd1_noc19_ee60
3. https://www.sanfoundry.com › best-reference-books-advance-electrical-machines

## E -TEXT BOOKS

1. Electrical Machines-I By U.A.Bakshi, V.U.Bakshi Technical Publications, 2009 PrintISBN:9783527340224 OnlineISBN:9783527698523 |DOI:10.1002/9783527698523

## MOOCS COURSES

1. https://nptel.ac.in/courses/108105017/
2. https://swayam.gov.in/nd1_noc19_ee60/preview

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## ELECTRICAL CIRCUITS LAB

### II B. TECH- I SEMESTER

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE307PC | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

Objectives of this course are.

1. To design electrical systems
2. To analyze a given network by applying various Network Theorems
3. To measure three phase Active and Reactive power.
4. To understand the locus diagrams

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Analyze complex DC and AC linear circuits
2. Apply concepts of electrical circuits across engineering
3. Evaluate response in a given network by using theorems

### LIST OF EXPERIMENTS

**The following experiments are required to be conducted compulsory experiments:**

1. Verification of Superposition and Reciprocity Theorems.
2. Verification of Maximum Power Transfer theorem.
3. Locus Diagrams of RL and RC Series Circuits.
4. Series and Parallel Resonance.
5. Time response of first order RC / RL network for periodic non – sinusoidal inputs – Time constant and Steady state error determination.
6. Two port network parameters – Z – Y parameters, Analytical verification.
7. Two port network parameters – A, B, C, D & Hybrid parameters, Analytical verification.
8. Separation of Self and Mutual inductance in a Coupled Circuit. Determination of Co-efficient of Coupling.

**In addition to the above eight experiments, at least two of the experiments from the following list is required to be conducted:**

9. Verification of compensation &Millman's theorems.
10. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzer and plotting frequency spectrum.

11. Verification of Thevenin's and Norton's theorem using MATLAB simulation.
12. Determination of form factor for non-sinusoidal waveform.
13. Measurement of Active Power for Star and Delta connected balanced loads.
14. Measurement of Reactive Power for Star and Delta connected balanced loads.

**TEXTBOOKS**


1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
2. Network Theory – Sudhakar and Shyam Mohan, McGraw Hill Education.


**REFERENCE BOOKS**


1. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly,MGH, 5th Edition, 1993.
2. A. Chakrabarthy (2010), Electrical Circuits, 5rd edition, DhanpatRai& Sons Publications, New Delhi.


**WEB REFERENCES**

1. https://nptel.ac.in/courses/108102042/
2. https://lecturenotes.in/subject/537/network-analysis-
3. https://nptel.ac.in/courses/108/104/108104139/

**E -TEXT BOOKS**

1. https://bookboon.com/en/electrical-electronic-engineering-ebooks

**MOOCS COURSES**

1. https://www.courses.com/electrical-engineering
2. https://www.edx.org/course/circuits-and-electronics-1-basic-circuit-analysis

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## ANALOG ELECTRONICS LAB

**II B. TECH- I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EC308PC | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To introduce components such as diodes, BJTs and FETs their switching characteristics, applications.
2. Learn the concepts of high frequency analysis of transistors.
3. To give understanding of various types of basic and feedback amplifier circuits such as small signal, Cascaded, large signal and tuned amplifiers.
4. To introduce the basic building blocks of linear integrated circuits.
5. To introduce the concepts of waveform generation and introduce some special function ICs.

### COURSE OUTCOMES

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

1. Know the characteristics, utilization of various components.
2. Understand the biasing techniques
3. Design and analyse various rectifiers, small signal amplifier circuits.
4. Design sinusoidal and non-sinusoidal oscillators.
5. Functioning and thorough understanding of OP-AMP, design OP-AMP based circuits with linear integrated circuits.

### LIST OF EXPERIMENTS

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Full Wave Rectifier with &without filters
3. Common Emitter Amplifier Characteristics
4. Common Base Amplifier Characteristics
5. Common Source amplifier Characteristics
6. Measurement of h-parameters of transistor in CB, CE, CC configurations
7. Half Wave Rectifier with & without filters
8. Two Stage RCC Coupled Amplifier
9. Class B Complementary Symmetry Amplifier
10. Cascade Amplifier
11. Current Shunt Feedback amplifier
12. RC Phase shift Oscillator

13. Hartley and Colpitt's Oscillators
14. Class A power amplifier
15. Voltage Series Feedback Amplifier

## TEXTBOOKS


1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd edition 2010
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.


## REFERENCE BOOKS


1. Electronic Devices Conventional and current version -Thomas L. Floyd2015, Pearson.
2. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
3. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
4. P. R. Gray, R. G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001.


## WEB REFERENCES

1. https://nptel.ac.in/noc/individual_course.php?id=noc19-ee07
2. https://nptel.ac.in/courses/117101106/
3. https://nptel.ac.in/courses/108102095/
4. https://nptel.ac.in/courses/108102112/

## E -TEXT BOOKS

1. https://easyengineering.net/analog-electronics-by-bakshi-and-godse/
2. Electronic circuits: Analysis and Design by Donald Neamen

## MOOCS COURSE

1. https://www.classcentral.com/course/swayam-analog-circuits-7957
2. https://www.edx.org/learn/electronics

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## GENDER SENSITIZATION LAB

**II B. TECH- I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| GS309MC | B. Tech | 0 | 0 | 2 | 0 | 100 | - | 100 |

### COURSE OBJECTIVES

To learn

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects ofgenders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

| UNIT-I | UNDERSTANDING GENDER | Classes: 12 |
|---|---|---|

UNDERSTANDING GENDER: Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up

| | | |
|---|---|---|
| Male. First lessons in Caste. | | |
| **UNIT-II** | **GENDER ROLES AND RELATIONS** | **Classes: 12** |
| GENDER ROLES AND RELATIONS: Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary | | |
| **UNIT-III** | **GENDER AND LABOUR** | **Classes: 12** |
| GENDER AND LABOUR: Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics - Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming | | |
| **UNIT-IV** | **GENDER - BASED VIOLENCE** | **Classes: 12** |
| Gender - Based Violence: The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! - Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life." | | |
| **UNIT-V** | **GENDER AND CULTURE** | **Classes: 12** |
| GENDER AND CULTURE: Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks The Brave Heart. | | |
| **TEXTBOOKS** | | |
| 1. Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, VasudhaNagaraj, AsmaRasheed, GoguShyamala, DeepaSreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015. | | |
| **REFERENCE BOOKS** | | |
| 1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012<br>2. Abdulali Sohaila. "I Fought For My Life…and Won."Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/ | | |
| **WEB REFERENCES** | | |

1. https://swayam.gov.in/
2. https://swayam.gov.in/NPTEL

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## TRANSFORMATIONS, COMPLEX VARIABLES AND NUMERICAL TECHNIQUES

**II B.TECH- II SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| MA405BS | B.Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. The Laplace transforms and inverse Laplace transform of a given function using shifting theorems
2. How to determine the Fourier coefficients for various functions in a given period
3. The nature of theFourierintegral
4. The Evaluation of integrals using Cauchy'sintegralformulaand Cauchy'sresidue theorem
5. The concept of numerical solutions of ordinary differential equations to the real-world problems of physics, biology and electrical circuits

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the concept of Laplace transforms to the real-world problems of electrical circuits, harmonic oscillators,optical devices, and mechanical systems
2. Estimate the value for the given data using interpolation and Find the numerical solutions for a given ordinary differential equations
3. Define Differentiation and integration of complex valued functions
4. Analyze thecomplexfunctionwithreference totheir analyticity,integrationusing Cauchy'sintegral and residue theorems
5. Apply numerical methods to obtain approximate solutions to Taylors, Eulers, Modified Eulers and Runge-Kutta methods of ordinary differential equations

| UNIT-I | LAPLACE TRANSFORMS | Classes: 12 |
|---|---|---|

Laplace Transforms: Laplace Transforms of Standard Functions, Shifting Theorems, Derivatives and Integrals, Properties (Without Proof),Unit Step Function, Dirac's Delta Function, Periodic Function. Inverse Laplace Transforms: Convolution Theorem (Without Proof).Applications: Solving Ordinary Differential Equations (Initial Value Problems) Using Laplace Transforms.

| UNIT-II | COMPLEX VARIABLES (DIFFERENTIATION) | Classes: 14 |
|---|---|---|

Limit,Continuity and Differentiation of Complex functions, Analyticity,Cauchy-Riemann equations (withoutproof), finding harmonic conjugate; elementary analytic functions (exponential,trigonometric, logarithm) and their properties.

| UNIT-III | COMPLEX VARIABLES (INTEGRATION) | Classes: 12 |
|---|---|---|
| Lineintegral, Cauchy's theorem, Cauchy's Integral formula, Zeros of analytic functions, Singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem. | | |
| **UNIT-IV** | **NUMERICAL METHODS – I** | **Classes: 12** |
| Solution of polynomial and transcendental equations – Bisection method, Iteration Method, Newton- Raphson method and Regula-Falsi method.<br>Finite differences- forward differences- backward differences-central differences-symbolic relations and separation of symbols; Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae; Lagrange's method of interpolation. | | |
| **UNIT-V** | **NUMERICAL METHODS–II** | **Classes: 12** |
| Numerical Integration: Trapezoidal Rule, Simpson's 1/3rd Rule and 3/8 Rules.<br>Numerical Solution of Ordinary Differential Equations: Taylor's Series, Picard's Method, Euler and Modified Euler's Methods; Runge-Kutta Method of fourth order | | |

**TEXT BOOKS**

1. Advanced Engineering Mathematics by Kreyszig, John Wiley &Sons
2. Higher Engineering Mathematics By Dr.B.S Grewal, Khanna Publishers
3. Churchill R.V., "Complex Variable and its Applications", McGraw Hill, New York, 9th edition 2013.

**REFERENCE BOOKS**

1. Mathematical Methods by T.K.V.Iyengar, B.Krishna Gandhi & Others, S.Chand
2. Introductory Methods by Numerical Analysis By S.S.Sastry, PHI Learning Pvt. Ltd

**WEB REFERENCES**

1. https://www.efunda.com/math/laplace_transform/index.cfm
2. https://www.efunda.com/math/fourier_transform/index.cfm
3. https://www.efunda.com/math/complex_numbers/complex.cfm

**E -TEXT BOOKS**

1. https://www.e-booksdirectory.com/details.php?ebook=10602
2. https://www.e-booksdirectory.com/details.php?ebook=4708

**MOOCS COURSE**

1. https://swayam.gov.in/
2. https://swayam.gov.in/NPTEL

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## ELECTRICAL MACHINES II

**II B. TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE401PC | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To understand the construction oftransformers
2. To identify the testing methods oftransformers
3. To understand the operational features of induction motor
4. To understand characteristics and speed control methods of induction motor
5. To discuss about single phase induction motor, Alternators and synchronous motors

### COURSE OUTCOMES

After the completion of this course the student can able to

1. To analyze the operational features of transformer
2. To discuss the testing methods of transformer
3. To demonstrate the operational features of induction motor
4. To analyze the speed control methods of induction motor
5. To describe about single phase induction motors, Alternators and synchronous motors

| UNIT-I | SINGLE PHASE TRANSFORMER | Classes: 15 |
|---|---|---|

Types - constructional details-minimization of hysteresis and eddy current losses- EMF equation - operation on no load and on load - phasor diagrams Equivalent circuit - losses and efficiency – regulation - All day efficiency - effect of variations of frequency & supply voltage on iron losses.

| UNIT-II | CALCULATION OF EFFIECEIENCY AND REGULATION OF TRANSFORMER | Classes: 15 |
|---|---|---|

OC and SC tests - Sumpner's test - predetermination of efficiency and regulation- separation of losses test-parallel operation with equal and unequal voltage ratios - auto transformers equivalent circuit - comparison with two winding transformers.

Polyphase transformers – Polyphase connections - Y/Y, Y/Δ, ΔY, Δ/Δ and openΔ .

Tap Changing Transformers: Concept of tap changing, on-load and off-load tap changers.

| UNIT-III | POLYPHASE INDUCTION MOTORS | Classes: 13 |
|---|---|---|

Constructional details of cage and wound rotor machines, production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency - rotor Reactance, rotor current and Power factor at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation -expressions for maximum torque and starting torque - torque slip characteristic

| UNIT-IV | CHARACTERISTICS AND SPEED CONTROL OF INDUCTION MOTOR | Classes: 15 |
|---|---|---|

Characteristics of Induction Motors: Equivalent circuit - phasor diagram - crawling and cogging - No-load Test and Blocked rotor test –Predetermination of performance-Methods of starting and starting current and Torque calculations.

Speed Control Methods: Change of voltage, change of frequency, voltage/frequency, injection of an EMF into rotor circuit (qualitative treatment only)-induction generator principle of operation.

| UNIT-V | SINGLE PHASE INDUCTION MOTOR , ALTERNATORS AND SYNCHRONOUS MOTOR | Classes: 15 |
|---|---|---|

Single Phase Induction Motors: Double revolving field theory and cross field theory, Capacitance starting, Shaded pole starting, speed-torque characteristics, Equivalent circuit, Phasor diagrams, Applications. Alternators: Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation. Voltage Regulation methods : Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods, experimental determination of Xd and Xq (Slip test) Phasor diagrams. Synchronous Motor : Theory of operation of synchronous motor – phasor diagram – Variation of current and power factor with excitation.

**TEXTBOOKS**


1. J. Nagrath& D.P. Kothari", "Electric Machines", Tata McGraw Hill Publishers, 3rd edition, 2004.
2. "P.S. Bimbra", "Electrical Machines", Khanna Publishers, 7th Edition, 2014.


**REFERENCE BOOKS**


1. "A. E. Fritzgerald, C. Kingsley and S. Umans", "Electric Machinary", McGraw Hill Companies, 6th edition, 2003.
2. "Abhijith Chakrabarthi&Subitha Debnath", "Electrical Machines", McGraw Hill, 2015.


**WEB REFERENCES**

1. https://www.scribd.com › doc › Electrical-Machines-2-AC-Machines
2. https://www.slideshare.net › karthi1017 › electrical-machines-ii
3. https://www.cet.edu.in › notice files › 226_Electrical_Machine-II

**E -TEXT BOOKS**

1. Electrical Machines - II. Authors, U.A.Bakshi, M.V. Bakshi. Publisher, Technical Publications, 2009. ISBN, 8184316070, 9788184316070.
2. Electrical Machines 2 by J b Gupta. ISBN: 9350141604, 9789350141601.

**MOOCS COURSE**

1. https://www.classcentral.com/course/swayam-electrical-machines-II-12948
2. https://nptel.ac.in/courses/108106072/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## POWER ELECTRONICS

**II B. TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE402PC | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To know, identify and define the basic elements of power electronicsdevices and their characteristics, specifications, operation, and protection.
2. To understand fundamentals, phase-controlled rectifiers (1ph and 3ph) and line commutated inverters.
3. To have the ability to analyze and design of DC-DC converters(choppers), AC-AC converters, DC-AC converters and control strategies.
4. To determine whether a converter or waveform can deliver energy tomeet specified requirements and to analyze harmonic distortion.
5. To discuss the important applications of power devices and provide critical evaluation, of the most common types of dc-dc, ac-dc and dc-ac converters.

### COURSE OBJECTIVES

Upon successful completion of the course, the student is able to

1. Understand the characteristics of various power electronic elements andable to build simple power electronic circuits.
2. Understand operation and waveforms for phase controlled converters.
3. Understand chopper operation and waveforms.
4. Understand AC voltage controllers and Cycloconverters operationand waveforms.
5. Apply knowledge of modulation techniques for inverters in real time projects.

| UNIT-I | POWER SEMI CONDUCTOR DEVICES AND COMMUTATION CIRCUITS | Classes: 15 |
|---|---|---|

Thyristors - Silicon Controlled Rectifiers (SCR's) - BJT - Power MOSFET - Power IGBT and their characteristics and other thyristors - Basic theory of operation of SCR - Static characteristics– Turn-on and Turn-off methods- Dynamic characteristics of SCR - Turn on and Turn off times-Salient points.

| | | |
|---|---|---|
| Two transistor analogy of SCR - R, RC, UJT firing circuits - Series and parallel connections of SCRs - Snubber circuit details – Specifications and Ratings of SCR - Numerical problems – Line Commutation and Forced Commutation circuits. | | |
| **UNIT-II** | **SINGLE PHASE HALF WAVE, FULLY CONTROLLED & THREE PHASE LINE COMMUTATED CONVERTERS** | **Classes: 15** |
| Phase control technique - Single phase Line commutated converters - Half wave controlled converters with Resistive, RL load and RLE load - Derivation of average load voltage and current -Active and Reactive power inputs to the converters without and with Freewheeling Diode - Numerical problems.<br><br>Fully controlled converters, Midpoint and Bridge connections with Resistive, RL loads and RLE load - Derivation of average load voltage and current – Line commutated inverters, semi-converters, active and Reactive power inputs to the converters, Effect of source inductance - Dual Converters -Numerical problems.<br><br>Three phase converters - Three pulse and six pulse converters-Midpoint and bridge connections with R, RL loads-Derivation of average load voltage and current - Semi Converters, Effect of Source inductance–Numerical Problems. | | |
| **UNIT-III** | **CHOPPERS** | **Classes: 10** |
| Choppers – Time ratio control and Current limit control strategies – Step down choppers-Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression.<br><br>Morgan's chopper – Jones chopper (Principle of operation only) - waveforms — AC Chopper – Problems. | | |
| **UNIT-IV** | **AC VOLTAGE CONTROLLERS &CYCLOCONVERTERS** | **Classes: 12** |
| AC voltage controllers – Single phase two SCR's in anti-parallel with R and RL loads , modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor- wave forms , Numerical problems- Single phase and three phase cycloconverters (principle of operation only). | | |
| **UNIT-V** | **INVERTERS** | **Classes: 12** |
| Inverters – Single phase inverter – Basic series inverter, parallel inverter-Operation and Waveforms, Three phase inverters (180,120 degrees conduction modes of operation) - Voltage control techniques for inverters- Pulse width modulation techniques – Numerical problems. | | |
| **TEXT BOOKS** | | |
| 1. M. D. Singh & K. B. Kanchandhani, "Power Electronics", Tata McGraw – Hill Publishing Company, 1998.<br>2. "Dr.P.S.Bimbra", "Power Electronics", Khanna Publishers.<br>3. "V. R. Murthy", "Power Electronics", Oxford University Press, 1st Edition 2005. | | |

4. "M. H. Rashid", Power Electronics : Circuits, Devices and Applications", Prentice Hall of India, 2nd edition, 1998

**REFERENCE BOOKS**

1. "Vedam Subramanyam", Power Electronics, New Age International (P) Limited, Publishers, 2nd Edition 2008.
2. Philip T. Krein, "Elements of Power Electronics", Oxford University Press, 1997.
3. M. S. JamilAsghar, "Power Electronics", PHI Private Limited, 2004.
4. P. C. Sen, "Power Electronics", Tata McGraw-Hill Publishing,2001.

**WEB REFERENCES**

1. "Power Electronics: Converter, Applications and Design" by N Mohan and W P Robbins.
2. "Power Electronics: Circuits, Devices and Applications" by Rashid.
3. https://electricalbaba.com › best-book-power-electronics.
4. https://easyengineering.net › power-electronics-books.

**E -TEXT BOOKS**

1. Power Electronic Converters: Dynamics and Control in Conventional and Renewable Energy Applications By Teuvo Suntio, Tuomas Messo, Joonas Puukko First published:12 October 2017Print ISBN:9783527340224 |Online ISBN:9783527698523 |DOI:10.1002/9783527698523

2. Digital Power Electronics and Applications by Fang Lin Luo Hong Ye Muhammad Rashid, Hardcover ISBN: 9780120887576,Paperback ISBN: 9781493300037,eBook ISBN: 9780080459028

**MOOCS COURSE**

1. https://nptel.ac.in/courses/108101126/Fundamentals of Power Electronics
2. https://nptel.ac.in/courses/108101038/Power Electronics

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## DIGITAL ELECTRONICS

**II B. TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE403PC | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To understand common forms of number representation in digital electronic circuits.
3. To implement simple logical operations using combinational logic circuits
4. To design combinational logic circuits, sequential logic circuits.
5. To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines by using flip flops.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand working of logic gates.
2. Remember the theorems and postulates of Boolean algebra and also learn how to use K-Map and Tabular Method (QM) to minimize digital functions.
3. Design and implementation of Combinational circuits.
4. Design and implementation of Sequential circuits.
5. Be able to understand FSMs to implement the given logical problem.

| UNIT-I | NUMBER SYSTEMS | Classes: 14 |
|---|---|---|

Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.

**Boolean Algebra:** Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations.

| UNIT-II | MINIMIZATION OF BOOLEAN FUNCTIONS | Classes: 12 |
|---|---|---|

Karnaugh Map Method –Two variable K-Map,3-variable K-Map,4 variable K-Map, Five Variable K-Map, Don't Care Map Entries, Sum of Products, Product of Sums, Tabular Method.

| UNIT-III | COMBINATIONAL LOGIC CIRCUITS | Classes: 14 |
|---|---|---|
| Half adder, Full Adder, Half Substracter, Full Substracter, Comparators, Multiplexers, De-multiplexers, Encoders, Priority Encoders, Decoders and Code converters, Hazards and Hazard Free Relations. | | |
| **UNIT-IV** | **SEQUENTIAL CIRCUITS I** | **Classes: 15** |
| Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.<br>**Registers and Counters:** Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers ,Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters, Design of Synchronous Modulo N – Counters | | |
| **UNIT-V** | **SEQUENTIAL CIRCUITS II** | **Classes: 12** |
| Finite State Machines, Serial Binary Adder, Sequence Detector, Finite state machine-capabilities and limitations, Mealy and Moore models, Completely Specified Sequential Machines, In Completely Specified Sequential Machines. | | |

**TEXTBOOKS**


1. Digital Design- Morris Mano, PHI, 4th Edition,2006
2. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed, John Wiley & Sons Inc.
3. Fundamentals of Logic Design- Charles H. Roth, Cengage Learning, 5th, Edition, 2004.


**REFERENCE BOOKS**


1. Switching and Finite Automata Theory – ZviKohavi&Niraj K. Jha, 3rd Edition, Cambridge, 2010.
2. Digital Principles, 3/e, Roger L. Tokheim, Schaum's outline series, 1994.
3. Modern Digital electronics RP Jain 4th Edition, McGraw Hill
4. Switching Theory and Logic Design – A Anand Kumar, PHI, 2013.


**WEB REFERENCES**

1. http://blog.digitalelectronics.co.in/
2. www.nesoacademy.org/electronics-engineering/digital-electronics/digital
3. https://www.slideshare.net/JournalsPubwwwjourna/international-journal-of-digital-electronics-vol-2-issue-2
4. https://lecturenotes.in/subject/203/switching-theory-and-logic-design-stld
5. http://www.infocobuild.com/education/audio-video-courses/electronics/DigitalCircuitsSystems
6. https://nptel.ac.in/courses/117105080/

| E -TEXT BOOKS |
| --- |
| 1. https://pages.uoregon.edu/rayfrey/DigitalNotes.pdf<br>2. https://easyengineering.net/fundamentals-of-digital-circuits-by-anand-kumar/ |
| **MOOCS COURSE** |
| https://www.smartzworld.com/notes/digital-logic-design-dld/<br>1. https://swayam.gov.in/courses/1392-digital-circuits-and-systems<br>2. https://swayam.gov.in/courses/4410-synthesis-of-digital-systems<br>3. |

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## POWER SYSTEMS I

**II B. TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE404PC | B.Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To understand structure of power system.
2. To identify the components of thermal power stations
3. To understand the operations of nuclear power stations
4. To discuss about substations and their types
5. To understand about various power factor improvement methods.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. To identify the components of power system
2. To describe about thermal power stations
3. To demonstrate the components of nuclear power stations
4. To differentiate substations
5. To analyze power tariffs

| UNIT-I | STRUCTURE OF POWER SYSTEM & HYDROELECTRIC POWER STATIONS | Classes: 12 |
|---|---|---|

**Components of an electric power system** - Single line diagram of electrical power system, important terms & factors. Base load and peak load on power station. Interconnected grid system, different types of energy sources and efficiency.

**Hydroelectric Power Stations:** Elements of hydroelectric power station-types-concept of pumped storage plants, storage requirements, mass curve and estimation of power developed from a given catchment area, heads and efficiencies.

| UNIT-II | THERMAL POWER STATIONS | Classes: 12 |
|---|---|---|

**Thermal Power Station (TPS)-** Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers.

| UNIT-III | NUCLEAR AND GAS POWER STATIONS | Classes: 12 |
|---|---|---|

**Nuclear Power Stations**: Nuclear Fission and Chain reaction. Nuclear fuels- Principle of

operation of Nuclear reactor. Reactor Components- Radiation hazards: Shielding and Safety precautions. Types of Nuclear reactors.

**Gas Power Stations:** Principle of Operation and Components.

| UNIT-IV | SUBSTATIONS | Classes: 12 |
|---|---|---|

**Classification of substations**: Air insulated substations, Indoor & Outdoor substations, Bus bar arrangements in the Sub-Stations, Gas insulated substations (GIS)- Advantages, single line diagram of gas insulated substations, Comparison of Air insulated substations and Gas insulated substations

| UNIT-V | ECONOMIC ASPECTS OF POWER GENERATION, POWER FACTOR AND TARIFF METHODS | Classes: 12 |
|---|---|---|

Load curve, load duration and integrated load duration curves, demand, diversity, capacity, utilization and plant use factors. Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Characteristics of a Tariff Method. Tariff Methods: Flat Rate, Block-Rate, two-part, three-part, and power factor tariff methods.

**Power Factor Improvement**: Causes of low power factor, Methods of Improving power factor, Phase advancing and generation of reactive KVAR using static Capacitors, Most economical power factor for constant KW load and constant KVA type loads.

## TEXT BOOKS

1.M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarti (2010), A Textbook on Power System Engineering, 2ndedition, DhanpatRai& Co. Pvt. Ltd, New Delhi.
2. C.L.Wadhawa (2010), Generation, Distribution and Utilization of Electrical Energy, 3rdedition, New Age International (P) Limited, New Delhi.

## REFERENCE BOOKS

1. M.V.Deshpande (2010), Elements of Power Station design, 1stedition, Prentice Hall India Learning Private Limited, New Delhi.
2. B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", S. Nagin Chand & Company Ltd.,46th edition(2013).

## WEB REFERENCES

1. https://nptel.ac.in/courses/112/107/112107216/.
2. https://nptel.ac.in/content/storage2/courses/112107216/3%20assignment%20solution.pdf
3. https://nptel.ac.in/content/storage2/courses/112107216/Assignment-6%20questions.pdf

## E -TEXT BOOKS

1. https://www.electricalengineeringinfo.com/2017/06/principles-power-systems-vk-mehta-ebook-pdf-download.html
2 A Text Book On Power System Engineering, A. Chakrabarti, Soni Ml, P. V. Gupta, DhanpatRai Publishing Company (P) Limited, 2008, ISBN 8177000209
3. 9788177000207
https://www.scribd.com/doc/192018739/A-Textbook-of-Power-System-Engineering-by-R-K-Rajput-Google-Book

## MOOCS COURSE

1.https://nptel.ac.in/courses/112/107/112107216/

2.https://nptel.ac.in/courses/112/103/112103243/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## ELECTRICAL MACHINES II LAB

**II B. TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE406PC | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To understand the operation of synchronous machines
2. To understand the analysis of power angle curve of a synchronous machine
3. To understand the equivalent circuit of a single phase transformer and single phase induction motor
4. To understand the circle diagram of an induction motor by conducting a blocked rotor test.

### COURSE OUTCOMES

After the completion of this laboratory course, the student will be able

1. Assess the performance of different machines using different testing methods
2. To convert the Phase from three phase to two phase and vice versa
3. Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods
4. Control the active and reactive power flows in synchronous machines
5. Start different machines and control the speed and power factor.

### LIST OF EXPERIMENTS

**The following experiments are required to be conducted as compulsory experiments:**

1. Sumpner's test on a pair of single-phase transformers
2. Break test on three-phase Induction Motor.
3. No-load & Blocked rotor tests on three - phase Induction motor
4. Regulation of a three - phase alternator by synchronous impedance &m.m.f. methods
5. **V** and **Inverted V** curves of a three - phase synchronous motor.
6. Equivalent Circuit of a single-phase induction motor
7. Determination of **Xd** and **Xq** of a salient pole synchronous machine
8. OC and SC test on single phase transformer

**In addition to the above eight experiments, at least two of the following experiments are required to be conducted from the following list:**

1. Parallel operation of Single-phase Transformers

2. Separation of core losses of a single-phase transformer
3. Scott connection of transformers
4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
5. Efficiency of a three-phase alternator.
6. Heat run test on a bank of 3 Nos. of single-phase Delta connected transformers
7. Measurement of sequence impedance of a three-phase alternator.

**TEXT BOOKS**

1. J. B. Gupta (2006), Theory and Performance of Electrical Machines, 14th edition, S. K. Kataria& Sons, New Delhi.
2. P. S .Bimbra (2000), Electrical Machinery, 7th edition, Khanna Publishers, New Delhi.

**REFERENCE BOOKS**

1. I. J. Nagrath, D. P .Kothari (2001), Electric Machines, 3rd edition, Tata McGraw Hill Publishers, New Delhi.

**WEB REFERENCES**

1. https://www.sanfoundry.com › best-reference-books-advance-electrical-ma
2. https://swayam.gov.in › nd1_noc19_ee60

**E -TEXT BOOKS**

1. **Electrical Machines - II**. Authors, U.A.Bakshi, M.V.Bakshi. Publisher, Technical Publications, 2009. ISBN, 8184316070, 9788184316070.
2. **Electrical Machines 2** by J b Gupta. ISBN: 9350141604, 9789350141601.

**MOOCS COURSE**

1. https://www.classcentral.com/course/swayam-electrical-machines-ii-12948
2. https://nptel.ac.in/courses/108106072/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## POWER ELECTRONICS LAB

**II B. TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE408PC | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To enable the Student to study the gate firing circuits of SCR.
2. To enable the Student to study the module and waveforms of various DC converters with different loads.
3. To verify the different types of forced commutation circuits by connecting a resistive load.
4. To enable the Student to study the module and waveforms of various AC converters with different loads.
5. To simulate and analyze the various converter circuits.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to understand the gate firing circuits of SCR, rectifier operation and waveforms.
2. Understand chopper operation and waveforms.
3. Understand AC voltage controllers &Cycloconverters operation and waveforms.
4. Understand Series & Parallel inverter operation and waveforms.
5. Ability to simulate and analyze the various converter circuits.

### LIST OF EXPERIMENTS

**Any eight experiments should be conducted.**

1. Gate firing circuits for SCR's
2. Single Phase AC Voltage Controller with R and RL Loads
3. Single Phase half controlled bridge converter with R and RL loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits.
6. Single Phase Cycloconverter with R and RL loads
7. Single Phase parallel inverter with R and RL loads
8. Single Phase Series inverter with R and RLloads
9. DC Jones chopper with R and RL Loads
10. MOSFET Based Buck Boost chopper

**Any Two experiments should be conducted.**

1. Simulation of single-phase full converter using R, RL and RLE loads
2. Simulation of single-phase AC voltage controller using R, RL and RLE loads
3. Simulation of Buck chopper.

4. Simulation of single-phase inverter with PWM Control.

**TEXT BOOKS**

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand and Co. Delhi)
2. An introduction to practical; chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing =,Delhi)
3. Vogel's textbook of practical organic chemistry, 5$^{th}$edition
4. Textbook on experiments and calculations in engineering chemistry, S.S. Dhara

**REFERENCE BOOKS**

1. M. H. Rashid, Simulation of Electric and Electronic circuits using PSPICE – by M/s PHI Publications.
2. Rashid, Spice for power electronics and electric power, CRC Press
3. Reference guides of related software's

**WEB REFERENCES**

1. "Power Electronics: Circuits, Devices and Applications" by Rashid.
2. Power Electronics Design Testing and Simulation Laboratory Manual (Pb 2017) Paperback – 2017By Varmah K R (Author)

**E -TEXT BOOKS**

1. Simulation of Power Electronic Circuits Paperback – 1 Dec2009 by M. B. Patil (Author)
2. Power Electronics: Converters Applications and Design, Media Enhanced, 3ed Paperback – 2007 by Mohan, Undeland, Robbins (Author)

**MOOCS COURSE**

1. https://www.iitk.ac.in/new/power-electronics-laboratory
2. http://www.ee.iitkgp.ac.in/faci_pe.php

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## DIGITAL ELECTRONICS LAB

**II B. TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE409PC | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To learn basic techniques for the design of digital circuits and fundamentalconcepts used in the design of digital systems.
2. To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
3. To implement simple logical operations using combinational logic circuits
4. To design combinational logic circuits, sequential logic circuits.
5. To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines by using flip flops.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand working of logic gates.
2. Design and implementation of Combinational logic circuits.
3. Design and implementation of Sequential logic circuits.
4. Be able to use PLDs to implement the given logical problem.
5. Be able to analyze state machines using sequential elements.

### LIST OF EXPERIMENTS

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Design an Adder / Substractor
4. Design and realization 2 bit comparator
5. Design and realization a 4 – bit Gray to Binary and Binary to Gray code Converter
6. Design and realization 8x1 using 2x1 Multiplexer
7. Realization of a Full Adder/Substractor using 3X8 Decoder
8. Generation of clock using NAND / NOR gates
9. Verification of Truth Tables of Flip-flops
10. Design a Master-Slave Flip-flop
11. Design and realization of a shift register using flip-flops.

12. Design and realization a counter using flip-flops.
13. State machines

## TEXTBOOKS


1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.


## REFERENCE BOOKS


1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. Switching Theory and Logic Design – Anand Kumar, 3rd Edition, PHI, 2013.
3. Modern Digital electronics RP Jain 4th Edition, McGraw Hill


## WEB REFERENCES

1. http://blog.digitalelectronics.co.in/
2. www.nesoacademy.org/electronics-engineering/digital-electronics/digital
3. https://www.slideshare.net/JournalsPubwwwjourna/international-journal-of-digital-electronics-vol-2-issue-2
4. https://lecturenotes.in/subject/203/switching-theory-and-logic-design-stld
5. http://www.infocobuild.com/education/audio-video-courses/electronics/DigitalCircuitsSystems
6. https://nptel.ac.in/courses/117105080/

## E -TEXT BOOKS

1. https://pages.uoregon.edu/rayfrey/DigitalNotes.pdf
2. https://easyengineering.net/fundamentals-of-digital-circuits-by-anand-kumar/

## MOOCS COURSE

1. https://swayam.gov.in/courses/1392-digital-circuits-and-systems
2. https://swayam.gov.in/courses/4410-synthesis-of-digital-systems

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

## ELECTRICAL SOFTWARES

**II B. TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE410VC | B. Tech | 3 | 0 | 0 | 0 | 100 | - | 100 |

### COURSE OBJECTIVES

To learn

1. Describe the structured programming and choosing MATLAB as a mathematically-oriented programming language
2. Express basic operations, how to use menus, Help System, and different tools in MATLAB
3. Apply the most common mathematical functions stored in MATLAB to create and use user defined functions including storing them in a function file and plotting those using graphing functions: XY plots – subplots
4. To know the basic concepts of a PSPICE A/D analysis and ORCAD Programs.
5. To know the circuit construction and program development in PSPICE.

### COURSE UTCOMES

Upon successful completion of the course, the student is able to

1. Describe the structured programming and choosing MATLAB as a mathematically-oriented programming language
2. Express basic operations, how to use menus, Help System, and different tools in MATLAB
3. Apply the most common mathematical functions stored in MATLAB to create and use user defined functions including storing them in a function file and plotting those using graphing functions: XY plots – subplots
4. To know the basic concepts of a PSPICE A/D analysis and ORCAD Programs.
5. To know the circuit construction and program development in PSPICE.

| UNIT- | INTRODUCTION TO MATLAB | Classes: 12 |
|---|---|---|

Introduction to MATLAB Software, Installation of MATLAB, Use of MATLAB, MATLAB window, Command window, Workspace, Command history, Setting directory, Working with the MATLAB user interface, Basic commands, Assigning variables, Operations with variables

**Data files and Data types**:, Character and string, Arrays and vectors, Column vectors,

Row vectors

| UNIT-II | BASIC OPERATIONS ON MATLAB | Classes: 10 |
|---|---|---|

BODMAS Rules, Arithmetic operations, Operators and special characters, Mathematical and logical operators, Solving arithmetic equations, Creating rows and columns Matrix, Matrix operations, Finding transpose, determinant and inverse, Solving matrix, Trigonometric functions, Complex numbers, fractions, Real numbers, Complex numbers.

**M files**, Working with script tools, Writing Script file, and Executing script files, The MATLAB Editor, Saving m files.

| UNIT-III | PLOTS, DESIGN & SIMULINK OF MATLAB | Classes: 14 |
|---|---|---|

**Plots**: Plotting vector and matrix data, Plot labelling, curve labelling and editing.

**2D Plots:** Basic Plotting Functions, Creating a Plot, Plotting Multiple Data Sets in One Graph, Specifying Line Styles and Colors, Graphing Imaginary and Complex Data, Figure Windows, Displaying Multiple Plots in One Figure, Controlling the Axes.

**3D Plots** Creating Mesh and Surface, About Mesh and Surface Visualizing, Subplots.

**GUI Design:** Introduction Of Graphical User Interface, GUI Function Property, GUI Component Design, GUI Container.

**MATLAB Simulink:** Introduction Of Simulink, Simulink Environment & Interface, Study of Library, Circuit Oriented Design, Equation Oriented Design, Model, Subsystem Design, Connect Call back to subsystem, Application.

| UNIT-IV | INTRODUCTION TO PSPICE A/D | Classes: 12 |
|---|---|---|

PSPICE A/D, Basic analysis, advanced multi run analysis, analysis waveforms with PSPICE, using PSPICE with ORCAD Programs.

| UNIT-V | OPERATIONS IN PSPICE | Classes: 12 |
|---|---|---|

Circuit Creation, Running PSPICE, DC Sweep analysis, Transient analysis, AC Sweep analysis, Parametric and performance analysis.

**TEXT BOOKS**


1. Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, "MATLAB and its applications in Engineeirng", Person Educations.
2. Duane Hanselman, Bruce Little field, "Mastering MATLAB". Person Education
3. "PSPICE$^{R}$ , includes PSPICE A/D, Basics", Cadence publication, 2012.


**REFERENCE BOOKS**


1. David Hocuque,, "Introduction to MATLAB for engineering students", North Western University.
2. Muhammed H Rasheed, "Introduction to PSPICE using ORCAD for circuits and electronics", Eastern Economy Edition.

3. Huei-Huang Lee " programming and engineering computing with MATLAB-2018", SDC Publications

**E -TEXT BOOKS**

1. Stormy Attaway, "Matlab: A Practical Introduction to Programming and Problem Solving", Elsiever Publications.
2. Mathworks "MATLAB programming Fundementals", Mathworks products.
3. Paul W.Tuinenga"SPICE A guide to circuit simulation & Analysis using PSPICE"Prentice Hall Publications.

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## CONSTITUTION OF INDIA
## COMMON TO ALL BRANCHES

**II B. TECH- II SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| *CI409MC | B. Tech | 3 | 0 | 0 | 0 | 100 | - | 100 |

### COURSE OBJECTIVES

To learn

Objective of the constitution of India is very well written in its preamble and that is to create a state which will be This Course deals with Fundamentals and Structures of Indian Government; it is specifically designed to give a complete overview and in-depth knowledge regarding the concerns and challenges faced by the modern constitutional governments and elaborately discusses the structure, procedures, powers and duties of governmental institutions. The Course analyses in detail the basic functions of a written constitution. Also, the theories and concepts relating to constitutionalism, federalism, judicial review, constitutional interpretation, etc. are reviewed. All the discussions in the Course are updated according to the latest position and the modifications made by judicial intervention

1. Sovereign -independent to conduct internal as well as external affairs
2. Socialist - preventing concentration of wealth into few hands
3. Secular - respecting all religions equally
4. Democratic- government by the people, of the people, for the people
5. Republic - Head of the state will be elected not hereditary

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. To understand the basic concepts of democracy, republicanism, constitutionalism and to know about the constitutional theories, virtues and constitutional interpretation
2. To study and analyse the quasi-federal nature of Indian Constitution and the basic function of a written constitution regarding the allocation of State power, the functions, powers and limits of the organs of state
3. To analyse elaborately regarding the emergency and amendment procedures; the need for granting of special status or special provisions to some states
4. To know about Panchayats, Municipalities, Scheduled and Tribal areas
5. To utilize Judiciary System of India

| UNIT-I | INTRODUCTION TO INDIAN CONSTITUTION | Classes: 6 |
|---|---|---|

Meaning and importance of Constitution, Making of Indian Constitution, Salient features and the Preamble, Fundamental rights, Fundamental duties, Directive Principles.

| UNIT-II | THE AMENDMENT OF THE CONSTITUTION | Classes: 6 |
|---|---|---|

| | | |
|---|---|---|
| Need for Amendment, Types of Amendment, Judicial Review of Constituent Power, Doctrine of Basic Structure, Major Amendments and their Constitutional Values. | | |
| **UNIT-III** | **UNION & STATE EXECUTIVE AND LEGISLATURE** | **Classes:8** |
| Lok Sabha & Rajya Sabha (Composition, Powers & Functions), President & Prime Minister (Powers, Functions, position), Supreme Court-Composition, Powers & Functions, The President: Powers, Functions and Procedure for Impeachment, Judicial Review of Presidents Actions, Governor: Powers, Functions, Legislative Power of the Executive – Ordinance, Parliament and State Legislature, Privileges of Legislature, Council of Ministers - Prime Minister. | | |
| **UNIT-IV** | **MAJOR FUNCTIONARIES & EMERGENCY POWERS** | **Classes: 6** |
| Union Public Service Commission, Election Commission, Planning Commission (NITI), Significance of Emergency Powers, National Emergency – Grounds – Suspension of Fundamental Rights, State Emergency – Grounds – Judicial Review, Financial Emergency. | | |
| **UNIT-V** | **INDIAN JUDICIARY** | **Classes: 6** |
| Supreme Court of India – Appointment of Judges – Composition, Jurisdiction: Original, Appellate and Writ Jurisdiction, Prospective Overruling and Judge - Made Laws in India (Art. 141), Review of Supreme Court Decision, High Courts – Judges - Constitution, Jurisdiction: Original, Appellate, Writ Jurisdiction and Supervisory Jurisdiction | | |

**TEXT BOOKS**

1. H.M. Seervai: Constitutional Law of India
2. M.P. Jain: Indian Constitutional Law
3. Mahendra P. Singh: V. N. Shukla's Constitution of India
4. Granville Austin: The Indian Constitution: Cornerstone of a Nation

**REFERENCE BOOKS**

1. A. Sarveswarareddy, K. Sathish, K. Sudha, Constitution of India, M/S Spectrum Publications, First Edition 2021.
2. An Introduction to the Constitution of India by Dr.Durga Das Basu
3. An Introduction to the Constitution of India by M.V.Pylee
4. Indian Constitutional Law by M.P. Jain

**WEB REFERENCES**

1. https://www.wdl.org/en/item/2672/
2. https://nptel.ac.in/courses/109103135/24

**E -TEXT BOOKS**

1. https://iasexamportal.com/ebook/the-constitution-of-india
2. https://www.india.gov.in/my-government/documents/e-books

**MOOCS COURSE**

1. http://nludelhi.ac.in/images/moocs/moocs-courses.pdf
2. https://www.classcentral.com/tag/constitutional-law

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

CONTROL SYSTEMS

**III B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE501PC | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To learn

1. To understand the different ways of system representation like transfer function and state space representation.
2. To understand the system performance in time domain analysis.
3. To study the system performance in frequency domain analysis.
4. To design various controllers to improve system performance.
5. To introduce the concept of state space representation.

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. To analyze and solve different transfer function models.
2. To analyze and solve system in time domain analysis.
3. To understand and analyze systems in frequency domain analysis.
4. To study the working principles of controllers.
5. To introduce concept of state space representation.

| UNIT-I | INTRODUCTION TO CONTROL PROBLEM | Classes:10 |
|---|---|---|

Industrial Control examples. Mathematical models of physical systems. Control hardware and their models. Transfer function models of linear time-invariant systems.

Feedback Control: Open-Loop and Closed-loop systems. Benefits of Feedback. Block diagram algebra.

| UNIT-II | TIME RESPONSE ANALYSIS OF STANDARD TEST SIGNALS | Classes:15 |
|---|---|---|

Time response of first and second order systems for standard test inputs. Application of initial and final value theorem. Design specifications for second order systems based on the time-response. Concept of Stability. Routh-Hurwitz Criteria. Relative Stability analysis. Root-Locus technique. Construction of Root-loci.

| UNIT-III | FREQUENCY-RESPONSE ANALYSIS | Classes:15 |
|---|---|---|

Relationship between time and frequency response, Design specifications in frequency-domain. Frequency-domain methods of design, Polar plots, Bode plots. Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin. Closed-loop frequency response.

| UNIT-IV | INTRODUCTION TO CONTROLLER DESIGN | Classes:15 |
|---|---|---|

Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness of control systems. Application of Proportional, Integral and Derivative Controllers, Lead and Lag compensation in designs.

| UNIT-V | STATE VARIABLE ANALYSIS AND CONCEPTS OF STATE VARIABLES | Classes:13 |
|---|---|---|

State space model. Diagonalization of State Matrix. Solution of state equations. Eigen values and Stability Analysis. Concept of controllability and observability. Pole-placement by state feedback. Discrete-time systems. Difference Equations. State-space models of linear discrete-time systems. Stability of linear discrete-time systems.

**TEXTBOOKS**

1. M. Gopal, "Control Systems: Principles and Design", McGraw Hill Education, 1997.
2. B. C. Kuo, "Automatic Control System", Prentice Hall, 1995.

**REFERENCE BOOKS**

1. K. Ogata, "Modern Control Engineering", Prentice Hall, 1991.
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009.

**WEB REFERENCES**

1. https://www.tutorialspoint.com/control_systems/control_systems_state_space_model.htm
2. https://www.tutorialspoint.com/control_systems/control_systems_compensators.htm
3. https://www.tutorialspoint.com/control_systems/control_systems_nyquist_plots.htm
4. https://www.tutorialspoint.com/control_systems/control_systems_root_locus.htm
5. https://www.electrical4u.com/transfer-function/

**E -TEXTBOOKS**

1. https://easyengineering.net/control-systems-engineering-by-nagrath-nw/
2. https://kupdf.net/download/automatic-control-systems-by-benjamin-c-kuo_5af5906fe2b6f523475ddf8c_pdf
3. https://civildatas.com/download/control-systems-engineering-by-i-j-nagrath

**MOOCS COURSE**

1. https://nptel.ac.in/courses/108108076/1
2. https://nptel.ac.in/courses/108102146/
3. https://nptel.ac.in/courses/108108076/35

# St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## POWER SYSTEMS - II

**III B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE502PC | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To analyze the performance of transmission lines.
2. To understand the voltage control and compensation methods.
3. To understand the per unit representation and to examine performance of travelling waves of power systems.
4. To know the methods of overvoltage protection and Insulation coordination of transmission lines.
5. To know the symmetrical components and fault calculation analysis.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Analyze transmission line performance.
2. Apply load compensation techniques to control reactive power
3. Understand the application of per unit quantities.
4. Design over voltage protection and insulation coordination
5. Determine the fault currents for symmetrical and unbalanced faults

| UNIT-I | PERFORMANCE OF LINES | Classes:15 |
|---|---|---|

Representation of lines, short transmission lines, medium length lines, nominal T and PI-representations, long transmission lines. The equivalent circuit representation of a long Line, A, B, C, D constants, Ferranti Effect, Power flow through a transmission line, receiving end power circle diagram.

| UNIT-II | VOLTAGE CONTROL & COMPENSATION IN POWER SYSTEMS | Classes:10 |
|---|---|---|

Introduction – methods of voltage control, shunt, and series capacitors / Inductors, tap changing transformers, synchronous phase modifiers.
Introduction - Concepts of Load compensation – Load ability characteristics of overhead lines – Uncompensated transmission line – Symmetrical line – Radial line with asynchronous load – Compensation of lines.

| UNIT-III | PER UNIT REPRESENTATION OF POWER SYSTEMS & TRAVELLING WAVES ON TRANSMISSION LINES | Classes:15 |
|---|---|---|

The one-line diagram, impedance and reactance diagrams, per unit quantities, changing the base of per unit quantities, advantages of per unit system.
Production of travelling waves, open circuited line, short circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at T-junction line terminated through a capacitance, capacitor connection at a T-junction, Attenuation of travelling waves.

| UNIT-IV | OVERVOLTAGE PROTECTION AND INSULATION COORDINATION | Classes:12 |
|---|---|---|

Over voltage due to arcing ground and Peterson coil, lightning, horn gaps, surge diverters, rod gaps, expulsion type lightning arrester, valve type lightning arrester, ground wires, ground rods, counter poise, surge absorbers, insulation coordination, volt-time curves.

| UNIT-V | SYMMETRICAL COMPONENTS AND FAULT CALCULATIONS | Classes:13 |
|---|---|---|

Significance of positive, negative and zero sequence components, Average 3-phase power in terms of symmetrical components, sequence impedances and sequence networks, fault calculations, sequence network equations, single line to ground fault, line to line fault, double line to ground fault, three phase fault, faults on power systems, faults with fault impedance, reactors and their location, short circuit capacity of a bus.

## TEXTBOOKS

1. John J. Grainger & W.D. Stevenson: Power System Analysis – Mc Graw Hill International 1994.
2. C.L. Wadhwa: Electrical Power Systems – New Age International Pub. Co. Third Edition, 2001

## REFERENCE BOOKS

1. Hadi Scadat: Power System Analysis – Tata Mc Graw Hill Pub. Co. 2002
2. W.D. Stevenson: Elements of Power system Analysis – McGraw Hill International Student Edition.
3. D.P. Kothari and I. J. Nagrath, Modern Power System Analysis - Tata Mc Graw Hill Pub. Co., New Delhi, Fourth edition, 2011

## WEB REFERENCES

1. https://www.electrical4u.com/
2. Power System 2 (PS 2) Pdf Notes - Free Download 2020 | SW (smartzworld.com)
3. https://www.sanfoundry.com/1000-power-systems-questions-answers/
4. Power Systems MCQ [Free PDF] - Objective Question Answer for Power Systems Quiz - Download Now! (testbook.com)

## E -TEXTBOOKS

1. Power Systems by Bakshi | PDF (scribd.com)
2. Handbook of Power Systems II | SpringerLink
3. https://easyengineering.net/objective-electrical-technology-by-mehta/

## MOOCS COURSE

1. NPTEL:: Electrical Engineering - NOC:Power System Engineering
2. NPTEL:: Electrical Engineering - Power System Analysis
3. Electric Power Systems | Coursera

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

**III B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE503PC | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

## COURSE OBJECTIVES

1. To introduce the basic principles of all measuring instruments
2. To deal with the measurement of voltage, current, Power factor, power, energy and magnetic measurements.
3. To understand the basic concepts of smart and digital metering.

## COURSE OUTCOMES

After completion of this course, the student able to

1. Understand different types of measuring instruments, their construction, operation and characteristics
2. Identify the instruments suitable for typical measurements
3. Apply the knowledge about transducers and instrument transformers to use them effectively.
4. Apply the knowledge of smart and digital metering for industrial applications

| UNIT-I | Introduction to Measuring Instruments | Classes:15 |
|---|---|---|

Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters electrometer type and attracted disc type – extension of range of E.S. Voltmeters.

| UNIT-II | Potentiometers & Instrument Transformers | Classes:10 |
|---|---|---|

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization – applications. CT and PT – Ratio and phase angle errors

| UNIT-III | Measurement of Power & Energy | Classes:15 |
|---|---|---|

Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems. Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter.

| UNIT-IV | DC & AC Bridges | Classes:15 |
|---|---|---|

Method of measuring low, medium and high resistance – sensitivity of Wheat-stone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method.
Measurement of Inductance- Maxwell bridge, Hay's bridge, Anderson's bridge- Owen's bridge
Measurement of capacitance and loss angle –Desaunty's Bridge - Wien's bridge – Schering Bridge

| UNIT-V | Transducers | Classes:15 |
|---|---|---|

Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes.

**TEXTBOOKS**

1. 1. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016
2. 2. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications, 2012.

**REFERENCE BOOKS**

1. A. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications, 2005.
2. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd., 2007.
3. Buckingham and Price, "Electrical Measurements", Prentice – Hall, 1988.
4. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition 2010.
5. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments", fifth Edition, Wheeler Publishing, 2011.

**WEB REFERENCES**

1. http://www.electrical4u.com/
2. http://www.basicsofelectricalengineering.com/
3. https://www.electricaldeck.com
4. https://circuitglobe.com/

**E -TEXTBOOKS**

1. https://easyengineering.net/a-course-in-electronic-measurements-and-instrumentation-by-sawhney/
2. https://easyengineering.net/a-textbook-of-electrical-technology-by-rajput/

**MOOCS COURSE**

1. https://nptel.ac.in/courses/108/105/108105153/
2. https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ee44/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

| III B. TECH I SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Programme** | **Hours / Week** | | | **Credits** | **Maximum Marks** | | |
| | | L | T | P | C | CIE | SEE | Total |
| **BE504MS** | **B. Tech** | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To learn the basic Business types, impact of the Economy on Business. and firms specifically. To analyze the Business from the Financial Perspective.
2. To Plan production and cost concepts for maximizing profit.
3. To Construct financial statement in accordance with generally accepted accounting principles
4. To Analyze the Financial performance of business through Ratios
5. To Estimate investment proposals through Capital Budgeting Methods

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand Business with the use of economic theories and business structure
2. Learn Production and cost concepts for maximizing profit
3. Construct financial statement in accordance with generally accepted accounting principles.
4. Analyze the Financial performance of business through Ratios.
5. Estimate investment proposals through Capital Budgeting Methods

| UNIT-I | INTRODUCTION TO BUSINESS AND ECONOMICS | Classes: 10 |
|---|---|---|

Business: Characteristic features of Business, Features and evaluation of Private Enterprises and Public Enterprises.
Economics: Significance of Economics, types, Concepts and Importance of National Income, Inflation, Nature and Scope of Business Economics.
Demand Analysis: Demand Definition, Types of Demand, Demand Function, Law of Demand, Elasticity of Demand, Types of Elasticity of Demand, Demand Forecasting Methods.

| UNIT-II | THEORY OF PRODUCTION AND COST ANALYSIS | Classes:8 |
|---|---|---|

Theory of Production: Factors of Production, Production Function, Production Function with one variable input, Production function with two variable inputs (ISO Quants and ISO Costs), Scale of Production with Law of Returns, Cobb-Douglas Production Function.
Cost Analysis: Types of Costs, Short run and Long run Cost Functions, Break Even Analysis.

| UNIT-III | MARKET STRUCTURES, PRICING | Classes: 08 |
|---|---|---|
| Market Structures, Pricing: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly and Monopolistic Competition, Types of Pricing. | | |
| **UNIT-IV** | **FINANCIAL ACCOUNTING & FINANCIAL ANALYSIS THROUGH RATIOS** | **Classes: 12** |
| Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts. Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Capital Structure Ratios and Profitability Ratios (simple problems), Cash Flow Statement (simple problems) and Funds Flow Statement (simple problems) | | |
| **UNIT-V** | **CAPITAL BUDGETING** | **Classes: 8** |
| Capital, significance, Types of Capital, Methods and sources of raising finance. Nature of Capital Budgeting, features of Capital Budgeting proposals, Methods of Capital Budgeting: Pay Back Period Method (PBP), Accounting Rate of Return (ARR), Net Present Value Method (NPV) Simple problems. | | |

**TEXT BOOKS**

1. S K Agarwal, Business Economics, S Chand Publications, 2018
2. Dr. A. R. Aryasri, Business Economics and Financial Analysis, McGraw Hill Education, First Edition 2020.
3. Charles T Horngren, Gary L. Sundem, John A Elliott, Donna R Philbrick, Introduction to Financial Accounting, Pearson Education, 11th Edition, 2017.

**REFERENCE BOOKS**

1. K. Sudha, K. Sathish, A. Sarveswarareddy, Business Economics and Financial Analysis-M/S Spectrum Publications, First Edition 2021.
2. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
3. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.
4. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.

**WEB REFERENCES**

1. https://nptel.ac.in/courses/110106050/17
2. https://nptel.ac.in/courses/110106050/39
3. https://nptel.ac.in/courses/110106050/38

**E -TEXT BOOKS**

1. https://www.sciencedirect.com/book/9780750644549/business-economics
2. http://www.freebookcentre.net/Business/Economics-Books.html

**MOOCS COURSE**

1. https://nptel.ac.in/courses/110106050/
2. https://nptel.ac.in/courses/110106050/11

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB

**III B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE505PC | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To calibrate LPF Watt Meter, energy meter, P. F Meter using electro dynamo meter type instrument as the standard instrument
2. To determine unknown inductance, resistance, capacitance by performing experiments on D.C Bridges & A. C Bridges
3. To determine three phase active & reactive powers using single wattmeter method practically.
4. To determine the ratio and phase angle errors of current transformer and potential transformer.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Choose instruments
2. Test any instrument
3. Find the accuracy of any instrument by performing experiment
4. Calibrate PMMC instrument using D.C potentiometer

**The following experiments are required to be conducted compulsory experiments:**

1. Calibration and Testing of single-phase energy Meter.
2. Calibration of dynamometer power factor meter.
3. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
4. Dielectric oil testing using H.T. testing Kit.
5. Schering Bridge & Anderson Bridge.
6. Measurement of 3 - Phase reactive power with single-phase wattmeter.
7. Measurement of displacement with the help of LVDT.
8. Calibration LPF wattmeter – by Phantom testing

**In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted**

1. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter.
2. Measurement of 3-phase power with single watt meter and two CTs.
3. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given CT by Null method.
4. PT testing by comparison – V. G. as Null detector – Measurement of % ratio error and phase angle of the given PT
5. Resistance strain gauge – strain measurements and Calibration.
6. Transformer turns ratio measurement using AC bridges.

7. Measurement of % ratio error and phase angle of given CT by comparison.

## TEXTBOOKS


1. "G. K. Banerjee", "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016
2. "S. C. Bhargava", "Electrical Measuring Instruments and Measurements", BS Publications, 2012.


## REFERENCE BOOKS


1. "A. K. Sawhney", "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications, 2005.
2. "R. K. Rajput", "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd., 2007.
3. "Buckingham and Price", "Electrical Measurements", Prentice – Hall, 1988.
4. "Reissland, M. U", "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition 2010.
5. "E.W. Golding and F. C. Widdis", "Electrical Measurements and measuring Instruments", fifth Edition, Wheeler Publishing, 2011.


## WEB REFERENCES

1. https://www.te.com/usa-en/products/sensors/position-sensors/linear-position-sensors-lvdt-lvit.html?tab=pgp-story
2. https://circuitglobe.com/schering-bridge.html
3. https://www.electricalengineeringinfo.com/2016/12/different-types-of-dc-potentiometers-laboratory-type-cromptons-vernier-brooks.html

## E -TEXTBOOKS

1. https://www.academia.edu/8140873/A_K_Sawhney_A_course_in_Electrical_and_Electronic_Measurements_and_Instrumentation
2. https://easyengineering.net/a-textbook-of-electrical-technology-by-rajput/

## MOOCS COURSE

1. https://nptel.ac.in/courses/108108076/1
2. https://nptel.ac.in/courses/108102146/
3. https://nptel.ac.in/courses/108108076/35

# St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## CONTROL SYSTEMS LAB

**III B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE506PC | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
2. To assess the system performance using time domain analysis and methods for improving it
3. To assess the system performance using frequency domain analysis and techniques for improving the performance

To design various controllers and compensators to improve system performance

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. To improve the system performance by selecting a suitable controller and/or a compensator for a specific application
2. Apply various time domain and frequency domain techniques to assess the system performance
3. Apply various control strategies to different applications (example: Power systems, electrical drives etc)
4. Test system controllability and observability using state space representation and applications of state space representation to various system.

**The following experiments are required to be conducted compulsory experiments:**

1. Time response of Second order system
2. Characteristics of Synchros
3. Effect of feedback on DC servo motor
4. Transfer function of DC motor
5. Transfer function of DC generator
6. Temperature controller using PID
7. Characteristics of AC servo motor
8. Effect of P, PD, PI, PID Controller on a second order systems

**In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted**

1. Programmable logic controller – Study and verification of truth tables of logic gates, simple

Boolean expressions, and application of speed control of motor.
2.Lag and lead compensation – Magnitude and phase plot
3. (a) Simulation of P, PI, PID Controller.
4. (b) Linear system analysis (Time domain analysis, Error analysis) using suitable software
5. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using suitable
software
6. State space model for classical transfer function using suitable software -Verification.
7. Design of Lead-Lag compensator for the given system and with specification using suitable Software

**TEXTBOOKS**

1. M. Gopal, "Control Systems: Principles and Design", McGraw Hill Education, 1997.
2. B. C. Kuo, "Automatic Control System", Prentice Hall, 1995.

**REFERENCE BOOKS**

1. K. Ogata, "Moden Control Engineering", Prentice Hall, 1991.
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009

**WEB REFERENCES**

1. https://www.tutorialspoint.com/control_systems/control_systems_state_space_model.htm
2. https://www.tutorialspoint.com/control_systems/control_systems_compensators.htm
3. https://www.tutorialspoint.com/control_systems/control_systems_nyquist_plots.htm
4. https://www.tutorialspoint.com/control_systems/control_systems_root_locus.htm
5. https://www.electrical4u.com/transfer-function/

**E -TEXTBOOKS**

1. https://easyengineering.net/control-systems-engineering-by-nagrath-nw/
2. https://kupdf.net/download/automatic-control-systems-by-benjamin-c-kuo_5af5906fe2b6f523475ddf8c_pdf
3. https://civildatas.com/download/control-systems-engineering-by-i-j-nagrath

**MOOCS COURSE**

1. https://nptel.ac.in/courses/108108076/1
2. https://nptel.ac.in/courses/108102146/
3. https://nptel.ac.in/courses/108108076/35

# St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## POWER SYSTEMS SIMULATION LAB

**III B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE507PC | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To perform voltage distributions across insulator strings
2. To understand the high frequency transients to perform parameter estimation and fault analysis on Transmission lines
3. To calculate Time constant calculations
4. To perform Tariff Estimation
5. To perform resonance circuit simulation

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Perform various transmission line calculations
2. Understand Different circuits time constants
3. Analyze the experimental data and draw the conclusions.

### LIST OF EXPERIMENTS

1. Generation of high frequency transients through RLC circuit
2. Voltage distribution across insulator string
3. Comparison of lumped and distributed transmission lines
4. Calculation of fault currents of transmission line
5. Time constant calculation of RL circuit
6. Time constant calculation of RC circuit
7. Time constant calculation of RLC circuit
8. Simulation of Resonance circuit
9. Calculation of R, L, C, Zs of 3-phase Transmission Line
10. Estimation of TARIFF based on load curve

**NOTE:** The above experiments shall be conducted using any software tool

### TEXTBOOKS

1. http://powerunit-ju.com/wp-content/uploads/2016/11/Power-System-Analysis-by-Hadi-Saadat-Electrical-Engineering-libre.pdf
2. https://books.google.co.in/books/about/Power_System_Simulation.html?id=Y2FW94TtaQ8C&redir_esc=y
3. https://www.elsevier.com/books/simulation-of-power-system-with-renewables/kunjumuhammed/978-0-12-811187-1

## REFERENCE BOOKS

1. https://www.mathworks.com/help/matlab/getting-started-with-matlab.html
2. https://onlinelibrary.wiley.com/doi/book/10.1002/9781119546924
3. V. D. Toro, – Electrical Engineering Fundamentals Prentice Hall India,1989.

## WEB REFERENCES

1. https://eee.srmeaswari.ac.in/power-system-simulation-lab/
2. https://www.eee.upd.edu.ph/research/research-laboratories/power-systems-simulation-laboratory
3. https://www.slideshare.net/gokulvlsi/ee6711-power-system-simulation-lab-manual-66894203

## E -TEXTBOOKS

1. https://ptolemy.berkeley.edu/books/Systems/PtolemyII_DigitalV1_02.pdf
2. http://personal.psu.edu/sab51/vls/vonmeier.pdf

## MOOCS COURSE

1. https://www.coursera.org/learn/electric-power-systems
2. https://online-learning.tudelft.nl/courses/smart-grids-modeling/
3. https://nptel.ac.in/courses/108/102/108102080/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## ADVANCED COMMUNICATION SKILLS LAB

**III B. TECH- I SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EN506HS | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### INTRODUCTION

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

### OBJECTIVES

This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. Further, they would be required to communicate their ideas relevantly and coherently in writing.
3. To prepare all the students for their placements.

### SYLLABUS

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

**1. Activities on Fundamentals of Inter-personal Communication and Building Vocabulary -**

Starting a conversation – responding appropriately and relevantly – using the right body language

– Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

**2. Activities on Reading Comprehension –**General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.

**3. Activities on Writing Skills –** Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.

**4. Activities on Presentation Skills –** Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/assignments etc.

**5. Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

**MINIMUM REQUIREMENT:**

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

**SUGGESTED SOFTWARE:**

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

**TEXT BOOKS**

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd.2nd Edition.
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## INTELLECTUAL PROPERTY RIGHTS

**III B. TECH I SEMESTER**

| Course Code | Category | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| *IP510MC | B. Tech | 3 | 0 | 0 | 0 | 100 | - | 100 |

### COURSE OBJECTIVES:

1. To acquaint the learners with the basic concepts of Intellectual Property Rights.
2. To develop expertise in the learners in IPR related issues and sensitize the learners with the emerging issues in IPR and the rationale for the protection of IPR.

### COURSE OUTCOMES:

Upon successful completion of the course

1. Gain knowledge on Intellectual Property assets and generate economic wealth.
2. Assist individuals and organizations in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of Intellectual Property & knowledge.
3. Gather knowledge about Intellectual Property Rights which is important for students of engineering in particular as they are tomorrow's technocrats and creator of new technology.
4. Discover how IPR are regarded as a source of national wealth and mark of an economic leadership in context of global market scenario.
5. Study the national & International IP system.
6. Summarize that it is an incentive for further research work and investment in R & D, leading to creation of new and better products and generation of economic and social

| UNIT-I | INTRODUCTION TO INTELLECTUAL PROPERTY | Classes:7 |
|---|---|---|

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

| UNIT-II | TRADE MARKS | Classes:8 |
|---|---|---|

Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

| UNIT-III | LAW OF COPY RIGHTS | Classes:6 |
|---|---|---|
| Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.<br>Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer | | |
| **UNIT-IV** | **TRADE SECRETS** | **Classes:7** |
| Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.<br>Unfair competition: Misappropriation right of publicity, false advertising. | | |
| **UNIT-V** | **NEW DEVELOPMENT OF INTELLECTUAL PROPERTY** | **Classes:6** |
| New developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law and international development in trade secrets law. | | |

**TEXT BOOKS:**

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd

**REFERENCE BOOKS:**

1. R Radha Krishnan & S Balasubramanian, “Intellectual Property Rights”, 1st Edition, Excel Books, 2012.
2. M Ashok Kumar & Mohd Iqbal Ali, “Intellectual Property Rights”, 2nd Edition, Serial publications, 2011.

**WEB REFERENCES:**

1. http://libgen.rs/book/index.php?md5=C4A6559ECCAEFC767CE71BD91A1BAD41
2. http://libgen.rs/book/index.php?md5=6463CAD16544B347B19335FB19D6917C

**E –TEXTBOOKS:**

1. http://libgen.rs/book/index.php?md5=13C4B3A45B1C95B4A388F94729CCCFBC
2. https://maklaw.in/intellectual-property-rights/?gclid=EAIaIQobChMIsprsv_WI7QIVilVgCh29HwPzEAAYASAAEgK5YvD_BwE

**MOOCS COURSE:**

1. https://nptel.ac.in/courses/110/105/110105139/
2. https://nptel.ac.in/courses/109/106/109106137/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## POWER SYSTEM PROTECTION

**III B. TECH- II SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE601PC | B. Tech | 3 | 1 | 0 | 4 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To introduce all kinds of circuit breakers and relays for protection of Generators, Transformers and feeder bus bars from Over voltages and other hazards.
2. To describe neutral grounding for overall protection.
3. To understand the phenomenon of Over Voltages and its classification.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Compare and contrast electromagnetic, static and microprocessor-based relays
2. Apply technology to protect power system components.
3. Select relay settings of over current and distance relays.
4. Analyze quenching mechanisms used in air, oil and vacuum circuit breakers

| UNIT-I | PROTECTIVE RELAYS & OPERATING PRINCIPLES AND RELAY CONSTRUCTION | Classes:15 |
|---|---|---|

Introduction, Need for power system protection, effects of faults, evolution of protective relays, zones of protection, primary and backup protection, essential qualities of protection, classification of protective relays and schemes, current transformers, potential transformers, basic relay terminology. Electromagnetic relays, thermal relays, static relays, microprocessor based protective relays.

| UNIT-II | OVER-CURRENT PROTECTION & DISTANCE PROTECTION | Classes:10 |
|---|---|---|

Time-current characteristics, current setting, over current protective schemes, directional relay, protection of parallel feeders, protection of ring mains, Phase fault and earth fault protection, Combined earth fault and phase fault protective scheme, Directional earth fault relay.
Impedance relay, reactance relay, MHO relay, input quantities for various types of distance relays, Effect of arc resistance, Effect of power swings, effect of line length and source impedance on the performance of distance relays, selection of distance relays, MHO relay with blinders, Reduction of measuring units, switched distance schemes, auto re-closing.

| UNIT-III | PILOT RELAYING SCHEMES & AC MACHINES AND BUS ZONE PROTECTION | Classes:15 |
|---|---|---|

Wire Pilot protection, Carrier current protection.
Protection of Generators, Protection of transformers, Bus zone protection, frame leakage protection.

| UNIT-IV | STATIC RELAYS & MICROPROCESSOR BASED RELAYS | Classes:15 |
|---|---|---|

Amplitude and Phase comparators, Duality between AC and PC, Static amplitude comparator, integrating and instantaneous comparators, static phase comparators, coincidence type of phase comparator, static over current relays, static directional relay, static differential relay, static distance relays, Multi input comparators, concept of Quadrilateral and Elliptical relay characteristics. Advantages, over current relays, directional relays, distance relays.

| UNIT-V | CIRCUIT BREAKERS | Classes:10 |
|---|---|---|

Introduction, arcing in circuit breakers, arc interruption theories, re-striking and recovery voltage, resistance switching, current chopping, interruption of capacitive current, oil circuit breaker, air blast circuit breakers, SF6 circuit breaker, operating mechanism, selection of circuit breakers, high voltage d.c. breakers, ratings of circuit breakers, testing of circuit breakers.

## TEXTBOOKS


1. Badriram and D.N. Vishwakarma, Power System Protection and Switchgear, TMH 2001.
2. U.A.Bakshi, M.V.Bakshi: Switchgear and Protection, Technical Publications, 2009.


## REFERENCE BOOKS


1. C.Russel Mason – "The art and science of protective relaying, Wiley Eastern, 1995
2. L.P.Singh "Protective relaying from Electromechanical to Microprocessors", New Age International.


## WEB REFERENCES

1. https://www.electrical4u.com/protection-system-in-power-system/
2. https://www.cet.edu.in/noticefiles/228_POWER_SYSTEM_PROTECTION.pdf
3. https://na.eventscloud.com/file_uploads/aaf42a76a5588f69c7a1348d6f77fe0f_Introduction_to_System_Protection-_Protection_Basics.pdf
4. https://pcmp.springeropen.com/articles/10.1186/s41601-016-0012-2.

## E -TEXTBOOKS

1. https://books.google.com.bd/books?id=AZLbHTJEDFIC&printsec=copyright#v=onepage&q&f=false
2. https://www.ebooksfree4u.com/2018/10/power-system-by-cl-wadhwa-pdf-download.html
3. https://www.scribd.com/document/439299065/switchgear-and-protection-by-jb-gupta-pdf

## MOOCS COURSE

1. https://nptel.ac.in/courses/108/101/108101039/
2. https://nptel.ac.in/noc/courses/noc20/SEM2/noc20-ee73/
3. https://pe.gatech.edu/courses/power-system-relaying-theory-and-applications

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## MICROPROCESSORS AND MICROCONTROLLERS

**III B. TECH- II SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE602PC | B.Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To familiarize the architecture of microprocessors and micro controllers
2. To provide the knowledge about interfacing techniques of bus & memory.
3. To understand the concepts of ARM architecture
4. To study the basic concepts of Advanced ARM processors

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understands the internal architecture, organization and assembly language programming of 8086 processors.
2. Understands the internal architecture, organization and assembly language programming of 8051/controllers
3. Understands the interfacing techniques to 8086 and 8051 based systems.
4. Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors

| UNIT-I | 8080 ARCHITECTURE | Classes: 12 |
|---|---|---|

8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

**Instruction Set and Assembly Language Programming of 8086**: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

| UNIT-II | 8051 MICROCONTROLLER | Classes: 12 |
|---|---|---|

**Introduction to Microcontrollers:** Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

**8051 Real Time Control:** Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

| UNIT-III | I/O and MEMORY INTERFACE | Classes: 12 |
|---|---|---|

**I/O And Memory Interface**: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

**Serial Communication and Bus Interface**: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

| UNIT-IV | ARM ARCHITECTURE | Classes: 12 |
|---|---|---|

ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions

| UNIT-V | ADVANCED ARM PROCESSORS | Classes: 12 |
|---|---|---|

Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

## TEXT BOOKS

1. Advanced Microprocessors and Peripherals – A. K. Ray and K. M. Bhurchandani, TMH, 2nd Edition 2006.
2. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012

## REFERENCE BOOKS

1. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed, 2004.
2. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition 2006.
3. The 8051 Microcontrollers, Architecture and Programming and Applications -K. Uma Rao, Andhe Pallavi, Pearson, 2009.
4. Digital Signal Processing and Applications with the OMAP- L138 Experimenter, Donald Reay, WILEY 2012.

## WEB REFERENCES

1. https://nptel.ac.in/noc/individual_course.php?id=noc18-ec03
2. https://nptel.ac.in/noc/individual_course.php?id=noc19-ee1
3. http://www.infocobuild.com/education/audio-video-courses/electronics/MicroprocessorsMicrocontrollers-IIT-Kharagpur/lecture-44.html
4. http://www.infocobuild.com/education/audio-video-courses/electronics/MicroprocessorsMicrocontrollers-IIT-Kharagpur/lecture-49.html

## E -TEXT BOOKS

1. Advanced Microprocessors and Peripherals – A. K. Ray and K. M. Bhurchandani, TMH, 2nd Edition 2006.
2. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012

## MOOCS COURSES

1. https://onlinecourses.nptel.ac.in/noc18_ec03
2. https://www.youtube.com/watch?v=liRPtvj7bFU
3. https://www.mooc-list.com/course/introduction-arm-ost
4. https://www.mooc-list.com/tags/microprocessors
5. https://www.mooc-list.com/tags/microcontroller
6. https://freevideolectures.com/course/3018/microprocessors-and-microcontrollers
7. http://e-box.co.in/micro-processor-and-micro-controller.shtml
8. https://ieeexplore.ieee.org/document/7020281
9. https://ict.iitk.ac.in/product/microprocessors-and-microcontrollers/
10. https://www.classcentral.com/course/nptel-microprocessors-and-microcontrollers-9894

# St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## SIGNALS AND SYSYTEMS

**III B. TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE603PC | B.Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. This gives the basics of Signals and Systems required for all Electronics and Communication Engineering related courses.
2. To understand the behavior of signal in time and frequency domain
3. To understand the characteristics of LTI systems
4. This gives concepts of Signals and Systems and its analysis using different transform techniques.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Differentiate various signal functions.
2. Represent any arbitrary signal in time and frequency domain.
3. Understand the characteristics of linear time invariant systems.
4. Relate different transform techniques
5. Perform the Sampling, Reconstruction of signals and Correlation of signals.

| UNIT-I | SIGNAL ANALYSIS | Classes: 12 |
|---|---|---|

Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

| UNIT-II | FOURIER SERIES AND FOURIER TRANSFORMS | Classes: 12 |
|---|---|---|

Fourier series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

| UNIT-III | SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS | Classes: 12 |
|---|---|---|

Linear System, Impulse response, Response of a Linear System, Linear Time Invariant(LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and rise time, Convolution and Correlation of Signals, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.

| UNIT-IV | LAPLACE TRANSFORMS AND Z-TRANSFORMS | Classes: 12 |
|---|---|---|

Laplace Transforms: Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Z–Transforms: Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

| UNIT-V | SAMPLING THEOREM AND CORRELATION | Classes: 12 |
|---|---|---|

Sampling theorem: Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling –Aliasing, Introduction to Band Pass Sampling.

Correlation: Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Energy Density Spectrum, Parsevals Theorem, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Relation between Convolution and Correlation, Detection of Periodic Signals in the presence of Noise by Correlation, Extraction of Signal from Noise by Filtering.

## TEXT BOOKS

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, 2 Ed.

## REFERENCE BOOKS

1. Signals and Systems – Simon Haykin and Van Veen, Wiley 2 Ed.,
2. Signals and Systems – A. Rama Krishna Rao, 2008, TMH
3. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition
4. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, 3 Ed., 2004, PE
5. Signals and Systems – K. Deergha Rao, Birkhauser, 2018.

## WEB REFERENCES

1. https://nptel.ac.in/noc/individual_course.php?id=noc19-ee07
2. https://nptel.ac.in/courses/108106075/8
3. https://nptel.ac.in/courses/117105134/13
4. https://nptel.ac.in/courses/117102059/4

**E -TEXT BOOKS**

1. SIGNALS & SYSTEMS 2nd Edition Paperback – 1 Jul 2017by H Hsu (Author), R Ranjan (Author)
2. Signals and Systems 2nd edition 2nd Edition (English, Paperback, Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab)

**MOOCS COURSE**

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/
2. https://www.coursera.org/lecture/dsp/5-3-c-the-sampling-theorem-DcFxD

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## ELECTRICAL ENERGY CONSERVATION AND AUDITING

**III B.TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | MaximumMarks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE604PC | B.Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To learn the basics of energy audit and energy conservation schemes.
2. To comprehend the principles of energy management and understand the need of energy efficient motors and lighting design practices.
3. To learn about power factor improvement techniques and energy instruments.
4. To learn about the economic aspects o\f energy equipment.

### COURSE OUTCOMES

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

1. Understand the principle of energy audit and their economic aspects.
2. Recommend energy efficient motors and design good lighting system.
3. Understand advantages to improve the power factor.
4. Evaluate the depreciation of equipment.

| UNIT-I | BASIC PRINCIPLES OF ENERGY AUDIT | Classes:15 |
|---|---|---|

Energy audit- definitions, concept , types of audit, energy index, cost index ,pie charts, Sankey diagrams and load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit.

| UNIT-II | ENERGY MANAGEMENT | Classes:10 |
|---|---|---|

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting. Energy manager, qualities and functions, language, Questionnaire – check list for top management

| UNIT-III | ENERGY EFFICIENT MOTORS AND LIGHTING | Classes:15 |
|---|---|---|

Energy efficient motors, factors affecting efficiency, loss distribution, constructional details, characteristics – variable speed , variable duty cycle systems, RMS - voltage variation-voltage unbalance over motoring-motor energy audit. lighting system design and practice, lighting control, lighting energy audit

| UNIT-IV | POWER FACTOR IMPROVEMENT AND ENERGY INSTRUMENTS | Classes:10 |
|---|---|---|

Power factor – methods of improvement, location of capacitors, Power factor with non-linear loads, effect of harmonics on p.f, p.f motor controllers – Energy Instruments- watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers, application of PLC's.

| UNIT-V | ECONOMIC ASPECTS | Classes:15 |
|---|---|---|

Economics Analysis depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, Power factor correction, lighting – Applications of life cycle costing analysis, return on investment..

**TEXTBOOKS**

1. Energy management by W.R.Murphy & G.Mckay Butter worth, Heinemann publications, 1982.
2. Energy management hand book by W.CTurner, John Wiley and sons, 1982.

**REFERENCEBOOKS**

1. Energy efficient electric motors by John.C.Andreas, Marcel Dekker Inc Ltd-2nd edition,1995
2. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998
3. Energy management and good lighting practice : fuel efficiency- booklet12-EEO

**WEBREFERENCES**

1. https://www.azdocuments.in/2021/11/electrical-energy-conservation-and.html
2. https://www.ijeast.com/papers/135-139,Tesma412,IJEAST.pdf resistance/a/ee-voltage-and-current
3. https://www.bvmengineering.ac.in/syllabi/UG1920/EE/4ee60.pdf

**E-TEXTBOOKS**

1. https://easyengineering.net/electrical energy conservation and auditing-by-callaghan/
2. https://www.ashirwadpublication.com/book/electrical-engineering/electrical-energy-conservation-and-auditing

**MOOCSCOURSE**

1. https://beeindia.gov.in/
2. https://nptel.ac.in/courses/109526017/23
3. https://nptel.ac.in/courses/109526019/25

# St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## POWER SYSTEM LAB

**III B. TECH- II SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE605PC | B. Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. Perform testing of CT, PT's and Insulator strings
2. To find sequence impedances of 3-Φ synchronous machine and Transformer
3. To perform fault analysis on Transmission line models and Generators.

### COURSE OUTCOMES

After completion of this lab, the student will be able to

1. Perform various load flow techniques
2. Understand Different protection methods
3. Analyze the experimental data and draw the conclusions.

**The following experiments are required to be conducted as compulsory experiments:**

**Part - A**

1. Characteristics of IDMT Over-Current Relay.
2. Differential protection of 1-Φ transformer.
3. Characteristics of Micro Processor based Over Voltage/Under Voltage relay.
4. A,B,C,D constants of a Long Transmission line
5. Finding the sequence impedances of 3-Φ synchronous machine.
6. Finding the sequence impedances of 3-Φ Transformer.

**In addition to the above six experiments, at least any four of the experiments from the following list are required to be conducted.**

**Part - B**

1. Formation of YBUS.
2. Load Flow Analysis using Gauss Seidal (GS) Method.
3. Load Flow Analysis using Fast Decoupled (FD) Method.
4. Formation of ZBUS.
5. Simulation of Compensated Line

| TEXTBOOKS |
| --- |
| 1. C.L. Wadhwa: Electrical Power Systems –Third Edition, New Age International Pub. Co., 2001.<br>2. Hadi Sadat: Power System Analysis –Tata Mc Graw Hill Pub. Co. 2002. |
| **REFERENCE BOOKS** |
| 1. D. P. Kothari: Modern Power System Analysis-Tata Mc Graw Hill Pub. Co. 2003 |

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## MICROPROCESSORS AND MICROCONTROLLERS LAB

**III B. TECH- II SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE606PC | B.Tech | 0 | 0 | 3 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn
1. Introduce ALP concepts and features
2.Write ALP for arithmetic and logical operations in 8086 and 8051
3.Differentiate Serial and Parallel Interface
4.Interface different I/Os with Microprocessors

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to
1. Implement the basic programming for Arithmetic and Logical operations in 8086 microprocessor and 8051 Microcontroller
2. Identity the assembly level programming in given problem.
3. Identity the assembly level programming in given problem.
4. Understand the techniques UART operation and LCD interfacing to 8051 Microcontroller

| CYCLE-1 | USING 8086 PROCESSOR KITS AND/OR ASSEMBLER | 5 Weeks |
|---|---|---|

Assembly Language Programs to 8086 to Perform
1. Arithmetic, Logical, String Operations on 16 Bit and 32-Bit Data.
2. Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

| CYCLE-2 | USING 8051 MICROCONTROLLER KITS | 6 Weeks |
|---|---|---|

Introduction to IDE
1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swap and Branch Instructions
2. Time delay Generation Using Timers of 8051.
3. Serial Communication from / to 8051 to / from I/O devices.
4. Program Using Interrupts to Generate Square Wave 10 KHZ Frequency on P2.1 Using Timer 0 8051 in 8 bit Auto reload Mode and Connect a 1 HZ Pulse to INT1 pin and Display on Port 0. Assume Crystal Frequency as 11.0592 MHZ

| CYCLE-3 | INTERFACING I/O DEVICES TO 8051 | 5 Weeks |
|---|---|---|

1. 7 Segment Display to 8051.
2. Matrix Keypad to 8051.
3. Sequence Generator Using Serial Interface in 8051.
4. 8 bit ADC Interface to 8051.
5. Triangular Wave Generator through DAC interfaces to 8051.

**TEXT BOOKS**

1. Advanced Microprocessors and Peripherals – A. K. Ray and K. M. Bhurchandani, TMH, 2nd Edition 2006.
2. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## SIGNALS AND SYSTEMS LAB

### III B. TECH- II SEMESTER

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE607PC | B.Tech | 0 | 0 | 2 | 1 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. This gives the basics of Signals and Systems required for all Electronics and Communication Engineering related courses.
2. To understand the behavior of signal in time and frequency domain
3. To understand the characteristics of LTI systems
4. This gives concepts of Signals and Systems and its analysis using different transform techniques.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. **Understand** Basics of MATLAB syntax, functions and programming and Analyze the generation Various Signals and Sequences in MATLAB, including the operations on Signals and Sequences.
2. **Analyze** the Fourier Transform of a given signal and plotting its magnitude and phase spectrum and Sampling Theorem.
3. **Determine** the Convolution and Correlation between Signals and sequences and Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
4. **Understand** the Waveform Synthesis using Laplace Transform and Remember for Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
5. **Verification** of Weiner-Khinchine Relations and random processes for stationary in wide-sense.

## LIST OF EXPERIMENTS

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its physical realiazability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
13. Generation of Gaussian noise ( Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Verification of Sampling Theorem.
15. Removal of noise by Autocorrelation / Cross correlation.
16. Extraction of Periodic Signal masked by noise using Correlation.
17. Verification of Weiner-Khinchine Relations.
18. Checking a Random Process for Stationarity in Wide sense.

## TEXT BOOKS

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, 2 Ed.

## REFERENCE BOOKS

1. Signals and Systems – Simon Haykin and Van Veen, Wiley 2 Ed.,
2. Signals and Systems – A. Rama Krishna Rao, 2008, TMH
3. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition
4. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, 3 Ed., 2004, PE
5. Signals and Systems – K. Deergha Rao, Birkhauser, 2018.

## WEB REFERENCES

1. https://nptel.ac.in/noc/individual_course.php?id=noc19-ee07
2. https://nptel.ac.in/courses/108106075/8
3. https://nptel.ac.in/courses/117105134/13
4. https://nptel.ac.in/courses/117102059/4

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## ENVIRONMENTAL SCIENCE

**III B. TECH- II SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| *ES608BS | B. Tech | 3 | 0 | 0 | 0 | 100 | - | 100 |

### COURSE OBJECTIVES

To learn

1. Analyze the inter relationship between living organism and environment
2. Describe various types of natural resources available on the earth surface
3. Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity
4. Explain the causes, effects and control measures of various types of environmental pollutions
5. Understand the importance of environment by assessing its impact on the human world

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Differentiate between various biotic and abiotic components of ecosystem
2. Describe the various types of natural resources
3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India
4. Illustrate causes, effects, and control measures of various types of environmental pollutions
5. Understand technologies on the basis of ecological principles environmental regulations which in turn helps in sustainable development

| UNIT-I | ECOSYSTEMS | Classes: 8 |
|---|---|---|

Definition, Scope, and Importance of ecosystem. Classification, structure and function of an ecosystem, food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification.

| UNIT-II | NATURAL RESOURCES | Classes: 8 |
|---|---|---|

Classification of Resources: Living and Non-Living resources.
Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources
Land resources: Forest resources.
Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

| UNIT-III | BIODIVERSITY AND BIOTIC RESOURCES | Classes: 7 |
|---|---|---|
| Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic, optional values and hotspots of biodiversity. Endangered and endemic species of India, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. | | |
| **UNIT-IV** | **ENVIRONMENTAL POLLUTION** | **Classes: 9** |
| Types of pollution, Causes, effects and prevention and control measures of air, water, soil, noise and thermal pollution. Solid waste and e-waste management. | | |
| **UNIT-V** | **ENVIRONMENTAL POLICY AND SUSTAINABLE DEVELOPEMENT** | **Classes: 10** |
| Concept of sustainable development: Sustainable development goals. Threats to sustainability: Population explosion- crazy consumerism. Green building concept. Water conservation, Rainwater harvesting, watershed management. Environmental Policies and Legislations: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Forest (conservation) Act, 1980. Wildlife Protection Act. | | |

**TEXT BOOKS**

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Textbook of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications
4. Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi, 12 Edition, 2015

**REFERENCE BOOKS**

1. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Pvt. Ltd, New Delhi
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHL Learning Pvt. Ltd, New Delhi
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition

**WEB REFERENCES**

1. https://www.britannica.com/science/ecosystem
2. https://ocw.mit.edu/resources/#EnvironmentandSustainability

**E -TEXT BOOKS**

1. P N Palanisamy Environmental Science ISBN:9788131773253, eISBN:97899332509771 Edition: Second edition
2. Environmental Studies. Author, Dr. J. P. Sharma. Publisher, Laxmi Publications, 2009 ISBN, 8131806413, 9788131806418.

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# FUNDAMENTALS OF MANAGEMENT FOR ENGINEERS

**IV B. TECH I SEMESTER**

| Course Code | Programme | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| FM702MS | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To understand the Management Concepts, applications of Concepts in Practical aspects of business and development of Managerial Skills for Engineers.

## COURSE OUTCOMES

The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.

| UNIT-I | INTRODUCTION TO MANAGEMENT | Classes: 12 |
|---|---|---|

Evolution of Management-Taylor Theory, Henry Fayol Theory, Maslow's theory, Theory X & Y, Two factors theory, Nature & Scope-Functions of Management- Role of Manager-levels of Management-Managerial Skills - Challenges-Planning-Planning Process- Types of Plans-MBO

| UNIT-II | ORGANIZATION STRUCTURE & HRM | Classes: 14 |
|---|---|---|

Organization Design-Organizational Structure-Departmentation– Delegation-Centralization - Decentralization-Recentralization-Organizational Culture- Organizational climate- Organizational change

Human Resource Management-HR Planning - Recruitment & Selection - Training & Development- Performance appraisal - Job Satisfaction-Stress Management Practices

| UNIT-III | OPERATION MANAGEMENT | Classes: 10 |
|---|---|---|

Introduction to Operations Management-Principles and Types of Plant Layout-Methods of production (Job Batch and Mass production) - Method study and Work Measurement-Quality Management - TQM-Six sigma - Deming's Contribution to Quality – Inventory Management – EOQ - ABC Analysis - JIT System-Business Process Re-engineering (BPR)

| UNIT-IV | MARKETING MANAGEMENT | Classes: 12 |
|---|---|---|

Introduction to Marketing-Functions of Marketing-Marketing vs. Selling- Marketing Mix - Marketing Strategies - Product Life Cycle - Market Segmentation -Types of Marketing - Direct Marketing-Network Marketing - Digital Marketing-Channels of Distribution - Supply Chain Management (SCM)

| UNIT-V | PROJECT MANAGEMENT | Classes: 12 |
|---|---|---|

Introduction to Project Management-steps in Project Management – Project Planning - Project Life Cycle-Network Analysis-Program Evaluation & Review Technique (PERT)- Critical Path Method (CPM) - Project Cost Analysis - Project Crashing - Project Information Systems

## TEXT BOOKS


1. Dr. A. R. Aryasri, Fundamentals of management, McGraw Hill Education, First Edition 2018.
2. Stephen P. Robbins, Fundamentals of Management, Pearson Education, 9th Edition, 2016.
3. R.K. Singla, Fundamentals of Management & Organisational Behaviour, VK Global Publications Pvt ltd, 2020.


## REFERENCE BOOKS


1. Kotler Philip and Keller Kevin Lane: Marketing Management, Pearson, 2012.
2. Koontz and Weihrich: Essentials of Management, McGraw Hill, 2012.
3. Thomas N. Duening and John M. Ivancevich Management - Principles and Guidelines, Biztantra, 2012.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2012.


## WEB REFERENCES

1. Concepts of management & evolution: https://nptel.ac.in/courses/122/108/122108038/
2. Nature and scope of HRM: https://nptel.ac.in/courses/122/105/122105020/
3. Operations management: https://nptel.ac.in/courses/112/107/112107238/

## E -TEXT BOOKS

1. library genesis: http://libgen.rs/book/index.php?md5=57DA3CF68A3570281FCD2001B5997585
2. http://www.freebookcentre.net/Business/Management-and-Leadership-Books.html

## MOOCS COURSE

1. http://nptel.ac.in/courses/110105074/6
2. http://nptel.ac.in/courses/110105033/14
3. http://nptel.ac.in/courses/122108038/37

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# ELECTRICAL AND ELECTRONICS DESIGN LAB

**IV B.TECH – I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE701PC | B. Tech | 0 | 0 | 3 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

1. To enhance practical knowledge related to different subjects .
2. To develop hardware skills such as soldering, winding etc.
3. To develop debugging skills.
4. To increase ability for analysis and testing of circuits.
5. To give an exposure to market survey for available components.
6. To develop an ability for proper documentation of experimentation.
7. To enhance employability of a student.
8. To prepare students for working on different hardware projects.

## COURSE OUTCOMES

After completion of course, student will be able to

1. Get practical knowledge related to electrical.
2. Fabricate basic electrical circuit elements/networks.
3. Trouble shoot the electrical circuits.
4. Design filter circuit for application.
5. Get hardware skills such as soldering, winding etc.
6. Get debugging skills.

**Experiments:-**

**Group A :**

1. Design and fabrication of reactor/ electromagnet for different inductance values.
2. Design and fabrication of single-phase Induction/three phase motor stator.
3. Start delta starter wiring for automatic and manual operation.
4. Wiring of distribution box with MCB, ELCB, RCCB and MCCB.
5. Wiring of 40 W tube, T-5, LED, Metal Halide lamps and available latest luminaries.
6. Assembly of various types of contactors with wiring.
7. Assembly of DOL and 3-point starter with NVC connections and overload operation.

**Group B:**

**This group consists of electronic circuits which must be assembled and tested on general**

**purpose PCB or bread boards.**

1. Design and development of 5 V regulated power supply.
2. Design and development of precision rectifier.
3. Design and development of first order/ second order low pass/high pass filters with an application.
4. Microcontroller Interface circuit for temperature/level/speed/current/voltage measurement.
5. Peak detector using op-amplifiers.
6. Zero crossing detector using op-amplifiers
7. PCB design and layout

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## LIST OF PROFESSIONAL ELECTIVES

**Professional Elective - I**

| Course Code | Course Name |
|---|---|
| EE510PE | Power Semiconductor Drives |
| EE511PE | Computer Architecture |
| EE512PE | Electrical Machine Design |

**Professional Elective – II**

| Course Code | Course Name |
|---|---|
| EE609PE | Optimization Technique |
| EE610PE | Wind and solar energy systems |
| EE611PE | High voltage engineering |

**Professional Elective – III**

| Course Code | Course Name |
|---|---|
| EE706PE | Power Quality |
| EE707PE | Power system Dynamics |
| EE708PE | Smart Grid Technologies |

**Professional Elective – IV**

| Course Code | Course Name |
|---|---|
| EE709PE | HVDC |
| EE710PE | Electrical and Hybrid vehicles |
| EE711PE | Digital signal Processing |

**Professional Elective – V**

| Course Code | Course Name |
|---|---|
| EE802PE | Control System Design |
| EE803PE | Industrial Electrical Systems |
| EE804PE | AI Techniques in Electrical Engineering |

**Professional Elective – VI**

| Course Code | Course Name |
|---|---|
| EE805PE | Digital Control Systems |
| EE806PE | Advanced Control of Electric Drives |
| EE807PE | Embedded System Design |

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## POWER SEMICONDUCTOR DRIVES

**III B.TECH-I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE510PE | B.Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSEOBJECTIVES

To learn

1. To introduce the drive system and operating modes of drive and its characteristics.
2. To understand Speed – Torque characteristics of different motor drives by various power converter topologies.
3. To appreciate the motoring and braking operations of drive.
4. To differentiate DC and AC drives.
5. To introduce separate control and self control of synchronous motor drive.

### COURSEOUTCOMES

Upon successful completion of the course, the students able to

1. Identify the drawbacks of speed control of motor by conventional methods.
2. Differentiate Phase controlled and chopper controlled DC drives speed-torque characteristics merits and demerits.
3. Understand Ac motor drive speed–torque characteristics using different control strategies its merits and demerits.
4. Describe Slip power recovery schemes.
5. To identify the applications of Control schemes of synchronous motors.

| UNIT-I | CONTROL OF DC MOTORS | Classes:15 |
|---|---|---|

Introduction to Thyristor controlled Drives, Single Phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed d.c motors.

Three phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque characteristics – Problems.

| UNIT-II | FOUR QUADRANT OPERATION OF DC DRIVES & CONTROL OF DC MOTORS BY CHOPPERS | Classes:15 |
|---|---|---|

Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic, and Regenerative Braking operations. Four quadrant operation of D.C motors by single phase and three phase dual converters – Closed loop operation of DC motor (Block Diagram Only)

Control of DC Motors by Choppers: Single quadrant, Two quadrant and four quadrant chopper fed dc separately excited and series motors – Continuous current operation – Output voltage and current wave forms – Speed and torque expressions – speed-torque characteristics – Problems on Chopper fed D.C Motors – Closed Loop operation ( Block Diagram Only)

| UNIT-III | CONTROL OF INDUCTION MOTOR | Classes:15 |
|---|---|---|

Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics.

Variable frequency characteristics-Variable frequency control of induction motor by Voltage source and current source inverter and Cyclo converters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block Diagram Only)

| UNIT-IV | ROTOR SIDE CONTROL OF INDUCTION MOTOR | Classes:08 |
|---|---|---|

Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages, applications, problems.

| UNIT-V | CONTROL OF SYNCHRONOUS MOTORS | Classes:12 |
|---|---|---|

Separate control and self-control of synchronous motors – Operation of self-controlled synchronou motors by VSI, CSI and cyclo converters. Load commutated CSI fed Synchronous Motor - Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerica Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only)

**TEXTBOOKS**

1. "G K Dubey", Fundamentals of Electric Drives, CRC Press, 2002.
2. "Vedam Subramanyam", Thyristor Control of Electric drives, Tata McGraw Hill Publications, 1987.

**REFERENCEBOOKS**

1. "S K Pillai", A First course on Electrical Drives, New Age International (P) Ltd. 2nd Edition. 1989.
2. "P. C. Sen", Thyristor DC Drives, Wiley-Blackwell, 1981
3. "B. K. Bose", Modern Power Electronics, and AC Drives, Pearson 2015.
4. "R. Krishnan", Electric motor drives - modeling, Analysis and control, Prentice Hall PTR, 2001

**WEBREFERENCES**

1. https://www.electrical4u.com/
2. http://www.nptelvideos.in/2012/11/advanced-electric-drives.html
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-334-power-electronics-spring-2007/
4. https://www.freevideolectures.com

**E-TEXTBOOKS**

1. https://www.freeengineeringbooks.com
2. https://www.pdfdrive.com/textbook-of-electrical-technology-ac-and-dc-machines-d184089760.html

**MOOCSCOURSE**

1. https://nptel.ac.in/courses/108108077/
2. http://www.nptelvideos.in/2012/11/advanced-electric-drives.html

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# COMPUTER ARCHITECTURE

**III B. TECH- I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE511PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To learn

1. To understand basic components of computers.
2. To understand the architecture of 8086 processor.
3. To understand the instruction sets, instruction formats and various addressing modes of 8086.
4. To understand the representation of data at the machine level and how computations are performed at machine level.
5. To understand the memory organization and I/O organization.
6. To understand the parallelism both in terms of single and multiple processors.

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the concepts of microprocessors, their principles and practices.
2. Write efficient programs in assembly language of the 8086 family of microprocessors.
3. Organize a modern computer system and be able to relate it to real examples.
4. Develop the programs in assembly language for 80286, 80386 and MIPS processors in real and protected modes.
5. Implement embedded applications using ATOM processor.

| UNIT-I | INTRODUCTION TO COMPUTER ORGANIZATION | Classes: 11 |
|---|---|---|

Architecture and function of general computer system, CISC Vs RISC, Data types, Integer Arithmetic - Multiplication, Division, Fixed and Floating-point representation and arithmetic, Control unit operation, Hardware implementation of CPU with Micro instruction, microprogramming, System buses, Multi-bus organization.

| UNIT-II | MEMORY ORGANIZATION | Classes: 11 |
|---|---|---|

System memory, Cache memory - types and organization, Virtual memory and its implementation, Memory management unit, Magnetic Hard disks, Optical Disks.
Input – Output Organization
Accessing I/O devices, Direct Memory Access and DMA controller, Interrupts and Interrupt Controllers, Arbitration, Multilevel Bus Architecture, Interface circuits - Parallel and serial port. Features of PCI and PCI Express bus.

| UNIT-III | 16 AND 32 MICROPROCESSORS | Classes: 10 |
|---|---|---|

80x86 Architecture, IA – 32 and IA – 64, Programming model, Concurrent operation of EU and BIU, Real mode addressing, Segmentation, addressing modes of 80x86, Instruction set of 80x86, I/O addressing in 80x86

| UNIT-IV | PIPELINING | Classes: 11 |
|---|---|---|

Introduction to pipelining, Instruction level pipelining (ILP), compiler techniques for ILP, Data hazards, Dynamic scheduling, Dependability, Branch cost, Branch Prediction, Influence on instruction set.

| UNIT-V | DIFFERENT ARCHITECTURES | Classes: 11 |
|---|---|---|

VLIW Architecture, DSP Architecture, SoC architecture, MIPS Processor and programming

**TEXT BOOKS**

1. V. Carl, G. Zvonko and S. G. Zaky, “Computer organization”, McGraw Hill, 1978.
2. B. Brey and C. R. Sarma, “The Intel microprocessors”, Pearson Education, 2000.

**REFERENCE BOOKS**

1. J. L. Hennessy and D. A. Patterson, “Computer Architecture A Quantitative Approach”, Morgan Kauffman, 2011.
2. W. Stallings, “Computer organization”, PHI, 1987.
3. P. Barry and P. Crowley, “Modern Embedded Computing”, Morgan Kaufmann, 2012.
4. N. Mathivanan, “Microprocessors, PC Hardware and Interfacing”, Prentice Hall, 2004.
5. Y. C. Lieu and G. A. Gibson, “Microcomputer Systems: The 8086/8088 Family”, Prentice Hall India, 1986.
6. J. Uffenbeck, “The 8086/8088 Design, Programming, Interfacing”, Prentice Hall, 1987.
7. B. Govindarajalu, “IBM PC and Clones”, Tata McGraw Hill, 1991.
8. P. Able, “8086 Assembly Language Programming”, Prentice Hall India.

**WEB REFERENCES**

1. https://www.csie.nuk.edu.tw/~kcf/course/ComputerArchitecture/ComputerArchitecture_Chapter1_introduction_color.pdf
2. https://www.cse.iitd.ac.in/~srsarangi/archbook/archbook.pdf
3. http://www.svecw.edu.in/Docs%5CITIIBTechIISemLecCOA.pdf
4. https://ict.iitk.ac.in/wp-content/uploads/CS422-Computer-Architecture-patterson-5th-edition.pdf
5. https://nitsri.ac.in/Department/Electronics%20&%20Communication%20Engineering/Chapter1-Introduction.pdf

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# ELECTRICAL MACHINE DESIGN

**III B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE512PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

1. To know the major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings,
2. To analyze the thermal considerations, heat flow, temperature rise, rating of machines.
3. To understand the design of transformers
4. To study the design of induction motors
5. To know the design of synchronous machines

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the construction and performance characteristics of electrical machines.
2. Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines.
3. Understand the principles of electrical machine design and carry out a basic design of an Ac machine.
4. Use software tools to do design calculations.

| UNIT-I | INTRODUCTION | Classes:10 |
|---|---|---|

Major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings, thermal considerations, heat flow, temperature rise, rating of machines.

| UNIT-II | TRANSFORMERS | Classes:10 |
|---|---|---|

Sizing of a transformer, main dimensions, kVA output for single- and three-phase transformers, window space factor, overall dimensions, operating characteristics, regulation, no load current, temperature rise in transformers, design of cooling tank, methods for cooling of transformers.

| UNIT-III | INDUCTION MOTORS | Classes:15 |
|---|---|---|

Sizing of an induction motor, main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines, design of rotor bars & slots, design of end rings, design of wound rotor, magnetic leakage calculations, leakage reactance of poly-phase machines, magnetizing current, short circuit current, operating characteristics.

| UNIT-IV | SYNCHRONOUS MACHINES | Classes:15 |
|---|---|---|

Sizing of a synchronous machine, main dimensions, design of salient pole machines, short circuit ratio, shape of pole face, armature design, armature parameters, estimation of airgap length, design of rotor, design of damper winding, determination of full load field mmf, design of field winding, design of turbo alternators, rotor design.

| UNIT-V | COMPUTER AIDED DESIGN (CAD) | Classes:15 |
|---|---|---|

Limitations (assumptions) of traditional designs need for CAD analysis, synthesis and hybrid methods, design optimization methods, variables, constraints and objective function, problem formulation. Introduction to FEM based machine design. Introduction to **c**omplex structures of modern machines-PMSMs, BLDCs, SRM and claw-pole machines.

## TEXTBOOKS

1. A. K. Sawhney, "A Course in Electrical Machine Design", Dhanpat Rai and Sons, 1970.
2. M.G. Say, "Theory & Performance & Design of A.C. Machines" , ELBS London.

## REFERENCE BOOKS

1. S. K. Sen, "Principles of Electrical Machine Design with computer programmes", Oxford and IBH Publishing, 2006.
2. K. L. Narang, "A Text Book of Electrical Engineering Drawings", SatyaPrakashan, 1969.
3. A. Shanmuga sundaram, G. Gangadharan and R. Palani, "Electrical Machine Design Data Book", New Age International, 1979.
4. M. V. Murthy, "Computer Aided Design of Electrical Machines", B.S. Publications, 2008.
5. Electrical machines and equipment design exercise examples using Ansoft's Maxwell 2D machine design package.

## WEB REFERENCES

1. https://www.electrical4u.com/
2. https://www.oreilly.com › library › view › electrical-machines-2nd › 25_ref
3. https://swayam.gov.in › nd1_noc19_ee602.https://circuitglobe.com/
4. https://www.sanfoundry.com › best-reference-books-advance-electrical-machines
5. https://www.scribd.com › doc › Electrical-Machines-2-AC-Machines
6. https://www.slideshare.net › karthi1017 › electrical-machines-II
7. https://www.cet.edu.in › notice files › 226_Electrical_Machine-II

## E -TEXTBOOKS

1. Electrical Machines-I By U.A.Bakshi, V.U.Bakshi Technical Publications, 2009 PrintISBN:9783527340224 OnlineISBN:9783527698523 |DOI:10.1002/9783527698523 https://easyengineering.net/objective-electrical-technology-by-mehta/
2. Electrical Machines - II. Authors, U.A.Bakshi, M.V. Bakshi. Publisher, Technical Publications, 2009. ISBN, 8184316070, 9788184316070.
3. Electrical Machines 2 by J b Gupta. ISBN: 9350141604, 9789350141601.

## MOOCS COURSE

1. 1. https://nptel.ac.in/courses/108105017/
2. 2. https://swayam.gov.in/nd1_noc19_ee60/preview
3. 1. https://www.classcentral.com/course/swayam-electrical-machines-II-12948
4. 2. https://nptel.ac.in/courses/108106072/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# OPTIMIZATION TECHNIQUES

**III B. TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE609PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To learn

1. To provide introduction to some of the fundamental concepts, theories, and algorithms for pattern recognition and machine learning
2. To introduce the fundamental concepts of Pattern Representation, Nearest Neighbor Based Classifier, Bayes Classify.
3. Classify machines by their power to recognize languages.
4. Classifier, Hidden Markov Models, Decision Trees, Support Vector Machines, Clustering machines to solve problems in computing.
5. To understand the differences between an application of hand-written digit recognition

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Able to understand the concept of abstract machines and their pattern recognition algorithms
2. Able to employ finite state machines for modeling and solving computing problems and machine learning techniques in classification
3. Able to design pattern recognition problems.
4. Able to distinguish between clustering and decision problems.
5. Able to gain proficiency with mathematical tools and formal methods.

| UNIT-I | OPTIMIZATION PROBLEM | Classes: 11 |
|---|---|---|

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – Multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

| UNIT-II | LINEAR PROGRAMMING: | Classes: 11 |
|---|---|---|

**Linear Programming**: Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

**Transportation Problem:** Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

| UNIT-III | UNCONSTRAINED NON-LINEAR PROGRAMMING | Classes: 10 |
|---|---|---|

Unconstrained Non-linear Programming: One dimensional minimization methods, Classification, Fibonacci method and Quadratic interpolation method Unconstrained Optimization Techniques: Uni-variant method, Powell's method and steepest descent method.

| UNIT-IV | CONSTRAINED NON-LINEAR PROGRAMMING | Classes: 11 |
|---|---|---|

Constrained Non-linear Programming: Characteristics of a constrained problem - classification - Basic approach of Penalty Function method - Basic approach of Penalty Function method - Basic approaches of Interior and Exterior penalty function methods - Introduction to convex programming problem

| UNIT-V | DYNAMIC PROGRAMMING | Classes: 11 |
|---|---|---|

Dynamic Programming: Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution

**TEXT BOOKS**

1. Singiresu S. Rao, Engineering Optimization: Theory and Practice by John Wiley and Sons, 4th edition, 2009.
2. H. S. Kasene & K. D. Kumar, Introductory Operations Research, Springer (India), Pvt. Ltd., 2004

**REFERENCE BOOKS**

1. George Bernard Dantzig, Mukund Narain Thapa, "Linear programming", Springer series in operations research 3rd edition, 2003.
2. H. A. Taha, "Operations Research: An Introduction", 8th Edition, Pearson/Prentice Hall, 2007.
3. Kalyanmoy Deb, "Optimization for Engineering Design – Algorithms and Examples", PHI Learning Pvt. Ltd, New Delhi, 2005.

**WEB REFERENCES**

1. https://www.slideshare.net/biniyapatel/optimization-techniques-37632457
2. https://www.shsu.edu/~eco_dgf/web_chapter_a.pdf
3. https://www.britannica.com/science/optimization
4. https://web.stanford.edu/~boyd/cvxbook/bv_cvxbook.pdf

**E -TEXT BOOKS**

1. https://www.elsevier.com/books/optimization-techniques/leitmann/978-0-12-442950-5
2. https://www.routledge.com/An-Introduction-to-Optimization-Techniques/Sharma-Jain-Kumar/p/book/9780367493240
3. https://onlinelibrary.wiley.com/doi/book/10.1002/9781119490616
4. https://www.igi-global.com/book/optimization-techniques-problem-solving-uncertainty/186873

**MOOCS COURSES**

1. https://ocw.mit.edu/courses/sloan-school-of-management/15-093j-optimization-methods-fall-2009/
2. https://www.my-mooc.com/en/mooc/optimization-methods-business-analytics-mitx-15-053x/
3. https://www.my-mooc.com/en/mooc/optimization/
4. https://www.coursera.org/courses?query=optimization

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## WIND AND SOLAR ENERGY SYSTEMS

**III B.TECH- II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE610PE | B.Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSEOBJECTIVES

1. To study the physics of wind power and energy
2. To understand the principle of operation of wind generators
3. To know the solar power resources
4. To analyze the solar photo-voltaic cells
5. To discuss the solar thermal power generation
6. To identify the network integration issues.

### COURSEOUTCOMES

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

1. Understand the energy scenario and the consequent growths of the power generate renewable energy sources.
2. Understand the basic physics of wind and solar power generation.
3. Understand the power electronic interfaces for wind and solar generation.
4. Understand the issues related to the grid-integration of solar and wind energy systems.

| UNIT-I | PHYSICS OF WIND POWER | Classes:10 |
|---|---|---|

History of wind power, Indian and Global statistics, Wind physics, Betz limit ratio, stall and pitch control, Wind speed statistics-probability distributions, and Wind power-cumulative distribution functions.

| UNIT-II | WIND GENERATOR TOPOLOGIES | Classes:15 |
|---|---|---|

Review of modern wind turbine technologies, Fixed and Variable speed wind turbine, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent Magnet Synchronous Generators, Power electronics converters. Generator configurations, Converter Control.

| UNIT-III | THE SOLAR RESOURCE AND SOLAR PHOTOVOLTAIC | Classes:15 |
|---|---|---|

**The Solar Resource**

Introduction, solar radiation spectra, solar geometry, Earth Sun angles, observer Sun angles, solar day length, Estimation of solar energy availability.

**Solar Photovoltaic**

Technologies-Amorphous, mono-crystalline, polycrystalline; V-I characteristics of a PV cell, PV module, array, Power Electronic Converters for Solar Systems, Maximum Power point Tracking (MPPT) algorithms. Converter Control.

| UNIT-IV | NETWORK INTEGRATION ISSUES | Classes:15 |
|---|---|---|

Overview of grid code technical requirements. Fault ride-through for wind farms - real and reactive power regulation, voltage and frequency operating limits, solar PV and wind farm behavior during grid disturbances. Power quality issues. Power system interconnection experiences in the world. Hybrid and isolated operations of solar PV and wind systems.

| UNIT-V | Solar Thermal Power Generation | Classes:10 |
|---|---|---|

Technologies, Parabolic trough, central receivers, parabolic dish, Fresnel, solar pond, elementary analysis.

**TEXTBOOKS**

1. T. Ackermann, "Wind Power in Power Systems", John Wiley and Sons Ltd., 2005.
2. G. M. Masters, "Renewable and Efficient Electric Power Systems", John Wiley and Sons, 2004.

**REFERENCEBOOKS**

1. S. P. Sukhatme, "Solar Energy: Principles of Thermal Collection and Storage", McGraw Hill, 1984.
2. H. Siegfried and R. Waddington, "Grid integration of wind energy conversion systems" John Wiley and Sons Ltd., 2006.
3. G. N. Tiwari and M. K. Ghosal, "Renewable Energy Applications", Narosa Publications, 2004.
4. J. A. Duffie and W. A. Beckman, "Solar Engineering of Thermal Processes", John Wiley & Sons, 1991.

**WEBREFERENCES**

1. https://www.energy.gov/energysaver/hybrid-wind-and-solar-electric-systems
2. https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-020-0240-1
3. https://www.sciencedirect.com/science/article/abs/pii/S1364032115016068

**E-TEXTBOOKS**

1. https://easyengineering.net/ Principles of Thermal Collection and Storage -by S. P. Sukhatme
2. https://easyengineering.net/objective- Renewable Energy Applications - G. N. Tiwari

**MOOCSCOURSE**

1. https://nptel.ac.in/courses/108/105/108105058/
2. https://nptel.ac.in/courses/103/103/103103206/
3. https://nptel.ac.in/courses/108/108/108108078/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## HIGH VOLTAGE ENGINEERING

**III B.TECH- II SEMESTER**

| CourseCode | Programme | Hours/Week | | | Credits | MaximumMarks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE611PE | B.Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To deal with the detailed analysis of Breakdown occurring in gaseous, liquids and solid dielectrics
2. To inform about generation and measurement of High voltage and current
3. To introduce High voltage testing methods.

### COURSE OUTCOMES

At the end of the course, the student will demonstrate

1. Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
2. Knowledge of generation and measurement of D. C., A.C., & Impulse voltages.
3. Knowledge of tests on H. V. equipment and on insulating materials, as per the standards.
4. Knowledge of how over-voltages arise in a power system, and protection against these over voltages.

| UNIT-I | BREAKDOWN IN GASES, LIQUIDS AND SOLID INSULATING MATERIAL | Classes:15 |
|---|---|---|

**Breakdown in Gases**

Ionization processes and de-ionization processes, Types of Discharge, Gases as insulating materials, Breakdown in Uniform gap, non-uniform gaps, Townsend's theory, Streamer mechanism, Corona discharge.

**Breakdown in Liquid and Solid Insulating Materials**

Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Partial discharge, applications of insulating materials.

| UNIT-II | GENERATION OF HIGH VOLTAGES | Classes:10 |
|---|---|---|

Generation of high voltages, generation of high D. C. and A.C. voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

| UNIT-III | MEASUREMENTS OF HIGH VOLTAGES AND CURRENTS | Classes:15 |
|---|---|---|

Peak voltage, impulse voltage and high direct current measurement method, cathode ray oscillographs for impulse voltage and current measurement, measurement of dielectric constant and loss factor, partial discharge measurements.

| UNIT-IV | LIGHTNING AND SWITCHING OVER-VOLTAGES | Classes:15 |
|---|---|---|

Charge formation in clouds, Stepped leader, Dart leader, Lightning Surges. Switching over voltages, Protection against over-voltages, Surge diverters, Surge modifiers.

| UNIT-V | HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS AND HIGH VOLTAGE LABORATORIES | Classes:10 |
|---|---|---|

Various standards for HV Testing of electrical apparatus, IS, IEC standards, Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, power transformers and some high voltage equipment, High voltage laboratory layout, indoor and outdoor laboratories, testing facility requirements, safety precautions in H. V. Labs.

**TEXTBOOKS**

1. M. S. Naidu and V. Kamaraju, "High Voltage Engineering", McGraw Hill Education, 2013.
2. C. L. Wadhwa, "High Voltage Engineering", New Age International Publishers, 2007.

**REFERENCEBOOKS**

1. D. V. Razevig (Translated by Dr. M. P. Chourasia), "High Voltage Engineering Fundamentals", Khanna Publishers, 1993.
2. E. Kuffel, W. S. Zaengl and J. Kuffel, "High Voltage Engineering Fundamentals", Newnes Publication, 2000.
3. R. Arora and W. Mosch "High Voltage and Electrical Insulation Engineering", John Wiley & Sons, 2011.
4. Various IS standards for HV Laboratory Techniques and Testing.

**WEBREFERENCES**

1. https://www.my.helsinki.fi/home/tpaulin/Text/hveng.pdf
2. http://www.basicsofelectricalengineering.com/
3. https://www.sciencedirect.com/book/9780750636346/high-voltage-engineering-fundamentals

**E-TEXTBOOKS**

1. https://easyengineering.net/ High Voltage Engineering -by-wadhwa/
2. https://easyengineering.net/ High Voltage Engineering -by- M. S. Naidu and V. Kamaraju /

**MOOCSCOURSE**

1. https://nptel.ac.in/courses/19278076/1
2. https://nptel.ac.in/courses/109564146/
3. https://nptel.ac.in/courses/108/104/108104048/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# POWER QUALITY

**IV B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE706PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To learn

1. Definition of power quality and different terms of power quality.
2. Study of voltage power quality issue – short and long interruption.
3. Detail study of characterization of voltage sag magnitude and three phase unbalanced voltage sag.
4. Know the behaviour of power electronics loads; induction motors, synchronous motor etc by the power quality issues.
5. Overview of mitigation of power quality issues by the VSI converters.

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Know the severity of power quality problems in distribution system
2. Understand the concept of voltage sag transformation from up-stream (higher voltages) to down-stream (lower voltage)
3. Concept of improving the power quality to sensitive load by various mitigating custom power devices

| UNIT-I | INTRODUCTION | Classes:10 |
|---|---|---|

Introduction of the Power Quality (PQ) problem, Terms used in PQ: Voltage, Sag, Swell, Surges, Harmonics, over voltages, spikes, Voltage fluctuations, Transients, Interruption, overview of power quality phenomenon, Remedies to improve power quality, power quality monitoring.

| UNIT-II | LONG & SHORT INTERRUPTIONS | Classes:15 |
|---|---|---|

Interruptions – Definition – Difference between failures, outage, Interruptions – causes of Long Interruptions – Origin of Interruptions – Limits for the Interruption frequency – Limits for the interruption duration – costs of Interruption – Overview of Reliability evaluation to power quality, comparison of observations and reliability evaluation.

**Short interruptions**: definition, origin of short interruptions, basic principle, fuse saving, voltage magnitude events due to re-closing, voltage during the interruption, monitoring of short interruptions, difference between medium and low voltage systems. Multiple events, single phase tripping – voltage and current during fault period, voltage and current at post fault period, stochastic prediction of short interruptions.

| UNIT-III | SINGLE AND THREE PHASE VOLTAGE SAG CHARACTERIZATION: | Classes:15 |
|---|---|---|

Voltage sag – definition, causes of voltage sag, voltage sag magnitude, and monitoring, theoretical calculation of voltage sag magnitude, voltage sag calculation in non-radial systems, meshed systems, and voltage sag duration.

Three phase faults, phase angle jumps, magnitude and phase angle jumps for three phase unbalanced sags, load influence on voltage sags.

| UNIT-IV | Power Quality Considerations In Industrial Power Systems: | Classes:10 |
|---|---|---|

Voltage sag – equipment behaviour of Power electronic loads, induction motors, synchronous motors, computers, consumer electronics, adjustable speed AC drives and its operation. Mitigation of AC Drives,adjustable speed DC drives and its operation, mitigation methods of DC drives.

| UNIT-V | MITIGATION OF INTERRUPTIONS & VOLTAGE SAGS: | Classes:15 |
|---|---|---|

Overview of mitigation methods – from fault to trip, reducing the number of faults, reducing the fault clearing time changing the power system, installing mitigation equipment, improving equipment immunity, different events and mitigation methods. System equipment interface – voltage source converter, series voltage controller, shunt controller, combined shunt and series controller.

**Power Quality and EMC Standards:** Introduction to standardization, IEC Electromagnetic compatibility standards, European voltage characteristics standards, PQ surveys.

## TEXTBOOKS


1. "Math H J Bollen", "Understanding Power Quality Problems" , IEEE Press, 2000.
2. "R. Sastry Vedam and Mulukutla S. Sarma", "Power Quality VAR Compensation in Power Systems", CRC Press, 2008


## REFERENCE BOOKS


1. C. Sankaran, Power Quality, CRC Press 2001.
2. Roger C. Dugan, Mark F. Mc Granaghan, Surya Santoso, H. Wayne Beaty, Electrical Power Systems Quality, Tata McGraw Hill Education Private Ltd, 3rd Edition 2012.


## WEB REFERENCES

1. https://www.power qualityworld.com/
2. https://www.researchgate.net.
3. https://www.aar.faculty.asu.edu/classes.

## E -TEXTBOOKS

1. Arindam Ghosh, Gerard Ledwich, Power quality enhancement using custom power devices, Kluwer academic publishers, 2002.
2. https://www.freebookcentre.net.

## MOOCS COURSE

1. https://nptel.ac.in/courses/108/102/108102179/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## POWER SYSTEM DYNAMICS

**IV B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE707PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn
1. To remember the dynamic characteristics of power system equipment.
2. To recognize dynamic performance of power systems.
3. To illustrate the system stability and controls.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to
1. Choose the fundamental dynamic behavior and controls of power systems to perform basic analysis.
2. Comprehend concepts in modeling and simulating the dynamic phenomena of power systems Interpret results of system stability studies.
3. Analyze theory and practice of modeling main power system components, such as synchronous machines, excitation systems and governors.

| UNIT-I | BASIC CONCEPTS | Classes:15 |
|---|---|---|

Power system stability states of operation and system security – system dynamics – problems system model analysis of steady State stability and transient stability – simplified representation of Excitation control.

| UNIT-II | MODELING OF SYNCHRONOUS MACHINE | Classes:10 |
|---|---|---|

Synchronous machine – park's Transformation-analysis of steady state performance per – unit quantities-Equivalent circuits of synchronous machine determination of parameters of equivalent circuits.

| UNIT-III | EXCITATION SYSTEM | Classes:15 |
|---|---|---|

Excitation system modeling-excitation systems block Diagram – system representation by state equations-Dynamics of a synchronous generator connected to infinite bus – system model Synchronous machine model-stator equations rotor equations – Synchronous machine model with field circuit – one equivalent damper winding on q axis.

| UNIT-IV | ANALYSIS OF SINGLE MACHINE SYSTEM | Classes:15 |
|---|---|---|
| Small signal analysis with block diagram – Representation Characteristic equation and application of Routh Hurwitz criterion- synchronizing and damping torque analysis-small signal model – State equations. | | |
| **UNIT-V** | **APPLICATION OF POWER SYSTEM STABILIZERS** | **Classes:10** |
| Basic concepts in applying PSS – Control signals – Structure and tuning of PSS – Washout circuit – Dynamic compensator analysis of single machine infinite bus system with and without PSS. | | |

**TEXTBOOKS**

1. K. R. PADIYAR," Power system dynamics "- B.S. Publications.
2. P.M. Anderson and A. A. Fouad, "Power system control and stability", IEEE Press.

**REFERENCE BOOKS**

1. R. Ramanujam, "Power Systems Dynamics"- PHI Publications.
2. James R. Bumby, formerly Reader at Durham University, UK.

**WEB REFERENCES**

1. https://www.electrical4u.com/
2. http://www.power systems .com/
3. https://www.Fouad academy.org/
4. power systems/a/ee-voltage-and-current
5. https://power supply globe.com/

**E -TEXTBOOKS**

1. https://easyengineering.net/ Power Systems Dynamics"- PHI Publications /
2. https://easyengineering.net/ Power system control and stability", IEEE Press /

**MOOCS COURSE**

1. https://nptel.ac.in/courses/108108076/4
2. https://nptel.ac.in/courses/108102146/
3. https://nptel.ac.in/courses/108108076/38

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# SMART GRID TECHNOLOGIES

**IV B. TECH- I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE708PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

1. To group various aspects of the smart grid,
2. To defend smart grid design to meet the needs of a utility
3. To select issues and challenges that remain to be solved
4. To analyze basics of electricity, electricity generation, economics of supply and demand, and the various aspects of electricity market operations in both regulated and deregulated environment.

## COURSE OUTCOMES

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

1. Understand the features of small grid in the context of Indian grid.
2. Understand the role of automation in transmission and distribution.
3. Apply evolutionary algorithms for smart grid.
4. Understand operation and maintenance of PMUs, PDCs, WAMs, and voltage and frequency control in micro grid

| UNIT-I | Introduction to Smart Grid | Classes:15 |
|---|---|---|

**Introduction to Smart Grid:** What is Smart Grid? Working definitions of Smart Grid and Associated Concepts –Smart grid Functions-Traditional Power Grid and Smart Grid –New Technologies for Smart Grid – Advantages –Indian Smart Grid –Key Challenges for Smart Grid.

| UNIT-II | Smart Grid Architecture | Classes:10 |
|---|---|---|

**Smart Grid Architecture:** Components and Architecture of Smart Grid Design –Review of the proposed architectures for Smart Grid. The fundamental components of Smart Grid designs – Transmission Automation – Distribution Automation –Renewable Integration

| UNIT-III | Tools and Techniques for Smart Grid | Classes:15 |
|---|---|---|

**Tools and Techniques for Smart Grid:** Computational Techniques –Static and Dynamic Optimization Techniques –Computational Intelligence Techniques –Evolutionary Algorithms –Artificial Intelligence techniques.

| UNIT-IV | Distribution Generation Technologies | Classes:15 |
|---|---|---|

**Distribution Generation Technologies:** Introduction to Renewable Energy Technologies –Micro grids –Storage Technologies –Electric Vehicles and plug –in hybrids –Environmental impact and Climate Change –Economic Issues.

**Communication Technologies and Smart Grid:** Introduction to Communication Technology – Synchro-Phasor Measurement Units (PMUs) –Wide Area Measurement Systems (WAMS).

| UNIT-V | Control of Smart Power Grid System | Classes:15 |
|---|---|---|

**Control of Smart Power Grid System:** Load Frequency Control (LFC) in Micro Grid System –Voltage Control in Micro Grid System – Reactive Power Control in Smart Grid. Case Studies and Test beds for the Smart Grids.

## TEXTBOOKS

1. 1. Stuart Borlase, Smart Grids, Infrastructure, Technology and Solutions, CRC Press, 2013
2. 2. Gil Masters, Renewable and Efficient Electric Power System, Wiley-IEEE Press, 2004

## REFERENCE BOOKS

1. 1. A.G. Phadke and J.S. Thorp, "Synchronized Phasor Measurements and their Applications", Springer Edition, 2010.
2. 2. T. Ackermann, Wind Power in Power Systems, Hoboken, NJ, USA, John Wiley, 2005

## WEB REFERENCES

1. https://www.electrical4u.com/
2. http://www.basicsofelectricalengineering.com/
3. https://www.electricaldeck.com
4. https://circuitglobe.com/

## E -TEXTBOOKS

1. http://www.freepdfbook.com/smart-grids-infrastructure-technology-and-solutions-by-stuart-borlase/
2. https://www.routledgehandbooks.com/pdf/doi/10.1201/9781351228480-3
3. http://www.a-ghadimi.com/files/Courses/Renewable%20Energy/REN_Book.pdf

## MOOCS COURSE

1. https://nptel.ac.in/courses/108/107/108107113/
2. https://nptel.ac.in/courses/108/108/108108034/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## HVDC

**IV B.TECH -I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | MaximumMarks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE709PE | B.Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To compare EHVAC and HVDC systems.
2. To analyze Graetz circuit and also explain 6 and 12 pulse converters.
3. To control HVDC systems with various methods.
4. To perform power flow analysis in AC/DC systems.
5. To describe various protection methods for HVDC systems and Harmonics.

### COURSE OUTCOMES

Upon successful completion of the course, the students able to

1. To compare EHVAC and HVDC system and describe various types of DC links.
2. To analyze Graetz circuit for rectifier and inverter mode of operation.
3. To describe various methods for the control of HVDC systems.
4. To perform power flow analysis in AC/DC systems.
5. To describe various protection methods for HVDC systems and classify harmonics and design different types of filters.

| UNIT-I | BASIC CONCEPTS AND ANALYSIS OF HVDC CONVERTERS | Classes:15 |
|---|---|---|

Basic Concepts: Necessity of HVDC systems, Economics and Terminal equipment of HVDC transmission systems, Types of HVDC Links, Apparatus required for HVDC Systems, Comparison of AC and DC Transmission, Application of DC Transmission System, Planning and Modern trends in D.C. Transmission.

Analysis of HVDC Converters: Choice of Converter Configuration, Analysis of Graetz circuit, Characteristics of 6 Pulse and 12 Pulse converters, Cases of two 3 phase converters in Y/Y mode – their performance.

| UNIT-II | CONVERTER AND HVDC SYSTEM CONTROL AND REACTIVE POWER CONTROL IN HVDC | Classes:15 |
|---|---|---|

Converter and HVDC System Control: Principle of DC Link Control, Converters Control Characteristics, Firing angle control, Current and extinction angle control, Effect of source inductance on the system, Starting and stopping of DC link, Power Control.

Reactive Power Control in HVDC: Introduction, Reactive Power Requirements in steady state, sources of reactive power- Static VAR Compensators, Reactive power control during transients.

| UNIT-III | POWER FLOW ANALYSIS IN AC/DC SYSTEMS | Classes:12 |
|---|---|---|

Power Flow Analysis in AC/DC Systems: Modelling of DC Links, DC Network, DC Converter, Controller Equations, Solution of DC load flow, P.U. System for DC quantities, solution of AC-DC Power flow-Simultaneous method-Sequential method.

| UNIT-IV | CONVERTER FAULTS AND PROTECTION | Classes:12 |
|---|---|---|
| Converter faults, protection against over current and over voltage in converter station, surge arresters, smoothing reactors, DC breakers, Audible noise, space charge field, corona effects on DC lines, Radio interference. | | |

| UNIT-V | HARMONICS AND FILTERS | Classes:10 |
|---|---|---|
| Generation of Harmonics, Characteristics harmonics, calculation of AC Harmonics, Non-Characteristics harmonics, adverse effects of harmonics, Calculation of voltage and Current harmonics, Effect of Pulse number on harmonics.<br>Types of AC filters, Design of Single tuned filters –Design of High pass filters. | | |

**TEXTBOOKS**

1. "K.R Padiyar", HVDC Power Transmission Systems: Technology and system Interactions, New Age International (P) Limited and Publishers, 1990.
2. "S K Kamakshaiah, V Kamaraju", HVDC Transmission, TMH Publishers, 2011.

**REFERENCE BOOKS**

1. "S.Rao", EHVAC and HVDC Transmission Engineering and Practice, Khanna publications, 3rd Edition 1999.
2. "Jos Arrillaga", HVDC Transmission, The Institute of electrical engineers,IEE power & energy series29,2nd edition 1998.
3. "E.W.Kimbark", Direct current Transmission, John Wiley and Sons, volume 1, 1971.
4. "E.Uhlmann", Power Transmission by Direct current, B.S. Publications, 2009.

**WEB REFERENCES**

1. https://www.electrical4u.com/
2. http://www.basicsofelectricalengineering.com/
3. https://onlinelibrary.wiley.com/doi/book/10.1002/9780470822975
4. https://www.accessengineeringlibrary.com/content/book/9780071771917/chapter/chapter11

**E-TEXTBOOKS**

1. https://onlinelibrary.wiley.com/doi/book/10.1002/9780470822975
2. https://easyengineering.net/hvdc-power-transmission-systems-by-padiyar/
3. https://www.geniuspublications.com/our-books/Engineering-Books/EE-Branch/ehv-ac-dc-transmission

**MOOCS COURSE**

1. https://nptel.ac.in/courses/108/104/108104013/
2. https://wireless.education/study/hvdc-transmission-substation-in-detail-engineering-online-course-by-udemy/
3. https://npti.gov.in/hvdc-transmission-systems

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## ELECTRICAL AND HYBRID VEHICLES

**IV B. TECH- I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE710PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To understand upcoming technology of electric and hybrid electric vehicles
2. Analyse different aspects of drive train topologies
3.learn different energy management strategies
4.To understand different communication systems used in electric and Hybrid electric vehicles
5. Explain the concept of vehicle to grid configurations

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1.Understand the models to describe hybrid vehicles and their performance.
2.Understand the different possible ways of energy storage.
3.Understand the different strategies related to energy storage systems.
4. Assess the impact of conventional vehicles on the society and different types of drive train topologies
5. Categorize different types of motors used in electric and hybrid electric vehicles

| UNIT-I | INTRODUCTION | Classes:15 |
|---|---|---|

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance.

| UNIT-II | INTRODUCTION TO HYBRID ELECTRIC VEHICLES | Classes:10 |
|---|---|---|

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

**HYBRID ELECTRIC DRIVE-TRAINS:** Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

| UNIT-III | ELECTRIC TRAINS | Classes:15 |
|---|---|---|

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

**ELECTRIC PROPULSION UNIT:** Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

| UNIT-IV | ENERGY STORAGE | Classes:15 |
|---|---|---|

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super

Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems

| UNIT-V | ENERGY MANAGEMENT STRATEGIES | Classes:10 |
|---|---|---|

Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

**CASE STUDIES:** Design of a Hybrid Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV).

**TEXTBOOKS**

1. C. Mi, M. A. Masrur and D. W. Gao, "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", John Wiley & Sons, 2011.
2. S. Onori, L. Serrao and G. Rizzoni, "Hybrid Electric Vehicles: Energy Management Strategies", Springer, 2015.
3. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals", CRC Press, 2010.
4. James Larminie, "Electric Vehicle Technology Explained", John Wiley & Sons, 2003
5. Iqbal Hussain, "Electric & Hybrid Vehicles – Design Fundamentals", Second Edition, CRC Press, 2011

**REFERENCE BOOKS**

1. Hybrid Vehicles and the future of personal transportation, Allen Fuhs, CRC Press, 2011.
2. Vehicle Power Management: Modelling, Control and Optimization, Xi Zhang, Chris Mi, Springer, 2011.
3. M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design", CRC Press, 2004.
4. T. Denton, "Electric and Hybrid Vehicles", Routledge, 2016.

**WEB REFERENCES**

1. https://www.electrical4u.com/
2. http://www.basicsofelectricalengineering.com/
3. https://www.khanacademy.org/science/physics/circuits-topic/circuits-
4. https://circuitglobe.com/

**E -TEXTBOOKS**

1. https://easyengineering.net/ Electric and Hybrid Vehicles Design Fundamentals by- Iqbal Hussain /
2. https://easyengineering.net/ History of Electrical Vehicle-by- Dr Sangeet Dwivedi/

**MOOCS COURSE**

1. https://nptel.ac.in/courses/108108076/1
2. https://nptel.ac.in/courses/108102146/
3. https://nptel.ac.in/courses/108108076/35

# St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## DIGITAL SIGNAL PROCESSING

| IV B. TECH- I SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Programme** | **Hours / Week** | | | **Credits** | **Maximum Marks** | | |
| | | **L** | **T** | **P** | **C** | **CIE** | **SEE** | **Total** |
| **EE711PE** | **B.Tech** | **3** | **0** | **0** | **3** | **30** | **70** | **100** |

### COURSE OBJECTIVES

To learn

1. To provide background and fundamental material for the analysis and processing of digital signals and acquaint in Multi-rate signal processing techniques.
2. To understand the fast computation of DFT and appreciate the FFT processing.
3. To design IIR digital filters, analyze and synthesize for a given specifications.
4. To design FIR digital filters using window techniques, analyze and synthesize for a given specifications.
5. To realize digital filter techniques and understand the concepts of finite word length effects.

### COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:

1. To **Understand** the operations on signals and characteristics of Linear Shift Invariant system and Multi rate DSP Techniques.
2. To **Build** the relationship among Z-Transform, DFT, FFT and various Transforms.
3. To **Design** of infinite impulse response filters for a given specification.
4. To **Evaluate** the Performance of finite impulse response filters
5. To A**nalyze** the finite length word effects and to realize Digital Filters.

| UNIT-I | INTRODUCTION | Classes: 12 |
|---|---|---|

**Introduction to Digital Signal Processing:** Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Normalized Frequency, Linear Shift Invariant Systems, Stability, and Causality, linear differential equation to difference equation, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems.

**Multirate Digital Signal Processing:** Introduction, Down Sampling, Decimation, Up sampling, Interpolation, Sampling Rate Conversion. Applications of Multirate Digital Signal Processing.

| UNIT-II | DISCRETE FOURIER SERIES AND FAST FOURIER TRANSFORMS | Classes: 12 |
|---|---|---|

**Discrete Fourier series:** Fourier Series, Fourier Transform, Laplace Transform and Z-Transform relation, DFS Representation of Periodic Sequences, Properties of Discrete Fourier Series, Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z-Transform.

**Fast Fourier Transforms:** Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT.

| UNIT-III | IIR DIGITAL FILTERS | Classes: 10 |
|---|---|---|

**IIR Digital Filters:** Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

| UNIT-IV | FIR DIGITAL FILTERS | Classes: 10 |
|---|---|---|

**FIR Digital Filters:** Characteristics of FIR Digital Filters, Frequency Response. Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

| UNIT-V | REALIZATION OF DIGITAL FILTERS AND FINITE WORD LENGTH EFFECTS | Classes: 10 |
|---|---|---|

**Realization of Digital Filters:** Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms.

**Finite Word Length Effects:** Limit cycles, Overflow Oscillations, Round-off Noise in IIR Digital Filters, Computational Output Round Off Noise, Methods to Prevent Overflow, Trade Off Between Round Off and Overflow Noise, Measurement of Coefficient Quantization Effects through Pole-Zero Movement, Dead Band Effects.

## TEXT BOOKS

1. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.

## REFERENCE BOOKS

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
3. Digital Signal Processing – S. Salivahanan, A. Vallavaraj and C. Gnanapriya, TMH, 2009
4. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and Barrie W. Jervis, 2nd Edition, Pearson Education, 2009

## WEB REFERENCES

1. ttps://freevideolectures.com/course/2339/digital-signal-processing-iitkharagpur/17
2. http://study.aisectonline.com/DisplaySub2SubCategory.aspx?Sub2Cat=10141
3. https://nptel.ac.in/noc/individual_course.php?id=noc18-ee30
4. http://www.infocobuild.com/education/audio-video-courses/electronics/DiscreteTimeSignalProcessing-IIT-Kharagpur/lecture-06.html

## E -TEXT BOOKS

1. https://www.google.co.in/books/edition/DIGITAL_SIGNAL_PROCESSING/cLAbjlSN7qQC?hl=en&gbpv=1&dq=inauthor:%22NAGOORKANI%22&printsec=frontcover
2. https://fmipa.umri.ac.id/wp-content/uploads/2016/03/Andreas-Intoniou-Digital-signal-processing.9780071454247.31527.pdf
3. https://www.riverpublishers.com/pdf/ebook/RP_E9788792982032.pdf

| MOOCS COURSE |
| --- |
| 1. https://nptel.ac.in/courses/108105055/10<br>2. http://freevideolectures.com/Course/2339/Digital-z transforms-IITKharagpur<br>3. http://study.aisectonline.com/Login.aspx?CID=CoursesSelect.aspx?courseid=11589#https://www.youtube.com/watch?v=V-kLaH4139o<br>4. https://cosmolearning.org/video-lectures/digital-filter-design-12020/ |

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## CONTROL SYSTEMS DESIGN

**IV B. TECH- II SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE802PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To know the time and frequency domain design problem specifications.
2. To understand the design of classical control systems in time-domain
3. To analyze the design aspects of classical control systems in frequency-domain
4. To know the design of various compensator controllers
5. To identify the performance of the systems by design them in state-space
6. To study the effects of nonlinearities on various systems performance

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand various design specifications.
2. Design controllers to satisfy the desired design specifications using simple controller structures(P, PI, PID, compensators).
3. Design controllers using the state-space approach.

| UNIT-I | DESIGN SPECIFICATIONS: | Classes:10 |
|---|---|---|

Introduction to design problem and philosophy. Introduction to time domain and frequency domain design specification and its physical relevance. Effect of gain on transient and steady state response. Effect of addition of pole on system performance. Effect of addition of zero on system response.

| UNIT-II | DESIGN OF CLASSICAL CONTROL SYSTEM IN THE TIME DOMAIN | Classes:15 |
|---|---|---|

Introduction to compensator. Design of Lag, lead lag-lead compensator in time domain. Feedback and Feed forward compensator design. Feedback compensation. Realization of compensators.

| UNIT-III | DESIGN OF CLASSICAL CONTROL SYSTEM IN FREQUENCY DOMAIN: | Classes:15 |
|---|---|---|

Compensator design in frequency domain to improve steady state and transient response. Feedback and Feed forward compensator design using bode diagram.

| UNIT-IV | DESIGN OF PID CONTROLLERS: | Classes:10 |
|---|---|---|
| Design of P, PI, PD and PID controllers in time domain and frequency domain for first, second and third order systems. Control loop with auxiliary feedback – Feed forward control. | | |

| UNIT-V | CONTROL SYSTEM DESIGN IN STATE SPACE: | Classes:15 |
|---|---|---|
| Review of state space representation. Concept of controllability & observability, effect of pole zero cancellation on the controllability & observability of thesystem, pole placement design through state feedback. Ackerman's Formula for feedback gain design.Design of Observer. Reduced order observer. Separation Principle.<br>**Non-linearities and Its Effect on System Performance:** Various types of non-linearities. Effect of various non-linearities on system performance. Singular points. Phase plot analysis. | | |

## TEXTBOOKS

1. N. Nise, "Control system Engineering", John Wiley, 2000.
2. I. J. Nagrath and M. Gopal, "Control system engineering", Wiley, 2000.

## REFERENCE BOOKS

1. M. Gopal, "Digital Control Engineering", Wiley Eastern, 1988.
2. K. Ogata, "Modern Control Engineering", Prentice Hall, 2010.
3. B. C. Kuo, "Automatic Control system", Prentice Hall, 1995.
4. J. J. D'Azzo and C. H. Houpis, "Linear control system analysis and design (conventional andmodern)", McGraw Hill, 1995.

   R. T. Stefani and G. H. Hostetter, "Design of feedback Control Systems", Saunders CollegePub, 1994.

## WEB REFERENCES

1. https://www.researchgate.net
2. https://www.aar.faculty.asu.edu./classes
3. https://www.facstaff.bucknell.edu/
4. https://www.electrical4u.com

## E -TEXTBOOKS

1. https://www.jntubook.com/
2. https://www.freeengineeringbooks.com

## MOOCS COURSE

1. https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ph16/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# INDUSTRIAL ELECTRICAL SYSTEMS

**IV B.TECH – II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE803PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

1. To understand the various electrical system components
2. To know the residential and commercial electrical systems
3. To study the illumination systems
4. To discuss about the industrial electrical systems

## COURSE OUTCOMES

After completing this course the student must demonstrate the knowledge and ability

1. To Understand the electrical wiring systems for residential, commercial and industrial consumers representing the systems with standard symbols and drawings, SLD
2. To Understand various components of industrial electrical systems
3. To Analyze and select the proper size of various electrical system components

| UNIT-I | ELECTRICAL SYSTEM COMPONENTS | Classes:15 |
|---|---|---|

LT system wiring components, selection of cables, wires, switches, distribution box, metering system,

Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices.

| UNIT-II | RESIDENTIAL AND COMMERCIAL ELECTRICAL SYSTEMS | Classes:10 |
|---|---|---|

Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

| UNIT-III | ILLUMINATION SYSTEMS | Classes:15 |
|---|---|---|

Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premise, flood lighting ,Street lighting , Factory lighting.

| UNIT-IV | INDUSTRIAL ELECTRICAL SYSTEMS – I | Classes:15 |
|---|---|---|

HT connect ion, industrial substation, Transformer select ion, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – KVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

| UNIT-V | INDUSTRIAL ELECTRICAL SYSTEMS – II | Classes:10 |
|---|---|---|

DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

## TEXT BOOKS


1. S. L. Uppal and G. C. Garg, "Electrical Wiring, Estimating & costing", Khanna publishers, 2008.
2. K. B. Raina, "Electrical Design, Estimating & Costing", New age International, 2007.


## REFERENCE BOOKS


1. S. Singh and R. D. Singh, "Electrical estimating and costing", Dhanpat Rai and Co., 1997.
2. Web site for IS Standards.
3. H. Joshi, "Residential Commercial and Industrial Systems", McGraw Hill Education, 2008.


## WEB REFERENCES

1. https://www.electrical4u.com/
2. https://circuitglobe.com/
3. https://www.integritypowerandelectric.com/electrical-contracting-services-articles/2014/07/30/the-difference-between-residential-and-commercial-electrical-wiring/
4. https://girishsab.wordpress.com/identification-of-various-types-of-electrical-accessories-and-components/
5. https://www.electricalindia.in/selection-of-electrical-power-cables/

## E- TEXTBOOKS

1. https://jcboseust.ac.in/electrical/index.php/download-for-student
2. https://www.kopykitab.com/Industrial-Electrical-Systems-I-by-B-P-Patil-M-A-Chaudhari

## MOOCS COURSE

1. https://nptel.ac.in/courses/108/105/108105053/
2. https://www.digimat.in/nptel/courses/video/108105060/L19.html
3. https://nptel.ac.in/courses/108/107/108107167/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## AI TECHNIQUES IN ELECTRICAL ENGINEERING

**IV B. TECH- II SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE804PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

To learn

1. To locate soft commanding methodologies, such as artificial neural networks, Fuzzy logic and genetic Algorithms.
2. To observe the concepts of feed forward neural networks and about feedback neural networks.
3. To practice the concept of fuzziness involved in various systems and comprehensive knowledge of fuzzy logic control and to design the fuzzy control
4. To analyze genetic algorithm, genetic operations and genetic mutations.

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand feed forward neural networks, feedback neural networks and learning techniques.
2. Understand fuzziness involved in various systems and fuzzy set theory.
3. Develop fuzzy logic control for applications in electrical engineering
4. Develop genetic algorithm for applications in electrical engineering.

| UNIT-I | ARTIFICIAL NEURAL NETWORKS | Classes:15 |
|---|---|---|

Introduction, Models of Neuron Network-Architectures –Knowledge representation, Artificial Intelligence and Neural networks–Learning process -Error correction learning, Hebbian learning –Competitive learning-Boltzman learning, supervised learning-Unsupervised learning–Reinforcement learning-Learning tasks.

| UNIT-II | ANN PARADIGMS | Classes:15 |
|---|---|---|

Multi-layer perceptron using Back propagation Algorithm (BPA), Self –Organizing Map (SOM), Radial Basis Function Network-Functional Link Network (FLN), Hopfield Network.

| UNIT-III | FUZZY LOGIC | Classes:15 |
|---|---|---|

Introduction –Fuzzy versus crisp, Fuzzy sets-Membership function –Basic Fuzzy set operations, Properties of Fuzzy sets –Fuzzy Cartesian Product, Operations on Fuzzy relations –Fuzzy logic–Fuzzy Quantifiers, Fuzzy Inference-Fuzzy Rule based system, Defuzzification methods.

| UNIT-IV | GENETIC ALGORITHMS | Classes:15 |
|---|---|---|

Introduction-Encoding –Fitness Function-Reproduction operators, Genetic Modeling –Genetic operators-Cross over-Single site cross over, Two point cross over –Multi point cross over Uniform cross over, Matrix cross over-Cross over Rate-Inversion & Deletion, Mutation operator – Mutation –Mutation Rate-Bit-wise operators, Generational cycle-convergence of Genetic Algorithm.

| UNIT-V | APPLICATIONS OF AI TECHNIQUES | Classes:15 |
|---|---|---|

Load forecasting, Load flow studies, Economic load dispatch, Load frequency control, Single area system and two area system, Reactive power control, Speed control of DC and AC Motors.

**TEXTBOOKS**

1. S. Rajasekaran and G.A.V. Pai Neural Networks, Fuzzy Logic & Genetic Algorithms, PHI, New Delhi, 2003.
2. Rober J. Schalkoff, Artificial Neural Networks, Tata McGraw Hill Edition, 2011.

**REFERENCE BOOKS**

1. P.D. Wasserman; Neural Computing Theory & Practice, Van Nostrand Reinhold, New York, 1989.
2. Bart Kosko; Neural Network & Fuzzy System, Prentice Hall, 1992
3. D.E. Goldberg, Genetic Algorithms, Addison-Wesley 1999.

**WEB REFERENCES**

1. https://www.javatpoint.com/artificial-neural-network
2. https://www.researchgate.net/publication/331508432_Exploring_the_best_ANN_model_based_on_four_paradigms_to_predict_delay_and_cost_overrun_percentages_of_highway_projects
3. https://www.geeksforgeeks.org/fuzzy-logic-introduction/
4. https://www.geeksforgeeks.org/genetic-algorithms/
5. https://www.javatpoint.com/application-of-ai

**E -TEXTBOOKS**

1. https://pdfcoffee.com/neural-networks-fuzzy-logic-and-genetic-algorithms-synthesis-and-applicationspdf-pdf-free.html
2. http://boente.eti.br/fuzzy/ebook-fuzzy-kazabov.pdf

**MOOCS COURSE**

1. https://nptel.ac.in/courses/117/105/117105084/
2. https://nptel.ac.in/courses/127/105/127105006/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# DIGITAL CONTROL SYSTEM

**IV B. TECH- II SEMESTER (R 20)**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE805PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To learn

1. To understand the fundamentals of digital control systems, z-transforms
2. To understand state space representation of the control systems, concepts of controllability and observability
3. To study the estimation of stability in different domains
4. To understand the design of discrete time control systems, compensators, state feedback controllers, state observers through various transformations.

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Obtain discrete representation of LTI systems.
2. Analyze stability of open loop and closed loop discrete-time systems.
3. Design and analyze digital controllers.
4. Design state feedback and output feedback controllers.

| UNIT-I | DISCRETE REPRESENTATION OF CONTINUOUS SYSTEMS | Classes:15 |
|---|---|---|

Basics of Digital Control Systems. Discrete representation of continuous systems. Sample and hold circuit. Mathematical Modeling of sample and hold circuit. Effects of Sampling and Quantization. Choice of sampling frequency. ZOH equivalent.

| UNIT-II | DISCRETE SYSTEM ANALYSIS AND STABILITY OF DISCRETE TIME SYSTEM | Classes:20 |
|---|---|---|

Z-Transform and Inverse Z Transform for analyzing discrete time systems. Pulse Transfer function. Pulse transfer function of closed loop systems. Mapping from s-plane to z plane. Solution of Discrete time systems. Time response of discrete time system.

Stability analysis by Jury test. Stability analysis using bilinear transformation. Design of digital control system with dead beat response. Practical issues with dead beat response design.

| UNIT-III | STATE SPACE APPROACH FOR DISCRETE TIME SYSTEMS | Classes:15 |
|---|---|---|

State space models of discrete systems, State space analysis. Lyapunov Stability. Controllability, reachability, Reconstructibility and observability analysis. Effect of pole zero cancellation on the controllability & observability.

| UNIT-IV | DESIGN OF DIGITAL CONTROL SYSTEM | Classes:15 |
|---|---|---|

Design of Discrete PID Controller, Design of discrete state feedback controller. Design of set point tracker. Design of Discrete Observer for LTI System. Design of Discrete compensator.

| UNIT-V | DISCRETE OUTPUT FEEDBACK CONTROL | Classes:15 |
|---|---|---|

Design of discrete output feedback control. Fast output sampling (FOS) and periodic output feedback controller design for discrete time systems.

## TEXTBOOKS

1. K. Ogata, "Digital Control Engineering", Prentice Hall, Englewood Cliffs, 1995.
2. M. Gopal, "Digital Control Engineering", Wiley Eastern, 1988.

## REFERENCE BOOKS

1. G. F. Franklin, J. D. Powell and M. L. Workman, "Digital Control of Dynamic Systems", AddisonWesley, 1998.
2. B.C. Kuo, "Digital Control System", Holt, Rinehart and Winston, 1980.

## WEB REFERENCES

1. https://www.sciencedirect.com/science/article/pii/S1474667017507004
2. https://www.globalspec.com/reference/71134/203279/chapter-2-analysis-of-discrete-time-systems
3. https://eng.libretexts.org/Bookshelves/Electrical_Engineering/Signal_Processing_and_Modeling/Book%3A_Signals_and_Systems_(Baraniuk_et_al.)/04%3A_Time_Domain_Analysis_of_Discrete_Time_Systems/4.06%3A_BIBO_Stability_of_Discrete_Time_Systems
4. https://www.brainkart.com/article/State-space-representation-for-discrete-time-systems_12866/#:~:text=The%20dynamics%20of%20a%20linear,(observation%20or%20measurement)%20equation.&text=Where%20the%20input%20u%2C%20output,c%20are%20n%2Ddimensional%20vectors.
5. https://www.researchgate.net/publication/228637940_Design_and_Application_of_Full_Digital_Control_System_for_LLC_Multiresonant_Converter
6. https://www.tandfonline.com/doi/abs/10.1080/00207178408933311#:~:text=Original%20Articles-,A%20design%20method%20of%20discrete%20output%20feedback%20control,on%20improved%20optimal%20regulator%20theory&text=A%20design%20method%20of%20an,electrical%20drive%20system%20is%20presented.

## E -TEXTBOOKS

1. https://digilib.bppt.go.id/sampul/Digital_Control_Engineering-Analysis_and_Design-full.pdf
2. https://gcebargur.ac.in/sites/gcebargur.ac.in/files/lectures_desk/Digital%20Control%20and%20State%20Variable%20Methods%20M%20Gopal.pdf

## MOOCS COURSE

1. https://nptel.ac.in/courses/108/103/108103008/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# ADVANCED CONTROL OF ELECTRIC DRIVES

**IV B. TECH- II SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE806PE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To learn

1. To know the power electronic converters.
2. To analyze the various control strategies of power converters for drives control
3. To understand the advanced control techniques for DC and AC motor drives
4. To go through the control strategies for drives using digital signal processors.

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the operation of power electronic converters and their control strategies.
2. Understand the vector control strategies for ac motor drives.
3. Understand the implementation of the control strategies using digital signal processors.

| UNIT-I | POWER CONVERTERS FOR AC DRIVES | Classes:15 |
|---|---|---|

PWM control of inverter, selected harmonic elimination, space vector modulation, current control of VSI, three level inverter, Different topologies, SVM for 3 level inverter, Diode rectifier with boost chopper, PWM converter as line side rectifier, current fed inverters with self-commutated devices. Control of CSI, H Bridge as a 4-Q drive.

| UNIT-II | INDUCTION MOTOR DRIVES | Classes:10 |
|---|---|---|

Different transformations and reference frame theory, modeling of induction machines, voltage fed inverter control-v/f control, vector control, direct torque and flux control (DTC)

| UNIT-III | SYNCHRONOUS MOTOR DRIVES | Classes:15 |
|---|---|---|

Modeling of synchronous machines, open loop v/f control, vector control, direct torque control, CSI fed synchronous motor drives.

| UNIT-IV | PERMANENT MAGNET MOTOR DRIVES & SWITCHED RELUCTANCE MOTOR DRIVES | Classes:15 |
|---|---|---|

Introduction to various PM motors, BLDC and PMSM drive configuration, comparison, block diagrams, Speed and torque control in BLDC and PMSM.

Evolution of switched reluctance motors; various topologies for SRM drives, comparison, closed loop speed and torque control of SRM.

| UNIT-V | DSP BASED MOTION CONTROL | Classes:10 |
|---|---|---|

Use of DSPs in motion control, various DSPs available, and realization of some basic blocks in DSP for implementation of DSP based motion control.

**TEXTBOOKS**

1. B. K. Bose, "Modern Power Electronics and AC Drives", Pearson Education, Asia, 2003.
2. P. C. Krause, O. Wasynczuk and S. D. Sudhoff, "Analysis of Electric Machinery and Drive Systems", John Wiley & Sons, 2013.

**REFERENCE BOOKS**

1. 1. H. A. Taliyat and S. G. Campbell, "DSP based Electromechanical Motion Control", CRC press, 2003.
2. R. Krishnan, "Permanent Magnet Synchronous and Brushless DC motor Drives", CRC Press,2009.

**WEB REFERENCES**

1. https://app.knovel.com/kn/resources/kpHPCACDEG/toc
2. https://circuitglobe.com/induction-motor-drives.html
3. https://www.electrical4u.com/synchronous-motor-drives/
4. https://www.controleng.com/articles/understanding-permanent-magnet-motors/
5. https://www.intechopen.com/chapters/70448
6. https://www.analog.com/en/analog-dialogue/articles/dsp-based-control-for-ac-machines.html

**E -TEXTBOOKS**

1. https://download.e-bookshelf.de/download/0008/4373/77/L-G-0008437377-0017429215.pdf
2. https://drive.google.com/file/d/1bEMhGT1mlUYCxyf1IPetLKjPU0ssO-fx/view
3. https://eee.sairam.edu.in/wpcontent/uploads/sites/6/2019/07/Modern_power_electronics_and_AC_drives.pdf

**MOOCS COURSE**

1. https://nptel.ac.in/courses/108/108/108108077/
2. https://nptel.ac.in/courses/108/104/108104140/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## EMBEDDED SYSTEM DESIGN

| IV B. TECH- II SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Programme** | **Hours / Week** | | | **Credits** | **Maximum Marks** | | |
| | | **L** | **T** | **P** | **C** | **CIE** | **SEE** | **Total** |
| **EE807PE** | **B.Tech** | **3** | **0** | **0** | **3** | **30** | **70** | **100** |

### COURSE OBJECTIVES

To learn
1. To provide an overview of Design Principles of Embedded System.
2. To provide clear understanding about the role of firmware.
3. To understand the necessity of operating systems in correlation with hardware systems.
4. To learn the methods of interfacing and synchronization for tasking.

### COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:
1. To understand the selection procedure of Processors in the embedded domain.
2. Design Procedure for Embedded Firmware.
3. To visualize the role of Real time Operating Systems in Embedded Systems.
4. To evaluate the Correlation between task synchronization and latency issues

| UNIT-I | INTRODUCTION TO EMBEDDED SYSTEMS | Classes: 12 |
|---|---|---|

**Introduction to Embedded Systems:** Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

| UNIT-II | TYPICAL EMBEDDED SYSTEM | Classes:13 |
|---|---|---|

**Typical Embedded System:** Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

| UNIT-III | EMBEDDED FIRMWARE | Classes:10 |
|---|---|---|

**Embedded Firmware:** Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

| UNIT-IV | RTOS BASED EMBEDDED SYSTEM DESIGN | Classes:12 |
|---|---|---|

**RTOS Based Embedded System Design:** Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

| UNIT-V | TASK COMMUNICATION | Classes: 12 |
|---|---|---|

**Task Communication**: Shared Memory, Message Passing, Remote Procedure Call and Sockets,
**Task Synchronization:** Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, Methods to Choose an RTOS.

## TEXT BOOKS

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

## REFERENCE BOOKS

1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems – Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education.

## WEB REFERENCES

1. http://laboratorios.fi.uba.ar/lse/seminario/bibliografia-y-referencias.html?hl=en
2. https://ptolemy.berkeley.edu/projects/chess/eecs149/references.html
3. https://www.sanfoundry.com/best-reference-books-embedded-systems/
4. https://www.embeddedrelated.com/books-11/nf/all/all.php

## E -TEXT BOOKS

1. https://www.e-booksdirectory.com/details.php?ebook=5392
2. https://books.google.co.in/books/about/Embedded_Systems_World_Class_Designs.html?id=-U_Kt_8EpuwC&redir_esc=y

## MOOCS COURSES

1. https://www.mooc-list.com/tags/embedded-systems
2. https://onlinecourses.nptel.ac.in/noc20_cs14/preview

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## LIST OF OPEN ELECTIVES

### Open Elective - I

| Course Code | Course Name |
|---|---|
| EE612OE | Non-Conventional Power Generation |
| EE613OE | Nanotechnology |
| EE614OE | Electrical Engineering Materials |

### Open Elective – II

| Course Code | Course Name |
|---|---|
| EE712OE | Design Estimation and Costing of Electrical Systems |
| EE713OE | Energy Storage system |
| EE714OE | Basics of Power Plant Engineering |

### Open Elective – III

| Course Code | Course Name |
|---|---|
| EE808OE | Energy Sources and Applications |
| EE809OE | Reliability Engineering |
| EE810OE | Utilisation of Electrical Energy |

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## NON CONVENTIONAL POWER GENERATION

**III B. TECH- II SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE612OE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To introduce various types of renewable energy technologies
2. To understand the technologies of energy conversion from the resources and their quantitative analysis.

### COURSE OUTCOMES

After completion of this course, the student will be able to

1. Analyze solar thermal and photovoltaic systems and related technologies for energy conversion.
2. Understand Wind energy conversion and devices available for it.
3. Understand Biomass conversion technologies, Geo thermal resources and energy conversion principles and technologies.
4. Realize Power from oceans (thermal, wave, tidal) and conversion devices.
5. Understand fundamentals of fuel cells and commercial batteries.

| UNIT-I | FUNDAMENTALS OF SOLAR ENERGY | Classes:15 |
|---|---|---|

Fundamentals of Solar Energy-Solar spectrum- Solar Radiation on Earth's surface-Solar radiation geometry-Solar radiation measurements- Solar radiation data- Solar radiation on horizontal and tilted surfaces. Solar Thermal conversion- Flat plate collectors- concentrated collectors- construction and thermal analysis- Solar applications- Solar ponds- Heliostat systems-water heater-air heater-solar still.

| UNIT-II | SOLAR ELECTRIC POWER GENERATION | Classes:10 |
|---|---|---|

Solar-Electric Power generation- Photovoltaic cells- Equivalent circuit- V-I Characteristics, Photovoltaic modules – constructional details- design considerations- Tracking- Maximum power point tracking - Solar Thermo electric conversion.

| UNIT-III | WIND ENERGY | Classes:10 |
|---|---|---|

Wind Energy- Fundamentals of wind energy-power available in wind- Betz Limit, Aerodynamics of wind turbine-Wind turbines-Horizontal and vertical axis turbines–their configurations- Wind Energy conversion systems.

| UNIT-IV | ENERGY FROM BIO MASS | Classes:15 |
|---|---|---|

Energy from Bio Mass- Various fuels- Sources-Conversion technologies-Wet Processes – Dry Processes- Bio Gas generation – Aerobic and anaerobic digestion - Factors affecting generation of bio gas - Classification of bio gas plants-Different Indian digesters- Digester design considerations - Gasification process - Gasifiers – Applications. Geothermal Energy - sources- Hydrothermal convective - Geo-pressure resources - Petro-thermal systems (HDR) - Magma Resources-Prime Movers.

| UNIT-V | OTEC SYSTEMS | Classes:20 |
|---|---|---|

OTEC Systems- Principle of operation - Open and closed cycles, Energy from Tides - Principle of Tidal Power - Components of tidal Power plants - Operation Methods - Estimation of Energy in Single and double basin systems - Energy and Power from Waves, Wave energy conversion devices - Fuel Cells - Design and Principle of operation - Types of Fuel Cells - Advantages and disadvantages - Types of Electrodes – Applications - Basics of Batteries - Constructional details of Lead acid batteries - Ni-Cd Batteries.

## TEXTBOOKS

1. "John Twidell & Wier", "Renewable Energy Resources", CRC Press, 2009.
2. "G. D. Rai", "Non Conventional Energy sources", Khanna publishers, 2004

## REFERENCE BOOKS

1. "D. P .Kothari, Singal, Rakesh and Ranjan", "Renewable Energy sources and Emerging Technologies", PHI, 2009.
2. "F. C. Treble", Generating Electricity from Sun, Pergamon Press, 1st Edition 1991
3. "C. S. Solanki", "Solar Photovoltaics - Fundamentals- Principles and Applications", PHI, 2009
4. "S. P. Sukhatme", "Solar Energy Principles and Application", TMH, 2009.

## WEB REFERENCES

1. https://www.electrical4u.com/
2. http://www.basicsofelectricalengineering.com/
3. https://www.khanacademy.org/science/physics/circuits-topic/circuits-
4. https://circuitglobe.com/
5. https://www.electricaleasy.com/

## E -TEXTBOOKS

1. https://easyengineering.net/basic-electrical-engineering-by-wadhwa/
2. https://easyengineering.net/objective-electrical-technology-by-mehta/

## MOOCS COURSE

1. https://nptel.ac.in/courses/121/106/121106014/
2. https://nptel.ac.in/courses/108/108/108108078/
3. https://onlinecourses.nptel.ac.in/noc20_ge06/preview

# St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## NANOTECHNOLOGY

**III B.TECH-II SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | MaximumMarks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE613OE | B.Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To know the extensive applications of Nanotechnology in the field of energy, electronics, Biomedical Engg. Etc.
2. To built to specifications by manufacturing matter on the atomic scale. the Nano products would exhibit an order of magnitude improvement in strength, toughness, and efficiency.
3. The objective here is imparting the basic knowledge in Nano Science and Technology.

### COURSE OUTCOMES

1. The present syllabus of "Introduction to Nano Technology" will give insight into many aspects of Nanoscience, technology and their applications in the prospective of materials science.
2. Able to know Effect of Nano-dimensions on Materials Behavior.
3. Able to know all the Applications of Nanotechnology.

| UNIT-I | INTRODUCTION | Classes:15 |
|---|---|---|

History and Scope, Can Small Things Make a Big Difference? Classification of Nanostructured Materials, Fascinating Nanostructures, Applications of Nanomaterials, Nature: The Best of Nanotechnologist, Challenges, and Future Prospects.

| UNIT-II | UNIQUE PROPERTIES OF NANOMATERIALS | Classes:10 |
|---|---|---|

**Microstructure and Defects in Nanocrystalline Materials**: Dislocations, Twins, stacking faults and voids, Grain Boundaries, triple and disclinations.

**Effect of Nano-dimensions on Materials Behavior:** Elastic properties, Melting Point, Diffusivity, Grain growth characteristics, enhanced solid solubility.

**Magnetic Properties:** Soft magnetic nanocrystalline alloy, Permanent magnetic nanocrystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties, and Mechanical Properties.

| UNIT-III | SYNTHESIS ROUTES | Classes:15 |
|---|---|---|

**Bottom up approaches**: Physical Vapor Deposition, Inert Gas Condensation, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Solgel method ,Self-assembly.

**Top down approaches**: Mechanical alloying, Nano-lithography,

**Consolidation of Nanopowders**: Shock wave consolidation, Hot isostatic pressing and Cold isostatic pressing Spark plasma sintering.

| UNIT-IV | TOOLS TO CHARACTERIZE NANOMATERIALS | Classes:15 |
|---|---|---|

X-Ray Diffraction (XRD), Small Angle X-ray scattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope R16 B.TECH MSNT. (STM), Field Ion Microscope (FEM), Three-dimensional Atom Probe (3DAP).

| UNIT-V | APPLICATIONS OF NANOMATERIALS | Classes:10 |
|---|---|---|

Nano-electronics, Micro- and Nano-electromechanical systems (MEMS/NEMS), Nanosensors, Nanocatalysts, Food and Agricultural Industry, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, WaterTreatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Defense and Space Applications, Concerns and challenges of Nanotechnology.

**TEXTBOOKS**

1. Text Book of Nano Science and Nano Technology – B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, University Press-IIM..

**REFERENCEBOOKS**

1. Text Book of Nano Science and Nano Technology -- B. S. Murthy, P. Shankar, Baldey Raj, B. B. Rath and James Munday, University Press – IIM.
2. Introduction to Nanotechnology – Charles P. Poole, Jr., and Frank J. Owens, Wley India Edition, 2012

**WEBREFERENCES**

1. https://en.wikipedia.org/wiki/Nanotechnology.
2. https://www.frontiersin.org/articles/10.3389/fmicb.2017.01501/full

**E-TEXTBOOKS**

1. http://web.pdx.edu/~pmoeck/phy381/workbook%20nanoscience.pdf
2. https://www.nanowerk.com/nanotechnology/periodicals/ebook_a.php

**MOOCS COURSE**

1. https://www.mooclist.com/tags/nanotechnology?__cf_chl_tk=IQS7JPHFNmAJEvyAsfBaXXRk0HiFZWZOdHWr3Bon9JI-1643616230-0-gaNycGzNCOU

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

## ELECTRICAL ENGINEERING MATERIALS

**III B.TECH - II SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE614OE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

### COURSE OBJECTIVES

1. To understand the importance of various materials used in electrical engineering andobtain a qualitative analysis of their behavior and applications To learn

### COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand various types of dielectric materials, their properties in various conditions.
2. Evaluate magnetic materials and their behavior.
3. Evaluate semiconductor materials and technologies.
4. Acquire Knowledge on Materials used in electrical engineering and applications.

| UNIT-I | DIELECTRIC MATERIALS | Classes:15 |
|---|---|---|

Dielectric as Electric Field Medium, leakage currents, dielectric loss, dielectric strength, breakdown voltage, breakdown in solid dielectrics, flashover, liquid dielectrics, electric conductivity in solid, liquid and gaseous dielectrics, Ferromagnetic materials, properties of ferromagnetic materials in static fields, spontaneous, polarization, curie point, anti-ferromagnetic materials, piezoelectric materials, pyroelectric materials.

| UNIT-II | MAGNETIC MATERIALS | Classes:10 |
|---|---|---|

Classification of magnetic materials, spontaneous magnetization in ferromagnetic materials, magnetic Anisotropy, Magnetostriction, diamagnetism, magnetically soft and hard materials, special purpose materials, feebly magnetic materials, Ferrites, cast and cermet permanent magnets, ageing of magnets. Factors effecting permeability and hysteresis

| UNIT-III | SEMICONDUCTOR MATERIALS | Classes:15 |
|---|---|---|

Properties of semiconductors, Silicon wafers, integration techniques, Large and very large scale integration techniques (VLSI)

| UNIT-IV | MATERIALS FOR ELECTRICAL APPLICATIONS | Classes:15 |
|---|---|---|

Materials used for Resistors, rheostats, heaters, transmission line structures, stranded conductors, bimetals fuses, soft and hard solders, electric contact materials, electric carbon materials, thermocouple materials. Solid, Liquid and Gaseous insulating materials, Effect of moisture on insulation

| UNIT-V | SPECIAL PURPOSE MATERIALS | Classes:10 |
|---|---|---|

Refractory Materials, Structural Materials, Radioactive Materials, Galvanization and Impregnation of materials, Processing of electronic materials, Insulating varnishes and coolants, Properties and applications of mineral oils, Testing of Transformer oil as per ISI

**TEXTBOOKS**

1. "R K Rajput", " A course in Electrical Engineering Materials", Laxmi Publications, 2009
2. "T K Basak", " A course in Electrical Engineering Materials", New Age Science Publications 2009

**REFERENCE BOOKS**

1. TTTI Madras, "Electrical Engineering Materials", McGraw Hill Education, 2004.
2. "AdrianusJ.Dekker", Electrical Engineering Materials, PHI Publication, 2006.
3. S. P. Seth, P. V. Gupta "A course in Electrical Engineering Materials", Dhanpat Rai & Sons, 2011.

**WEB REFERENCES**

1. https://www.electrical4u.com/electrical-engineering-materials/
2. https://lecturenotes.in/subject/219/electrical-engineering-materials-eem

**E -TEXTBOOKS**

1. https://www.books.google.co.in/books/about/A_Textbook_of_Electrical_Engineering_Mat.html?id=Ee8ruUXkJeMC.
2. https://www.amazon.in/Introduction-Electrical-Engineering-Materials-ebook/dp/B00QUYKXTI

**MOOCS COURSE**

1. https://youtube.com/playlist?list=PL63n2PcxRiNcW6kYMoglxTLUAcfDJ7xUR

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# DESIGN ESTIMATION AND COSTING OF ELECTRICAL SYSTEMS

**IV B.TECH – I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE712OE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

1. To emphasize the estimation and costing aspects of all electrical equipment, installation and designs on the cost viability.
2. To design and estimation of wiring
3. To design overhead and underground distribution lines, substations and illumination

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the design considerations of electrical installations.
2. Design electrical installation for buildings and small industries.
3. Identify and design the various types of light sources for different applications

| UNIT-I | DESIGN CONSIDERATIONS OF ELECTRICAL INSTALLATIONS | Classes:15 |
|---|---|---|

Electric Supply System, Three phase four wire distribution system, Protection of Electric Installation against over load, short circuit and Earth fault, Earthing, General requirements of electrical installations, testing of installations, Indian Electricity rules, Neutral and Earth wire, Types of loads, Systems of wiring, Service connections , Service Mains, Sub-Circuits, Location of Outlets, Location of Control Switches, Location of Main Board and Distribution board, Guide lines for Installation of Fittings, Load Assessment, Permissible voltage drops and sizes of wires, estimating and costing of Electric installations.

| UNIT-II | ELECTRICAL INSTALLATION FOR DIFFERENT TYPES OF BUILDINGS AND SMALL INDUSTRIES | Classes:10 |
|---|---|---|

Electrical installations for residential buildings – estimating and costing of material, Electrical installations for commercial buildings, Electrical installations for small industries.

| UNIT-III | OVERHEAD AND UNDERGROUND TRANSMISSION AND DISTRIBUTION LINES | Classes:15 |
|---|---|---|

Introduction, Supports for transmission lines, Distribution lines – Materials used, Underground cables, Mechanical Design of overhead lines, Design of underground cables.

| UNIT-IV | SUBSTATIONS | Classes:15 |
|---|---|---|
| Introduction, Types of substations, Outdoor substation – Pole mounted type, Indoor substations – Floor mounted type. | | |
| **UNIT-V** | **DESIGN OF ILLUMINATION SCHEMES** | **Classes:10** |
| Introduction, Terminology in illumination, laws of illumination, various types of light sources, Practical lighting schemes LED, CFL and differences. | | |

**TEXTBOOKS**

1. "K. B. Raina, S. K. Bhattacharya", "Electrical Design Estimating and Costing", New Age International Publisher, 2010.
2. "Er. V. K. Jain, Er. Amitabh Bajaj", "Design of Electrical Installations", University Science Press.

**REFERENCE BOOKS**

1. Code of practice for Electrical wiring installations,(System voltage not exceeding 650 volts), Indian Standard Institution, IS: 732-1983.
2. Guide for Electrical layout in residential buildings, Indian Standard Institution, IS: 4648-1968.
3. Electrical Installation buildings Indian Standard Institution, IS: 2032.
4. Code of Practice for selection, Installation of Maintenance of fuse (voltage not exceeding 650 V), Indian Standard Institution, IS: 3106-1966.
5. Code of Practice for earthling, Indian Standard Institution, IS: 3043-1966.
6. "Gupta J. B., Katson, Ludhiana", "Electrical Installation, estimating and costing", S.K. Kataria and sons, 2013.

**WEB REFERENCES**

1. https://www.electrical4u.com/
2. https://lecturenotes.in/subject/219/ design-estimation-and-costing-of-electrical-systems-deces

**E -TEXTBOOKS**

1. https://www.scribd.com/document/391792290/ELECTRICAL-DESIGN-Estimating-and-Costing-K-B-RAINA-S-K-BHATTACHARYA
2. https://idoc.pub/download/electrical-layout-and-estimate-2nd-edition-by-max-b-fajardo-jr-leo-r-fajardo-k546w29qo9l8

**MOOCS COURSE**

1. https://youtu.be/7mjp8SCCbdI

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# ENERGY STORAGE SYSTEMS

**IV B.TECH I SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE713OE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

1. To enable the student to understand the need for energy storage, devices and technologies available and their applications

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. analyze the characteristics of energy from various sources and need for storage
2. classify various types of energy storage and various devices used for the purpose
3. Identify various real time applications.

| UNIT-I | ELECTRICAL ENERGY STORAGE TECHNOLOGIES | Classes:15 |
|---|---|---|

Characteristics of electricity, Electricity and the roles of EES, High generation cost during peak-demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable.

| UNIT-II | NEEDS FOR ELECTRICAL ENERGY STORAGE | Classes:10 |
|---|---|---|

Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses, The roles of electrical energy storage technologies, The roles from the viewpoint of a utility, The roles from the viewpoint of consumers, The roles from the viewpoint of generators of renewable energy.

| UNIT-III | FEATURES OF ENERGY STORAGE SYSTEMS | Classes:15 |
|---|---|---|

Classification of EES systems, Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES), Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen (H2), Synthetic natural gas (SNG).

| UNIT-IV | TYPES OF ELECTRICAL ENERGY STORAGE SYSTEMS | Classes:15 |
|---|---|---|

Electrical storage systems, Double-layer capacitors (DLC), Super conducting magnetic energy storage (SMES), Thermal storage systems, Standards for EES, Technical comparison of EES technologies.

| UNIT-V | APPLICATIONS | Classes:10 |
|---|---|---|

Present status of applications, Utility use (conventional power generation, grid operation & service) , Consumer use (uninterruptable power supply for large consumers), New trends in applications, Renewable energy generation, Smart Grid, Smart Micro grid, Smart House, Electric vehicles, Management and control hierarchy of storage systems, Internal configuration of battery storage systems, External connection of EES systems , Aggregating EES systems and distributed generation (Virtual Power Plant), Battery SCADA– aggregation of many dispersed batteries.

**TEXTBOOKS**

1. "James M. Eyer, Joseph J. Iannucci and Garth P. Corey ", "Energy Storage Benefits and Market Analysis", Sandia National Laboratories, 2004.
2. The Electrical Energy Storage by IEC Market Strategy Board.

**REFERENCE BOOKS**

1. . "Jim Eyer, Garth Corey", Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Sandia National Laboratories, Feb 2010.

**WEB REFERENCES**

1. https://www.electrical4u.com/
2. https://lecturenotes.in/subject/219/energy-storage-systems-ess

**E -TEXTBOOKS**

1. https://indiasmartgrid.org/Electric-Energy-Storage-(EES).php
2. https://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/AdvancedMaterials_12-30-10_FINAL_lowres.pdf

**MOOCS COURSE**

1. https://youtu.be/j7RaL_XKywk
2. https://youtu.be/dFnu5nSJcrQ

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# BASICS OF POWER PLANT ENGINEERING

**IV B.TECH – I SEMESTER**

| Course Code | Programme | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE714OE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

- To provide an overview of power plants and the associated energy conversion issues

## COURSE OUTCOMES

- Upon completion of the course, the students can understand the principles of operation for different power plants and their economics.

| UNIT-I | COAL BASED THERMAL POWER PLANTS | Classes:15 |
|---|---|---|

Basic Rankine cycle and its modifications, layout of modern coal power plant, super critical boilers, FBC boilers, turbines, condensers, steam and heating rates, subsystems of thermal power plants, fuel and ash handling, draught system, feed water treatment, binary cycles and cogeneration systems.

| UNIT-II | GAS TURBINE AND COMBINED CYCLE POWER PLANTS | Classes:10 |
|---|---|---|

Brayton cycle analysis and optimization, components of gas turbine power plants, combined cycle power plants, Integrated Gasifier based Combined Cycle (IGCC) systems.

| UNIT-III | BASICS OF NUCLEAR ENERGY CONVERSION | Classes:15 |
|---|---|---|

Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants.

| UNIT-IV | HYDROELECTRIC POWER PLANTS | Classes:15 |
|---|---|---|

Classification, typical layout and components, principles of wind, tidal, solar PV and solar thermal, geothermal, biogas and fuel cell power systems.

| UNIT-V | ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES | Classes:10 |
|---|---|---|

Power tariffs, load distribution parameters, load curve, capital and operating cost of different power plants, pollution control technologies including wastedisposal options for coal and nuclear plants.

## TEXT BOOKS

1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.
2. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.

## REFERENCE BOOKS

1. Elliot T.C., Chen K and Swanekamp R.C., Power Plant Engineering, 2nd ed., McGraw Hill, 1998.

## WEB REFERENCES

1. http://mat.gsia.cmu.edu/blog/. https://www.iiit.ac.in/people/faculty/
2. http://mitsloan.mit.edu
3. www.energyshouldbe.org

## MOOCS COURSE

1. http://nptel.ac.in/courses/112106133/1
2. http://nptel.ac.in/courses/112106133/2
3. http://nptel.ac.in/courses/112106133/3
4. http://nptel.ac.in/courses/112106133/4
5. http://nptel.ac.in/courses/112106133/5
6. http://nptel.ac.in/courses/108105058/8
7. http://nptel.ac.in/courses/108105058/9
8. http://nptel.ac.in/courses/108105058/10

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# ENERGY SOURCES AND APPLICATIONS

**IV B. TECH- II SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE808OE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To learn

1. To introduce various types of energy sources available.
2. The technologies of energy conversion from these resources and their quantitative analysis.
3. To know the applications of various energy sources

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. List and generally explain the main sources of energy and their primary applications nationally and internationally.
2. Understand the energy sources and scientific concepts/principles behind them.
3. Understand effect of using these sources on the environment and climate.
4. Describe the challenges and problems associated with the use of various energy sources, Including fossil fuels, with regard to future supply and the impact on the environment.
5. List and describe the primary renewable energy resources and technologies
6. To quantify energy demands and make comparisons among energy uses, resources, and Technologies.

| UNIT-I | INTRODUCTION TO ENERGY SCIENCE | Classes:15 |
|---|---|---|

Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment

| UNIT-II | ENERGY SOURCES | Classes:10 |
|---|---|---|

Overview of energy systems, sources, transformations efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) -past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar nuclear, wave, tidal and hydrogen.

| UNIT-III | SUSTAINABILITY AND ENVIRONMENTAL TRADE-OFFS OF DIFFERENCE ENERGY SYSTEMS | Classes:10 |
|---|---|---|

Possibilities for energy storage or regeneration (Ex. Pumped storage hydro Power projects, superconductor-based energy storages, high efficiency batteries)

| UNIT-IV | ENERGY & ENVIRONMENT | Classes:15 |
|---|---|---|

Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability; introduction to the economics of energy; How the economic system determines production and consumption; linkages between economic and environmental outcomes; How future energy use can be influenced by economic environmental, trade, and research policy.

| UNIT-V | ENGINEERING FOR ENERGY CONSERVATION | Classes:15 |
|---|---|---|

Concept of Green Building and Green Architecture; Green building concepts (Green building encompasses everything from the choice of building materials to where a building is located, how it is designed and operated) LEED ratings; Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates; Embodied energy analysis and use as a tool for measuring sustainability. Energy Audit of Facilities and optimization of energy consumption

**TEXTBOOKS**


1. Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford University Press
2. Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press.


**REFERENCE BOOKS**


1. Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living, Gaiam.
2. Jean-Philippe; Zaccour, Georges (Eds.), (2005), Energy and Environment Set: Mathematics of Decision Making, Loulou, Richard; Waaub, XVIII.
3. Ristinen, Robert A. Kraushaar, Jack J. A Kraushaar, Jack P. Ristinen, Robert A. (2006) Energy and the Environment, 2nd Edition, John Wiley UNDP (2000), Energy and the Challenge of Sustainability, World Energy assessment.
4. E H Thorndike (1976), Energy & Environment: A Primer for Scientists and Engineers, Addison-Wesley Publishing Company
5. Related papers published in international journals.


**WEB REFERENCES**

1. https://letstalkscience.ca/educational-resources/backgrounders/introduction-energy
2. https://vikaspedia.in/energy/energy-basics/sources-of-energy
3. https://www.sciencedirect.com/journal/energy-policy/special-issue/10KFFPJCBMT
4. https://en.wikipedia.org/wiki/Energy_%26_Environment
5. https://en.wikipedia.org/wiki/Energy_engineering

**E -TEXTBOOKS**

1. https://pdfroom.com/books/real-goods-solar-living-sourcebook-your-complete-guide-to-living-beyond-the-grid-with-renewable-energy-technologies-and-sustainable-living-14th-edition/v0K2l70gape

**MOOCS COURSE**

1. https://nptel.ac.in/courses/108/105/108105058/
2. https://nptel.ac.in/courses/121/106/121106014/
3. https://nptel.ac.in/courses/103/103/103103206/
4. https://nptel.ac.in/courses/108/108/108108078/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# RELIABILITY ENGINEERING

**IV B. TECH- II SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE809OE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

To learn

1. To introduce the basic concepts of reliability, various models of reliability.
2. To analyze reliability of various systems.
3. To introduce techniques of frequency and duration for reliability evaluation of repairable

## COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Model various systems applying reliability networks.
2. Evaluate the reliability of simple and complex systems.
3. Estimate the limiting state probabilities of repairable systems.
4. Apply various mathematical models for evaluating reliability of irreparable systems.

| UNIT-I | BASIC PROBABILITY THEORY & BINOMIAL DISTRIBUTION | Classes:15 |
|---|---|---|

Elements of probability, probability distributions, Random variables, Density and Distribution functions- Mathematical expected – variance and standard deviation

Concepts, properties, engineering applications.

| UNIT-II | NETWORK MODELING AND EVALUATION OF SIMPLE SYSTEMS | Classes:10 |
|---|---|---|

Basic concepts- Evaluation of network, Reliability / Unreliability - Series systems, Parallel systems - Series-Parallel systems- Partially redundant systems- Examples.

**Network Modeling and Evaluation of Complex Systems**: Conditional probability method- tie set, Cut-set approach- Event tree and reduced event tree methods- Relationships between tie and cut-sets- Examples.

| UNIT-III | PROBABILITY DISTRIBUTIONS IN RELIABILITY EVALUATION | Classes:15 |
|---|---|---|

Distribution concepts, Terminology of distributions, General reliability functions, Evaluation of the reliability functions, shape of reliability functions –Poisson distribution – normal distribution, exponential distribution, Weibull distribution.

**Network Reliability Evaluation Using Probability Distributions:** Reliability Evaluation of Series systems, Parallel systems – Partially redundant systems- determination of reliability measure- MTTF for series and parallel systems – Examples.

| UNIT-IV | DISCRETE MARKOV CHAINS | Classes:15 |
|---|---|---|

Basic concepts- Stochastic transitional probability matrix- time dependent probability evaluation- Limiting State Probability evaluation- Absorbing states – Application.

**Continuous Markov Processes:** Modeling concepts- State space diagrams- Unreliability evaluation of single and two component repairable systems

| UNIT-V | FREQUENCY AND DURATION TECHNIQUES | Classes:10 |
|---|---|---|

Frequency and duration concepts, application to multi state problems, Frequency balance approach. **Approximate System Reliability Evaluation**: Series systems – Parallel systems- Network reduction Techniques- Cut set approach- Common mode failures modeling and evaluation techniques- Examples.

## TEXTBOOKS

1. Roy Billinton and Ronald N Allan, Reliability Evaluation of Engineering Systems, Plenum Press.
2. E. Balagurusamy, Reliability Engineering by Tata McGraw-Hill Publishing Company Limited.

## REFERENCE BOOKS

1. Reliability Engineering: Theory and Practice by Alessandro Birolini, Springer Publications.
2. An Introduction to Reliability and Maintainability Engineering by Charles Ebeling, TMH, Publications.
3. Reliability Engineering by Elsayed A. Elsayed, Prentice Hall Publications.

## WEB REFERENCES

1. https://corporatefinanceinstitute.com/resources/knowledge/other/binomial-distribution/
2. https://stephens999.github.io/fiveMinuteStats/markov_chains_discrete_intro.html
3. https://www.sciencedirect.com/topics/mathematics/continuous-time-markov-chain
4. https://link.springer.com/chapter/10.1007%2F978-1-4615-7728-7_11

## E -TEXTBOOKS

1. https://link.springer.com/chapter/10.1007%2F978-1-4615-7728-7_11
2. https://qpr.buaa.edu.cn/__local/2/AA/B8/BB116BBD20312235B2E7F93FAD2_483F18EF_5132FE.pdf?e=.pdf
3. https://mast.queensu.ca/~stat455/lecturenotes/set5.pdf

## MOOCS COURSE

1. https://nptel.ac.in/courses/111/104/111104032/#
2. https://nptel.ac.in/courses/105/108/105108128/
3. https://nptel.ac.in/courses/115/106/115106089/

St. Martin's Engineering College
UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in

# Utilization of Electrical Energy

**IV B. TECH- II SEMESTER**

| Course Code | Programme | Hours /Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIE | SEE | Total |
| EE810OE | B. Tech | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

## COURSE OBJECTIVES

- To understand the fundamentals of illumination and good lighting practices
- To understand the methods of electric heating and welding.
- To understand the concepts of electric drives and their application to electrical traction systems.

## COURSE OUTCOMES

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

- Understand basic principles of electric heating and welding.
- Determine the lighting requirements for flood lighting, household and industrial needs.
- Calculate heat developed in induction furnace.
- Evaluate speed time curves for traction

| UNIT-I | INTRODUCTION TO HEATING | Classes:15 |
|---|---|---|

Electrical Heating: Advantages and methods of electric heating, resistance heating, induction heating and dielectric heating.

| UNIT-II | ELECTRIC WELDING | Classes:10 |
|---|---|---|

Electric Welding: Electric welding equipment, resistance welding and arc welding, comparison between AC and DC welding. Electrolysis process: principle of electrolysis, electroplating, metal extraction and metal processing electromagnetic stirs.

| UNIT-III | ILLUMINATION | Classes:15 |
|---|---|---|

Illumination: Terminology, Laws of illumination, coefficient of Utilization and depreciation, Polar curves Photometry, integrating sphere, sources of light, fluorescent lamps, compact fluorescent lamps, LED lamps discharge lamps, mercury vapor lamps, sodium vapor lamps and neon lamps, comparison between tungsten filament lamps and fluorescent tubes. Basic principles of light control, Types and design of lighting scheme, lighting calculations, factory lighting, street lighting and flood lighting.

| UNIT-IV | ELECTRIC TRACTION | Classes:15 |
|---|---|---|

Electric Traction: Systems of electric traction and track electrification- DC system, single phase and 3-phase low frequency and high frequency system, composite system, kando system, comparison between AC and DC systems, problems of single-phase traction with current unbalance and voltage unbalance. Mechanics of traction movement, speed – time curves for different services, trapezoidal and quadrilateral speed – time curves, tractive effort, power, specific energy consumption, effect of varying acceleration and braking, retardation, adhesive weight and braking retardation, coefficient of adhesion.

| UNIT-V | SYSTEMS OF TRAIN LIGHTING | Classes:10 |
|---|---|---|

Systems of Train Lighting: special requirements of train lighting, methods of obtaining unidirectional polarity constant output- single battery system, Double battery parallel block system, coach wiring, lighting by making use of 25KV AC supply

## TEXTBOOKS

1. H. Partab: Modern Electric Traction, Dhanpat Rai & Co, 2007.
2. E. Openshaw Taylor: Utilization of Electric Energy, Orient Longman, 2010

## REFERENCE BOOKS

1. H. Partab: Art & Science of Utilization of Electric Energy, Dhanpat Rai & Sons, 1998.
2. N.V. Suryanarayana: Utilisation of Electrical power including Electric drives and Electric Traction, New Age Publishers, 1997.

## WEB REFERENCES

1. https://www.Electric heating .com/
2. http://www. Electric Traction .com/
3. http://www.Utilization of Electric .com/

## E -TEXTBOOKS

1. https://easyengineering.net/ **J.B. Gupta**/Utilization of Electric Power & Electric Traction/
2. https://easyengineering.net/ Tarlok Singh /Utilization Of Electric Energy

## MOOCS COURSE

1. https://nptel.ac.in/courses/108108076/11
2. https://nptel.ac.in/courses/108102146/12
3. https://nptel.ac.in/courses/108108076/45