With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

Ibrahimbagh, Hyderabad-31
Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

Sponsored
by
VASAVI ACADEMY OF EDUCATION
Hyderabad

SCHEME OF INSTRUCTION AND SYLLABI UNDER CBCS FOR
M.E. (PSPE) I and IV Semesters
With effect from 2019-20
(For the batch admitted in 2019-20)
(R-19)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
Phones: +91-40-23146030, 23146031
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VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS) :: IBRAHIMBAGH, HYDERABAD – 500 031.
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION (R-19) :: M.E. - EEE (PSPE): FIRST SEMESTER (2019 - 20)

M.E – EEE (PSPE) I Semester								
Course Code	**Name of the Course**	**Scheme of Instruction**			**Scheme of Examination**			
		Hours per Week			**Duration in Hrs**	**Maximum Marks**		**Credits**
		L	**T**	**P/D**		**SEE**	**CIE**	
THEORY								
PI19HS110EH	Skill Development Course: Communication Skills in English	1	-	-	2	40	30	1
PI19PE110EE	Skill Development Course : Technical Skills	2	-	-	3	60	40	2
PI19PC110EE	PC-I:AdvancedComputer Methods in Power Systems	3	-	-	3	60	40	3
PI19PC120EE	PC-II:Applicationof Power Electronics to PowerSystems	3	-	-	3	60	40	3
PI19PC130EE	PC III:Power System Stability	3	-	-	3	60	40	3
PI19PE1XXEE	PE-I (from Power Systems Stream)	3	-	-	3	60	40	3
PI19PE1XXEE	PE-II (from Power Electronics Stream)	3	-	-	3	60	40	3
PI19AC110EH	AC-I : English for Research Paper Writing	2	-	-	3	60	40	-
PRACTICALS								
PI19PC111EE	Power Systems Simulation Lab	-	-	3	3	-	50	1.5
PI19PC121EE	Power Electronics Simulation Lab	-	-	3	3	-	50	1.5
PI19PC118EE	Seminar	-	-	2	-	-	50	1
	TOTAL	**20**	**0**	**8**		**460**	**460**	**22**
GRAND TOTAL		**28**				**920**		**22**
Student should acquire one online course certification equivalent to two credits during I Sem to III sem.								

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION (R-19) :: M.E. - EEE (PSPE): SECOND SEMESTER (2019 - 20)

M.E – EEE (PSPE) II Semester								
Course Code	**Name of the Course**	**Scheme of Instruction**			**Scheme of Examination**			
		Hours per Week			**Duration in Hrs**	**Maximum Marks**		**Credits**
		L	**T**	**P/D**		**SEE**	**CIE**	
THEORY								
PI19HS210EH	Skill Development Course : Soft Skills	1	-	-	3	40	30	1
PI19PE210EE	Skill Development Course : Technical Skills	2	-	-	3	60	40	2
PI19PC240ME	Research Methodology & IPR	2	-	-	3	60	40	2
PI19PC210EE	PC IV: Power Electronics Controlled Electric Drives	3	-	-	3	60	40	3
PI19PC220EE	PC V: Distribution System Planning & Automation	3	-	-	3	60	40	3
PI19PC230EE	PC VI: Power Electronics Converters	3	-	-	3	60	40	3
PI19PE2XXEE	PE-III (from Power Systems Stream)	3	-	-	3	60	40	3
PI19PE2XXEE	PE-IV(from Power Systems & Power Electronics Stream)	3	-	-	3	60	40	3
PI19AC210EH	AC-II : Pedagogy Studies	2	-	-	3	60	40	-
PRACTICALS								
PI19PC211EE	Power Systems & Power Electronics Lab	-	-	3	3	-	50	1.5
PI19PC221EE	Programmable LogicControllers& Applications Lab	-	-	3	3	-	50	1.5
PI19PW219EE	Mini Project	-	-	2	-	-	50	1
	TOTAL	**22**	**0**	**8**		**520**	**500**	**24**
	GRAND TOTAL	**30**				**1020**		**24**
Student should acquire one online course certification equivalent to two credits during I Sem to III sem.								

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION (R-19) :: M.E. - EEE (PSPE): THIRD SEMESTER (2019 - 20)

M.E – EEE (PSPE) III Semester								
Course Code	**Name of the Course**	**Scheme of Instruction**			**Scheme of Examination**			
		Hours per Week			**Duration in Hrs**	**Maximum Marks**		**Credits**
		L	**T**	**P/D**		**SEE**	**CIE**	
THEORY								
PI19PE3XXEE	Professional Elective – V	3	0	0	3	60	40	3
PI19OE3XXXX	Open Elective	3	0	0	3	60	40	3
PRACTICALS								
PI19PW319EE	Dissertation-Phase I / Internship	0	0	8	-	-	100	4
	TOTAL	**6**	**0**	**8**		**120**	**180**	**10**
	GRAND TOTAL	**14**				**300**		**10**
Student should acquire one online course certification equivalent to two credits during I Sem to III sem.								

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION (R-18) :: M.E. - EEE (PSPE): FOURTH SEMESTER (2019 - 20)

M.E – EEE (PSPE) IV Semester								
Course Code	**Name of the Course**	**Scheme of Instruction**			**Scheme of Examination**			
		Hours per week			**Duration in Hrs**	**Maximum Marks**		**Credits**
		L	**T**	**P/D**		**SEE**	**CIE**	
PRACTICALS								
PI19PW419EE	Phase II Dissertation / Internship	0	0	20		Viva-Voce (Grade)		10
	TOTAL	**0**	**0**	**20**				**10**
	GRAND TOTAL	**20**						**10**

CORE SUBJECTS		
1	PI19PC110EE	Advanced Computer Methods in Power Systems
2	PI19PC120EE	Application of Power Electronics to Power Systems
3	PI19PC130EE	Power System Stability
4	PI19PC210EE	Power Electronics Controlled Electric Drives
5	PI19PC220EE	Distribution System Planning & Automation
6	PI19PC230EE	Power Electronic Converters
PROFESSIONAL ELECTIVES-POWER SYSTEMS		
1	PI19PEX10EE	Advanced Synchronous Machine Theory
2	PI19PEX20EE	Advanced Power System Protection
3	PI19PEX30EE	Real Time Applications in Power Systems
4	PI19PEX40EE	High Voltage D.C. Transmission
5	PI19PEX50EE	Renewable Energy Sources
6	PI19PEX60EE	Reliability Modeling in Power Systems
7	PI19PEX70EE	Energy Management
8	PI19PEX80EE	Swarm Intelligence Applications to Power Systems
9	PI19PEX90EE	High Voltage Engineering
10	PI19PEX14EE	Distributed generation and micro grids
11	PI19PEX24EE	Power System Analysis
12	PI19PEX34EE	AI Techniques
13	PI19PEX44EE	Digital Protection of Power Systems
14	PI19PEX54EE	Electrical Power Distribution System
15	PI19PEX64EE	Wind and Solar Systems
16	PI19PEX74EE	Smart Grid Technologies

PROFESSIONAL ELECTIVES-POWER ELECTRONICS		
1	PI19PEX94EE	Power Semi-Conductor Devices Circuits
2	PI19PEX15EE	Machine Modeling and Analysis
3	PI19PEX25EE	Power Quality Engineering
4	PI19PEX35EE	Advanced topics in Power Electronics
5	PI19PEX45EE	Switched Mode power conversion
6	PI19PEX55EE	PWM converters and applications

7	PI19PEX65EE	Digital controllers in Power Electronics Applications
8	PI19PEX75EE	Static Control of Electric Drives
9	PI19PEX85EE	Application of Micro controllers to Power electronics
10	PI19PEX95EE	Power Electronic Control of DC Drives
11	PI19PEX16EE	Power Electronic Control of AC Drives
12	PI19PEX26EE	Digital Control of Power Electronics and Drive systems
13	PI19PEX36EE	SCADA Systems and Applications
14	PI19PEX46EE	Electric and Hybrid Vehicles
15	PI19PEX56EE	Electric Drive Systems
16	PI19PEX66EE	Static VAR Controllers and Harmonic Filtering
PROFESSIONAL ELECTIVES (COMMON TO POWER SYSTEMS & POWER ELECTRONICS)		
1	PI19PEX76EE	Advanced Microprocessors Systems
2	PI19PEX86EE	Digital Control Systems
3	PI19PEX96EE	Programmable Logic Controllers & Applications
4	PI19PEX17EE	Modern Control Theory
5	PI19PEX27EE	Microcontrollers

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Humanities & Social Sciences

Course Name: Communication Skills In English

SKILL DEVELOPMENT COURSE-1

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):1:0:0	SEE Marks : 40	Course Code: **P19HS110EH**
Credits: 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
This course will enable the students to:	**On completion of the course the students will be able to:**
1. involve in the content for all the above mentioned four skills in teaching English and to get students proficient in both receptive and productive skills	1. Make effective presentations
	2. Successfully attempt Versant, AMCAT and secure better placements
	3. Perform better in Interviews

Unit I **Remedial English: Delightful Descriptions:**

Describing Past, Present and Future Events.

Unit II **Developing Conversational Skills –** Exchange of pleasantries, Exchange facts and opinions, Using relevant vocabulary.

UNIT III **Contextual Conversations:** Ask for Information, Give Information, Convey bad news, show appreciation.

UNIT IV **Business English**: **Professional Communication**:

Concise Cogent Communication, Active Listening, Interact, Interpret and Respond. **Expositions and Discussions:** Organization, Key Points, Differing Opinions, Logical conclusions. **Effective Writing Skills:** Structure, Rough Draft, Improvisations and Final Draft for Emails, paragraphs

and Essays. **High Impact Presentations:** Structure, Content, Review, Delivery

Unit V **Industry Orientation and Interview Preparation**

Interview Preparation– Fundamental Principles of Interviewing, Resume Preparation, Types of Interviews, General Preparations for an Interview. Corporate Survival skills: Personal accountability, Goal Setting, Business Etiquette, Team Work

Learning Resources:

1. Business Communication, by Hory Shankar Mukerjee, Oxford/2013
2. Managing Soft Skills for Personality Development by B.N.Gosh, Tata McGraw-Hill/ 2012
3. Personality Development & Soft Skills by Barun K Mitra, Oxford/2011
4. Murphy, Herta A., Hildebrandt, Herbert W., & Thomas, Jane P., (2008) "Effective Business Communication", Seventh Edition, Tata McGraw Hill, New Delhi
5. Locker, Kitty O., Kaczmarek, Stephen Kyo, (2007), "Business Communication – Building Critical Skills", Tata McGraw Hill, New Delhi
6. Lesikar, Raymond V., &Flatley, Marie E., (2005)"Basic Business Communication – Skills for Empowering the Internet Generation", Tenth Edition, Tata McGraw Hill, New Delhi
7. Raman M., & Singh, P., (2006) "Business Communication", Oxford University Press, New Delhi.

Journals / Magazines:

1. Journal of Business Communication, Sage publications

2. Management Education, Mumbai

Websites:

www.mindtools.com
www.bcr.com

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	01	Max.Marks for each Internal Tests:	20
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Advanced Computer Methods in Power Systems

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PC110EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes** *On completion of the course the students will be able to:*
To Familiarize the students with fundamental and advanced concepts of power system study and also analyse using computer programming methods	1. Develop proper mathematical models for analysis of a selected problem like load flow study, Bus Impedance matrices, fault analysis. 2. Prepare the practical input data required for load flow or fault calculations. 3. Select and identify the most appropriate algorithm for load–flow and short circuit studies.

UNIT I

Network graph, Incidence Matrices – Element node incidence matrix - Bus incidence matrix -Branch path incidence matrix - Basic and Augmented cut set incidence matrices - Basic and Augmented branch incidence matrices - Basic and Augmented loop incidence matrices - Primitive network - Formation of Y Bus, YBR & Z loop by singular transformation.

UNIT II

Matrix representation of power systems, Triangularization, Gaussian elimination method, LU, LOU factorization, Table of factors, optimal ordering.Algorithm for formation of ZBus matrix.Concept of branch and link addition -modification of bus impedance matrix for changes in the network, Z bus -sparse vector method.

UNIT III

Concepts of load flow -classification of buses, Representation of fixed tap setting and on load tap changing transformers, load flow solution using Gauss -Seidel, Newton-Raphson methods, Treatment of voltage controlled buses - Acceleration factors, Decoupled and fast decoupled method,- Flow chart and comparison of different methods.

UNIT IV

Representation and performance equation of 3 phase network elements - Three phase network elements with balanced and unbalanced excitation - Transformation matrices -Symmetrical and Clarke's components -Algorithm for formation of 3-phase bus impedance matrix -Modification of three phase ZBUS charges in network.

UNIT V

Basic assumption in short circuit studies -System representation - General equations for short circuit study in phase variables and Symmetrical components for fault current and node voltage –Short circuit calculations for balanced three phase network using ZBUS - Fault impedance and admittance matrices -Analysis of 3 phase, line to ground and double line to ground faults -Flow chart for short circuit study.

Suggested Reading:

1. Stagg & EI-Abiad. Computer methods in Power System Analysis, Tata McGraw Hill, 1968.
2. KusicGearge L -Computer Aided Power System Analysis, - Prentice Hall, 1986.
3. M.A.Pai -Computer techniques in Power System Analysis, Tata McGraw Hill, 2006.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

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VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Application of Power Electronics To Power Systems

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PC120EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
Acquire the knowledge on flexible AC Transmission System by using FACTS controllers and to understand the various FACTS controllers operation in FACTS systems to control the power system parameters.	1. An ability to apply knowledge of FACTS Controllers. 2. An ability to design a Compensators within realistic constraints. 3. An ability to identify, formulate, and solve real network problems with FACTS controllers 4. Students are able to identify and apply the recent trends in FACTS technology to compensate reactive power. 5. Students can be able to apply the different types of techniques for mitigation of harmonics.

UNIT I

General System considerations and FACTS: Transmission Interconnections, Flow of Power in an AC System, Power Flow and Dynamic Stability Considerations of a Transmission Interconnection, principles of series and shunt compensation, Basic Types of FACTS Controllers, Benefits from FACTS, Application of FACTS.

UNIT II

Shunt Compensators: Objectives of Shunt Compensation, Midpoint Voltage Regulation for Line Segmentation, End of Line Voltage Support to Prevent

Voltage Instability, improvement of Transient Stability, Power Oscillation Damping, Static Var Compensators, SVC and STATCOM, The Regulation Slope, Transfer Function and dynamic Performance, Transient Stability Enhancement and Power Oscillation Damping

UNIT III

Series Compensators: Objectives of Series Compensation, concept of series capacitive compensation, voltage stability, improvement of transient stability, power oscillation damping, GTO thyristor controlled series capacitor, thyristor controlled series capacitor, SSSC.

UNIT IV

Combined Compensators: Introduction, unified power flow controller, basic operating principles, independent real and reactive power flow control, control structure, basic control system for P and Q control.

UNIT V

Mitigation of Harmonics: Power quality problems, harmonics, harmonic creating loads, harmonic power flow, and mitigation of harmonics, filters, passive filters, active filters, shunt, series and hybrid filters.

Suggested Reading:

1. Narain G. Hingorani, Laszlo Gyugyi, Understanding FACTS, IEEE press
2. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H.WayneBeaty, Electrical Power Systems Quality, McGraw Hill,2003
3. Y.H.Song, A.T.Johns, Flexible A.C.Transmission System, IEE, London, 1999

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

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VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name:Power Systems Stability

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PC130EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
1. To develop models of single machine and multi machine systems for stability studies 2. To design controllers for power system stabilization and voltage regulation.	1. Able to model the power system and analyse power system behaviour 2. Able to identify and discriminate power system disturbances 3. Able to design controllers for improving power system stability

UNIT I

Steady state stability: Basic concept of stability-Types of stability- Stability criteria for single and multi-machine systems — Concept of voltage stability — Characteristics of network, generator and load, for voltage stability.

UNIT II

Transient stability: The swing equation for single and multi-machine system — Basic assumptions — Different methods of solution of swing equation — Solution by indirect methods — Runge- gutta method - Swing curve — Determination of critical time and critical angle.

UNIT III

Hydraulic power and governor models — IEEE standard models — Models for steam turbine. Improvement of Transient stability- potential energy function for SVC, SSSC & UPFC.

UNIT IV

Low frequency oscillation and supply controls: Transfer function of low frequency oscillation studies — Improving system damping with supplementary excitation — Design of supplementary excitation system — State equation for single machine system — Improving system model with governor control.

UNIT V

Sub Synchronous oscillation: Turbine generator torsional Characteristics, Torsional interaction with power system controls. Sub Synchronous resonance. Damping schemes.

Suggested Reading:

1. Yao-Nan-Yu, *Power System Dynamics,* Academic Press, 1983.
2. PrabhaKunder, *Power System Stability &Controi,* Tata McGraw Hill edition. 2006.
3. KR Padiyar, *FACTS Controllers in Power Transmission & Distribution* New AGE International Publishers First edition 2007.
4. Stagg and Elabiad, *Computer Methods in Power systems* - McGraw Hill., 1968.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

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VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Power Electronics Controlled Electric Drives

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PC210EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The aim of the course is to understand and analyze the performance of electrical drives with power electronics by analog and digital control.	The student will able to 1. Apply the knowledge of power converters in application of electrical drives. 2. Analyze the performance of dc motor and induction motor fed from power electronic converters. 3. Know the speed control of electric motors by the microprocessor control schemes. 4. Understand the driver circuits used for operation of Stepper Motor, BLDC motor and Switched Reluctance Motor

UNIT I

Review of Power Converters: Commutation in Thyristor power converters – Principle of natural commutation – Principle of forced commutation – Discontinuous conduction in converters- DC choppers – Force commutated inverters – Frequency conversion – Inverter voltage control – Harmonic neutralization – Current source inverters – Phase controlled cyclo-converters – AC Voltage controller.

UNIT II

DC Motor Control: General considerations – Evaluation of a dc drive performance – Forced commutation schemes to improve the performance of the drives – Features and Steady state analysis of a separately excited dc motor fed from chopper – Current limit control – Regenerative braking of dc motors – Steady state performance of dc motors on phase controlled rectifiers –Dual converters – Reversible drives – State space model and digital simulation of dc motors.

UNIT III

Induction Motor Control: Speed control of induction motors – Analysis of induction motor on non-sinusoidal voltage waveforms – Analysis of current source inverter fed induction motor –Variable frequency operation of induction motors – Analysis of induction motor fed from AC voltage controller – Chopper controlled resistance in the rotor circuit of an induction motor – Static slip energy recovery schemes employing converter cascades in the rotor circuit – Dynamic behavior and Stability of induction motor fed from variable frequency supply.

UNIT IV

Microprocessors in the Control of Electrical Drives: Applications of microprocessors in variable speed drives (Block Diagram and Flowchart Approach only) – DC motor speed control using microprocessor – Microprocessor based firing scheme for a dual converter – Induction motor speed control – Synchronous motor speed control – Stepper Motor Control.

UNIT V

Brushless DC Motor and Switched Reluctance Motor Drives: Switched reluctance motor drive – Normalized torque-speed characteristics – Speed Control Schemes – Control Circuits – Brushless DC Motor – Construction – Working Principle – Control Schemes.

Suggested Reading:

1. VedamSubramanyam, Thyristor Control of Electric Drives, Tata MGraw Hill Publishing Co., New Delhi, 2003.
2. S.B.Dewan, G.R.Slemon, A.Straughen, Power Semi Conductor Drives, Wiley Interscience, 1984.
3. B.K.Bose, Power Electronics and AC Drives – Prentice Hall, 1986.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

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VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Distribution System Planning and Automation

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PC220EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
To provide a thorough understanding of the fundamentals of distribution systems such that the student would develop an in-depth knowledge of distribution systems and would be able to analyze distribution system planning issues considering the factors affecting the system.	1. Identify and analyze the various socio and economic factors affecting the distribution system planning. 2. Describe the functionality of primary equipment necessary for automation and control of distribution system 3. Interpret the percentage voltage drop equation and can examine the various alternatives for maintaining the voltage drop in the limits. 4. Compare different feeder configuration in terms of area served and the amount of voltage drop for substation. 5. Apply the ABCD parameters, substation application curves to determine the receiving end voltage and number of primary feeders for the distribution system planning.

UNIT I

Distribution System Planning: Introduction, Distribution system Planning: Factors effecting planning, present techniques, planning models, planning in the future, future nature of distribution planning, Role of computer in Distribution planning. Load characteristics and Load models– Wye connected loads, Delta connected loads.

UNIT II

Sub Transmission lines & Substations: Types of sub- transmission, Distribution substation, bus schemes, substation location, rating of substation, calculation of voltage drops with primary feeders, Derivation of the K constant, Application curves, Interpretation of the Percentage Voltage drop formula.

UNIT III

Primary Feeders: Types of primary feeders, Primary feeder loading, Tie-lines, Distribution feeder exit — rectangular and radial type development, Design of radial primary feeders — Voltage drop calculations by A,B,C,D constants, Uniformly distributed load, Non uniformly distributed load. Distribution Feeder Analysis – the ladder Iterative technique.

UNIT IV

Secondary Feeders: Secondary voltage levels, Present designpractice, Secondary Banking, Economic design of secondaries, Total annual cost equation, Voltage drop and Power loss calculations. Distribution system voltage regulation: Quality of services, voltage control, Application of capacitors in Distribution system.

UNIT V

Distribution Automation: Distribution Automation, project planning, Definitions, communication, sensors, Supervisory Control and Data Acquisition Systems (SCADA), Consumer Information Service(CIS), Geographical Information System (GIS), Automatic Meter Reading (AMR), Automation system.

Suggested Reading:

1. GanenTuran, Electric Power Distribution System Engineering, 2nd EditionCRC Press, 2007
2. William.Kersting, Distribution Modelling& Analysis – CRC Press – third edition -2002
3. A.S. Pabla, Electric Power Distribution, Tata McGraw Hill, 5 Edition, 2005.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

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VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Power Electronics Converters

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PC230EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
1. To understand and acquire knowledge about various power semiconductor devices. 2. To prepare the students to analyze and design different power converter circuits.	1. Acquire knowledge about fundamental concepts and techniques used in power electronics. 2. Ability to analyze various single phase and three phase power converter circuits and understand their applications. 3. Foster ability to identify basic requirements for power electronics-based design application. 4. To develop skills to build and troubleshoot power electronics circuits. 5. Foster ability to understand the use of power converters in commercial and industrial applications.

UNIT I

Analysis of power semiconductor switched circuits with R, L, RL, RC loads, d.c.motor
load, battery charging circuit.

UNIT II

Single-Phase and Three-Phase AC to DC converters- half controlled configurationsoperating 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

AC to AC power conversion using voltage regulators, choppers and cyclo-converters,
consideration of harmonics, introduction to Matrix converters.

Suggested Reading:

1. Ned Mohan, Undeland and Robbin, 'Power Electronics: converters, Application anddesign', John Wiley and sons.Inc, Newyork, 2006.
2. Rashid M.H., 'Power Electronics-Circuits, Devices and Applications ', Prentice HallIndia, New Delhi, 2009.
3. P.C Sen., 'Modern Power Electronics', Wheeler publishing Company, 1st Edition, NewDelhi, 2005.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Advanced Synchronous Machine Theory

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX10EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
To learn modeling of synchronous machine, simplified models, linear models, simplified linear models & representation of excitation systems	Studentswillbe ableto: 1. Model synchronous machine 2. Simplify the models of synchronous machine 3. Obtain linear models of synchronous machine 4. Simplify linear models of synchronous machine 5. Identify various excitation systems

UNIT- I

The Synchronous machine - Park's transformation — Flux linkage equations — Voltage equations — Current formulation of state space equations — Per-unit conversion — Normalizing Voltage and torque equations — Torque and power — Equivalent circuits of synchronous machine — Flux linkage state space model — Treatment of saturation Synchronous machine connected to infinite bus — Current , Voltage and flux linkage models.

UNIT- II

Sub-transient and transient reactances and time constants — Simplified models of the synchronous machine — Steady state equations and phasor diagrams — Machine connected to infinite bus with local load at machine terminals - Determining steady state conditions.

UNIT- III

Linear models of the synchronous machine - Linearization of the generator state space current, voltage and flux linkage models.

UNIT-IV

Linearization of the load equation for the one machine problem -- Simplified linear models — Effect of loading — State space representation of simplified model.

UNIT- V

Representation of excitation systems, Different models of excitation systems — IEEE, 1, 2 & 3 systems — Representation of loads.

Suggested Reading:

1. Kimbark, E.W., *Power System Stability,* Vol. III, Dover, New York, 1968.
2. P.M.Anderson&A.A.Foud, *Power System Control & Stability,* Iowa State University Press, U.S.A. 1977.
3. Yao-Nan-Yu, *Power System Dynamics, Academic Press,* 1983.

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Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Advanced Power System Protection

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX20EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
1. To know construction of static relays and understand the operation of amplitude and phase comparators 2. To comprehend the concepts of Static over current, static differential and static distance relays. 3. To understand generator and transformer protection. 4. To know the differential protection of transformer 5. To realize the concepts pilot wire and carrier wire protection.	1. Explain various static relay operating principles. 2. Comprehend the working of static distance relays. 3. Apply the knowledge of different principles of relays for protection of alternators, transformers and motors. 4. Illustrate the differential protection of transformers. 5. Explain the Pilot wire and carrier protection and digital protection of EHV/UHV transmission line.

UNIT I

Static relays- Comparators and static relay characteristics: Relays as comparators –Amplitude and Phase comparison schemes – General equation for comparators for different types of relays – Static comparators – Coincidence circuits – Phase splitting methods–Hall effect comparators –

Operating principles – Use of level detectors – Time delay circuits – Filters – Thyristors – Triggering circuits and DC power supplies.

UNIT II

Static relay hardware: Operating principles: Static time current relays directional units based on phase and amplitude comparison– Differential relays – Distance relays – Quadrilateral relay – Elliptical relay – Relay response – Principle of R-X diagram – Convention for superposing relay and system characteristics – Power swings, Loss of synchronism and its effect on distance relays.

UNIT III

Generator, motor and transformer protection: Generator protection against short circuits using differential relays against inter-phase fault – Combined split-phase and overall differential relays – Protection against stator open circuits – Rotor and Stator overheating, Loss of excitation protection and field & ground fault protection. Digital protection scheme based upon second harmonic current induced in the rotor field circuit.

UNIT IV

Transformer differential protection: Effect of magnetizing in rush currents – Grounding transformers – Bus protection with differential relays. Line protection: 3 zone protection using distance relays – Switched schemes – Auto-reclosing – Single and multi-shot auto reclosing – Single pole and three pole auto reclosing.

UNIT V

Pilot wire and carrier protection: Circulating current scheme – Balanced Voltage scheme – Translay scheme – Half wave comparison scheme – Phase comparison carrier current protection –carrier transfer scheme – carrier blocking scheme – Digital protection EHV/ UHV transmission line based upon traveling wave phenomena.

Suggested Reading:

1. Badriram and Viswakarma D.N., *Power System Protection and Switchgear* — Tata McGraw Hill, 2004.
2. L.P.Singh, *Digital Protection*, Wiley Eastern Ltd., 1994.

3. Warrington A.R. Van C, *Protective Relays* ,Vol I & II Chapman & Hall, London and John Wiley & Sons, 1977.
4. Mason C.R. *The art and science of Protective Relaying,* Wiley & Sons, 1956.

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Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: REAL TIME APPLICATIONS IN POWER SYSTEMS

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX30EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
To Familiarize the students with fundamental and advanced concepts of power system study and	1. Develop proper mathematical models for analysis of a selected problem like load flow methods and contingency analysis 2. Prepare the practical input data required for load flow and fault calculations. 3. Select and identify the most appropriate algorithm for load–flow studies. 4. To investigate the state estimation and its effect

UNIT I

Power Flow Studies: Introduction, power flow problem, formulation of power flow equation, computational aspects of power flow problem, Gauss-Seidel iterative technique, Gauss elimination(Triangular factorization) method, Power flow solution using Zbus matrix, power flow solution by Newton-Raphson method, decoupled load flow, fast decoupled load flow, power flow control by regulating the operating conditions.

UNIT II

Contingency Analysis Techniques: Security in a power system, approximations in contingency analysis, simulation of addition and removal of multiple lines in

a power system, simulation of tie lines in inter connected power systems, network reduction for contingency analysis, contingency analysis, approximate power flow method for simulating contingencies.

UNIT III

State Estimation Techniques: Data acquisition, role of a state estimator, rationale of state estimation, method of least squares for state estimation, estimation of power system state varables by the weighted least square estimation(WLSE) technique, statistical errors and bad data recognition, power system state estimator in noisy environment, composition of the Jacobian matrix H and the measurement vector Z

UNIT IV

Power System Security: Introduction, challenges for secure operation, methods of enhancing security, reliability criterion, enhancement of stability controls, online dynamic security assessment, management of system reliability, Future trends in dynamic security assessment, real time monitoring and control

UNIT V

Load Forecasting Technique: Forecasting methodology, estimation of average and trend terms, estimation periodic components, estimation of Ys(k): Time series approach, estimation of stochastic component: kalman filters approach, long term load predictions, reactive load forecast

Suggested Reading:

1. T.K.Nagsarkar, M.S.Sukhija, Power system analysis, Oxford publications
2. PrabhaKundur, Power system stability and control, TataMcGrawHill Edition, 2006
3. J.Arrillaga, C.P.Arnold, Computer modeling of electric power systems, John Wiley 1983

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: High Voltage D.C. Transmission

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX40EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
To provide the knowledge on comparison of HVAC and HVDC transmission system, different types of AC and DC filters and control schemes for HVDC converters, different types of faults over voltages and over currents and its protection, AC and DC interaction system and different types of reactive power sources, different types MTDC system and current control schemes.	Students will be: 1. Able to differentiate the cost comparison of AC and DC system 2. Able to comprehend the different types of AC and DC filters and control scheme for HVDC converters. 3. Able to analyze different types of faults, such as over voltages and over current and its protection. 4. Able to comprehend the AC and DC system interaction and different types of reactive power sources. 5. Able to comprehend and analyze series and parallel MTDC systems and current control schemes.

UNIT I

Comparison of AC and DC Transmission systems, Applications of DC Transmission, Description of DC Transmission Systems, Modern trends in HVDC Technology.Static power conversion - Principle -Ideal / real

commutation process - Rectifier operation - Inverter operation - Power factor and reactive power - Converter harmonics, Smoothing reactors.

UNIT II

Harmonic elimination - Design of ac. Filters- D.C. side filters - Alternative methods of harmonic elimination - Control of H.V.D.C. converters and systems - Individual phase control - Equidistant firing control - D.C. system control - Characteristics and direction of D.C power flow.

UNIT III

Fault development and protection - Converter disturbances -A.C system faults -Over current protection - Transient over-voltages - Harmonic over voltages excited by A.C disturbances - Fast transients generated on the D.C system - Surges generated on the a system insulation co-ordination. DC Circuit breakers.

UNIT IV

AC – DC system interactions: System models, Torsional, harmonic interactions with HVDC systems. Reactive power control: Requirements in steady state, Sources of reactive power and control during transients.

UNIT V

Study of MTDC systems, Multi-infeed DC systems, Types of MTDC systems, Existinga.c.transmission facilities converted for use with d.c. - Generator rectifier units- Forced commutation - Compact converter stations - Microprocessor based digital control.

Suggested Reading:

1. Arrillaga J., *High Voltage Direct Current Transmission,* Peter Peregrinus Ltd., London. 1983.
2. Padiyar KR., *HVDC Power Transmission Systems,* New Age International, New Delhi, 2010.

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Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Renewable Energy Sources

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX50EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
To provide a survey of the most important renewable energy resources and the technologies for harnessing these resources within the framework of a broad range of simple to state- of -the-art energy systems.	1. Comprehend the generation of electricity from various Non-Conventional sources of energy, have a working knowledge on types of fuel cells. 2. Estimate the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation. 3. Absorb the concepts involved in energy conversion system by studying its components, types and performance. 4. Comprehend geo-thermal energy, ocean energy and their operational methods. 5. Acquire the knowledge on harnessing biomass as a source of energy and analyze photo synthetic efficiency.

UNIT I

Review of Conventional and Non-Conventional energy sources - Need for non-conventional energy sources Types of Non- conventional energy sources - Fuel Cells - Principle of operation with special reference to H2°2 Cell -

Classification and Block diagram of fuel cell systems - Ion exchange membrane cell - Molten carbonate cells - Solid oxide electrolyte cells - Regenerative system- Regenerative Fuel Cell - Advantages and disadvantages of Fuel Cells — Polarization - Conversion efficiency and Applications of Fuel Cells.

UNIT II

Solar energy - Solar radiation and its measurements - Solar Energy collectors - Solar Energy storage systems - Solar Pond - Application of Solar Pond - Applications of solar energy.

UNIT III

Wind energy- Principles of wind energy conversion systems - Nature of wind - Power in the Wind-Basic components of WECS -Classification of WECS -Site selection considerations -Advantages and disadvantages of WECS -Wind energy collectors -Wind electric generating and control systems - Applications of Wind energy -Environmental aspects.

UNIT IV

Energy from the Oceans - Ocean Thermal Electric conversion (OTEC) methods - Principles of tidal power generation -Advantages and limitations of tidal power generation -Ocean waves - Wave energy conversion devices - Advantages and disadvantages energy - Geo-thermal Energy - Types of Geo-thermal Energy Systems - Applications of Geo-thermal Energy. of wave

UNIT V

Energy from Biomass - Biomass conversion technologies / processes - Photosynthesis - Photosynthetic efficiency - Biogas generation - Selection of site for Biogas plant - Classification of Biogas plants - Details of commonly used Biogas plants in India - Advantages and disadvantages of Biogas generation -Thermal gasification of biomass -Biomass gasifies.

Suggested Reading:

1 Rai G.D, *Non-Conventional Sources of Energy,* Khanfla Publishers, New Delhi, 1999.
2 El-Wakil, M0M.,*Power Plant Technology.* McGraw Hill, 1984.

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Duration of Internal Test: 90 Minutes

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VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Reliability Modeling In Power Systems

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX60EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
1. To Describe importance of reliability and identify various methods of determining the power system reliability. 2. Understand the reliability processes and reliability measures. 3. To perform reliability analysis of Generation systems. 4. To perform reliability analysis of transmission systems. 5. To perform reliability analysis of distribution systems.	1. Apply analytical methods to evaluate power system reliability. 2. Determine the generation system reliability using frequency and duration methods and loss of load method. 3. Examine the effect of operating reserve on the generation system reliability. 4. Evaluate the generation and transmission system reliability using stochastic data. 5. Apply FMEA technique to determin the reliability of radial distribution systems

UNIT I

Introduction: The Concept of reliability – Reliability Indices – Power System reliability-Component Reliability – Non-repairable components – Hazard Models – System Reliability – network methods – Logic Diagrams – Monotonic Structures.

UNIT II

Generating Capacity Reserve Evaluation: Planning for reliability – Outage definitions – Construction of reliability models –– probability of capacity deficiency – Loss of load method – Loss of energy method – Frequency and duration method – Two level representation of the daily load - Merging the generation and load models – Multilevel representation of the daily load – Comparison of the reliability indices – Generation expansion planning.

UNIT III

Operating Reserve Evaluation: General concepts – PJM method –Outage replacement rate – Generation model – Unit commitment risk – Modified PJM method – Area risk curves – Modelling rapid start units – Modelling hot reserve units – Unit commitment risk – Security function approach – Security function model – Response risk – Evaluation techniques – Effect of distributing spinning reserve – Effect of Hydro – electric units.-interconnected systems

UNIT IV

Generation and Transmission Systems: Introduction – Radial configurations – Conditional probability approach – Network configurations – State selection – Systems and load point indices – Application to practical systems – Data requirements for composite system reliability evaluation – concepts – deterministic data – Stochastic data – Independent outages – Dependent outages – Common mode outages – station originated outages.

UNIT V

Distribution Systems: Introduction – Basic evaluation techniques – state space diagrams – approximate methods – Network reduction method – Failure modes and effects analysis – Temporary and transient failures – concepts – evaluation techniques – Common mode failures – Evaluation techniques – Sensitivity analysis – Total loss of continuity(TLOC) – Partial loss of Continuity(PLOC) – PLOC criteria – Extended load – duration curve – Effect of transferable loads – General concepts – Evaluation techniques – Economic considerations

Suggest Reading:

1. Endrenyi, Relaibility Modeling in Electrical Power Systems, Johnwiley& Sons,1978.
2. Roy Billiton, RonoldN.Allan, : Relaibility Evaluation of Power Systems, Plenum press, springer international edition
3. E.Balaguruswamy, Relaibility Engineering.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Energy Management

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX70EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
1.To emphasize the energy management on various electrical equipments and metering. 2. To illustrate the energy management in lighting systems and cogeneration. 3. To study the concepts behind the economic analysis and load management	students will be able to 1. Apply energy management schemes in electrical systems 2. Perform economic analysis load management 3. Perform Energy auditing for efficient usage of energy 4. Analyse critical assessment of energy 5. Analyse life cycle cost of Machines

UNIT I

Essentials of Energy Management: Introduction – Scope of Energy Management – Necessary Steps of Energy Management Programme – General Principles of Energy Management – Qualities and Functions of an Energy Manager – The Language of the Energy Manager. Method of investment appraisal – Rate of return method - Pay back method – Net present value method (NPV) - Internal rate of return method (IRR)– Capital budgeting.

UNIT II

Energy Auditing: Introduction – Objective of Energy Audit – Control of Energy – Uses of Energy – Energy Conservation Schemes – Energy Index – Cost Index – Pie Chart – Sankey Diagram – Load Profile – Types of Energy Audit –

General Energy Audit – Sankey Questionnaire – Sample Questionnaire – Energy Audit Case Studies

UNIT III

Energy Conservations: Introduction – Indian Energy Conservation Act, 2001(EC Act) – The Electricity Act 2003 – Rules for Efficient Energy Conservation of Energy and Materials – Technologies for Energy Conservation – Design of EC – Energy Flow Networks – Critical Assessment of Energy Use – Formulation of Objectives and Constraints.

UNIT IV

Improvement of Energy Efficiency: Waste Heat – Advantages of Recuperators – Air Preheaters and Economizers – Furnaces – Fans and Blowers – Compressors – Pumps – Energy Audits – Case studies, Tips for energy conservation in domestic and industrial sectors

UNIT V

Electrical Energy Management: Introduction – Power Factor Control – Tariff – Energy Efficient Motors – Case Study – Energy Efficient Lighting – Life cycle Cost Analysis (LCC analysis) – Equivalent Annual Worth(EAW) – Break Even Analysis.

Suggested Reading:

1. KV Sharma,P.Venkataseshaiah: Energy management and conservation IK International publishing house Pvt. Ltd.
2. Guide book for national certification examination for energy managers and energy auditors, Books1,2,3 &4-Bureau of Energy Efficiency, Ministry of power, Govt. of India
3. Turner W.C.: Energy management handbook

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VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Swarm Intelligence Applications To Power Systems

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX80EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
To cater the knowledge of swarm intelligent techniques like genetic algorithm, particle swarm optimization, artificial bee colony algorithms, artificial immune systems etc. and their applications in electrical engineering.	The student will be able to extensively use the various swarm intelligent techniqueslike 1. genetic algorithm 2. particle swarm optimization 3. Ant colony algorithms 4. Differential evolution algorithms 5. Apllications to Power sytems

UNIT I

Fundamentals of Genetic Algorithms: Introduction to GAs, Encoding, Fitness Function, Premature Convergence, Basic Operators, Selection, Tournament Selection, Truncation Selection, Linear Ranking Selection, Exponential Ranking Selection, Elitist Selection, Proportional Selection, Crossover, Mutation.

UNIT II

Fundamentals of Particle Swarm Optimization Techniques : Introduction, Basic Particle Swarm Optimization, Background of Particle Swarm Optimization, Original PSO, Variations of Particle Swarm Optimization, Discrete PSO, PSO for MINLPs, Constriction Factor Approach (CFA), Hybrid PSO (HPSO), Lbest Model.

UNIT III

Ant Colony Search Algorithms : Introduction, Ant Colony Search Algorithm, Behavior of Real Ants, Ant Colony Algorithms, The Ant System, The Ant Colony System, The Max-Min Ant System, Major Characteristics of Ant Colony Search Algorithms, Distributed Computation: Avoid Premature Convergence, Positive Feedback: Rapid Discovery of Good Solution,, Use of Greedy Search and constructive Heuristic Information.

UNIT IV

Differential Evolution: Introduction, Evolutionary Algorithms, Basic EAs, Virtual Population-Based Acceleration Techniques, Differential Evolution, Function Optimization Formulation, DE Fundamentals, Initial Population, Mutation and Recombination to Create New Vectors, Selection and the Overall DE, Key Operators for Differential Evolution, Encoding, Mutation, Crossover, Other Operators, An Optimization Example.

UNIT V

Applications to power systems: Distribution Network Expansion, Dynamic Planning of Distribution System Expansion: Reactive Power Planning at Generation–Transmission Level, Benders Decomposition of the Reactive Power Planning Problem, Solution Algorithm, Reactive Power Planning at Distribution Level, Application Examples, Optimal Power Flow Under Contingent Condition with Line Capacity Limit, Optimal Power Flow for Loss Minimization

Suggested Reading:

1. Kwang Y. Lee and Mohamed A. El-Sharkawi, "Modern heuristic optimization techniques" IEEE press, Wiley-Interscience Publication
2. Soliman, Soliman Abdel-Hady, Mantawy, Abdel-Aal Hassan, "Modern Optimization Techniques with Applications in Electric Power Systems" Springer publications
3. S.N.Sivanandam, S.N.Deepa, "Introduction to Genetic algorithms" Springer publications

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VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: High Voltage Engineering

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX90EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
1) Comprehend the phenomenon of Gaseous insulating material conduction and breakdown 2) Comprehend the conduction and breakdown in \liquid and solid dielectrics 3) Comprehend the generation and measurement of high voltages 4) Comprehend the phenomenon involved in high voltage testing.	Students will be 1) Able to describe the principles behind generating high DC – AC and impulse voltages 2) Able to compute the breakdown strength of gas, liquids and solids insulation systems 3) Able to perform a dynamic response analysis of high voltage measurement systems 4) Able to assess the lifetime of insulation based on accelerated ageing tests.

UNIT I

Conduction and Breakdown of Gaseous Insulating Material: lionization processes and current growth – Townsend's criterion for breakdown – Breakdown in electronegative gases – Time lags for breakdown – Paschen's law – Corona discharges – Breakdown in non – uniform fields – Practical considerations for selecting gases for insulation purposes.

UNIT II

Conduction and Breakdown in Liquid and solid Dielectrics : Various mechanisms of breakdown in liquid dielectrics - Liquid dielectrics used in practice – Various processes – Breakdown in solid dielectrics – Solid dielectrics used in practice.

UNIT III

Generation of High Voltages and Currents : Generation of High DC Voltages using voltage multiplier circuits – Van de Graff generator. Generation of high alternating voltages using cascade transformers – Production of high frequency AC high voltages – Standard impulse wave shapes – Marx circuit – Generation of switching surges – Impulse current generation – Tripping and control of impulse generators.

UNIT IV

Measurement of High voltages and Currents: High DC Voltage measurements techniques – Methods of measurements for power frequency AC voltages – sphere gap measurements technique – potential divider or impulse voltage measurements – measurements of high DC., AC and impulse currents – Use of CRC for impulse voltage and current measurements.

UNIT V

High voltages Testing: Tests on insulators – testing on bushings – testing of isolators and circuit breakers – cable testing of transformers surge diverter testing – Radio interference measurement – Use of I.S.S. of testing.

Suggested Reading:

1. M.S Naidu and V.Kamaraju, High voltage Engineering, Tata McGraw Hill, 1982.
2. E.Kufferl and M.Abdullah, High voltage Engineering, Pergamon Press, 1960.

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VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Distribution Generation and Micro Grids

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX14EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
To develop a conceptual introduction to various distributed generation systems, micro grids and their control	1. Describe a range of distributed energy sources including wind, PV, hydro, and energy storage systems. 2. Demonstrate the impacts that distributed energy sources are having on the control and operation of power systems including voltage control, power factor, power quality and protection coordination. 3. Analyze grid integration of different types of DGs and their effect on dynamic, steady state stability of power system. 4. Illustrate grid integration system issues and challenges with conventional and non-conventional energy sources and estimate reliability of DG based systems. *5.* Model and analyze a micro grid taking into consideration the planning and operational issues of the DGs to be connected in the system.

UNIT I

Need for Distributed generation, renewable sources in distributed generation, current
scenario in Distributed Generation, Planning of DGs – Siting 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. Energy storage elements: Batteries, ultra-capacitors, flywheels.

UNIT III

Technical impacts of DGs – Transmission systems, Distribution systems, De-regulation – Impact of DGs upon protective relaying – Impact of DGs upon transient and dynamicstability of existing distribution systems.

UNIT IV

Economic and control 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 – Steady-state and Dynamic analysis

UNIT V

Introduction to micro-grids – Types of micro-grids – autonomous and non-autonomousgrids – Sizing of micro-grids- modeling& analysis- Micro-grids with multiple DGs – Microgrids with power electronic interfacing units. Transients in micro-grids - Protection ofmicro-grids – Case studies.

Suggested Reading:

1. H. Lee Willis, Walter G. Scott ,'Distributed Power Generation – Planning and Evaluation',
Marcel Decker Press, 2000.
2. M.GodoySimoes, Felix A.Farret, 'Renewable Energy Systems – Design and Analysis with
Induction Generators', CRC press.

3. Robert Lasseter, Paolo Piagi, ` Micro-grid: A Conceptual Solution', PESC 2004, June 2004.
4. F. Katiraei, M.R. Iravani, 'Transients of a Micro-Grid System with Multiple Distributed
Energy Resources', International Conference on Power Systems Transients (IPST'05) in
Montreal, Canada on June 19-23, 2005.
5. Z. Ye, R. Walling, N. Miller, P. Du, K. Nelson 'Facility Microgrids', Subcontract report, May 2005, General Electric Global Research Center, Niskayuna, New York.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Power System Analysis

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX24EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

CourseObjectives	**Courseoutcomes**
1. Studentswillbeableto: 2. Studyvariousmethodsofloadflow andtheiradvantagesanddisadva ntages 3. Understandhowtoanalyzevariou stypesoffaultsinpower system 4. Understandpowersystemsecurit yconceptsandstudythemethodst orankthecontingencies 5. Understandneedofstateestimati onandstudysimplealgorithmsfor stateestimation 6. Studyvoltageinstabilityphenom enon	Studentswillbeableto: 1. Ableto calculatevoltagephasorsatallbuses, giventhedatausingvariousmethods ofloadflow 2. Abletocalculatefaultcurrentsineachphase 3. Rankvariouscontingenciesaccordin gtotheirseverity 4. Estimatethebusvoltagephasorsgive nvariousquantitiesviz.powerflow,v oltages,taps,CBStatusetc 5. EstimateclosenesstovoltagecollapseandcalculatePVcurvesusingcontinuationpowerflow

Unit-I

Loadflow**:**OverviewofNewton-Raphson,GaussSiedel,fastedcoupledmethods,convergenceproperties,sparsitytechniques,handlingQ-maxviolationsinconstantmatrix,inclusioninfrequencyeffects,AVRinloadflow, handlingofdiscretevariableinloadflow.

Unit-II

FaultAnalysis**:**Simultaneousfaults,openconductorsfaults, generalizedmethodoffaultanalysis.

Unit-III

SecurityAnalysis: Securitystate diagram, contingencyanalysis, generatorshiftdistributionfactors,lineoutagedistributionfactor,multiplelineoutages,overloadindexranking

Unit-IV

StateEstimation: Sourcesoferrorsinmeasurement, VirtualandPseudo, Measurement,Observability, Trackingstateestimation.

Unit-V

VoltageStability:Voltagecollapse, P-Vcurve,multiplepowerflowsolution, continuationpowerflow,optimalloadflow, voltagecollapseproximityindices.

Suggestedreading

1.J.J.Grainger&W.D.Stevenson,"Power systemanalysis",McGrawHill,2003

1.A.R.Bergen&VijayVittal,"Power SystemAnalysis",Pearson,2000

2.L.P.Singh,"AdvancedPowerSystemAnalysisandDynamics",NewAge International,2006

3.G.L.Kusic,"Computeraidedpower systemanalysis",PrenticeHallIndia,1986

4.A.J.Wood,"Powergeneration,operationandcontrol",JohnWiley,1994

5.P.M.Anderson,"Faultedpowersystemanalysis",IEEEPress,1995

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: AI Techniques

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX34EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
1.Understandingfuzzylogic, ANN 2.UnderstandingGA&EP	1. Learn the concepts of biological foundations of artificial neural networks 2. Learn Feedback networks and radial basis function networks and fuzzy logics 3. Identifications of fuzzy and neural network 4. Acquire the knowledge of GA

Unit I

Biological foundations to intelligent SystemsArtificial Neural Networks, Single layer and Multilayer Feed ForwardNNLMS and Back Propagation AlgorithmFeedback networks and Radial Basis Function Networks

Unit II

Fuzzy Logic & Fuzzy Neural NetworksKnowledge Representation and Inference MechanismDefuzzificationMethods

Unit III

System Identification using Fuzzy and Neural Network

Unit IV

Genetic algorithm, algorithms to learn parameters of network like GA Reproduction crossover, mutationIntroduction to evolutionary program

Unit V

Applicationsofabovementionedtechniquestopracticalproblems

Suggestedreading

1. J MZurada,"AnIntroductiontoANN",Jaico**Publishing**House
2. SimonHaykins,"NeuralNetworks",PrenticeHall
3. TimothyRoss,"FuzzyLogicwithEngg.Applications",McGraw.Hill
4. Driankov,Dimitra,"AnIntroductiontoFuzzyControl",NarosaPublication
5. Golding,"Genetic Algorithms",Addison-Wesley**Publishing**Com

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Digital Protection of Power Systems

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX44EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

CourseObjectives	**Courseoutcomes**
Studentswillbeableto: 1. Studyofnumericalrelays 2. Developingmathematicalapproachtowardsprotection 3. Studyofalgorithmsfornumericalprotection	Studentswillbeableto: 1. LearntheimportanceofDigitalRelays 2. ApplyMathematicalapproachtowardsprotection 3. LearntodevelopvariousProtectionalgorithms

Unit-I

Evolutionofdigitalrelaysfromelectromechanicalrelays, Performanceandoperationalcharacteristicsofdigitalprotection

Unit-II

Mathematicalbackgroundtoprotectionalgorithms, Finitedifferencetechniques

Unit-III

Interpolationformulae,Forward,backwardandcentraldifferenceinterpolation, Numericaldifferentiation, Curvefittingandsmoothing, Leastsquaresmethod, Fourieranalysis, FourierseriesandFouriertransform, Walshfunctionanalysis.

Unit-IV

Basicelementsofdigitalprotection, Signal conditioning: transducers, surge protection,analogfiltering,analogmultiplexers,
onversionsubsystem:thesamplingtheorem,signalaliasing,Error,
ampleandholdcircuits,multiplexers,analogtodigitalconversion,
Digitalfilteringconcepts,Thedigitalrelayasaunitconsistingofhardwareandsoftwar e.

Unit-V

Sinusoidalwavebasedalgorithms,
Sampleandfirstderivative(MannandMorrison)algorithm,
FourierandWalshbasedalgorithms.
Fourier Algorithm: Full cycle window algorithm, fractional cycle windowalgorithm, Walshfunctionbasedalgorithm, LeastSquaresbasedalgorithms.

Suggestedreading

1. A.G.PhadkeandJ.S.Thorp,"ComputerRelayingforPowerSystems",Wiley/Res earchstudies

Press,2009

2.A.T.Johnsand
S.K.Salman,"DigitalProtectionofPowerSystems",IEEEPress,1999
3.GerhardZeigler,"NumericalDistanceProtection",SiemensPublicisCorporatePub lishing,2006
4.S.R.Bhide "DigitalPowerSystemProtection"PHILearningPvt.Ltd.2014

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering
Course Name: Electrical Power Distribution System

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX54EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

CourseObjectives	**Courseoutcomes**
Studentswillbe ableto: 1. Learningaboutpowerdistributionsystem 2.LearningofSCADASystem 3.UnderstandingDistribution Automation	Studentswillbeableto: 1. Knowledgeofpowerdistributionsystem 2. StudyofDistributionautomationanditsapplicationinpractice 3. learnSCADAsystem

Unit-I

- DistributionofPower,Management,PowerLoads,
- LoadForecastingShort-term&Long-term,
- PowerSystemLoading,TechnologicalForecasting.

Unit-II

- Advantages of Distribution Management System (D.M.S.)
  DistributionAutomation:Definition,
- Restoration / Reconfiguration of Distribution Network,
  DifferentMethodsandConstraints
- PowerFactorCorrection

Unit-III

- InterconnectionofDistribution,
- Control&CommunicationSystems,
- RemoteMetering,
- AutomaticMeterReadinganditsimplementation

Unit-IV

- SCADA:Introduction,BlockDiagram,
- SCADA AppliedToDistributionAutomation.
- CommonFunctionsofSCADA,
- AdvantagesofDistributionAutomationthroughSCADA

Unit-V

- CalculationofOptimumNumberofSwitches,Capacitors,Optimum
- SwitchingDevicePlacementinRadial,
- DistributionSystems,SectionalizingSwitches–Types, Benefits,
- Bellman'sOptimalityPrinciple,
- RemoteTerminalUnits,
- Energyefficiencyinelectricaldistribution&Monitoring
- in Actual Practice, Urban/Rural Distribution, Energy
    - Management,AItechniquesappliedtoDistributionAutomation

Suggestedreading

1.A.S.Pabla,"ElectricPowerDistribution",TataMcGrawHillPublishingCo.Ltd.,FourthEdition.
2. M.K.Khedkar,G.M. Dhole,"ATextBookofElectricalpowerDistributionAutomation", UniversitySciencePress, NewDelhi
3.AnthonyJPanseni,"ElectricalDistributionEngineering",CRCPress
4.JamesMomoh,"ElectricPowerDistribution,automation,protection&control",CRCPress

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Wind And Solar Systems

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX64EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

CourseObjectives	**Courseoutcomes**
Studentswillbeableto: 1.Togetexposureto windandsolarsystems 2.Tounderstandthefactorsinvolvedininstallationandcommissioningofa Solar orWindplant. 3.Learningthedynamicsinvolvedwhen interconnectedwithpowersystemgrid	Studentswillbeableto: 1. Appreciate the importance of energy growth of the power generation from the renewable energy sources and participate in solving these problems 2. Demonstrate the knowledge of the physics of wind power and solar power generation and all associated issues so as to solve practical problems 3. Demonstrate the knowledge of physics of solar power generation and the associated issues 4. Identify, formulate and solve the problems of energy crises using wind and solar energy

Unit I

Historicaldevelopmentandcurrentstatuscharacteristicsofwindpowergenerationnetworkintegrationissues

Unit II

Generatorsandpowerelectronicsforwindturbines,powerqualitystandardsforwindturbines,Technicalregulationsforinterconnectionsofwindfarmwithpowersystems.

Unit III
Isolatedwindsystems,reactivepowerandvoltagecontrol,economicaspects.

Unit IV
Introductionofsolarsystems,meritsanddemerits,concentrators,variousapplications.

Unit V
Solar thermalpowergeneration,PVpower generation,EnergyStoragedevice.Designingthesolarsystemforsmallinstallations.

Suggestedreading

1. ThomasAckermann,Editor,"WindpowerinPowerSystems",JohnWillyandsons ltd.2005
2. SiegfriedHeier,"Gridintegrationofwindenergyconversionsystems",JohnWillyandsonsltd.,2006
3. K.SukhatmeandS.P.Sukhatme, "SolarEnergy".TataMacGrawHill,SecondEdition,1996

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

Department of Electrical & Electronics Engineering

Course Name: Smart Grid Technologies

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX74EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
Studentswillbeableto: 1.To get exposure to grid standards and intelligent interfacing techniques. 2. Understanding smart meters, PMU,IED and their applications	Students will be able to: 1. Understand concept of smart grid and its advantages over conventional grid 2. Know smart metering techniques 3. Learn wide area measurement techniques 4. Understanding the problems associated with integration of distributed generation & its solution through smart grid.

UNIT I

Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, Concept of Resilient &Self Healing Grid, Present development & International policies in Smart Grid, Diverse perspectives from experts and global Smart Grid initiatives.

UNIT II

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation ,Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control, Distribution systems: DMS, Volt/VAr control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Plug in Hybrid Electric Vehicles (PHEV).

UNIT III

Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED) & their application for monitoring & protection.

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

Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN),

Broadband over Power line (BPL), IP based Protocols, Basics of Web Service and CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid.

Suggested Reading:

1. Stuart Borlase 'Smart Grid: Infrastructure, Technology and Solutions', CRC Press 2012.

2. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, 'Smart Grid: Technology and Applications', Wiley, 2012.

3. Vehbi C. Güngör, DilanSahin, TaskinKocak, SalihErgüt, ConcettinaBuccella, Carlo Cecati, and Gerhard P. Hancke, 'Smart Grid Technologies: Communication Technologies and Standards' IEEE Transactions On Industrial Informatics, Vol. 7, No. 4, November 2011.

4. Xi Fang, SatyajayantMisra, GuoliangXue, and Dejun Yang 'Smart Grid – The New and Improved Power Grid: A Survey' , IEEE Transaction on Smart Grids.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Power Semi-Conductor Devices & Circuits

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX94EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
Students will be able to: 1.Learn about modern power semiconductor devices for medium and high power applications. 2.Learn about soft switching technologies used in uni and bidirectional with and without transformer coupled converters and their applications.	Students will be able to: 1. Understand the basic operation of various power semiconductor devices 2. To understand Necessity and Importance of Switch Mode Converters 3. Study the circuit model and operation of various Resonant Converters 4. Understand the Power supply Applications for uni and bidirectional converters.

UNIT I

Switching characteristics: Power MOSFETs and IGBTs, limitations and Safe Operating Areas (SOAs), —Latching in IGBTs. Thyristors-Converter & Inverter grade, GTO, RCT, MCT.

UNIT II

Switch Mode D.C-D.C Converters: Step-down converter (Buck)—Step-up converter (Boost) — Buck-Boost converter Control of D.C-D.C converters — Cuk converter.

UNIT III

Switch Mode D.C-A.C Inverters: Pulse width modulated switching schemes — sinusoidal PWM and Square wave PWM of Single phase Inverters and Three

phase Voltage source Inverters — Effect of Blanking time on output voltage in PWM Inverters.

UNIT IV

Resonant Converters: Classification — Basic resonant circuit concepts, Load resonant! Resonant switch converters — Resonant D.C Link Inverters with Zero-voltage switching — High frequency Link Integral half-Cycle converters.

UNIT V

Power supply Applications: overview of switching power supplies – DC-AC converters with electrical isolation, electrical isolation in the feed back loop, fly-back converters forward converters, push pull converters – full bridge converters, power supply protection, applications

Suggested Reading:

1. Mohan, Undeland, Robbins, *Power Electronics,* John Wiley, 1996.
2. Rashid M.H., *Power Electronics,* Prentice Hall of India, 1994.
3. Singh M.D and Khanchandani K.B, *Power Electronics,* Tata McGraw Hill, 1998.
4. Sen P.C, *Power Electronics,* Tata McGraw Hill Pvt. Ltd., New Delhi.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Machine Modeling and Analysis

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX15EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
To understand the mathematical model concepts of DC Machines, Induction machines and Synchronous machines	Students will be able to: 1. Draw the basic two pole machine of any rotating electric machine and obtain voltage and torque equations 2. Model DC machine mathematically 3. Apply reference frame theory 4. Model Induction machine mathematically 5. Model Synchronous machine mathematically

UNIT I

Basic Principles for Electric Machine Analysis: Magnetically coupled circuits, Electromechanical energy conversion, Basic Two pole DC Machine – primitive 2 axis machine – Voltage and Current relationship – Torque equation.

UNIT II

Theory of DC Machines: Mathematical model of separately excited DC Motor, DC Series Motor, DC shunt motor and D.C. Compound Motor in state variable form – Transfer function of the motor.

UNIT III

Reference Frame Theory: Equations of transformation - Change of variables, Stationary circuit variables Transformed to the Arbitrary Reference Frame, Commonly used reference frames, Transformation between reference frames, Transformation of a balanced set, Balanced steady state phasor Relationships, Balanced steady state equations, Variables observed from various frames.

UNIT IV

Theory of Symmetrical Induction Machines: Voltage and torque equations in machine variables, Equations of transformation for Rotor circuits, Voltage and torque equations in arbitrary reference frame variables, Analysis of steady state operation- state-space model of induction machine in'd-q' variables, Free Acceleration Characteristics, Dynamic Performance-during sudden changes in load- during a 3 phase fault at the machine terminals.

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UNIT V

Theory of Synchronous Machines: Voltage and Torque equations in machine variables, Stator Voltage equations in Arbitrary Reference Frame Variables, Voltage Equations in Rotor Reference Frame Variables: park's Equations, Torque Equations in Substitute Variables, Analysis of steady state operation, Dynamic performance - During sudden changes in Input Torque - During a 3 phase fault at the machine terminals.

Suggested Reading:

1. Paul C. Krause, Oleg Wasynczuk, Scott D.Sudhoff, "*Analysis of Electric Machinery and drive systems*" John Wiley and Sons, 2nd Edition, 2006
2. C.V. Jones, *"Unified Theory of Electrical Machines"*Butterworths Publishers.
3. P.S. Bhimbra, "*Generalized Theory of Electrical Machines"*, Khanna publishers, 2002.
4. J. Meisel, "*Principles of Electromechanical Energy Conversion" McGraw Hill, 1966.*

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Power Quality Engineering

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX25EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The primary objective of this course is to give the engineering student a basic understanding of the fundamental concepts associated with Power Quality	1.Learn to distinguish between the various categories of power quality problems.
	2.Understand the root of the power quality problems in industry and their impact on performance and economics.
	3.Learn to apply appropriate solution techniques for power quality mitigation based on the type of problem.

UNIT I

Introduction: Power Quality (PQ),PQ problems , Sags, Swells, Transients, Harmonics, Interruptions, Flicker ,Voltage fluctuations, Notch. PQ Issues, Assessing PQ: Remedies -Customer side of meter, Utility side of the meter. Power quality monitoring – Monitoring considerations, Historical Perspective of PQ Measuring Instruments, PQ measurement equipment, Assessment of PQ measurement data, Application of intelligent systems, PQ monitoring standards.

UNIT II

Voltage Sag Analysis: Voltage sag characteristics - Methodology for computation of voltage sag magnitude and occurrence — Accuracy of sag analysis — Duration & frequency of sags — Faults behind transformers — Effect of pre-fault voltage — Simple examples — Voltage dip problems, fast assessment methods for voltage sags in distribution systems.

UNIT III

PQ Consideration in Industrial Power Systems: Adjustable speed drive (ASD) systems and applications — Sources of power system harmonics — Mitigation of harmonics — Characterization of voltage sags experienced by three-phase ASD systems — Types of sags and phase angle jumps — Effects of momentary voltage dips on the operation of induction and synchronous motors .

UNIT IV

Harmonics: Harmonic distortion, Voltage versus current distortion, Harmonics versus Transients, Harmonic Indices, Harmonic sources from commercial loads, Harmonic sources from industrial loads, Locating Harmonic sources, System response characteristics, Effects of Harmonic distortion, Inter harmonics, Devices for controlling harmonic distortion.

UNIT V

Transient Overvoltages – Sources of Transient Overvoltages. Wiring and Grounding: Resources, Definitions, Reasons for Grounding, Typical wiring and grounding problems, Solutions to wiring and grounding problems.

Suggested Reading:

1. Math H.J. Bollen, Understanding Power Quality Problems, IEEE Press, 1999.
2. Roger C.Dugan, Mark F.McGranaghan, Surya Santoso, H.WayneBeaty, Electrical Power Systems Quality, Second Edition, Tata McGraw-Hill Edition.
3. C.Sankaran, Power Quality, CRC Press, 2002.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Advanced Topics In Power Electronics

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX35EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
The objective of this course is to provide knowledge on advanced power electronic devices, power converters, reactive elements design, Protection and cooling techniques and advanced methods of storage.	At the end of the course students will able to 1. Understand the structure and behavior of advanced power semiconductor devices. 2.Analyze different topologies of converters. 3. Design reactive elements suitable for power convertion and energy storage. 4. Develop different advanced storage systems. 5.Apply advanced thermal cooling methods for power converters.

UNIT I

Introduction to switches - Advanced Silicon devices - Silicon HV thyristors, MCT, BRT & EST. SiC devices - diodes, thyristors, JFETs & IGBTs. Gallium nitrate devices - Diodes, MoSFETs.

UNIT II

Advance converter topologies for PEE - Interleaved converters, Z-Source converters, Multi level converters (Cascaded H-Bridge, Diode clamped, NPC, Flying capacitor) Multi pulse PWM current source converters, Advanced drive control schemes.

UNIT III

Advances in reactive elements - Advanced magnetic material, technology and design
(Powder ferrite, Amorphous, Planar designs) Advance capacitive designs (Multilayer chip capacitors, double layers for storage, Aluminum electrolytic)

UNIT IV

Advance storage systems - Developments in battery systems, Ultra capacitors, Fly wheel
energy storage, Hybrid storage systems for EV/HEV, Power management in hybrid systems, Energy storage in renewables.

UNIT V

Thermal engineering with EMI/EMC techniques - Advanced thermal solutions (fan cooled,
liquid cooled, heat pipes, hybrid techniques) EMC techniques (Conducted, Radiated
emissions& Susceptibility), System design for EMC

Suggested Reading:

1. Andrzej M Trzynadlowski, 'Introduction to Modern Power Electronics, John Wiley and sons. Inc, New York, 1998
2. R D MiddleBrook& Slobodan CUK, 'Advances in Switched Mode Power Conversion', Vol I, II, & III, Tesla Co (
optimum power conversion)
3. B. JayantBalinga, 'Advanced High Voltage Power Device Concepts', Springer New York 2011. ISBN 978-1-
4614-0268-8
4. BIN Wu, ' High Power Converters and AC Drives', IEEE press Wiley Interscience, a John wiley& sons Inc
publication 2006
5. Wurth Electronics, 'Trilogy of Magnetics, Design guide for EMI filter design in SMPS & RF circuits', 4th extended and revised edition.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Switched Mode Power Conversion

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX45EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
To apply the basic concepts of power electronics for designing converters and implement practical circuits for UPS, SMPS etc.	Students are able to 1. Design converter system for electrical applications 2. Design SMPS for small power applications. 3. Choose suitable control scheme for converters. 4. Design appropriate filter to get harmonic free power supply. 5. Choose appropriate filter for reduction of EMI.

UNIT I

Design constraints of reactive elements in Power Electronic Systems: Design of inductor, Transformer and capacitors for power electronic applications, Input filter design.

UNIT II

Basic concepts and steady state analysis of second and higher order Switched Mode power converters: PWM DC - DC Converters (CCM and DCM) - Operating principles, constituent elements, characteristics, comparisons and selection criteria.

UNIT III

Dynamic modeling and control of second and higher order switched mode power converters: Analysis of converter transfer functions, design of feedback compensators, current programmed, frequency programmed and critical conduction mode control.

UNIT IV

Soft-switching DC - DC converters: Zero-voltage-switching converters, zero-current - Switching converters, multi-resonant converters and load resonant converters.

UNIT V

Pulse Width Modulated Rectifiers: Properties of ideal rectifier, realization of near ideal rectifier, control of the current waveform, single phase and three phase converter systems incorporating ideal rectifiers and design examples - Non-linear phenomena in switched mode power converters: Bifurcation and Chaos.

Suggested Reading:

1. Robert W. Erickson and DraganMaksimovic, 'Fundamentals of Power Electronics', Springer, 2nd Edition, 2001.
2. Marian K. Kazimierczuk, 'Pulse-width Modulated DC-DC Power Converters',John Wiley & Sons Ltd., 1st Edition, 2008.
3. Philip T Krein, 'Elements of Power Electronics', Oxford University Press, 2nd Edition, 2012.
4. Batarseh, 'Power Electronic Circuits', John Wiley, 2nd Edition, 2004.
5. H. W. Whittington, B. W. Flynn, D. E. Macpherson, 'Switched Mode Power Supplies', John Wiley & Sons Inc., 2nd Edition, 1997.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: PWM Converters and Applications

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX55EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
To know the modulation techniques employed for power electronic converters, design multi-level inverters with different topologies, performance evaluation of inverter fed drives and compensation techniques for power factor and reactive power.	After completion of the course, students will be able to: 1: Understand the basic converter topologies and pulsewidth modulation techniques. 2: Analyze the performance of practical devices devices. 3: Apply Pulse width modulation for multi-level converters. 4: Estimate the performance of inverter fed drives. 5: Identify the methods of power factor and reactive power compensation.

UNIT I

AC/DC and DC/AC power conversion - Overview of applications of voltage source converters - Pulse modulation techniques for bridge converters.

UNIT II

Bus clamping PWM - Space vector based PWM - Advanced PWM techniques - Practical devices in converter - Calculation of switching and conduction losses.

UNIT III

Compensation for dead time and DC voltage regulation - Dynamic model of a PWM converter - Multilevel converters - Constant V/F induction motor drives.

UNIT IV

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.

Suggested Reading:

1. Mohan, Undeland and Robbins, 'Power Electronics; Converters, Applications and Design', John Wiley and Sons, 1989.
2. Erickson R W, 'Fundamentals of Power Electronics', Chapman and Hall, 1997.
3. Vithyathil J, 'Power Electronics: Principles and Applications', McGraw Hill, 1995

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Digital Controllers In Power Electronics Applications

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX65EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

UNIT I

Introduction to the C2xx DSP core and code generation - The components of the C2xx DSP core - Mapping external devices to the C2xx core - Peripherals and Peripheral Interface - System configuration registers - Memory - Types of Physical Memory - Memory addressing Modes - Assembly Programming using C2xx DSP - Instruction Set - Software Tools.

UNIT II

Pin Multiplexing (MUX) and General Purpose I/O Overview - Multiplexing and General Purpose I/O Control Registers - Introduction to Interrupts - Interrupt Hierarchy - Interrupt Control Registers - Initializing and Servicing Interrupts in Software.

UNIT III

ADC Overview - Operation of the ADC in the DSP - Overview of the Event manager (EV) - Event Manager Interrupts - General Purpose (GP) Timers - Compare Units - Capture Units And Quadrature Enclosed Pulse (QEP) Circuitry - General Event Manager Information.

UNIT IV

Introduction to Field Programmable Gate Arrays – CPLD Vs FPGA – Types of FPGA - Xilinx XC4000 series - Configurable logic Blocks (CLB) - Input/Output Block (IOB) – Programmable Interconnect Point (PIP) – Xilinx 4000 series –

HDL programming –overview of Spartan 3E and Virtex II pro FPGA boards-case study.

UNIT V

Controlled Rectifier - Switched Mode Power Converters - PWM Inverters - DC motor control - Induction Motor Control.

Suggested Reading:

1. Hamid.A.Toliyat and Steven G.Campbell, 'DSP Based Electro Mechanical Motion Control' ,CRC Press New York , 2004.
2. XC 4000 series datasheets (version 3.1). Xilinx, Inc., USA, 1998.
3. XC 4000 series datasheets (version 1.6). Xilinx, Inc., USA, 1999.
4. Wayne Wolf, 'FPGA based system design', Prentice hall, 2004.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Static Control of Electric Drives

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX75EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
To learn DC motor control, scalar control, vector control, sensor less vector & various special machines	Studentswillbe ableto: 1. Control & analyze DC motor using various converters 2. Apply scalar control 3. Apply vector control 4. Apply sensor less vector control 5. Analyze BLDC, Stepper & Switched reluctance motors

UNIT I

DC Motor Control: Operation of Single phase and Three phase Full converter and

Semi converter fed dc motors, Speed torque characteristics, Performance characteristics, Dual converter drives, Analysis of four quadrant chopper fed dc drive, Dynamic & Regenerative braking, Closed loop control of phase control and chopper dc drive.

UNIT II

Scalar Control: Stator voltage control, Static rotor resistance control, Slip power recovery schemes, Closed loop control, VSI & CSI fed Induction motor drives, Analysis of stepped and PWM waveform, Harmonic equivalent circuit and motor performance.

UNIT III

Vector Control: DC drive analogy, Equivalent circuit and Principle of Vector control, Direct vector control – Flux & Torque processor using Terminal voltages and Induced emf, Indirect vector control – Flow chart and Implementation.

UNIT IV

Principle of Sensor less vector control: Principle of Space vector Pulse width modulation & control, Direct torque and Flux control - Torque expression with Stator and Rotor fluxes - Control strategy of DTC.

UNIT V

Brushless D.C Motor: Unipolar and Bipolar Brushless D.C motors, Applications, Stepper Motors — Variable reluctance and Permanent magnet stepper motors — Characteristics& Drive circuits, Switched reluctance motor.

Suggested Reading:

1. R.Krishnan, *Electric Motor Drives*, Prentice Hall of India Pvt. Ltd., New Delhi,
2002.
2. G.K.Dubey, *Fundamentals of Electrical Drives*, Narosa Publishing House, New
Delhi, 1999.
3. W.Shepard, L.N.Hulley and D.T.W.Liang, *Power Electronics and Motor Control*,
Cambridge University Press, 1995.
4. B.K.Bose, *Modern Power Electronics and A.C. Drives,* Prentice Hall, 2002.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Application of Micro Controller to Power Electronics

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX85EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
1. To make the students understand the fundamentals of 8051 Microcontroller. 2. Students should understand the working of these systems and should be able to determine hardware and software 3. Interfacing with real time systems. They should further understand how to design any application based on these systems..	The students will be able to 1. Explain architecture and operation of 8051 Microcontroller. Understand the concept of I/O Port interfacing with 8051 Microcontroller. 2. Understand the concept of Interfacing with power converters and architecture, pin diagram of PIC16F876. 3. Describe the PIC16F876 controller memory organisation, registers, I/O ports, timers PWM modules. 4. Develop PIC programming 5. Understand the concept of MPLAB IDE and PICSTART plus, Interfacing with Real time systems.

UNIT–I

8051 microcontroller – Architecture – Addressing modes – I/O ports - Instruction sets – Simple assembly language programming.

UNIT–II

Use of microcontrollers for pulse generation in power converters - Overview of Zero-Crossing Detectors – typical firing/gate-drive circuits – Firing/gate

pulses for typical single phase and three phase power converters - PIC16F876 Micro-controller – Device overview – Pin diagrams.

UNIT–III

PIC16F876 micro-controller memory organization – Special Function Registers - I/O ports – Timers – Capture/ Compare/ PWM modules (CCP).

UNIT–IV

Analog to Digital Converter module – Instruction set – Instruction description – Introduction to PIC microcontroller programming – Oscillator selection – Reset – Interrupts – Watch dog timer.

UNIT–V

Introduction to MPLAB IDE and PICSTART plus – Device Programming using MPLAB and PICSTART plus – Generation of firing / gating pulses for typical power converters.

Suggested Reading:

1. PIC16F87X Datasheet 28/40–pin 8 bit CMOS flash Microcontrollers, Microchip technology Inc., 2001. and MPLAB IDE Quick start guide, Microchip technology Inc., 2007.
2. John B. Peatman, 'Design with PIC Microcontrollers', Prentice Hall, 2003.
3. MykePredko, 'Programming and customizing the PIC Microcontroller', Tata McGraw-Hill, 3rd Edition, 2008.
4. M.A. Mazidi, J.G. Mazidi and R.D. McKinlay, 'The 8051 microcontroller and embedded systems', Prentice Hall India, 2nd Edition, New Delhi, 2007.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

Department of Electrical & Electronics Engineering

Course Name: Power Electronic Control of DC Drives

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX95EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
The aim of the course is to understand and analyze the performance of dc drives with phase control rectifier and chopper control.	After completion of the course, students will be able to: 1: Analyze the performance of separately excited dc motor fed from single phase controlled rectifiers. 2: Analyze the performance of separately excited dc motor fed from three phase controlled rectifiers. 3: Design of controllers for closed loop controlled dc drives. 4: Analyze the performance of dc motor fed from Choppers. 5: Apply digital simulation to know the dynamic performance of drives.

UNIT–I: SINGLE-PHASE CONTROLLED RECTIFIERS FED DC MOTOR

Separately excited DC motors with rectified single –phase supply – single-phase semi converter and single phase full converter for continuous and discontinuous modes of operation – power and power factor.

UNIT–II: THREE-PHASE CONTROLLED RECTIFIERS FED DC MOTOR

Three-phase semi converter and Three phase full converter for continuous and discontinuousmodes of operations – power and power factor - Addition of Free wheeling diode – Three phase double converter.

Three phase controlled bridge rectifier with passive load impedance, resistive load and idealsupply – Highly inductive load and ideal supply for load side and supply side quantities, shunt capacitor compensation, three phase controlled bridge rectifier inverter.

UNIT–III: PHASE, CURRENT & SPEED CONTROLLED DC DRIVE

Three-phase controlled converter, control circuit, control modeling of three phase converter –Steady state analysis of three phase converter control DC motor drive – Two quadrant, Threephase converter controlled DC motor drive – DC motor and load, converter.

Current and speed controllers - Current and speed feedback – Design of controllers – Currentand speed controllers – Motor equations – filter in the sped feed back loop speed controller –current reference generator – current controller and flow chart for simulation – Harmonics and associated problems – sixth harmonics torque.

UNIT–IV: CHOPPER CONTROLLED DC MOTOR DRIVES

Principle of operation of the chopper – Four – quadrant chopper circuit – Chopper for inversion – Chopper with other power devices – model of the chopper – input to the chopper – steady state analysis of chopper controlled DC motor drives – rating of the devices – Pulsating torque.

Closed loop operation: Speed controlled drive system – current control loop – pulse widthmodulated current controller – hysteresis current controller – modeling of current controller –design of current controller.

UNIT–V: SIMULATION OF DC MOTOR DRIVES

Dynamic simulations of the speed controlled DC motor drives – Speed feedback speed controller – command current generator – current controller.

Suggested Reading:

1. Power Electronics and motor control – Shepherd, Hulley, Liang – 2nd Edition, Cambridge University Press.
2. Electronic motor drives modeling Analysis and control – R. Krishnan – 1st Edition, Prentice Hall India.
3. Power Electronics circuits, Devices and Applications – MH Rashid – PHI – 1st Edition, 1995.
4. Fundamentals of Electric Drives – GK DubeyNarosa Publishers 1995
5. Power Semiconductor drives – SB Dewan and A Straughen -1975.

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Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Power Electronic Control of AC Drives

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX16EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
The aim of the course is to understand and analyze the performance of power electronic control of ac drives.	After completion of the course, students will be able to: **1:** Understand the fundamentals of motor drives. 2: Analyze the performance of induction motor control on stator side. 3: Analyze the performance of induction motor control on rotor side. 4: Apply different control strategies for speed control of synchronous motor. 5: Understand the driver circuits used for operation of BLDC motor and Variable Reluctance Motor.

UNIT-I: INTRODUCTION

Introduction to motor drives – Torque production – Equivalent circuit analysis – Speed – Torque Characteristics with variable voltage operation Variable frequency operation constant v/t operation – Variable stator current operation

– Induction motor characteristics in constant torque and field weakening regions.

UNIT-II: STATOR SIDE CONTROL OF INDUCTION DRIVES
Scalar control – Voltage fed inverter control – Open loop volts/Hz control – speed control slip regulation – speed control with torque and flux control – current controlled voltage fed inverter drive – current – fed inverter control – Independent current and frequency control – Speed and flux control in Current –Fed inverter drive – Volts/Hz control of Current –fed inverter drive – Efficiency optimization control by flux program.

UNIT–III: ROTOR SIDE CONTROL OF INDUCTION DRIVES
Slip power recovery drives – Static Kramer Drive – Phasor diagram – Torque expression – speed control of Kramer Drive – Static Scheribus Drive – modes of operation.

Vector control of Induction Motor Drives: Principles of Vector control – Vector control methods– Direct methods of vector control – Indirect methods of vector control – Adaptive controlprinciples – Self tuning regulator Model referencing control.

UNIT–IV: CONTROL OF SYNCHRONOUS MOTOR DRIVES
Synchronous motor and its characteristics – Control strategies – Constant torque angle control – Unity power factor control – Constant mutual flux linkage control.

Controllers: Flux weakening operation – Maximum speed – Direct flux weakening algorithm – Constant Torque mode controller – Flux Weakening controller – indirect flux weakening – Maximum permissible torque – speed control scheme – Implementation strategy speed controller design.

UNIT–V: VARIABLE RELUCTANCE MOTOR DRIVE
Variable Reluctance motor drive – Torque production in the variable reluctance motor Drivecharacteristics and control principles – Current control variable reluctance motor service drive.

BRUSHLESS DC MOTOR DRIVES: Three phase full wave Brushless dc motor – Sinusoidal type of Brushless dc motor- current controlled Brushless dc motor Servo drive.

Suggested Reading:

1. Electric Motor Drives Pearson Modeling, Analysis and control, R. Krishnan, Publications, 1st edition– 2002.
2. Modern Power Electronics and AC Drives B K Bose – Pearson Publications 1st edition,
3.Power Electronics and Control of AC Motors – MD Murthy and FG Turn Bull pergman, Press (For Chapters II, III, V) 1st edition
4.Power Electronics and AC Drives – BK Bose – Prentice Hall Eagle wood diffs NewJersey (for chapters I, II, IV) - 1st edition
5. Power Electronic circuits Deices and Applications – M H Rashid – PHI – 1995.
6. Fundamentals of Electrical Drives – G. K. Dubey – Narora publications – 1995 (forchapterII)
7. Power Electronics and Variable frequency drives, BK Bose, IEEE Press, Standard publications, 1st edition, 2002.
8. Power Electronics and Motor Drives Advances and Trends, Bimal Bose, Elesevier.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Digital Control of Power Electronics and Drive Systems

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX26EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
Tounderstanddifferent controlstrategies, statespacemodelingofdifferent converters& to performsimulationofdifferent powerconverters	Studentswillbe ableto: 1. Apply numerical methods to solve transients 2. Model and simulate power electronic switches 3. Model and simulate electrical machines 4. Model and simulate rectifiers 5. Model and simulate chopper and inverter fed drives

Unit I

Reviewofnumericalmethods.Applicationofnumericalmethodstosolvetransientsin D.C.SwitchedR,L,R-L,R-CandR-L-Ccircuits.Extensionto ACcircuits.

Unit II

Modellingofdiodeinsimulation.DiodewithR,R-L,R-CandR-L-CloadwithACsupply.ModellingofSCR, TRIAC,IGBTandPowerTransistorsinsimulation.Applicationofnumericalmethodsto R,L,Ccircuitswithpowerelectronicswitches.Simulationofgate/basedrivecircuits,simulationofsnubbercircuits.

Unit III

Statespacemodellingandsimulationoflinearsystems.Introductionto electrical machine modelling: induction, DC, and synchronous machines, simulation of basic electric drives, stability aspects.

Unit IV

Simulationofsinglephaseandthreephaseuncontrolledandcontrolled(SCR)rectifiers .Converters withself-commutateddevices-simulationofpowerfactorcorrectionschemes.SimulationofconverterfedDCmotordrives.

Unit V

SimulationofchopperfedDCmotor.Simulationofsingleandthreephaseinverterswithhyristorsandself- commutateddevices.Pulse-widthmodulationmethodsforvoltagecontrol.Waveformcontrol.Simulationofinverterfedinductionmotordrives.

Suggestedreading

1. SimulinkReferenceManual,Mathworks,USA

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: SCADA Systems and Applications

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX36EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
1. To provide the information about SCADA & Data acquisition 2. To provide knowledge on different SCADA Architecture and communication technologies 3. To provide information on different industrial applications	Students will be able 1. Describe the various SCADA architectures 2. Identify best communication techniques in various applications 3. Use SCADA for effective monitoring of industrial systems

Unit I

IntroductiontoSCADA:Dataacquisitionsystems,EvolutionofSCADA,Communicationtechnologies

Unit II

Monitoringandsupervisoryfunctions,SCADAapplicationsinUtilityAutomation

Unit III

IndustriesSCADASystemComponents:Schemes-RemoteTerminalUnit(RTU),IntelligentElectronicDevices(IED),ProgrammableLogicController(PLC),CommunicationNetwork,SCADAServer,SCADA/HMISystems

Unit IV

SCADA Architecture: Various SCADA architectures, advantages and disadvantagesofeachsystem-singleunifiedstandardarchitecture-IEC61850.

Unit V

SCADACommunication:variousindustrialcommunicationtechnologies-wiredandwirelessmethodsandfiberoptics

Openstandardcommunicationprotocols

SCADAApplications:Utilityapplications-TransmissionandDistribution sector-operations,monitoring,analysisandimprovement

Suggestedreading

1. StuartA.Boyer:"SCADA-SupervisoryControlandDataAcquisition",InstrumentSocietyof
2. AmericaPublications,USA,2004
3. GordonClarke,DeonReynders:"PracticalModernSCADAProtocols:DNP3,60870.5and
4. RelatedSystems",NewnesPublications,Oxford,UK,2004
5. WilliamT.Shaw,"CybersecurityforSCADAsystems",PennWellBooks,2006
6. DavidBailey,EdwinWright,"PracticalSCADAforindustry",Newnes,2003
7. MichaelWiebe,"Aguidetoutilityautomation:AMR,SCADA,andITsystemsforelectric power",PennWell1999

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Electric and Hybrid Vechiles

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX46EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives:	**Course Outcomes:**
Acquire knowledge about fundamental concepts, principles, analysis and design of hybrid and electric vehicles and learn electric drive in vehicles / traction.	At the end of this course, students will demonstrate the ability to: 1. Understand the models to describe the conventional & hybrid vehicles and their performance. 2. Identify different drive trains 3. Select various types of propulsion units and their control depending upon the application 4. Understand the different possible ways of energy storage. 5. Adopt different strategies related to energy storage systems.

Unit I: Introduction

Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance.

Unit-II:Drive Trains

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.
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.

Unit-III: 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: 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
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.
Charging Topologies: AC, DC, Wireless; Vehicle to Grid(V2G)

Suggested reading:

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
2. MehrdadEhsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained Wiley, 2003.
4. C. Mi, M. A. Masrur and D. W. Gao, "Hybrid Electric Vehicles: Principles and
5. Applications with Practical Perspectives", John Wiley & Sons, 2011.

6. S. Onori, L. Serrao and G. Rizzoni, "Hybrid Electric Vehicles: Energy Management
7. Strategies", Springer, 2015..
8. T. Denton, "Electric and Hybrid Vehicles", Routledge, 2016.
9. John M. Miller, Propulsion Systems for Hybrid Vehicles, IET 2nd Edition, 2010

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Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Electric Drive Systems

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX46EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
Students will be able to: 1. Understand basic electrical drives and their analysis. 2. Learn design of controller for drives. 3. Understand Scalar control of electrical drives.	1. Model and simulate electric drive systems 2. Design modulation strategies of power electronics converters, for drives application 3. Design appropriate current/voltage regulators for electric drives 4. Select and implement the drives for Industrial Process 5. 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, Close 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, Traction motors used in practice, Industrial Drives-Digital Control of Electric Drives, Stepper motor, Servo motor and their Applications.

Suggestedreading

1. G.K, Dubey, "Power semiconductor controlled Drives", Prentice Hall international, New Jersey, 1989.
2. R. Krishanam, "Electric motor drives modeling, analysis and control", PHI-India-2009.
3. G. K. Dubey, "Fundamentals of electric Drives, Narosa Publishing House", 2nd edition, 2011.
4. W. Leonhard, "Control of Electrical drives", Springer, 3rd edition, 2001.
5. P.C. Krause, "Analysis of Electric Machine", Wiley-IEEE press 3rd edition.
6. K. Bose,"Modern Power Electronics and AC Drives", Prentice Hall publication, 1st edition, 2001.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Static VAR Controllers and Harmonic Filtering

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX66EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
Studentswillbeableto: 1. Understand the various static converters 2. Understand the static converter control strategies 3. Understand the active and reactive power compensation and their control 4. Understand harmonic filtering and its control design.	Studentswillbeableto: 1. Acquire knowledge about the fundamental principles of Passive and Active Reactive Power Compensation Schemes at Transmission and Distribution level in Power Systems. 2. To introduce the student to varioussingle phase and three-phase Static 3. VAR Compensation schemes and their controls. 4. develop analytical modeling skills needed for modeling and analysis of such Static VAR.

Unit I

Fundamentals ofLoad Compensation. Steady-State Reactive Power Control in Electric Transmission Systems.Reactive Power Compensation and Dynamic Performance of Transmission Systems.Static Reactive PowerCompensators and their control. Shunt SVCs of Thyristor Switched and ThyristorControlled types and their control, STATCOMs and their control. Series Compensators of thyristorSwitched and ControlledTypeandtheirControl.SSSC and its Control, Sub-Synchronous Resonance and damping.

Unit II

SSSC and its Control, Sub-Synchronous Resonance and damping.Useof STATCOMs and SSSCs for Transient and Dynamic Stability.Improvement inPowerSystem.Converters for Static Compensation.SinglePhase and Three Phase Converters and Standard Modulation Strategies(ProgrammedHarmonicEliminationandSPWM).

Unit III

GTO Inverters.Multi-Pulse Converters and Interface Magnetics.Multi-Level Inverters of Diode Clamped Type and FlyingCapacitorType and suitable modulations trategies(includesSVM). Multi-level inverters of Cascade Type and their modulation. Current Control of Inverters. Power Quality Issues: Sags, Swells, Unbalance, Flicker, Distortion.

Unit IV

Current Harmonics.Sources of Harmonics in Distribution Systems and Ill Effects.Passive Harmonic Filtering.Single Phase Shunt Current InjectionTypeFilterand its Control.Three Phase Three-wire Shunt Active Filtering and their control using p-q theory and d-qmodeling.

Unit V

Three phase four wire shunt activefilters. Hybrid Filtering using Shunt Active Filters.Dynamic Voltage Restorer and its control. Power Quality Conditioner

Suggestedreading

1. Ned Mohanet.al, "PowerElectronics",JohnWileyandSons,2006.
2. G. Massobrio, P. Antognet," SemiconductorDeviceModelingwith Spice", McGraw-Hill,Inc.,1988.
3. B.J.Baliga,"PowerSemiconductorDevices",Thomson,2004
4. V.Benda, J.Gowar, D.A. Grant," Power Semiconductor Devices.Theory andApplications",JohnWiley&Sons1994.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Advanced Microprocessor Systems

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX76EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
1.To impart basic understanding of the internal organisation of 8086, 8087, 80386,80486 Microprocessor . 2. To introduce the concepts of interfacing microprocessors with external devices. 3. To develop Assembly language programming skills.	The students will be able to 1. Describe the architecture and different modes of operations of a typical 8086 and 8087 microprocessor s. 2. Describe the architecture and different modes of operations of a typical 80386 and 80486 microprocessor s. 3. Explain Pentium processors architecture memory management. 4. Understand RISC and CISC processors. 5. Understand Motorola microprocessors.

UNIT I

8086 Microprocessor Architecture - Segmented Memory - Addressing Modes - Instruction Set - 8086 Assembly Language Programming - 8087 Numerical Data Processor Architectural details - Data types - Floating point Operations - 8087 Instructions.

UNIT II

Architectural details of 80386 Microprocessor - Special registers - Memory management -Operation in protected mode and virtual 80386 mode - Memory paging mechanism - Special instructions of 80386 - Architectural details of

80486 - Special registers - Additional instructions - Comparison of 80386 and 80486 processors.

UNIT III

Introduction to Pentium Processor - Architectural features - Comparison with the workstations - Branch prediction logic - cache structure. - Special Pentium Registers. Memory management - virtual mode of operation - Comparison with the previous processors.Features of Pentium-II, Pentium-III and Pentium Pro-processors.

UNIT IV

RISC Microprocessors – RISC Vs CISC – RISC Properties – DEC Alpha AXP Architecture - Power PC – Architecture - Programming Model – Data Types – Addressing Modes – Instruction Set. Sun SPARC – Architecture – Data Types – Instruction Sets - Features of MIPS, AMD Microprocessors

UNIT V

Motorola Microprocessors – 68000 Microprocessor – Architecture – Registers – Addressing Modes – Features of 68020 – 68040 – 68040 Microprocessors.

Suggested Reading

1. Barry B Brey "Intel Microprocessors : 8086/88, 80186/188, 80286, 80386, 80486, Pentium, Pentium – II, Pentium – III and Pentium – IV, Architecture, Programming & Interfacing", Pearson Education, 2003.
2. Badri Ram, "Advanced Microprocessors and Interfacing", Tata McGraw Hill.
3. A.K. Ray & K.M. Bhurchandi, "Advanced Microprocessors & Peripherals, Architecture, Programming & Interfacing", Tata McGraw Hill.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Digital Control Systems

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX86EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
1. To understand the basics of Z-Transform 2. Understand mathematical models of linear discrete-time control systems using transfer functions and state-space models. 3. Knowledge instability analysis of digital control system in Z-plane. 4. Design controllers and compensators for linear discrete-time control systems so that theirperformance meets specified design criteria. 5. Carry out modelling and design of a digital controller using state-space methods.	1. Analyze signals in both time domain and Z domain. 2. Understand the basic knowledge in state-space models and stability methods in digitalcontrol system. 3. To introduce the design of state feedback controllers and observers for digital control systems.

UNIT I

Review of Z – Transforms: Introduction - Linear difference equations - Pulse response - Z - transforms, Theorems of Z – Transforms - Inverse Z – transforms - Modified Z- Transforms. Z-Transform method for solving difference equations - Pulse transforms function - Block diagram analysis of sampled data systems - mapping between s-plane and z-plan - Primary strips and Complementary Strips.

UNIT II

State Space Analysis : State Space Representation of discrete time systems - Pulse Transfer Function - Matrix solving discrete time state space equations - State transition matrix and it's Properties - Methods for Computation of State Transition Matrix - Discretization of continuous time state - space equations.

UNIT III

Controllability and Observability : Concepts of Controllability and Observability - Tests for controllability and Observability -Duality between Controllability and Observability - Controllability and Observability conditions for Pulse Transfer Function.

Stability Analysis (Discrete): Stability Analysis of closed loop systems in the Z-Plane. Jury stability test - Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.Stability analysis using Liapunov theorems.

UNIT IV

Design of Discrete Time Control System by Conventional Methods: Design of digital control based on the frequency response method - Bilinear Transformation and Design procedure in the w-plane - Lead, Lag and Lead-Lag compensators and digital PID controllers – Design of digital control through deadbeat response method.

UNIT V

State Feedback Controllers and Observers(Discrete): Design of state feedback controller through pole placement - Necessary and sufficient conditions - Ackerman's formula - State Observers - Full order and Reduced order observers - Min/Max principle, Linear Quadratic Regulators - Kalman filters - State estimation through Kalman filters - Introduction to adaptive controls.

Suggested Reading:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition
2. Digital Control and State Variable Methods by M.Gopal, TMH
3. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
4. Digital Control Engineering, M.Gopal

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Programmable Logic Controllers and Applications

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX96EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
To Teach Students 1. Design, Programme and build an operational control system complete with instrumentation, analogue / digital inputs and outputs and Programmable Logic controllers. 2. Practicalities of working with PLCs in an industrial environment and fault-finding in an automated environment.	1. Design a PLC system, component, or process to meet a set of specifications. 2. Describe and understand how analogue and digital instrumentation connect to a PLC. 3. Understand advanced programming techniques including functional block and statement list. 4. Program, edit and test PLC programs incorporating combinational and sequential logic function, timers, counters and data handling instructions. 5. Design, understand and solve industrial problems with automation solutions

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:

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples

Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT-III:

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT-IV:

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT-V:

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data
processing , analog output application examples, PID principles position indicator with PID
control, PID modules, PID tuning, PID functions.

Suggested Reading:

1. Programmable Logic Controllers – Principle and Applications by John WWebb and Ronald A Reiss Fifth edition, PHI.
2. Programmable Logic Controllers – Programming Method andApplications by JR Hackworth and F.D Hackworth – Jr- Pearson, 2004.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Modern Control Theory

Syllabus for M.E. I - SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX17EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
To study the review of a state variable representation of systems, effect of a state feedback, classification of Nonlinearity, Measurement of time on phase plane trajectories, Concept of stability and generation of liapunov functions, Formation of Optimal control problems, Design of Model Reference Adaptive Control System	1. Able to provide the review of state variables representation of systems 2. Able to classify the Non-linear systems 3. Able to provide the concept of stability and generation of liapunov functions 4. Able to provide the formulation of optimal control problems and Boundary conditions 5. Able to provide the design of model reference adaptive control using MIT Rule and Lipunov stability theorem

UNIT I

Review of state variable representation of systems - Controllability and Observability — Model control of single input — single output systems (SISO), Controllable and Observable companion forms — Effect of state feedback on Controllability and Observability, Pole placement by State feed back.

UNIT II

Classification of Non-linearities - Phenomenon exhibited by the nonlinearities - Limit cycles - Jump resonance Sub-harmonic oscillations - Phase plane analysis - Singular points - Construction of phase plane trajectories - Isocline method - Delta method - Measurement of time on phase plane trajectories.

UNIT III

Concept and definition of stability - Lyapunov stability - Lyapunov's first and second methods - Stability of linear time invariant systems by Lyapunov's second method - Generation of Lyapunov functions- Variable gradient method - Krasooviski's method.

UNIT IV

Formulation of optimal control problems - Calculus of variations — Fundamental concepts — Functionals — Variation of functionals — Fundamental theorem of calculus of variations - Boundary conditions - Constrained minimization — Dynamic programming – Hamilton Principle of optimality, Jacobi Bellman equation – potryagins minimum principle.

UNIT V

Introduction to adaptive control, types of adaptive control systems. Design of model reference adaptive control systems using M/T rule and Lyapunov stability theory.

Suggested Reading:

1. IJ Nagarath ,M.Gopal *Control Systems Engineering fifth edition - ,* New Age International Rablishess, 1984 Wiley Eastern Ltd.
2. Ogata K, *Modern Control Engineering,* Prentice Hall, 1997.
3. Donald E Kirk, optimal control thery An introduction
4. Karl J AstromBjronwihenmark, Adaptive control second edition – Peasson education

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Microcontrollers

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PEX27EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
1. To make the students understand the fundamentals of 8051 Microcontroller. 2. Students should understand the working of these systems and should be able to determine hardware and software interfacing with real time systems. 3. They should further understand how to design any application based on these systems.	The students will be able to 1. Explain architecture and operation of 8051 Microcontroller. Understand the concept of Timer, Interrupt, I/O Port interfacing with 8051 Microcontroller. 2. Develop ALPs using data and logical operations. 3. Develop ALPs using arithmetic operations and jump, call opcodes. 4. Describe the designing of 8051 controller. 5. Understand the concept of Interfacing with Real time systems

UNIT - I

Introduction and 8051 Architecture: Introduction to microcontrollers, comparing microprocessors and microcontrollers, 4,8,16 and 32 bit microcontrollers, Development systems for Microcontrollers, Architecture, Architecture of 8051, pin configuration of 8051 microcontroller, hardware input pins, output pins ports and external memory, counters and timers, serial data input and output and interrupts.

UNIT - II

Moving Data and Logical Operations: Introduction, Addressing modes, External Data moves, Code Memory Read-only Data Moves, PUSH and POP

Op-codes, Data Exchanges, Logical Operations; Introduction, Byte-Level Logical Operations, Bit-Level Logical Operations, Rotate and Swap Operations.

Unit - III

Arithmetic Operations, Jump and Call Op-codes: Introduction, Flags, Incrementing and Decrementing, Addition, Subtraction, Multiplication and Division, Decimal Arithmetic, Jump and Call op-codes, introduction, The jump and call program range, Jumps, Calls and Subroutines, call and returns, Interrupts and Returns.

Unit - IV

8051 Microcontroller Design: Introduction, A microcontroller specification, A microcontroller Design, Testing the Design, Timing subroutines, Lookup Tables for the 8051, Serial Data Transmission.

Unit - V

Applications and Serial Data Communication: Introduction, Keyboards, Displays, pulse Measurement, D/A and A/D Conversions, Multiple Interrupts, Serial data Communication, Introduction, Network Configurations, 8051 Data Communication Modes.

Suggested Reading:

1. Kennth J. Ayala, The 8051 Microcontroller Architecture Program and Applications, 2nd edition, Penram International Publications, 1996.
2. Mohammed Ari Mazidi and JanciGillispie, The 8051 Microcontroller andEmbedded Systems, Pearson Education Asia, New Delhi, 2003.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Power System Simulation Laboratory

(List of Experiments)

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code:
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objective of this lab is to provide basic idea about electrical engineering field softwares, simulate different power electronic circuits and power system problems.	1. Students are able to simulate the Power Electronic circuits using MATLAB 2. Students are able to analyze the power system problems using MATLAB/MIPOWER/ETAP

1. Load flow studies
2. Short circuit studies
3. Transient stability studies
4. Distribution load flow studies
5. Simulation of Facts controllers
6. Load forecasting and unit commitment
7. Simulation of reactive power compensation
8. Simulation of single -area and Two -area Systems
9. Economic Load Dispatch with thermal power plants
10. Economic Load Dispatch with Hydro thermal power plants
11. Low frequency oscillation studies
12. Subsynchronous oscillation studies

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering
Course Name: Power Electronics Simulation Lab

Syllabus for M.E. I-SEMESTER

L:T:P(Hrs/Week):3:0:0	SEE Marks :60	Course Code: PI19PC121EE
Credits: 3	CIE Marks :40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
1. To comprehend power electronic circuits and evaluate their performance characteristics 2. To analyse the power electronic circuits and predict their behaviour under the specified conditions	At the end of the course student should be able to 1. Simulate the given power electronic circuits(s) in MATLAB/SIMULINK compare the results with the theoretical calculations wherever applicable 2. Solve the nonlinear transcendental equations using MATLAB command window 3. Simulate the mathematical model of the given power electronic circuit and compare the results with the circuit model 4. Generate PWM signals for a given power electronic circuit with the chosen logic 5. Analyse the given power electronic circuit and estimate the parameters of interest at each and every point in the circuit

LIST OF EXPERIMENTS

1) Performance of half controlled thyristor rectifier with inductive load
2) Performance of full controlled thyristor rectifier with inductive load
3) Design of L filter for a 1-ϕ diode bridge rectifier under CCM of operation
4) Design of C filter for a 1-ϕ diode bridge rectifier
5) Performance of 1-ϕ diode bridge rectifier with LC filter under CCM of operation
6) Three phase voltage source inverter (VSI) with 180^o conduction and 120^o conduction
7) Selective harmonic elimination PWM for a 1-ϕ VSI
8) Selective harmonic elimination PWM for a 3-ϕ, 2-level inverter
9) Analysis of 6-pulse Graetz bridge converter with RL load
10) Analysis of 12 pulse converter with RL load
11) Open loop speed control of a DC shunt motor
12) Open loop speed control of 3-ϕ induction motor
13) Sinusoidal pulse widthmodulation of 3-ϕ inverter
14) Series resonant converter with R-load
15) Buck, Buck-Boost converter control with various duty cycles
16) Speed control 3-ϕ induction motor using v/f control

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Power Systems & Power Electronics Lab

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PC211EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
1. to provide practical exposure on relays and analyse the fault in Power Systems 2. to provide practical exposure on Power Electronic Converter.	1. able to select relays for faults in a Power System 2. able to control and operate electrical loads

Part-A (Power Systems)

1. Measurement of positive, negative and zero sequence reactances of synchronous machine
2. Measurement of Direct axis and quadrature axis reactances of synchronous machine
3. Fault analysis of Single Line To Ground Fault
4. Fault analysis of Line To Line Fault
5. Fault analysis of Three-phase fault
6. Microcontroller based Over current relay
7. Percentage biased Differential Relay
8. Microcontroller based Over Voltage Relay
9. Microcontroller based Under Voltage Relay
10. Measurement of positive, negative and zero sequence reactances of three-phase transformer

Part-B (Power Electronics)

1. Three phase step down cyclo-converter
2. Three phase fully controlled rectifier with R and RL loads
3. Three phase half controlled rectifier with R and RL loads
4. Three phase IGBT inverter
5. Single phase dual converter
6. Speed control of dc motor using chopper

Note: At least five experiments should be conducted in each part

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Electrical & Electronics Engineering

Course Name: Programmable Logic Controllers and their Applications Lab

Syllabus for M.E. I-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks : 60	Course Code: **PI19PC221EE**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
To provide the practical knowledge on different PLCs and associated programming languages for the industrial automation.	Students are 1. Able to design the programs for any industrial automation application using CX-Programmer. 2. Able to control the real time electrical devises with HMI-PLC. 3. Able to visualize and control the industry automation with SCADA-PLC. 4. Able to control the electrical equipments remotely through GSM module.

1. Basic control function
2. Implementation of logic gates and Boolean functions
3. PLC timer functions
4. PLC counters functions
5. PLC Arithmetic functions
6. Number Comparison functions
7. Study of sequencer
8. Industrial Applications of PLC
9. Motor control using PLC
10. Sequential lighting of bulbs
11. Automatic Traffic control

12. SCADA applications
13.Motor control through MMI-PLC
14.Temperature control using GSM

Note: At least ten experiments should be conducted

With effect from the Academic Year 2019-20

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

AUDIT COURSE FOR M.E- I SEMESTER

Course Name: **ENGLISH FOR RESEARCH PAPER WRITING**

L : T : P (Hrs/Week) : 2	SEE Marks : 60	Course Code: Audit course
Credits: Nil	CIE Marks : 40	Duration of SEE : Hours : 03

COURSE OBJECTIVES	COURSE OUTCOMES
This will enable the students should be able to:	**On completion of the course the students will be able to:**
1. Understand, how to improve writing skills and level of readability.	1. write research papers
2. Learn about what to write in each section.	2. write citations as per the MLA style sheet and APA format
3. Understand the skills needed when writing a Title	3. write concisely and clearly following the rules of simple grammar, diction and coherence.
4.Ensure the good quality of paper at very first-time submission	

UNIT-1

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

UNIT-2

Clarifying Who Did What, Highlighting your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT-3

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

UNIT-4

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, useful phrases, how to ensure paper is as good as it could possibly be the first-time submission.

UNIT-5

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

LEARNING RESOURCES:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM Highman's book.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg
London, 2011

The break-up of marks for CIE:
Internal Tests (2) ; Quiz Tests (3) + Assignments (3)

1. No. of Internal Tests	:	2	Max. Marks for each Internal Tests :
2. No. of Assignments	:	3	Max. Marks for each Assignments :
3. No. of Quizzes	:	3	Max. Marks for each Quiz Tests :

Duration of Internal Tests : 90 minutes

VASAVI COLLEGE OF ENGINEERING(AUTONOMOUS)
DEAPRTMENT OF HUMANITIES AND SOCIAL SCIENCES

M.E - AUDIT COURSE-II SEMESTER

PEDAGOGY STUDIES

Instruction:2Hours	SEE: 60	CourseCode: Audit course DurationofSEE: 3 Hours
Course - Audit	CIE:40	

Course objectives	**Course outcomes**
This course will enable the students to: 1. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers. 2. Identify critical evidence gaps to guide the development.	1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries? 2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners? 3. How can teacher education (curriculum and practicum) and the

Units	Content
1a.	**Introduction and Methodology :** ➢ Theories of learning, Curriculum, Teacher education. ➢ Conceptual framework, Research questions. ➢ Overview of methodology and Searching. ➢ Pedagogic theory and pedagogical approaches. ➢ Teachers' attitudes and beliefs and Pedagogic strategies.
b.	**Thematic overview:** ➢ Pedagogical practices that are being used by teachers. ➢ Curriculum, Teacher education. How can teacher education (curriculum and practicum) and the curriculum and guidance materials best support effective pedagogy.
2	•**Research gaps and future directions** ➢ Research design- Lesson plans, Course plans ➢ Teacher education ➢ Curriculum and assessment

Suggested reading

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

2 Internals

2 Quizzes

2 Assignments

Durations of internals 90 minutes