FACULTY OF ENGINEERING

Scheme of Instruction & Examination

and

Syllabi

B.E. V and VI Semester

of

Four Year Degree Programme

In

Electrical & Electronics Engineering

(With effect from the academic year 2018 – 2019)

Issued by

Dean, Faculty of Engineering

Osmania University, Hyderabad

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SCHEME OF INSTRUCTION & EXAMINATION
B.E. V – Semester
(ELECTRICAL AND ELECTRONICS ENGINEERING)

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1.	PC501EE	Power Systems-II	3	-	-	3	30	70	3	3
2.	PC502EE	Electrical Machines-II	3	-	-	3	30	70	3	3
3.	PC503EE	Electrical Measurements and Instrumentation	3	1	-	4	30	70	3	3
4.	PC504EE	Linear Control Systems	3	1	-	4	30	70	3	3
5.	PC505EE	Digital Signal Processing and Applications	3	1	-	4	30	70	3	3
6.	PE-1	Professional Elective-I	3	-	-	3	30	70	3	3
7	MC901EG	Gender Sensitization	3	-	-	3	30	70	3	0
Practical / Laboratory Courses										
8.	PC551EE	Electrical Machines Lab-1	-	-	2	2	25	50	3	1
9.	PC552EE	Power Electronics Lab	-	-	2	2	25	50	3	1
10.	PC553EE	Circuits & Measurements Lab	-	-	2	2	25	50	3	1
		Total	**21**	**3**	**6**	**30**	**285**	**640**		**21**

Professional Elective-1

PE501EE	Programmable Logic controllers
PE502EE	Electronic Instrumentation
PE503EE	FACTS Devices

MC: Mandatory Course **PC:** Professional Course
L: Lecture **T:** Tutorial **P:** Practical **D:** Drawing
CIE: Continuous Internal Evaluation **SEE:** Semester End Examination (Univ. Exam)

Note: 1) Each contact hour is a Clock Hour
2) The practical class can be of two and half hour (clock hours) duration as per the requirement of a particular laboratory.

Course Code	Course Title						Core / Elective
PC501EE	Power Systems-II						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Power Systems-I	3	0	0	0	30	70	3

Course Objectives

- The student able to learn and understand the performance analysis of transmission lines and cables.
- To be able to comprehend analysis of symmetrical and unsymmetrical faults in the power system.

Course Outcomes

At the end of the course students will be able to

- Acquire modeling of different short, medium and long transmission lines
- Understand the impact of different types of faults on overhead transmission lines and calculation of fault currents and their significance.
- Explain the reasons for voltage variation, importance of maintaining constant voltage in power system and different voltage control methods.
- Acquire the knowledge of natural impedance of transmission line and significance in the operation of power system network.

UNIT-I

Transmission Line Theory: Performance of short, medium, long lines, Line calculations, Tuned lines, Power circle diagram and their applications.

Corona – Causes, Disruptive and Visual critical voltages, Power loss, Minimization of corona effects.

UNIT-II

Symmetrical Faults: Use of per unit quantities in power systems, advantages of per unit system. Symmetrical Three-phase Faults, Transients in RL series circuits, Short circuit currents, Reactance‘s of synchronous machines, Symmetrical fault calculations, Short circuit capacity of bus.

UNIT-III

Unsymmetrical Faults: Symmetrical components of unsymmetrical phasors, Power in terms of symmetrical components, Sequence impedance and sequence networks, Sequence networks of unloaded generators, Sequence impedances of circuit elements, Single line to ground, line to line and double line to ground faults on unloaded generator, Unsymmetrical faults of power systems, Open circuit faults.

UNIT-IV

Voltage Control: Phase modifiers, Induction Regulators, Tap changing Transformers, Series and Shunt Capacitors, Reactive Power requirement calculations, Static VAR compensators, Thyristor Controlled reactor, Thyristor switched capacitor.

UNIT-V

Travelling Wave Theory : Causes of over voltages, Travelling wave theory, Wave equation, Open circuited line, The short circuited line, Junction of lines of different natural impedances, Reflection and Refraction Coefficients, Junction of cable and over head lines, Junction of three lines of different natural impedances, Bewley Lattice diagram.

Suggested Readings:

1. CL Wadhwa - Electrical Power Systems, New Age International, 4th edition, 2006.
2. Grainger and Stevenson - Power System Analysis, Tata McGraw Hill, 4th edition, 2003.
3. Nagarath and Kothari - Modern Power System Analysis, Tata McGraw Hill, 4th edition- 2012.

Course Code	Course Title						Core / Elective
PC502EE	Electrical Machines – II						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Electrical Machines – I	3	0	0	0	30	70	3

Course Objectives:

- To be able to understand in detail about transformers and induction machines. Construction, principle, performance characteristics and testing.
- To understand the construction, principle and performance characteristics of fractional HP motors

.**Course Outcomes**

- Explain the rating, testing and applications of single phase, three phase transformers
- Acquire the knowledge of Rotating magnetic field theory, Double field revolving theory
- Develop equivalent circuit diagram of transformer, three phase induction motor and single phase induction motor.
- Develop Slip-torque characteristics of single phase and three phase induction motors
- Demonstrate knowledge of Starting methods, Speed control methods and applications of single and three phase induction motors.

UNIT-I

Single Phase Transformers : Constructional features of single phase transformers, principle of two winding transformer, ideal transformer, transformer on no load and on load, phasor diagrams equivalent circuits, losses , Testing, a Polarity test, OC and SC tests, Sumpner's test, Regulation and efficiency, All day efficiency, separation of losses, Excitation phenomena in transformers, Auto transformer, Comparison with two winding transformer and applications.

UNIT-II

Three - Phase Transformers: Connections, Choice of transformer connections, Third harmonic voltages, Phase conversion, 3 - phase to 2 -phase transformation, Scott connection, constructional features of poly phase transformers, Tertiary winding, Parallel operation of transformers, phase shifting transformer, Tap changer.

UNIT-III

Three - Phase Induction Motor: Constructional features, Rotating magnetic field theory, Principle of operation of Squirrel cage and Slip ring motors, Phasor diagram, Equivalent Circuit, expression for torque, starting torque, Max torque. Slip-torque characteristics, Equivalent circuit parameters from no-load and blocked rotor test, Circle diagram, Determination of performance characteristics of induction motor, Applications.

UNIT-IV

Starting & Speed Control Methods: Starting methods of 3-phase induction motor, Auto transformer, Star – delta Starter. Double cage machine, Speed control methods, Resistance

control, Voltage Control, Pole changing, Cascading, Induction Generator, Principle of operation, Applications.

UNIT-V

Single Phase Motors: Double field revolving theory. Equivalent circuit of single phase induction Motor, Principle of operation, speed torque characteristics of a split phase and capacitor motors. Compensated and uncompensated series motor, Repulsion motor and universal motor, Applications.

Suggested Readings:

1. P.S.Bimbhra- Electrical Machinery, Khanna Publishers 2006
2. D.P. Kothari & I.J. Nagrath, Electrical Machines, Tata McGraw Hill, 4th Edition, 2010.
3. M.G.Say - The Performance and Design of AC. Machines Pitman Publication, 2002.
4. Irving L. Kosow - Electric Machinery and Transformers. PPH, Pearson Education 2nd Edition, 2009.

Course Code	Course Title						Core / Elective
PC503EE	Electrical Measurements and Instrumentation (Common to EEE and EIE)						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	1	0	0	30	70	3

Course Objectives

- To learn and understand the fundamental concepts, principle of operation and applications of various electrical measuring instruments.
- To understand various types of Bridges in measurement of resistance, inductance, capacitance and frequency.
- To understand the operation and applications of Ballistic Galvanometer, Flux meter and DC/AC Potentiometer.
- To understand the application of CRO for measurement of amplitude , phase and frequency of sinusoidal signals.

Course Outcomes

At the end of the course students will be able to

- Choose the suitable instrument like Ammeter, Voltmeter for AC/DC applications.
- Select suitable Bridge for measurement of electrical parameters and quantities.
- Use CRO for measurement of Amplitude, Phase and frequency of sinusoidal signals.

UNIT-I

Instruments: indicating, recording and integrating instruments, Ammeter, Voltmeter, Expression for torque of moving coil, moving iron, Dynamometer, induction and electrostatic instruments. Extension of range of instruments, Wattmeter Torque expression for dynamometer instruments, Reactive power measurement.

UNIT- II

Meters: Energy meters, single phase and 3-phase, Driving torque and braking torque equations, Errors and testing compensation, Maximum demand indicator, Power factor meters, Frequency meters, Electrical resonance and Weston type of synchroscope.

UNIT- III

Bridge Methods and transducers: Measurement of inductance, capacitance and resistance using Bridges, Maxwell's, Hay's. bridge, Anderson, Wein, Desauty's, Schering's bridges, Kelvin's double bridge, Megger, Loss of charge method, Wagners earthing device, Transducers - Analog and digital transducers, Strain gauges and Hall effect transducers.

UNIT-IV

Magnetic Measurements and instrument transformers: Ballistic galvanometer, Calibration by Hibbert' s magnetic standard flux meter, Lloyd-Fischer square for measuring iron loss, Determination of B-H curve and Hysteresis loop using CRO, Instrument transformers – Current and potential transformers, ratio and phase angle errors of CT's and PT's.

UNIT-V

Potentiometers: Crompton's DC and AC polar and coordinate types, Applications, Measurements of impedance, Calibration and ammeter voltmeter and wattmeters. Use of oscilloscope in frequency, phase and amplitude measurements

Suggested Reading:

1. Shawney A.K., Electrical and Electronics Measurements and Instruments, Dhanpatrai & Sons, Delhi, 2000.
2. Umesh Sinha, Electrical, Electronics Measurement & Instrumentations, Satya Prakashan, New Delhi.
3. Golding E.W., Electrical Measurements & Measuring Instruments, Sir Issac & Pitman & Sons Ltd., London.
4. U.A.Bakshi, A.V.Bakshi, Electrical and Electronic Instrumentation, Technical publications

Course Code	Course Title						Core / Elective
PC504EE	Linear Control Systems (Common to EEE and EIE)						Core
Prerequisite	Contact Hours per Week				CIE	SEE	
	L	T	D	P			Credits
Electric Circuits - II	3	1	0	0	30	70	3

Course Objectives

- To develop basic skills of utilizing mathematical tools needed to analyze and design classical linear control systems.
- To understand and develop the state space representation of control systems.

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Course Outcomes

At the end of the course students will be able to

- Understand the concept of the terms control systems, feedback, Mathematical modeling of Electrical and Mechanical systems.
- Explain the time domain and frequency response analysis of control systems.
- Acquire the knowledge of various analytical techniques used to determine the stability of control systems.
- Able to understand the importance of design of compensators
- Able to demonstrate controllability and observability of modern control systems.

UNIT-I

Introduction to Control Systems: Classification of control systems. Components of control systems, Feed-Back Characteristics, Effects of feedback - Mathematical modeling of Electrical and Mechanical systems, Transfer function, Transfer function of Potentiometer, synchro, AC servo motor, DC servo motor, Block diagram reduction technique, Signal flow graph, Mason's gain formula

UNIT-II

Time Domain Analysis: Standard test signals, Time response of first order systems, Transient response of second order system for unit step input, Time domain specifications, Steady state response, Steady state errors and error constants, Effects of P, PD, Pl and PID controllers.

UNIT-III

Stability Analysis in S-Domain: The concept of stability, Routh's stability Criterion, Absolute stability and relative stability, limitations of Routh's stability.

Root Locus Technique: The root locus concept, construction of root loci, Effects of adding poles and zeros on the root loci.

UNIT-IV

Frequency Response Analysis: Introduction to frequency response, Frequency domain specifications, Bode plot, Stability analysis from Bode plots, Determination of transfer function from the Bode Diagram, Polar Plots, Nyquist Plots, Stability Analysis, Gain margin and phase margin

Control System Design: Introduction - Lag, Lead and Lag-Lead Compensator design in frequency Domain.

UNIT-V

State Space Analysis: Concepts of state, State variables and state model, Derivation of state models of linear time invariant systems - Controllable, Observable and Diagonal state models, State transition matrix, Solution of state equation, Concepts of Controllability and Observability.

Suggested Reading:

1. Nagrath I.J. & Gopal.M - Control System Engineering, Wiley Eastern, 2003.
2. B.C.Kuo - Automatic Control Systems, Wiley India edition, 7th Edition, 2002.
3. K.Ogata - Modern Control System, Prentice Hall of India, 4th edition, 2002.
4. N.C.Jagan - Control Systems, B.S Publications, 2nd edition,2008

Course Code	Course Title						Core / Elective
PC505EE	Digital signal processing and Applications (Common to EEE and EIE)						Core
Prerequisite	Contact Hours per Week				CIE	SEE	
	L	T	D	P			Credits
-	3	1	0	0	30	70	3

Course Objectives

- To be able to understand and apply classification: characterization, representation and analysis of signals and systems in time and frequency domain.
- To understand the principle and design of digital filters and to introduce digital signal processor and their architecture.

Course Outcomes

At the end of the course students will be able to

- Acquire the knowledge of - Classification of discrete time signals & discrete time systems, Properties of Z-transforms, Discrete time Fourier transform.
- Analyze the Characteristics of IIR digital filters, FIR digital filters.
- Explain the Advantages of Digital signal processors over conventional Microprocessors.

UNIT- I

Introduction to Digital Signal Processing: Sampling, Quantizing and coding, Classification of discrete time signals & discrete time systems, linear shift invariant systems, Stability and causality, Solution to Linear constant coefficient difference equations.

Z-transforms: Properties Inverse z – transform, System function, Relation between s-plane and z- plane - Stability in Z-domain, Solution of difference equations using one sided z-transform.

UNIT - II

Frequency domain analysis : Discrete time Fourier transform (DTFT), Properties, Frequency domain representation of discrete time signals and systems - DFS, Properties- Frequency domain sampling OFT, Properties - circular convolution - Linear convolution using OFT - Fast Fourier transforms (FFT), Radix-2 decimation in time(DIT) and decimation in frequency(DIF) FFT Algorithms, IDFT using FFT.

UNIT-III

IIR digital filters: Analog filter approximations, Butterworth and Chebyshev filters, Design of IIR Digital filters from analog filters using Bilinear transformation, Impulse invariant and step invariant methods. Realization of IIR filters - Direct form - I, Direct form - II, Cascade and parallel form realizations

UNIT- IV

FIR digital filters: Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital filters using window techniques, Linear phase realization, Applications of digital signal processing to speech processing.

Multirate signal processing: Decimation, Interpolation, Sampling rate conversion, Implementation of sampling rate conversion.

UNIT-V

Introduction to Digital Signal Processors: Introduction to programmable DSPs -Advantages of Digital signal processors over conventional Microprocessors - Architecture of TMS 320C5X introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register, Index Register, Auxiliary Register Compare Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, Program controller, Status registers, On- chip memory and On-chip peripherals

Suggested Reading:

1. Proakis & Manolakis - Digital Signal Processing, Principles, Algorithms and Applications, Prentice Hall of India - 3rd Edition-1994.
2. Opeinheim & Schaffter - Digital Signal Processing, PHI Publications, 2002.
3. Salivahanan Valluaraj & Gnanapriya - Digital Signal Processing• Tata McGraw Hill, 2001.
4. Anand Kumar.A - Digital Signal Processing - PHI learning Private Ltd. 2013.
5. B.Venkataramani and M. Bhaskar - Digital Signal Processors, Architecture programs and applications, Tata McGraw Hill, 2007.

Course Code	Course Title						Core / Elective
PE501EE	**PROGRAMMABLE LOGIC CONTROLLERS (Professional Elective-I)**						**Core**
Prerequisite	**Contact Hours per Week**				**CIE**	**SEE**	**Credits**
	L	**T**	**D**	**P**			
-	**3**	**0**	**0**	**0**	**30**	**70**	**3**

Course Objectives

- To be able to understand basics of Programmable logic controllers, basic programming of PLC.
- To make the students to understand the Functions and applications of PLC

Course Outcomes

At the end of the course students will be able to

- Develop PLC programs for industrial applications
- Acquire the knowledge of PLC counter functions and PLC Arithmetic functions and data handling functions.

UNIT-I

PLC Basics: Definition and History of PLC, PLC advantages and disadvantages, Over all PLC Systems, CPUs and Programmer Monitors, PLC input and output models, Printing PLC Information, Programming Procedures, Programming Equipment, Programming Formats, Proper Construction of PLC Diagrams, Devices to which PLC input and output modules are connected, Input on/off switching devices, Input analog devices, Output analog on/off devices and output analog devices.

UNIT-II

Basic PLC Programming: Programming on/off inputs to produce on/off outputs - PLC input instructions, Outputs Operational procedures, Contact and coil input/output programming examples, Relation of digital gate logic contact / coil logic - PLC programming and conversion examples, Creating ladder diagrams from process control descriptions, Sequence listings, Large process ladder diagram constructions.

UNIT-III

Basic PLC Functions: General Characteristics of Registers, Module addressing, holding registers, Input registers, output registers, PLC timer functions, examples of timer functions. Industrial applications, PLC counter functions.

UNIT-IV

Intermediate Functions: PLC Arithmetic functions, PLC additions and subtractions, The PLC repetitive clock, PLC Multiplications, Division and Square Root, PLC trigonometric and log functions, Other PLC arithmetic functions, PLC number comparison functions. PLC basic comparison functions and applications, Numbering systems and number conversion functions, PLC conversion between decimal and BCD-Hexadecimals numbering systems

UNIT-V

Data Handling Functions: The PLC skip and master control relay functions, Jump functions, Jump with non return, Jump with return. PLC data move Systems, The PLC functions and applications. PLC functions working with bits, PLC digital bit functions and applications, PLC sequence functions, PLC matrix functions.

Suggested Reading:

1. John W. Weff, Ronald A. Reis, Programmable Logic Controllers, Prentice Hall of India Private Limited, Fifth edition, 2003.

Course Code	Course Title						Core / Elective
PE502EE	**Electronic Instrumentation (Professional Elective – I)**						**Core**
Prerequisite	**Contact Hours per Week**				**CIE**	**SEE**	
	L	**T**	**D**	**P**			**Credits**
-	**3**	**0**	**0**	**0**	**30**	**70**	**3**

Course Objectives

- To be able to understand various electrical transducers and instrumentation, amplifiers operation and their characteristics.
- To understand in detail about digital instruments and recorders, oscilloscopes, signal conditioning and data conversion

Course Outcomes

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

- Understand various electrical transducers and instrumentation
- Understand in detail about digital instruments and recorders

UNIT I

Transducers: Classification of transducers-Pressure sensitive detectrors-Temparature detectors-Types of Electrical Transducers-Analogue and Digital transducers-Strain gauges-Thermo-couple inductive transducer-Capacitive transducer-Piezo-electric transducers-Photo sensitive devices-Photo conductive cells-Photovoltaic cell-Selecting a transducer, Hall-effect transducers.

UNIT II

Instrumentation amplifiers: Basic characteristics of instrumentation amplifiers, Direct coupled amplifiers, Operational amplifiers, various function of operational amplifiers Difference amplifiers, Charge amplifiers, Logarithmic amplifier, Instrumentation amplifier with operational amplifier, three amplifier configuration.

UNIT III

Signal conditioning and Data conversion: Types of signal conditioning, Amplification of amplitude modulation in instrumentation, Modulators, Demodulators, Filters, Types of filters-Signal circuits-Bridge as input Circuit, Filters as integrator and differentiator (Analog to digital and Digital to analog conversion-Weighted resistance D/A converter-Analog to digital converters), Sample and hold circuit-Flash type, Dual scope integrating type-Successive approx.method.

UNIT IV

Digital Instruments & Recorders: Characteristics of digital meters-Digital frequency meter-High frequency measurements-Time period measurements -Digital voltmeter, Digital multimeter-Data Transmission in digital instrument system-IEEE 488 standards-Analog recorders-Graphic recorders-strip chart recorders-Types of strip chart recorders-Potentiometer recorders-Bridge recorders-Differential transformer recorder X Y recorders-Magnetic type recorders-PDM recording-Digital recorders.

UNIT V

Oscilloscopes: Block diagram-Electro static focusing-Cathode Ray Tube-Time base generator-Horizontal and Vertical deflection system-Deflection sensitivity and deflection factor, Frequency limitation-Delay line-Application of oscilloscope-Accessories of oscilloscope-Special oscilloscope-Digital storage oscilloscopes-Principle of operation.

Suggested Reading:

1**.** Sawhney A.K -A course in Electrical & Electronic Measurement and Instrumentation, Dhanpat Rai & Co., Delhi.1999.
2. Helfrick and cooper-Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall, India,New delhi 1999.
3. Kalsi-Electronic Instrumentation, Tata McGraw Hill, New Delhi, 2nd Edition, 2004.

Course Code	Course Title						Core / Elective
PE503EE	FACTS DEVICES (Professional Elective – I)						Core
Prerequisite	Contact Hours per Week				CIE	SEE	
	L	T	D	P			Credits
Power Electronics	3	0	0	0	30	70	3

Course Objectives

- To understand the concepts and Importance of different loads characteristics, Design of Sub-Transmission Lines, Sub-Stations and Feeders.
- To make the students understand about importance of Power Quality and Applications of capacitors in distribution systems.

Course Outcomes

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

- Apply impedance, phase angle and voltage control for real and reactive power flow in ac transmission systems
- Analyze and select a suitable FACTS controller for a given power flow condition

UNIT-I

Flexible AC Transmission Systems (FACTS): FACTS concepts and general system conditions: Power flow in AC systems, Relative importance of controllable parameters, Basic types of FACTS controllers, shunt and series controllers, Current source and Voltage source converters

UNIT-II

Static Shunt Compensators: Objectives of shunt compensation, Methods of controllable VAR generation, Static Var Compensator, its characteristics, TCR, TSC, FC-TCR configurations, STATCOM, basic operating principle, control approaches and characteristics.

UNIT-III

Static Series Compensators: Objectives of series compensator, variable impedance type of series compensators, TCSC, TSSC-operating principles and control schemes, SSSC, Power Angle characteristics, Control range and VAR rating, Capability to provide reactive power compensation, external control .

UNIT-IV

Combined Compensators: Introduction to Unified Power Flow Controller, Basic operating principles, Conventional control capabilities, Independent control of real and reactive power

UNIT-V

Application of FACTS: Improvement of system stability limit-enhancement of system damping-Enhancement of transient stability, Prevention of voltage instability

Suggested Reading

1. Understanding FACTS –Concepts and Technology of Flexible AC Transmission Systems‖ Narain G.Honorani, Laszlo Gyugyi

Course Code	Course Title						Core / Elective
MC901EG	GENDER SENSITIZATION						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	0	0	0	30	70	3

Course Objectives

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes

At the end of the course students will be able to

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students and professionals will be better equipped to work and live together as equals. Students will develop a sense of appreciation of women in all walks of life.

UNIT-I

UNDERSTANDING GENDER:

Why Should We Study It? Socialization: Making **Women, Making Men:** Introduction-Preparing for Womanhood-Growing up male-First lessons in caste-Different Masculinities;

Just Relationships: Being Together as Equals: Mary Kom and Onler- Love and acid just do not mix-Love Letters-Mothers and Fathers-Further reading: Rosa Parks-The brave heart.

UNIT-II

GENDER AND BIOLOGY: Missing Women: Sex selection and Its Consequences – Declining sex ratio. Demographic Consequences; Gender Spectrum: Beyond the Binary – Two or many – Struggles with discrimination; Our Bodies, Our Health.

UNIT-III

GENDER AND LABOUR: Housework: the Invisible Labour: "My mother doesn't work"-Share the Load"; **Women's Work; Its Politics and Economics:** Fact and fiction-Unrecognized and unaccounted work- Wages and conditions of work.

UNIT-IV

ISSUES OF VIOLENCE: Sexual Harassment: Say No! : Sexual harassment – not eve-teasing-Coping with everyday harassment-"Chupulu"; **Domestic Violence: Speaking Out:** Is home a safe place? When women unite-Rebuilding lives-New forums for justice; **Thinking about Sexual Violence:** Blaming the victim – "I fought for my life". The caste face of violence

UNIT – V

GENDER STUDIES: Knowledge - Through the Lens of Gender - Point of view - Gender and the structure of knowledge – Unacknowledged women artists of Telangana: **Whose History? Questions for Historians and Others:** Reclaiming a past-Writing other histories-Missing pages from modern Telangana history.

Suggested Reading:

1. A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu, *"Towards a World of Equals: A Bilingual Text book on Gender"* Telugu Akademi, Hyderabad, 1st Edition, 2015.
2. www.halfthesky.cgg.gov.in

Course Code	Course Title						Core/Elective
PC551EE	ELECTRICAL MACHINES LAB-I						Core
Prerequisite	L	T	D	P	CIE	SEE	Credits
ELECTRICAL MACHINES – I	0	0	0	2	25	50	1

Course Objectives:

- To learn operation and performance characteristics of dc machines by conducting various experiments and tests practically.
- To understand the operation and performance characteristics of transformers by conducting various experiments and tests.

Course Outcomes:

On successful completion of this course student will be able to

- Estimate the efficiency and voltage regulation of D.C. generator and transformers under various loading conditions.
- Acquire the knowledge of efficiency and speed regulation D.C. Motors under various loading conditions.

LIST OF EXPERIMENTS

1. Magnetization characteristics of a separately excited D.C. generator.
2. Determination of the load characteristics of shunt and compound generators.
3. Determination of the performance and mechanical characteristics of series, shunt and compound motors (Any one).
4. Separation of iron and friction losses and estimation of parameters in D.C. machine.
5. Speed control of D.C. Shunt motor using shunt field control and armature control methods.
6. Separation of core losses in a single phase transformer.
7. Open circuit and short circuit and load test on a single phase transformer.
8. Sumpner's test on two identical transformers.
9. Three phase Transformer connections.
10. Three phase to two phase transformation and open delta connection.
11. Hopkinson's test.
12. Swinburne's test.

Note: Atleast ten experiments should be conducted in the Semester.

Suggested Reading:

1. P.S.Bimbhra- Electrical Machinery, Khanna Publishers 2006
2. D.P. Kothari & I.J. Nagrath, Electrical Machines, Tata McGraw Hill, 4th Edition, 2010.
3. M.G.Say - The Performance and Design of AC. Machines Pitman Publication, 2002.
   Irving L. Kosow - Electric Machinery and Transformers. PPH, Pearson Education, 2nd Edition, 2009

Course Code	Course Title						Core/Elective
PC552EE	Power Electronics Lab (Common to EEE and EIE)						Core
Prerequisite	**L**	**T**	**D**	**P**	**CIE**	**SEE**	**Credits**
Power Electronics	**0**	**0**	**0**	**2**	**25**	**50**	**1**

Course Objectives:

- To be able to understand various power switching devices, trigger circuits, characteristics and applications by conducting the experiments.
- To learn and understand the rectifiers, choppers and inverters principle operation, characteristics and applications.

Course Outcomes:

On successful completion of this course student will be able to

- Able to understand speed control of motors by using controlled rectifier
- Able to understand the applications of cycloconverters
- Able to simulate different power electronic devices using softwares.

LIST OF EXPERIMENTS:

1. R, RC, UJT Trigger Circuits for SCR's.
2. Design and fabrication of trigger circuits for single phase half - controlled and fully controlled bridge rectifiers.
3. Study of SCR chopper.
4. Design and fabrication of trigger circuit for MOSFET chopper.
5. Study of forced commutation techniques of SCRs.
6. Speed control of separately excited DC motor by controlled rectifier.
7. Speed control of universal motors using choppers.
8. Study of single phase half and fully controlled rectifier.
9. Study of single phase and three phase AC voltage controller.
10. Study of single phase dual converter.
11. Study of single phase cyclo-converter.
12. IGBT based PWM inverters.
13. Simulation of single-phase half and fully controlled rectifier.
14. Simulation of single phase and three phase AC voltage controller.
15. Simulation of single phase inverter & three phase inverter.

Note: At least ten experiments should be conducted in the Semester.

Suggested Reading:

1. Bimbra.P.S. - Power Electronics, Khanna Publications, 2006.
2. Rashid M.H. - Power Electronics Circuits, Devices and Applications - Prentice Hall of India, 2004.
3. Singh. M.D., Khanchandani K.B. - Power Electronics - Tata McGraw Hill, 14th reprint, 1999.
4. Mohan, Undeland & Robbins - Power Electronic Converters. Applications and Design - John Wiley & Sons - 3rd Edition, 2007.

Course Code	Course Title						Core/Elective
PC553EE	Circuits and Measurement Lab (Common to EIE and EEE)						Core
Prerequisite	**L**	**T**	**D**	**P**	**CIE**	**SEE**	**Credits**
EC – I	0	0	0	2	25	50	1

Course Objectives:

- To train the students for acquiring practical knowledge for measuring resistance, inductance and capacitance using various bridges.
- To train the student for the usage of A.C. and D.C. potentiometers.
- To make the student understand the operation of CRO and its usefulness in finding the amplitude, phase and frequency of waveforms.

Course Outcomes:

On successful completion of this course student will be able to

- Measure the inductance, capacitance and resistance using various bridges.
- Measure resistance and calibrate ammeter, voltmeters and wattcmeters using A.C. and D.C. potentiometers.
- Have hands on experience on the operation of CRO

List of Experiments:

PART – A: CIRCUITS

1. Verification of KCL&KVL using Mesh and nodal analysis
2. Verification of (a) Thevenin's Theorem (b) Norton Theorem (c) Super Position Theorem (d) Max power transfer theorem
3. Frequency and time response of of 2nd order RLC circuits
4. Open circuit, short and ABCD parameters of two port parameters
5. Simulation of 2nd order RLC using Pspice
6. Transient Response of RLC circuits

PART – B: MEASUREMENTS

7. Measurement of low resistance by Kelvin's double bridge
8. Measurement of active, reactive power measurements using two wattmeter method
9. Calibration of Single phase energy meter by Phantom loading and measurement of power direct loading
10. Measurement of power by 3-voltmeter and 3-Ammeter methods
11. Measurement of a) Inductance by Maxwell's and Andersons bridge b) Measurement of capacitance by DeSauty's bridge
12. Use of DC Potentiometer for measurement of unknown voltage and impedance

Note: Atleast ten experiments should be conducted in the Semester.

Suggested Reading:

1. Shawney A.K., Electrical and Electronics Measurements and Instruments, Dhanpatrai & Sons, Delhi, 2000.
2. Umesh Sinha, Electrical, Electronics Measurement & Instrumentations, Satya Prakashan, New Delhi.
3. Golding E.W., Electrical Measurements & Measuring Instruments, Sir Issac & Pitman & Sons Ltd., London.