Power Electronics (M.Tech):

Department of Electrical and Electronics Engineering (EEE)

I Year 1st Semester

S. No.	Subject Code	Name of the Course / Laboratory	No.of Periods per week			No. of Credits
			L	T	Lab/ Practice	
1	18EE2101	Electric Drives System	3	0	0	3
2	18EE2102	Modeling and Analysis of Electrical Machines	3	0	0	3
3	18EE2103 18EE2104 18EE2105 18EE2106	Advanced Power Electronic Circuits Optimal and AdaptiveControl Power Quality Dynamics of Electrical Machines	3	0	0	3
4	18EE2107 18EE2108 18EE2109	Static VAR Controllers and Harmonic Filtering PWM converter and Applications Power Semiconductor Devices & Modeling	3	0	0	3
5	18HS0823	Research Methodology and IPR	2	0	0	2
6	18EE2110	Power Electronics Simulation Lab	0	0	4	2
7	18EE2111	Industrial Automation Lab (Virtual Lab)	0	0	4	2
8	 18HS0818 18CE1029 18HS0825 18HS0826	Audit I English for Research Paper Writing Disaster Management Sanskrit for Technical Knowledge Value Education	3	0	0	0
			17	0	8	
Total/Week 25						18

I Year 2nd Semester

S. No.	Subject Code	Name of the Course / Laboratory	No.of Periods per week			No. of Credits
			L	T	Lab/ Practice	
1	18EE2112	Power Electronic Converters	3	0	0	3
2	18EE2113	Digital Control of Power Electronic and Drive Systems	3	0	0	3
3	18EE2114 18EE2115 18EE2116	Switched Mode and Resonant Converters Industrial Load Modeling and Control Advanced Digital Signal Processing	3	0	0	3
4	18EE2117 18EE2118 18EE2119	Advanced Microcontroller based Systems Distributed Generation Smart Grids	3	0	0	3
5	18EE2120	Mini Project with Seminar	1	0	4	2
6	18EE2121	Power Converters Lab	0	0	4	2
7	18EE2122	Industrial Electric Drives Lab (Virtual Lab)	0	0	4	2
8	 18HS0829 18HS0827 18HS0828 18HS0819	Audit II Constitution of India Pedagogy Studies Stress Management by Yoga Personality Development through Life Enlightenment Skills.	3	0	0	0
			16	0	12	
Total/Week 28						**18**

II Year 1st Semester

S. No.	Subject Code	Name of the Course / Laboratory	No.of Periods per week			No. of Credits
			L	T	Lab/ Practice	
1	18EE2123 18EE2124 18EE2125	SCADA Systems and Applications FACTS and Custom Power Devices HVDC Transmission Systems	3	0	0	3
2	18HS0824 18ME3121 18ME3122 18CE1028 18ME3128 18EE2128	1. Business Analytics 2. Industrial Safety 3. Advances in Operations Research 4. Cost Management of Engineering Projects 5. Composite Materials 6. Waste to Energy	3	0	0	3
3	18EE2126	Phase-I Dissertation	0	0	20	10
			6	0	20	
Total/Week 26						**16**

II Year 2nd Semester

S. No.	Subject Code	Name of the Course / Laboratory	No.of Periods per week			No. of Credits
			L	T	Lab/ Practice	
1	18EE2127	Phase-II Dissertation	0	0	32	16
				0	32	16
Total/Week 32						**16**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2101) ELECTRIC DRIVE SYSTEMS

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand Basic electrical drives and their analysis.
- Learn Design of controller for drives.
- Understand Scalar control of electrical drives.

Course Outcomes:

Students will be able to:

- Model and simulate electric drive systems
- Design modulation strategies of power electronics converters, for drives application
- Design appropriate current/voltage regulators for electric drives
- Select and implement the drives for Industrial Process
- Implement various variable speed drives in Electrical Energy Conversion System

UNIT- I

Dynamics of Electric Drives: Fundamentals of torque equation, Speed torque convention and Multi-quadrant operation, components of load torques.

UNIT- II

Classification of load torques steady state stability, Load equation, Speed control and drive classification, closed loop control of drives.

UNIT- III

DC motor Drives-Modeling of DC machines, Steady state characteristics with armature and speed control. Phase controlled DC motor drives, chopper controlled DC motor drives.

UNIT- IV

Poly-phase induction machines- Dynamic modeling of induction machines, Small signal equations, control characteristics of induction machines, Phase-controlled induction machines, Stator voltage control, Slip energy recovery scheme, frequency control and vector control of induction motor drives.

UNIT -V

Traction motor: Starting, Speed-Time characteristics, braking. Stepper motor, Servo motor and their Applications.

TEXT BOOKS:

1. G.K. Dubey, "Power semiconductor controlled Drives", Prentice Hall international, New Jersey, 1989.
2. R. Krishnan, “Electric motor drives modeling, analysis and control”, PHI-India-2009.
3. G. K. Dubey, “Fundamentals of electric Drives, Narosa Publishing House”, 2nd edition, 2011.

REFERENCES:

1. W. Leonhard, “Control of Electrical drives”, Springer, 3rd edition, 2001.
2. P.C. Krause, “Analysis of Electric Machine”, Wiley-IEEE press 3rd edition.
3. K. Bose, “Modern Power Electronics and AC Drives”, Prentice Hall publication, 1st Edition, 2001.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2102) MODELING AND ANALYSIS OF ELECTRICAL MACHINES

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the operation of an electrical machine mathematically.
- To understand how a machine can be represented as its mathematical equivalent.
- To develop mathematical model of AC & DC machines and perform transient analysis on them

Course Outcomes:

Students will be able to:

- Knowledge about the dynamic behavior rotating machines.
- Able to understand equivalent circuit of synchronous machines.
- To understand various practical issues of different machines.

UNIT-I

Principles of Electromagnetic Energy Conversion, General expression of stored magnetic energy, Co-energy and force/torque, example using single and doubly excited system,

UNIT-II:

Basic Concepts of Rotating Machines-Calculation of air gap MMF and per phase, machine inductance using physical machine data; Voltage and torque equation of dc machine.

UNIT-III

Three phase symmetrical induction machine and salient pole synchronous machines in phase variable form, Application of reference frame theory to three phase symmetrical induction and synchronous machines, Dynamic direct and quadrature axis model in arbitrarily rotating reference frames.

UNIT-IV

Determination of Synchronous machine dynamic equivalent circuit parameters, Analysis and dynamic modelling of two phase asymmetrical induction machine and single phase induction machine.

UNIT-V

Special Machines - Permanent magnet synchronous machine, Surface permanent magnet (square and sinusoidal back emf type) and interior, permanent magnet machines, Construction and operating principle, dynamic modelling and self-controlled operation. Analysis of Switch Reluctance Motors, Brushless D.C. Motor for space Applications Recent trends.

TEXT BOOKS:

1. Charles Kingsle, Jr., A.E. Fitzgerald, Stephen D.Umans, “Electric Machinery”,
2. Tata McGraw Hill, R. Krishnan, “Electric Motor & Drives: Modelling, Analysis and Control”

REFERENCES:

1. Prentice Hall of India Miller, T.J.E., "Brushless Permanent Magnet and Reluctance Motor Drives".
2. Clarendon PressP.C.Krause "Analysis of Electric Machine" Wiley IEEE Press 3rd Edition.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2103) ADVANCED POWER ELECTRONIC CIRCUITS

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the operation of advanced power electronic circuit topologies.
- Understand the control strategies involved.
- Learn few practical circuits, used in practice.

Course Outcomes:

Students will be able to:

- Knowledge about analysis and design of Load Commutated CSI and PWM CSI Learn analysis and design of series Inverters.
- Acquire knowledge about analysis and design of Switched Mode Rectifiers,APFC,
- DC-DC converters &Resonant converters

UNIT-I

Special Inverter Topologies - Current Source Inverter. Ideal Single Phase CSI operation, analysis and waveforms - Analysis of Single Phase Capacitor Commutated CSI.Series Inverters. Analysis of Series Inverters. Modified Series Inverter. Three Phase Series Inverter

UNIT- II:

Switched Mode Rectifier - Operation of Single/Three Phase bilateral Bridges in Rectifier Mode. Control Principles. Control of the DC Side Voltage. Voltage Control Loop. The inner Current Control Loop. Single phase and three phase boost type APFC and control, three phase utility interphases and control

UNIT- III

Buck, Boost, Buck-Boost SMPS Topologies . Basic Operation- Waveforms - modes of operation – Output voltage ripple

UNIT-IV

Push-Pull and Forward Converter Topologies - Basic Operation . Waveforms - Voltage Mode Control. Half and Full Bridge Converters . Basic Operation and Waveforms- Flyback Converter . discontinuous mode operation . waveforms . Control - Continuous Mode Operation . Waveforms

UNIT-V

Introduction to Resonant Converters. Classification of Resonant Converters. Basic Resonant Circuit Concepts. Load Resonant Converter. Resonant Switch Converter. Zero Voltage Switching Clamped Voltage Topologies. Resonant DC Link Inverters with Zero Voltage Switching. High Frequency Link Integral Half Cycle Converter.

TEXT BOOKS:

1. Ned Mohan et.al “Power electronics: converters, applications, and design” John Wiley and Sons, 2006
2. Rashid “Power Electronics” Prentice Hall India 2007.
3. G.K.Dubey et.al “Thyristorised Power Controllers” Wiley Eastern Ltd., 2005, 06.

REFERENCES:

1. Dewan & Straughen “Power Semiconductor Circuits” John Wiley & Sons., 1975.
2. G.K. Dubey & C.R. Kasaravada “Power Electronics & Drives” Tata McGraw Hill., 1993.
3. IETE Press Book Power Electronics Tata McGraw Hill, 2003
4. Cyril W Lander “Power Electronics” McGraw Hill., 2005.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2104) OPTIMAL AND ADAPTIVE CONTROL

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To know the operation of closed and open loop optimal control.
- Understand the adaptive control strategies.
- Learn dynamic programming method

Course Outcomes:

Students will be able to:

- Knowledge in the mathematical area of calculus of variation so as to apply the same for solving optimal control problems.
- Problem formulation, performance measure and mathematical treatment of optimal Control problems.
- Acquire knowledge on solving optimal control design problems by taking into
- consideration the physical constraints on practical control systems.
- To obtain optimal solutions to controller design problems taking into consideration the Limitation on control energy in the real practical world.

UNIT-I

Optimal control problem, Fundamental concepts and theorems of calculus of variations Euler-Lagrange equation and external of functional.

UNIT-II

Variational approach to solving optimal control problems, Hamiltonian and different boundary conditions for optimal control problem

UNIT-III

Linear regulator problem, Potryangin's minimum principle, Dynamic programming Principle of optimality and its applications to optimal control problem.

UNIT-IV

MIT rule – Determination of adaptation gain - Lyapunov theory –Design of MRAS using Lyapunov theory – Relations between MRAS and STR- Case Study. (9) PROPERTIES OF ADAPTIVE SYSTEMS: Nonlinear dynamics, Analysis of Indirect discrete time self-tuners, Stability of direct discrete time algorithms, Averaging, Application of averaging techniques, averaging in stochastic systems, robust adaptive controllers.

UNIT-V

Nonlinear dynamics, Analysis of Indirect discrete time self-tuners, Stability of direct discrete time algorithms, Averaging, Application of averaging techniques, averaging in stochastic systems, robust adaptive controllers

TEXT BOOKS:

1. Donald E. Kirk, "Optimal Control Theory, An introduction." Prentice Hall Inc., 2004
2. A.P. Sage, "Optimum Systems Control", Prentice Hall, 1977
3. HSU and Meyer , "Modern Control, Principles and Applications," McGraw Hill, 1968

REFERENCES:

1. Yoan D. Landu, "Adaptive Control" (Model Reference Approach), Marcel Dekker. 1981
2. Ioannou P A and Sun J, "Robust Adaptive Control", Prentice Hall, 1996

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2105) POWER QUALITY

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the different power quality issues to be addressed
- Understand the recommended practices by various standard bodies like IEEE, IEC,etc. on
- voltage & frequency, harmonics
- Understanding STATIC VAR Compensators

Course Outcomes:

Students will be able to:

- Acquire knowledge about the harmonics, harmonic introducing devices and effect of harmonicson system equipment and loads
- develop analytical modeling skills needed for modeling and analysis of harmonics innetworks and components
- Introduce the student to active power factor correction based on static VAR compensators andits control techniques
- Introduce the student to series and shunt active power filtering techniques for harmonics

UNIT-I

Power quality-voltage quality-overview of power quality Phenomena classification of power quality issues-power quality measures and standards-THD-TIF-DIN-C message weights-flicker factor transient phenomena-occurrence of power quality problems power acceptability curves-IEEE guides, standards and recommended practices.

UNIT-II

Individual and total harmonic distortion RMS value of a harmonic waveform-Triplex harmonics-important harmonic introducing devices-SMPS- Three phase power converters- arcing devices saturable devices-harmonic distortion of fluorescent lamps-effect of power system harmonics on power system equipment and loads.

UNIT-III

Modeling of networks and components under non-sinusoidal conditions transmission and distribution systems Shunt capacitors-transformers-electric machines-ground systems loads that cause power quality problems power quality problems created by drives and its impact on drive.

UNIT-IV

Passive Compensation Passive Filtering, Harmonic Resonance Impedance Scan Analysis- Active Power Factor Corrected Single Phase Front End, Control Methods for Single Phase APFC Three Phase APFC and Control Techniques, PFC Based on Bilateral Single Phase and Three Phase Converter

UNIT-V

SVC and STATCOM Active Harmonic Filtering-Shunt Injection Filter for single phase, three-phase three-wire and three-phase four wire systems d-q domain control of three phase shunt active filters uninterruptible power supplies constant voltage transformers series active power filtering techniques for harmonic cancellation and isolation.

Dynamic Voltage Restorers for sag swell and flicker problems.

TEXT BOOKS:

1. G.T. Heydt, “Electric power quality”, McGraw-Hill Professional, 2007
2. Math H. Bollen, “Understanding Power Quality Problems”, IEEE Press, 2000
3. J. Arrillaga, “Power System Quality Assessment”, John Wiley, 2000

REFERNCES:

1. J. Arrillaga, B.C. Smith, N.R. Watson & A. R.Wood,”Power system Harmonic Analysis”, Wiley,1997

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2106) DYNAMICS OF ELECTRICAL MACHINES

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- Learn Performance characteristics of machine.
- To understand the dynamics of the machine.
- To understand how to determine stability of machine.
- Learn the synchronous machine analysis

Course Outcomes

Students will be able to:

- Derive Kron's Primitive machine as an unified electrical machine model
- Derive the mathematical model and control a 3- phase Induction motor
- Knowledge of transformations for the dynamic analysis of machines
- Knowledge of determination of stability of the machines under small signal and transient conditions
- Study about synchronous machine

UNIT-I:

Basic Two-pole machine representation of commutator machines, 3-ph synchronous machine with and without damper bars and 3-ph induction machine, Kron's primitive machine-voltage, current and torque equations. Real time model of a two phase induction machine-transformation to obtain constant matrices-thee phase to two phase transformation- power equivalence.

UNIT-II

Generalized model in arbitrary reference frame- Electromagnetic torque – Derivation of commonly used induction machine models- Stator reference frame modelRotor reference frame model- Synchronously rotating frame model- Equations in flux linkages - per unit model-Dynamic Simulation- Small signal equations of induction machine – derivation DQ flux linkage model derivation – control principle of Induction machine

UNIT-III

Analysis of symmetrical 2 phase induction machine-voltage and torque equations for unsymmetrical 2 phase induction machine voltage and torque equations in stationary reference frame variables for unsymmetrical 2 phase induction machine-analysis of steady state operation of unsymmetrical 2 phase induction machine-single phase induction motor - Cross field theory of single-phase induction machine

UNIT-IV

Small Oscillation Equations in State Variable form, Dynamical Analysis of Interconnected Machines.

UNIT-V

Large Signal Transient Analysis using Transformed Equations, DC Generator /DC Motor System, Alternator /Synchronous Motor System

TEXTBOOKS:

1. D.P. Sengupta& J.B. Lynn," Electrical Machine Dynamics", the Macmillan Press Ltd. 1980
2. R Krishnan "Electric Motor Drives, Modeling, Analysis, and Control", Pearson Education. 2001

REFERENCES:

1. Shaahin Filizadeh," Electrical Machine and Drives", the CRC Press Ltd. 2017
2. P.C. Kraus, "Analysis of Electrical Machines", McGraw Hill Book Company, 1987

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2107) STATIC VAR CONTROLLER AND HARMONIC FILTERING

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the various static converters
- Understand the static converter control strategies
- Understand the active and reactive power compensation and their control
- Understand harmonic filtering and its control design

Course Outcomes

Students will be able to:

- Acquire knowledge about the fundamental principles of Passive and Active Reactive Power Compensation
- Schemes at Transmission and Distribution level in Power Systems.
- To introduce the student to various single phase and three-phase Static VAR Compensation schemes and their controls
- To develop analytical modeling skills needed for modeling and analysis of such Static VAR

UNIT-I

Steady-State Reactive Power Control in Electric Transmission Systems. Reactive Power Compensation and Dynamic Performance of Transmission Systems.

Sags, Swells, Unbalance, Flicker, Distortion. Current Harmonics. Sources of Harmonics in Distribution Systems and Ill Effects.

UNIT-II

Shunt Compensators. SVCs of Thyristor Switched and Thyristor Controlled types and their control, STATCOMs and their control. Series Compensators of thyristor Switched and Controlled Type and their Control. SSSC and its Control, Sub-Synchronous Resonance and damping.

UNIT-III

Single Phase and Three Phase Converters and Standard Modulation Strategies (Programmed Harmonic Elimination and SPWM). GTO Inverters. Multi-Pulse Converters and Interface Magnetics. Multi-Level Inverters of Diode Clamped Type

UNIT-IV

Single Phase Shunt Current Injection Type Filter and its Control. Three Phase Three-wire Shunt Active Filtering and their control using p-q theory and d-q modeling. Three phase four wire shunt active filters. Hybrid Filtering using Shunt Active Filters. Dynamic Voltage Restorer and its control.

UNIT-V

Series Active Filtering in Harmonic Cancellation Mode. Series Active Filtering in Harmonic Isolation Mode. V-I and power oscillation characteristics

TEXT BOOKS:

1. Ned Mohan et.al, “Power Electronics”, John Wiley and Sons, 2006.

2. G. Massobrio, P. Antognet,” Semiconductor Device Modeling with Spice”, McGraw-Hill, Inc., 1988.

REFERENCE BOOKS:

1. B. J. Baliga,” Power Semiconductor Devices”,Thomson, 2004

2. V. Benda, J. Gowar, D. A. Grant,” Power Semiconductor Devices. Theory and Applications”,JohnWiley& Sons1994.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2108) PWM CONVERTERS AND APPLICATION

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the concepts and basic operation of PWM converters, including basic circuit operation and design.
- Understand the steady-state and dynamic analysis of PWM converters along with the applications like solid state drives and power quality.

Course Outcomes:
Students will be able to:

- Knowledge concepts and basic operation of PWM converters, including basic circuit operation and design
- Learn the steady-state and dynamic analysis of PWM converters along with the applications like solid state drives and power quality
- Able to recognize and use the following concepts and ideas:Steady-State and transient modelling and analysis of power converters with various PWM techniques.

UNIT-I

AC/DC and DC/AC power conversion, Overview of applications of voltage source converters and current source converters, Pulse width modulation techniques for bridge converters,

UNIT-II

Bus clamping PWM, Space vector based PWM, Advanced PWM techniques, Practical devices in converter.

UNIT-III

Calculation of switching and conduction power losses, Compensation for dead time and DC voltage regulation, Dynamic model of PWM converter

UNIT-IV

Multilevel converters, Constant V/F induction motor drives, Estimation of current ripple and torque ripple in inverter fed drives, Line-side converters with power factor compensation

UNIT-V

Active power filtering, Reactive power compensation, Harmonic current compensation
Selective harmonic elimination PWM technique for high power electric drives.

TEXT BOOKS:

1. Mohan, Undeland and Robbins, “Power Electronics: Converters, Applications and Design”, John’s Wiley and Sons
2. Erickson RW, “Fundamentals of Power Electronics”, Chapman and Hall

REFERENCES

1. Vithyathil. J, “Power Electronics: Principles and Applications”, McGraw Hill.
2. D. Grahame Holmes “Pulse Width Modulation for Power Converters**”** IEEE PRESS

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2109) POWER SEMICONDUCTOR DEVICES AND MODELING

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- Acquire the background required for engineers to meet the role of energy managers and to acquire the skills and techniques required to implement energy management.
- Identify and quantify the energy intensive business activities in an organization.
- Knowledge about standard methodologies for measuring energy in the workplace and energy audit instruments.

Course Outcomes

Students will be able to:

- Acquire the background required for engineers to meet the role of energy managers and to acquire the skills and techniques required to implement energy management.
- Identify and quantify the energy intensive business activities in an organization.
- Knowledge about standard methodologies for measuring energy in the workplace and energy audit instruments.
- Knowledge about energy efficient motors, load matching and selection of motors.
- Acquire knowledge about reactive power management, capacitor sizing and degree of compensation

UNIT-I

Electric motors-Energy efficient controls and starting efficiency, Motor Efficiency and Load Analysis-Energy efficient /high efficient Motors-Case study, Load Matching and selection of motors. Variable speed drives; Pumps, and Fans-Efficient Control strategies, Optimal selection and sizing – Optimal operation and Storage; Case study.

UNIT-II

Feeder/cable loss evaluation, Case study Reactive Power management-Capacitor Sizing-Degree of Compensation-Capacitor losses Location-Placement Maintenance, Case study.

UNIT-III

Methodologies-Types of Industrial loads- Optimal Load, scheduling-case study, Lighting- Energy efficient light sources-Energy conservation in Lighting Schemes, Electronic ballast-Power quality issues-Luminaries, Case study.

UNIT-IV

Optimal operation of cogeneration plants-case study, Electric loads of Air conditioning & Refrigeration-Energy conservation, measures- Cool storage types Optimal operation case study.

UNIT-V

Gysers-Solar Water Heaters, Power Consumption in Compressors Energy conservation measures Electrolytic Process, Computer Controls- software – EMS

TEXT BOOKS

1 Giovanni Petrecca, “Industrial Energy Management: Principles and Applications”, The Kluwerinternational series -207, 1999

2. Anthony J. Pansini, Kenneth D. Smalling, “Guide to Electric Load Management”, Pennwell Pub;(1998)

REFERENCES

1. Handbook on Energy Audit and Environment Management, Y P Abbi and Shashank Jain, TERI, 2006

2. Handbook of Energy Audits Albert Thumann, William J. Younger, Terry Niehus, 2009

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18HS0823)RESEARCH METHODOLOGY AND INTELLECTUAL PROPERTY RIGHTS

M.Tech, I Year 1st Semester (PE)

L	T	P	C
0	0	4	2

Course Objectives:

- Understand research problem formulation. Analyze research related information Follow research ethics and IPR

Course outcomes:

At the end of this course, students will be able to:

- Understand research problem formulation. Analyze research related information Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT- I:

Meaning of research problem, Sources of research problem, Criteria Characteristics ofa good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT -II:

Effective literature studies approaches, analysisPlagiarism, Research ethics,

UNIT -III:

Effective technical writing, how to write report, Paper

Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-IV:

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process ofPatenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-V: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology.Patentinformation and databases.Geographical Indications.New Developments in IPR: Administration of Patent System. New developments inIPR; IPR of Biological Systems, Computer Software etc.Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners" Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.

REFERENCES

1.Mayall , "Industrial Design", McGraw Hill, 1992. Niebel , "Product Design", McGraw Hill, 1974.

2.Asimov , "Introduction to Design", Prentice Hall, 1962.

3.Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

4. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)

(18EE2110) POWER ELECTRONICS SIMULATION LAB

M.Tech, I Year 1st Semester (PE)

L	T	P	C
0	0	4	2

1. Write program and simulate dynamical system of following models:
   (a) I/O Model (b) State variable model also identifies time domain specifications of each.
2. Obtain frequency response of a given system by using various methods:
   (a) General method of finding the frequency domain specifications (b) Polar plot
   (c) Bode plot Also obtain the Gain margin and Phase margin.
3. Determine stability of a given dynamical system using following methods: (a) Root locus (b) Bode plot (c) Nyquist plot (d) Liapunov stability criteria
4. Transform a given dynamical system from I/O model to state variable model and vice versa.
   (a) Obtain model matrix of a given system, obtain it's diagonalize form if exists or obtain
   (b) Jordon Canonical form of system.
5. Write a program and implement linear quadratic regulator
6. Design a compensator for a given systems for required specifications.
7. Conduct a power flow study on a given power system.
8. Design a PID controller.
9. Conduct a power flow study on a given power system network using Guass-Seidel iterative method.
10. Develop a program to solve Swing Equation.
11. Develop a Simulink model for a single area load frequency problem and simulate the same.
12. Develop a Simulink model for a two-area load frequency problem and simulate the same.
13. Design a PID controller for two-area power system and simulate the same.
14. PSPICE Simulation of Single phase full converter using RL and E loads.
15. PSPICE Simulation of Three phase full converter using RL and E loads.
16. PSPICE Simulation of Single phase AC Voltage controller using RL load.
17. PSPICE Simulation of Three phase inverter with PWM controller.
18. PSPICE Simulation of resonant pulse commutation circuit.
19. PSPICE Simulation of impulse commutation circuit.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)

(18EE2111) INDUSTRIAL AUTOMATION LAB
(Virtual Lab)

M.Tech, I Year 1st Semester (PE)

L	T	P	C
0	0	4	2

LIST OF EXPERIMENTS

1. Study hardware and software platforms for DCS
2. Simulate analog and digital function blocks
3. Study, understand and perform experiments on timers and counters
4. Logic implementation for traffic Control Application
5. Logic implementation for Bottle Filling Application
6. Tune PID controller for heat exchanger using DCS
7. FBD for autoclavable laboratory fermenter
8. Develop graphical user interface for the fermenter plant

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18HS0818) ENGLISH FOR RESEARCH PAPER WRITING

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	0

Course objectives:

- to improve your writing skills and level of readability

Course outcomes

Students will be able to:

- Understand that how to improve your writing skills and level of readability.
- Learn about what to write in each section.
- Understand the skills needed when writing a Title.
- Ensure the good quality of paper at very first-time submission.

UNIT-I

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.

UNIT-II

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts and Introduction.

UNIT-III

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV

Key skills needed when writing a Title, key skills needed when writing abstract, key skills needed when writing an Introduction, skills when writing a Review of the Literature.

UNIT-V

Skills needed when writing the Methods, skills needed when writing the Results, skills needed when writing the Discussion, skills needed when writing the Conclusions.

TEXT BOOKS:

1. Goldbort R (2006) Writing for Science, Yale University Press.
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press

REFERENCES:

3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's Books.
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht. Heidelberg London, 2011.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18CE1029) DISASTER MANAGEMENT

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	0

Course Objective

- To give the basic knowledge of Environmental Hazards and disasters
- To the basics of Endogenous and Exogenous hazards and gives a suitable picture on the different types of hazard and disaster mitigation methods.

Course Outcomes:

On completion of the course the students will have knowledge on

- Types of disasters and their effects on environment
- Causes of disasters
- Disaster management through engineering applications

UNIT-I

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT –II

Types of Environmental hazards & Disasters: Natural hazards and Disasters – Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters – Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards – Exogenous Hazards

UNIT–III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides – Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions – Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes – Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

UNIT –IV

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters: - Floods- Droughts- Cold waves- Heat waves. Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Planetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters: Release of toxic chemicals, nuclear explosion- Sedimentation processes. Sedimentation processes: - Global Sedimentation problems- Regional Sedimentation problems-

Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation. Biological hazards/ disasters: - Population Explosion.

UNIT –V

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

TEXT BOOKS:

1. Disaster Management by Rajib Shah, Universities Press, India, 2003
2. Disaster Science and Management by Tushar Bhattacharya, TMH Publications.
3. Disaster Mitigation: Experiences and Reflections by Pardeep Sahni
4. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning

REFERENCES:

1. The Environment as Hazards by Kates, B.I & White, G.F, Oxford Publishers, New York, 1978
2. Disaster Management by R.B. Singh (Ed), Rawat Publication, New Delhi, 2000
3. Disaster Management by H.K. Gupta (Ed), Universiters Press, India, 2003
4. Space Technology for Disaster Mitigation in India (INCED) by R.B. Singh, University of Tokyo, 1994.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)

(18HS0825) SANSKRIT FOR TECHNICAL KNOWLEDGE

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	0

Course Objectives:

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world.
2. Learning of Sanskrit to improve brain functioning.
3. Learning of Sanskrit to develop the logic in mathematics, science & other subjects Enhancing the memory power.
4. The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature.

Unit-1

Alphabets in Sanskrit, Past/Present/Future Tenses, Simple Sentences

Unit-2

Order, Introduction of roots, Technical information about Sanskrit Literature

Unit-3

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Suggested reading

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi

2. "Teach Yourself Sanskrit" Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication

3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

Course Output

Students will be able to

1. Understanding basic Sanskrit language
2. Ancient Sanskrit literature about science & technology can be understood
3. Being a logical language will help to develop logic in students

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18HS0826) VALUE EDUCATION

M.Tech, I Year 1st Semester (PE)

L	T	P	C
3	0	0	0

Course Objectives

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

Course outcomes

- Students will be able to:
- 1. Knowledge of self-development.
- 2. Learn the importance of Human values.
- 3. Developing the overall personality.

UNIT-I

Values and self-development – Social values and individual attitudes. Work ethics and Indian vision of humanism. Moral and non-moral valuation. Standards and principles. Value judgements.

UNIT-II

Importance of cultivation of values; Sense of duty. Devotion, Self-reliance; Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature and Discipline.

UNIT-III

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship.Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature.

UNIT-IV

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively.

TEXT BOOKS:

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2112) POWER ELECTRONIC CONVERTERS

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the concepts and basic operation of SCR,UJT and Commutation.
- Understand the various conversion techniques

Course Outcomes:

Students will be able to:

- To understand the various power semiconductor devices
- To know the various conversion techniques of power semiconductor devices and its applications

UNIT- I

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 – SCR - UJT firing circuit —– Series and parallel connections of SCR's – Snubber circuit details – Specifications and Ratings of SCR's, BJT, IGBT - Numerical problems – Line Commutation and Forced Commutation circuits.

UNIT- II

Single-Phase and Three-Phase AC to DC converters: Half controlled configurations-operating domains of three phase full converters and semi-converters, Reactive power considerations.

UNIT- III

Analysis and design of DC to DC converters, Control of DC-DC converters: Buck converters, Boost converters, Buck-Boost converters, Cuk converters.

UNIT -IV

Single phase and three phase inverters, Voltage source and Current source inverters, Voltage control and harmonic minimization in inverters.

UNIT -V

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. Ned Mohan, Undeland and Robbin, "Power Electronics: converters, Application and Design", John's Wiley and sons. Inc, Newyork.
2. M.H.Rashid, "Power Electronics", Prentice Hall of India 1994.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2113) DIGITAL CONTROL OF POWER ELECTRONICS AND DRIVES SYSTEMS

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand different control strategies
- To understand state space modeling of different converters
- To perform simulation of different power converters

Course Outcomes:

Students will be able to:

- To provide knowledge on modelling and simulation of power simulation circuits and systems.
- The candidate will be able to simulate power electronic systems and analyse the system response.

UNIT-I

Review of numerical methods. Application of numerical methods to solve transients in D.C. Switched R, L, R-L, R-C and R-L-C circuits. Extension to AC circuits.

UNIT-II

Diode with R, R-L, R-C and R-L-C load with AC supply. Modelling of SCR, TRIAC, IGBT and Power Transistors in simulation. Application of numerical methods to R, L, C circuits with power electronic switches. Simulation of gate/base drive circuits, simulation of snubber circuits.

UNIT-III

State space modelling and simulation of linear systems. Introduction to electrical machine modelling: induction, DC, and synchronous machines, simulation of basic electric drives, stability aspects.

UNIT-IV

Simulation of single phase and three phase uncontrolled and controlled (SCR) rectifiers. Converters with self-commutated devices- simulation of power factor correction schemes.

UNIT-V:

Simulation of thyristor choppers with voltage. Current and load commutation schemes. Simulation of chopper fed DC motor. Simulation of single and three phase inverters with thyristors and self-commutated devices. Space vector representation. Pulse-width modulation methods for voltage control. Waveform control. Simulation of inverter fed induction motor drives.

REFERENCE:

1. Simulink Reference Manual, Math works, USA
2. Fundamental of Power Electronics: Robert Erickson
3. Digital Control System Design: Santina, Stubberud, Hostetter

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2114) SWITCHED MODE AND RESONANT CONVERTERS

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand different types of converters
- To understand different switch mode topologies & control methods
- To understand different resonant converter topologies

Course Outcomes:

- Acquire knowledge about the principles of operation of non-isolated and isolated hard-switched DC-DC converters
- Acquire knowledge on various loss components in a switched mode converter and choice of switching frequency with a view towards design of such converters

UNIT-I

Buck, Boost, Buck-Boost SMPS Topologies, Basic Operation-Waveforms - modes of operation -switching stresses, Switching and conduction losses. Optimum switching frequency, Practical voltage, current and power limits - design relations, Voltage mode control principles, Push-Pull and Forward Converter Topologies - Basic Operation, Waveforms, Flux Imbalance Problem and Solutions.

UNIT-II

Transformer Design. Output Filter Design. Switching Stresses and Losses, Forward Converter Magnetics. Voltage Mode Control, Half and Full Bridge Converters. Basic Operation and Waveforms, Magnetics, Output Filter, Flux Imbalance, Switching Stresses and Losses, Power Limits, Voltage Mode Control.

UNIT-III

Classification of Resonant Converters. Basic Resonant Circuit Concepts, Load Resonant Converter, Resonant Switch Converter, Zero, Voltage Switching Clamped Voltage Topologies. Resonant DC Link Inverters with Zero Voltage Switching, High Frequency Link Integral Half Cycle Converter, and Fly back Converter- discontinuous mode operation, waveforms, control, Magnetics- Switching Stresses and Losses, Disadvantages – Continuous Mode Operation, waveforms, control, design relations.

UNIT-IV

Voltage Mode Control of SMPS- Loop Gain and Stability Considerations, Error Amp– frequency Response and Transfer Function, Trans-conductance Current Mode Control of SMPS, Current Mode Control Advantages, Current Mode vs. Voltage Mode. Current Mode Deficiencies, Slope Compensation, Study of a typical Current Mode PWM Control IC UC3842. Modelling of SMPS.

UNIT-V

DC Transformer, Voltage Mode SMPS Transfer Function, General Control Law Consideration, MI Generation and Filtering in SMPS - Conducted and Radiated Emission Mechanisms in SMPS, Techniques to reduce Emissions, Control of Switching Loci, Shielding and Grounding, Power Circuit Layout for minimum EMI,EMI Filtering at Input and Output, Effect of EMI Filter on SMPS Control Dynamics, Introduction to Resonant Converters.

TEXT BOOKS:

1. Abraham I Pressman, “Switching Power Supply Design,” McGraw Hill Publishing Company, 2001.
2. Daniel M Mitchell, “DC-DC Switching Regulator Analysis,” McGraw Hill Publishing Company-1988.

REFERENCES:

1. Ned Mohan et.al, “Power Electronics,” John Wiley and Sons 2006.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)

(18EE2115) INDUSTRIAL LOAD MODELLING AND CONTROL

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the energy demand scenario
- To understand the modeling of load and its ease to study load demand industrially
- To know Electricity pricing models
- Study Reactive power management in Industries

Course Outcomes:

Students will be able to:

- Knowledge about load control techniques in industries and its application.
- Different types of industrial processes and optimize the process using tools like LINDO and LINGO.
- Apply load management to reduce demand of electricity during peak time.
- Apply different energy saving opportunities in industries

UNIT-I

Demand Side Management-Industrial Load Management. Load Curves-Load Shaping Objectives-Methodologies, Barriers; Classification of Industrial Loads- Continuous and Batch processes -Load Modelling.

UNIT-II

Dynamic and spot pricing –Models. Direct load control- Interruptible load control. Bottom up approach- scheduling- Formulation of load models- Optimization and control algorithms.

UNIT-III

load profiling- Modelling., Cool storage-Types- Control strategies., Optimal operation-Problem formulation- Case studies., Selection of Schemes Optimal Operating Strategies.

UNIT-IV

Operating and control strategies- Power Pooling, Operation models. Energy banking-Industrial Cogeneration, Reactive power management in industries-controls-power quality impacts.

UNIT-V

Constraints-Problem formulation- Case study, Integrated Load management for Industries, impacts, application of filters Energy saving in industries.

TEXT BOOKS:

1. C.O. Bjork “Industrial Load Management - Theory, Practice and Simulations", Elsevier, the Netherlands, 1989.
2. C.W. Gellings and S.N. Talukdar, “Load management concepts,” IEEE Press, New York, 1986, pp. 3-28.

REFERENCES:

1. Y. Manichaikul and F.C. Schweppe," Physically based Industrial load", IEEE Trans. on PAS, April 1981.
2. H. G. Stoll, "Least cost Electricity Utility Planning”, Wiley Interscience Publication, USA, 1989.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2116) ADVANCED DIGITAL SIGNAL PROCESSING

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the difference between discrete-time and continuous-time signals
- To understand and apply Discrete Fourier Transforms (DFT)

Course Outcomes :

Students will be able to:

- Knowledge about the time domain and frequency domain representations as well analysis of discrete time signals and systems
- Study the design techniques for IIR and FIR filters and their realization structures.
- Acquire knowledge about the finite word length effects in implementation of digital filters.
- Knowledge about the various linear signal models and estimation of power spectrum of Stationary random

UNIT-I

Analog to digital and Digital to Analog conversion, sampled and Hold circuit, Continuous time Fourier Transforms, Discrete time signals and systems, Discrete time Fourier transform, its properties and applications, Fast Fourier Transform (in time domain and Frequency domain), IDFT and its properties.

UNIT-II

Definition and properties, Rational z-transforms, Region of convergence of a rational z-Transform, The inverse z-Transform, z-Transform properties, Computation of the convolution sum of finite, length sequences, The transfer function.

UNIT-III

Block Diagram representation, Equivalent structures, Basic FIR Digital Filter structures, Basic IIR Digital Filter structures, Realization of Basic structures using MATLAB, All pass filters, Computational complexity of Digital filter structures.

UNIT-IV

Preliminary considerations, Bilinear transformation method of IIR Filter design, Design of low pass IIR Digital filters, Design of High pass, Band pass and band stop IIR digital filters, Spectral Transformations of IIR filter, IIR digital filter design using MATLAB, Computer aided design of IIR digital filters.

FIR digital filter design: Preliminary considerations, FIR filter design based on windowed Fourier series, Computer aided design of Equiripple Linear phase FIR filters, Design of Minimum phase FIR filters, FIR digital filter design using MATLAB, Design of computationally efficient FIR digital filters.

UNIT-V

The quantization process and errors, quantization of Fixed point numbers, Quantization of floating point numbers, Analysis of coefficient quantization effects, Analysis of arithmetic round off errors, Low sensitivity digital filters, Reduction of product round off errors using error feedback, Round off errors in FFT algorithms.The basic sample rate alteration devices, Multi rate structures for sampling rate conversion, Multistage design of decimator and interpolator,

The Polyphase decomposition, Arbitrary rate sampling rate converter, Nyquist Filters and some applications of digital signal processing.

TEXT BOOKS

1. Digital Signal Processing, S.K. Mitra, Tata McGraw,Hill, Third Edition, 2006.
2. Principle of Signal Processing and Linear Systems, B.P. Lathi, Oxford International Student Version, 2009
3. Continuous and Discrete Time Signals and Systems, M. Mondal and A Asif, Cambridge, 2007

REFERENCES

1. Digital Signal Processing, Fundamentals and Applications, LiTan-Indian reprint,Elsevier,2008.
2. Discrete-Time Signal Processing, Alan V. Oppenheim, Ronald, W. Schafer, and John R.Buck, Pearson Education, 2008.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)

(18EE2117) ADVANCED MICRO-CONTROLLER BASED SYSTEMS

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the architecture of advance microcontrollers
- To understand the applications of these controllers
- To get some introduction to FPGA

Course Outcomes

Students will be able to:

- To learn how to program a processor in assembly language and develop an advanced processor based system.
- To learn configuring and using different peripherals in a digital system.
- To compile and debug a Program.
- To generate an executable file and use it.

UNIT – I

Basic Computer Organization, Accumulator based processes-Architecture-Memory Organization-I/O Organization.

UNIT – II

Intel 8051, Intel 8056- Registers, Memories, I/O Ports, Serial Communication, Timers, Interrupts, Programming, Intel 8051 – Assembly language programming-Addressing-Operations-Stack & Subroutines, Interrupts-DMA.

UNIT – III

PIC 16F877- Architecture Programming, Interfacing Memory/ I/O Devices, Serial I/O and data communication.

UNIT – IV

Digital Signal Processor (DSP) - Architecture – Programming, Introduction to FPGA.

UNIT – V

Microcontroller development for motor control applications, Stepper motor control using micro controller.

TEXT BOOKS:

1. John.F.Wakerly: "Microcomputer Architecture and Programming", John Wiley and Sons 1981.
2. Ramesh S.Gaonker: "Microprocessor Architecture, Programming and Applications with The 8085", Penram International Publishing (India), 1994.
3. Raj Kamal: "The Concepts and Features of Microcontrollers", Wheeler Publishing, 2005.

REFERENCES:

1. Kenneth J. Ayala, "The 8051 microcontroller", Cengage Learning, 2004.
2. John Morton," The PIC microcontroller: your personal introductory course", Elsevier, 2005.
3. Dogan Ibrahim," Advanced PIC microcontroller projects in C: from USB to RTOS with The PIC18F Series", Elsevier, 2008.
4. Microchip datasheets for PIC16F877.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2118) DISTRIBUTED GENERATION

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand renewable energy sources.
- To gain understanding of the working of off-grid and grid-connected renewable energy generation schemes

Course outcomes

Students will be able to:

- To understand the planning and operational issues related to Distributed Generation.
- Acquire Knowledge about Distributed Generation Learn Micro-Grids

UNIT-I

Need for Distributed generation, Renewable sources in distributed generation and current scenario in Distributed Generation, Planning of DGs. Sitting and sizing of DGs optimal placement of DG sources in distribution systems.

UNIT-II

Grid integration of DGs Different types of interfaces, Inverter based DGs and rotating machine based interfaces, Aggregation of multiple DG units, Technical impacts of DGs.

UNIT-III

Transmission systems Distribution Systems De-regulation Impact of DGs upon protective relaying, Impact of DGs upon transient and dynamic stability of existing distribution systems, Steady-state and Dynamic analysis.

UNIT-IV

Aspects of DGs Market facts, Issues and challenges Limitations of DGs, Voltage control techniques. Reactive power control, Harmonics Power quality issues, Reliability of DG based systems, Transients in micro-grids, Protection of micro-grids, Case
Studies, Advanced topics.

UNIT-V

Types of micro-grids: autonomous and non-autonomous grids Sizing of micro-grids, Modelling & analysis of Micro-grids with multiple DGs. Micro-grids with power electronic interfacing units.

TEXT BOOKS:

1. H. Lee Willis, Walter G. Scott, "Distributed Power Generation – Planning and Evaluation", Marcel Decker Press.
2. M.GodoySimoes, Felix A.Farret, "Renewable Energy Systems – Design and Analysis with Induction Generators", CRC press.

REFERENCES:

1. Stuart Borlase. "Smart Grid: Infrastructure Technology Solutions" CRC Press

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2119) SMART GRIDS

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand concept of smart grid and its advantages over conventional grid.
- Know smart metering techniques.
- Learn wide area measurement techniques.
- Understanding the problems associated with integration of distributed generation & its solution through smart grid

Course Outcomes:

Students will be able to:

- Appreciate the difference between smart grid & conventional grid.
- Apply smart metering concepts to industrial and commercial installations.
- Formulate solutions in the areas of smart substations, distributed generation and wide area measurements.
- Come up with smart grid solutions using modern communication technologies

UNIT-I

Evolution of Electric Grid Concept of Smart Grid, Definitions

Need of Smart Grid, Concept of Robust & Self-Healing Grid Present development & International policies in Smart Grid Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS), Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart, Sensors, Home & Building Automation, Smart Substations, Substation Automation, Feeder Automation .

UNIT-II

Intelligent Electronic Devices (IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System (WAMS), Phase Measurement Unit (PMU)

UNIT-III

Need & applications of micro-grid, formation of micro-grid, Issues of interconnection, protection & control of micro-grid. Plastic & Organic solar cells, thin film solar cells, Variable speed wind generators, fuel-cells, micro-turbines, Captive power plants, Integration of renewable energy sources

UNIT-IV

Power Quality & EMC in Smart Grid, Power Quality issues of Grid, connected Renewable Energy Sources; Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit

UNIT-V

Home Area Network (HAN), Neighbourhood Area Network (NAN), Wide Area Network (WAN), Bluetooth, ZigBee, GPS, Wi-Fi, Wi-Max based communication, Wireless Mesh Network, Basics of CLOUD Computing & Cyber Security for Smart Grid, Broadband over Power line (BPL), IP based protocols

TEXT BOOKS:

1. Ali Keyhani, “Design of smart power grid renewable energy systems”, Wiley IEEE, 2011
2. Clark W. Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”, CRC Press, 2009
3. Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, “Smart Grid: Technology and Applications”, Wiley 2012

REFERENCES:

1. Stuart Borlase, “Smart Grid: Infrastructure, Technology and solutions “CRC Press
2. A.G.Phadke, “Synchronized Phasor Measurement and their Applications”, Springer

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY

(AUTONOMOUS)

(18EE2120) POWER CONVERTERS LAB

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
0	0	4	2

1. Speed Measurement and closed loop control using PMDC motor.
2. Thyristorised drive for PMDC Motor with speed measurement and closed Loop control.
3. IGBT used single 4 quadrant chopper drive for PMDC motor with speed measurement and closed loop control.
4. Thyristorised drive for 1Hp DC motor with closed loop control.
5. 3-Phase input, thyristorised drive, 3 Hp DC motor with closed loop
6. 3-Phase input IGBT, 4 quadrant chopper drive for DC motor with closed Loop control equipment.
7. Cyclo-converter based AC Induction motor control equipment.
8. Speed control of 3 phase wound rotor Induction motor.
9. Single-phase fully controlled converter with inductive load.
10. Single phase half wave controlled converter with inductive load.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY

(AUTONOMOUS)

(18EE2122) INDUSTRIAL ELECTRIC DRIVES LAB

(Virtual Lab)

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
0	0	4	2

1 PLC Timer Instruction

2. PLC Counter Instruction

3. Garbage Shutter opening and closing using PLC

4. Container Filling Operations Limiter using PLC

7. Motor forward and reverse Process Using PLC

5. Simultaneous output interlock using PLC

6. Maximum Simultaneous direction control using PLC

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18HS0829) CONSTITUTION OF INDIA

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	0

Course Objectives:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals 'constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT-I

History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working)

UNIT-II

Philosophy of the Indian Constitution: Preamble, Salient Features.

UNIT-III

Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT-IV

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT-V

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

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

TEXT BOOKS:

1. The Constitution of India, 1950 (Bare Act), Government Publication.

2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

REFERENCES:

1. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

2. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18HS0827) PEDAGOGY STUDIES

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	0

Course Objectives:

- Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Course Outcomes:

Students will be able to understand:

- What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

UNIT-I

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and Terminology. Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions**.** Overview of methodology and Searching.

UNIT-II

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT-III

Evidence on the effectiveness of pedagogical practices. Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change.

Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT-IV

Professional development: alignment with classroom practices and follow-up support. Peer support

Support from the head teacher and the community. Curriculum and assessment Barriers to learning: limited resources and large class sizes

UNIT-V

Research gaps and future directions Research design Contexts Pedagogy Teacher education Curriculum and assessment Dissemination and research impact.

TEXT BOOKS:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.

REFERENCES:

1. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
2. Chavan M (2003) Read India: A mass scale, rapid, ‘learning to read’ campaign.
3. www.pratham.org/images/resource%20working%20paper%202.pdf.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18HS0828) STRESS MANAGEMENT BY YOGA

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	0

Course Objectives:

- To achieve overall health of body and mind
- To overcome stress

Course Outcomes:

Students will be able to:

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency.

UNIT-I

Definitions of Eight parts of yoga (Ashtanga)

UNIT-II

Yam and Niyam. Do`s and Don'ts in life:

i) Ahinsa, satya, astheya, bramhacharya and aparigraha.

ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.

UNIT-III

Asan and Pranayam:

i) Various yog poses and their benefits for mind & body.

ii) Regularization of breathing techniques and its effects-Type of pranayam.

TEXT BOOKS:

1. 'Yogic Asanas for Group Tarining-Part-I" :Janardan Swami Yogabhyasi Mandal, Nagpur Model Curriculum of Engineering & Technology PG Courses [Volume-I] [47].

2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department) Kolkata.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY

(AUTONOMOUS)

(18HS0819)PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

M.Tech, I Year 2nd Semester (PE)

L	T	P	C
3	0	0	0

Course Objectives:

- To learn to achieve the highest goal happily.
- To become a person with stable mind, pleasing personality and determination.
- To awaken wisdom in students.

Course Outcomes

Students will be able to:

- Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity.
- Study of Neetishatakam will help in developing versatile personality of students.

UNIT-I

Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)
- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

UNIT-II

- Approach to day to day work and duties.
- Shrimad BhagwadGeeta : Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
- Chapter 18-Verses 45, 46, 48.

UNIT-III

- Statements of basic knowledge.
- Shrimad BhagwadGeeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad BhagwadGeeta:

Chapter2-Verses 17, Chapter 3-Verses 36,37,42,

- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

TEXT BOOKS:

1. "Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, 4. Rashtriya Sanskrit Sansthanam, New Delhi.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2123) SCADA SYSTEM AND APPLICATIONS

M.Tech, II Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- what is meant by To understand PLC and its functions.
- what is meant by To understand SCADA and its functions
- To know SCADA communication.
- To get an insight into its application

Course Outcomes

Students will be able to:

- Describe the basic tasks of Supervisory Control Systems (SCADA) as well as their typicalapplications**.**
- Acquire knowledge about SCADA architecture, various advantages and disadvantages of eachsystem.
- Knowledge about single unified standard architecture IEC 61850.
- To learn about SCADA system components: remote terminal units, PLCs, intelligent electronic devices, HMI systems, SCADA server.
- Learn and understand about SCADA applications in transmission and distribution sector, industries etc.

UNIT-I

PLC basics: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules

UNIT-II

Introduction to SCADA , Data acquisition systems, Evolution of SCADA, Communication technologies, Monitoring and supervisory functions, SCADA applications in Utility Automation, SCADA System Components.

UNIT-III

Need of computer control of power systems, concept of energy control center (or) load dispatch center and the functions, system monitoring, data acquisition and control, system hardware configuration, SCADA and EMS functions, network topology, state estimation, security analysis and control, operating states.

UNIT-IV

SCADA System Components: Schemes- Remote Terminal Unit (RTU), Intelligent Electronic Devices (IED), Programmable Logic Controller (PLC), Communication Network, SCADA Server, SCADA/HMI Systems.

UNIT-V

Utility applications- Transmission and Distribution sector -operations, monitoring, analysis and improvement. Industries - oil, gas and water. Case studies,

Implementation, Simulation Exercises.

TEXT BOOKS

1. Stuart A. Boyer: "SCADA-Supervisory Control and Data Acquisition", Instrument Society of America Publications,USA,2004
2. Gordon Clarke, Deon Reynders: "Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems", Newnes Publications, Oxford, UK,2004
3. William T. Shaw, "Cybersecurity for SCADA systems", PennWell Books, 2006
4. David Bailey, Edwin Wright, "Practical SCADA for industry", Newnes, 2003
5. Michael Wiebe, "A guide to utility automation: AMR, SCADA, and IT systems for electric power", PennWell 1999

REFERENCES:

1. P.Kundur ; "Power System Stability and Control", EPRI Publications, California 1994.
2. Nagrath, I.J. and Kothari D.P., 'Modern Power System Analysis', TMH, New Delhi, 1980
3. D.P.Kothari & J.S.Dhillon, Power System Optimization, PHI, 2004

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2124) FACTS AND CUSTOM POWER DEVICES

M.Tech, II Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:
- To learn the active and reactive power flow control in power system
- To understand the need for static compensators
- To develop the different control strategies used for compensation

Course Outcomes:
Students will be able to:

- Acquire knowledge about the fundamental principles of Passive and Active Reactive Power Compensation Schemes at Transmission and Distribution level in Power Systems.
- Learn various Static VAR Compensation Schemes like Thyristor/GTO Controlled.
- Reactive Power Systems, PWM Inverter based Reactive Power Systems and their controls.
- To develop analytical modeling skills needed for modeling and analysis of such Static VARSystems

UNIT-I

Reactive power control of dynamic power unbalances in Power System - Power flow control Constraints of maximum transmission line loading Benefits of FACTS Transmission line compensation Uncompensated line -Shunt compensation, Series compensation Phase angle control Reactive power compensation Shunt and Series compensation principles Reactive compensation at transmission and distribution level

UNIT-II

Static versus passive VAR compensator, Static shunt compensators: SVC and STATCOM
Operation and control of TSC, TCR and STATCOM –Compensator control Comparison between SVC and STATCOM

UNIT-III

TSSC, SSSC -Static voltage and phase angle regulators TCVR and TCPAR Operation and Control, Applications, Static series compensation GCSC, TSSC, TCSC and Static synchronous series compensators and their Control

UNIT-IV

SSR and its damping Unified Power Flow Controller, Circuit Arrangement, Operation and control of UPFC, Basic Principle of P and Q control, Independent real and reactive power flow control-Applications.

UNIT-V

Modelling and analysis of FACTS Controllers Simulation of FACTS controllers Power quality problems in distribution systems, harmonics, loads that create harmonics modelling, harmonic propagation, series and parallel resonances
Mitigation of harmonics passive filters, active filtering – shunt, series and hybrid and their control

TEXT BOOKS:

1. K R Padiyar, “FACTS Controllers in Power Transmission and Distribution”, New Age International Publishers, 2007
2. X P Zhang, C Rehtanz, B Pal, “Flexible AC Transmission Systems- Modelling and Control”, SpringerVerlag, Berlin, 2006

REFERENCES:

1. N.G. Hingorani, L. Gyugyi, “Understanding FACTS: Concepts and Technology of Flexible ACTransmission Systems”, IEEE Press Book, Standard Publishers and Distributors, Delhi, 2001.
2. K.S.Sureshkumar, S.Ashok, “FACTS Controllers & Applications”, E-book edition, Nalanda DigitalLibrary, NIT Calicut, 2003

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2125) HVDC TRANSMISSION SYSTEMS

M.Tech, II Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand state of the art HVDC technology.
- Learn the Methods to carry out modeling and analysis of HVDC system frontier-area Power flow regulation

Course Outcomes:

Students will be able to:

- To expose the students to the state of the art HVDC technology.
- Knowledge of modelling and analysis of HVDC system for inter-area power flow regulation.
- Study of Neetishatakam will help in developing

UNIT-I

Comparison of AC and dc Transmission (Economics, Technical Performance and Reliability). Application of DC Transmission. Types of HVDC Systems. Components of a HVDC system. Line Commutated Converter and Voltage Source Converter based systems.

UNIT-II

Analysis of Line Commutated and Voltage Source Converters Line Commutated Converters (LCCs): Six pulse converter, Analysis neglecting commutation overlap, harmonics, Twelve Pulse Converters. Inverter Operation. Effect of Commutation Overlap. Expressions for average dc voltage, AC current and reactive power absorbed by the converters. Effect of Commutation Failure, Misfire and Current Extinction in LCC links.

Voltage Source Converters (VSCs): Two and Three-level VSCs. PWM schemes: Selective Harmonic Elimination, Sinusoidal Pulse Width Modulation. Analysis of a six pulse converter.Equations in the rotating frame. Real and Reactive power control using a VSC.

UNIT-III

Principles of Link Control in a LCCHVdc system. Control Hierarchy, Firing Angle Controls – Phase-Locked Loop, Current and Extinction Angle Control, Starting and Stopping of a Link. Higher level Controllers Power control, Frequency Control, Stability Controllers.Reactive Power Control. Principles of Link Control in a VSC HVdc system: Power flow and dc Voltage Control. Reactive Power Control/AC voltage regulation.

UNIT-IV

Smoothing Reactors, Reactive Power Sources and Filters in LCC HVdc systems DC line: Corona Effects. Insulators, Transient Over-voltages. dc line faults in LCC systems. dc line faults in VSC systems. dc breakers. Monopolar Operation. Ground Electrodes.

Stability Enhancement using HVdc Control

Basic Concepts: Power System Angular, Voltage and Frequency Stability.

Power Modulation: basic principles – synchronous and asynchronous links. Voltage Stability Problem in AC/dc systems.

UNIT-V

Multi-Terminal and Multi-Infeed Systems. Series and Parallel MTdc systems using LCCs. MTdc systems using VSCs. Modern Trends in HVdcTechnology. Introduction to Modular Multi-level Converters.

TEXT BOOKS:

1. K. R. Padiyar, "HVDC Power Transmission Systems", New Age International Publishers, 2011.
2. J. Arrillaga, "High Voltage Direct Current Transmission", Peter Peregrinus Ltd., 1983.

REFERENCES:

1. E. W. Kimbark, "Direct Current Transmission", Vol.1, Wiley-Interscience,1971.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18HS0824) BUSINESS ANALYTICS

M.Tech, II Year 1st Semester (PE)

L	T	P	C
3	0	0	0

Course Objective:

- To understand the management and administration, functions of management, formal and informal organization, staffing, creativity and innovation, process of communication.

Course Outcomes:

Students will be able to:

- Design, device, and query relational databases for operative data.
- Design, implement, populate and query data warehouses for informational data.
- To integrate very large data sets to make business decisions.
- Evaluate the use of data from acquisition through cleansing, warehousing, analytics, and visualization to the ultimate business decision.
- Evaluate the key concepts of business analytics.
- Determine when to implement relational versus document oriented database structures.

UNIT-I

Introduction to Descriptive analytics, Descriptive Statistics, Probability Distributions, Inferential Statistics through hypothesis tests, Permutation & Randomization Test

UNIT-II

Regression, ANOVA (Analysis of Variance), Machine Learning Introduction and ConceptsDifferentiating, algorithmic and model based frameworks, Regression: Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbors', Regression &Classification

UNIT-III

Supervised Learning with Regression and Classification techniques- Bias-Variance Dichotomy, Model Validation Approaches, Logistic Regression, Linear DiscriminantAnalysis, Quadratic Discriminant Analysis, Regression and Classification Trees, Support Vector Machines, Ensemble Methods: Random Forest, Neural Networks, Deep learning

UNIT-IV

Unsupervised Learning and Challenges for Big Data Analytics- Clustering, Associative Rule Mining, Challenges for big data analytics

UNIT-V

Prescriptive analytics Creating data for analytics through designed experiments, creating data for analytics through Active learning, creating data for analytics through Reinforcement learning, Graph Visualization, Data Summaries, Model Checking & Comparison

TEXT BOOKS:

1. Hastie, Trevor, et al. The elements of statistical learning.Vol.2.No. 1. New York: springer, 2009.

2. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons, 2010

3. Bekkerman et al. Scaling up Machine Learning

REFERENCES:

1. Tom White "Hadoop: The Definitive Guide" Third Edition, O"reilly Media, 2012.

2. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

3. Vincent Granville, Developing Analytic Talent: Becoming a Data Scientist, wiley, 2014.

4. Jeffrey Stanton & Robert De Graaf, Introduction to Data Science, Version 2.0, 2013.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18ME3121) INDUSTRIAL SAFETY

M.Tech, II Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To learn about mechanical and electrical hazards.
- To learn about P mechanical and electrical hazards.
- To learn about Wear and Corrosion and their prevention.
- To learn about Periodic and preventive maintenance

Course Outcomes:

Students undergoing this course are able to

- Understand the points of factories act 1948 for health and safety.
- Understand the cost & its relation with replacement economy.
- Understand the concepts of sequence of fault finding activities
- Understand the Program and schedule of preventive maintenance of mechanical and electrical equipment.

UNIT-I:

Industrial Safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc., Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT-II:

Fundamentals of Maintenance Engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT-III:

Wear and Corrosion and their Prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT-IV:

Fault Tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, Any one machine tool, Pump, Air compressor, Internal combustion engine, Boiler, Electrical motors, Types of faults in machine tools and their general causes.

UNIT-V:

Periodic and Preventive Maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: Machine tools, Pumps, Air compressors, Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

TEXT BOOKS:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services, 2002
2. Maintenance Engineering, H. P. Garg, S. Chand and Company, 2008

REFERENCES:

1. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication, 2009
2. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London, 2010

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18ME3122) ADVANCES IN OPERATIONS RESEARCH

M.Tech, II Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To learn about Optimization Techniques.
- To learn about Graphical solution revised simplex method
- To learn about Non linear programming problem.
- To learn about Scheduling and sequencing and Competitive Models

Course Outcomes:

Students undergoing this course are able to

- Understand the Inventory Control Models
- Understand the Graphical solution revised simplex method
- Understand the concepts of Kuhn-Tucker conditions min cost flow.
- Understand the Probabilistic inventory control models and Dynamic Programming

UNIT-I

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.

UNIT-II

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

UNIT-III

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

UNIT-IV

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT-V

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

TEXT BOOKS:

1. Operations Research, An Introduction, H.A. Taha, PHI, 2008
2. Principles of Operations Research, H.M. Wagner, PHI, Delhi, 1982.
3. Introduction to Optimization: Operations Research, J.C. Pant, Jain Brothers, Delhi, 2008

REFERENCE BOOKS:

1. Operations Research: Hitler Liebermann McGraw Hill Pub. 2009
2. Operations Research: Pannerselvam, Prentice Hall of India 2010

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY (AUTONOMOUS)

(18CE1028) COST MANAGEMENT OF ENGINEERING PROJECTS

M.Tech, II Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To study fundamentals of engineering project economics
- To understand dynamics of money over time
- To understand the significance of Benefit & Cost Analysis

Course Outcomes:

- Student can access the present value and future value for money
- Student can apply the principals of Benefit & Cost Analysis and
- Break-Even comparison
- Student can calculate the depreciation cost for construction equipment and can estimate the cost for construction equipment
- Can prepare profit and loss, balance sheets etc

UNIT – I

Engineering economics : Basic principles – Time value of money, Quantifying alternatives for decision making, Cash flow diagrams, Equivalence- Single payment in the future (P/F, F/P), Present payment compared to uniform series payments (P/A, A/P), Future payment compared to uniform series payments (F/A, A/F), Arithmetic gradient, Geometric gradient.

UNIT – II

Comparison of alternatives: Present, future and annual worth method of comparing alternatives, Rate of return, Incremental rate of return, Break-even comparisons, Capitalized cost analysis, Benefit-cost analysis.

UNIT – III

Depreciation, Inflation and Taxes: Depreciation, Inflation, Taxes.

Equipment economics: Equipment costs, Ownership and operating costs, Buy/Rent/Lease options, Replacement analysis.

UNIT – IV

Cost Estimating: Types of Estimates, Approximate estimates – Unit estimate, Factor estimate, Cost indexes, parametric estimate, and Life cycle cost.

UNIT – V

Financial management: Construction accounting, Chart of Accounts, Financial statements – Profit and loss, Balance sheets, Financial ratios, Working capital management.

TEXT BOOKS

1. Blank, L. T. and Tarquin, A. J., "Engineering Economy", Fourth Edition, WCB/McGraw-Hill, 1998.
2. Bose, D. C., "Fundamentals of Financial management", 2nd ed., PHI, New Delhi, 2010.

REFERENCE BOOKS:

1. Boyer, C. B. and Merzbach, U. C., "A History of Mathematics", 2nd ed., John Wiley & Sons, New York, 1989.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)

(18ME3123) COMPOSITE MATERIALS

M.Tech, II Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To learn about Classification and characteristics of Composite materials
- To learn about layup method and Mechanical Behavior of composites
- To learn about Manufacturing of Metal Matrix Composites and Manufacturing of Polymer Matrix Composites
- To learn about Laminar Failure Criteria and Laminate strength-ply discount truncated maximum strain criterion

Course Outcomes:

Students undergoing this course are able to

- Understand the need of composite materials.
- Understand the Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites.
- Understand the concepts of Manufacturing of Ceramic Matrix Composite and Metal Matrix Composite.
- Understand the various manufacturing method of composites.

UNIT–I:

Introduction: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT – II:

Reinforcements: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

UNIT – III:

Manufacturing Of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT–IV:

Manufacturing Of Polymer Matrix Composites: Preparation of Moulding compounds and prepress – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – V:

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hydro thermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany, 2003
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Bala Subramanian, John Wiley & Sons, NY, Indian edition, 2007.

REFERENCES:

1. Hand Book of Composite Materials-ed-Lubin. 2010
2. Composite Materials – K.K.Chawla. 2009
3. Composite Materials Science and Applications – Deborah D.L. Chung, 2012
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi, 2012

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
(18EE2128) WASTE TO ENERGY

M.Tech, II Year 1st Semester (PE)

L	T	P	C
3	0	0	3

Course Objectives:

- To study fundamentals of industrial waste conversion devices
- To understand Manufacture of pyrolytic oils and gases, yields and applications
- To understand the Equilibrium and kinetic consideration in gasifier operation
- Tounderstand the Thermo chemical conversion

Course Outcomes:

Students will be able to:

- To study fundamentals of industrial waste conversion devices
- To understand Manufacture of pyrolytic oils and gases, yields and applications
- To understand the Equilibrium and kinetic consideration in gasifier operation
- Tounderstand the Thermo chemical conversion

UNIT-I

Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors.

UNIT-II

Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods -Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

UNIT-III

Gasifiers – Fixed bed system – Downdraft and updraft gasifiers –Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

UNIT-IV

Biomass stoves – Improved chullahs, types, some exotic designs, fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

UNIT-V

Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

TEXT BOOKS:

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.

REFERENCES:

1. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.