FACULTY OF ENGINEERING

Scheme of Instruction & Examination

For

Four Year Degree Programme of

Bachelor of Engineering (B.E)

in

Electrical and Electronics Engineering

(Accredited by NBA)

(Batch 2021 – 25: With effect from the academic year 2022–23)

STANLEY COLLEGE OF ENGINEERING AND TECHNOLOGY FOR WOMEN (AUTONOMOUS)

(Affiliated to Osmania University)

(Accredited by NAAC with "A" Grade)

ABIDS, HYDERABAD-500001, Telangana.

V Semester

S.No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hours per week	CIE	SEE	SEE Duration in Hours	
Theory Courses										
1	SPC501EE	Electrical Machines – II	3	-	-	3	40	60	3	3
2	SPC502EE	Power Electronics	3	-	-	3	40	60	3	3
3	SPC503EE	Measurements & Instrumentation	3	-	-	3	40	60	3	3
4	SPC504EE	Power Systems – I	3	-	-	3	40	60	3	3
5	SOE5xxxx	Open Elective – II	3	-	-	3	40	60	3	3
Practical/Laboratory Courses										
6	SPC511EE	Electrical Machines – II Lab	-	-	4	4	40	60	3	2
7	SPC512EE	Power Electronics Lab	-	-	3	3	40	60	3	1.5
8	SPC513EE	Measurements & Instrumentation Lab	-	-	3	3	40	60	3	1.5
9	SPW511EE	Industrial Visit			2	2	50	-	-	1
TOTAL			**15**	**-**	**12**	**27**	**370**	**480**	**24**	**21**

VI Semester

S.No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hours per week	CIE	SEE	SEE Duration in Hours	
Theory Courses										
1	SHS601BM	Finance & Accounting	3	-	-	3	40	60	3	3
2	SPC601EE	Power Systems–II	3	-	-	3	40	60	3	3
3	SPC602EC	Microprocessors and Micro Controllers	3	-	-	3	40	60	3	3
4	SPC603EE	Digital Signal Processing	3	-	-	3	40	60	3	3
5	SPE6xxEE	Professional Elective – I	3	-	-	3	40	60	3	3
Practical/Laboratory Courses										
6	SPC611EE	Digital Signal Processing Lab	-	-	3	3	40	60	3	1.5
7	SPC612EC	Microprocessors and Micro Controllers Lab	-	-	4	4	40	60	3	2
8	SPW611EE	Mini Project	-	-	2	2	50	-	-	1
9	SPW612EE	Internship- 2	The students have to undergo an Internship of 2 week duration after VI- Semester SEE				50	-	-	1
TOTAL			**15**	**-**	**9**	**24**	**380**	**420**	**21**	**20.5**

Batch: 2021 – 25
V Semester Detailed Syllabus

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPC501EE	**ELECTRICAL MACHINES – II**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
SPC401EE, SES102EE	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• To be able to understand in detail about Induction Machines Construction, principle, performance Characteristics and testing. • To understand the testing and performance characteristics of Induction Machines. • To understand the construction, principle and Performance of Synchronous machines and Special Machines	1. Acquire the knowledge of Rotating magnetic field Theory, performance of three phase Induction motor. 2. Demonstrate knowledge of Starting methods, Speed control methods and applications of single and three phase induction motors. 3. Understand the principle, characteristics and operation of synchronous Generator. 4. Understand the principle, characteristics and operation of synchronous Motor. 5. Understand the working principle of single-phase motors and Special motors.

UNIT I – Three - Phase Induction Machines

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, Torque-speed characteristics, Equivalent circuit parameters from no-load and blocked rotor test, Circle diagram, Determination of performance characteristics of induction motor, Applications.

UNIT II – Starting and 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 III – Synchronous Machines

Types and Constructional Details - Types of Winding, Winding factors - E.M.F. equation - Fractional pitch and fractional slot windings - Suppression of harmonics and tooth ripple - Armature reaction and reactance - Synchronous impedance. Synchronous Generator**:** Voltage Regulation - Phasor diagram of alternator with non-salient poles - O.C. and S.C. Characteristics-Synchronous impedance, Ampere turn, ZPF methods for finding regulation - Principle of two reaction theory and its application for the salient pole-synchronous machine analysis - Synchronizing and parallel operation.

UNIT IV – Synchronous Motor

Theory of operation - Vector diagram - Variation of current and p.f. with excitation - Hunting and its prevention - Current and power circle diagram - Predetermination of performance - Methods of starting and synchronizing - Synchronizing power, Synchronous condenser, Applications.

UNIT V – Single Phase Motors and Special Motors

Single phase induction motor – Constructional features - Double revolving field theory, Principle of operation, Equivalent circuit of single-phase induction Motor, split-phase motors, Capacitor Motors, speed torque characteristics of a split phase and capacitor motors, Compensated and uncompensated series motor, Repulsion motor and universal motor, Stepper motor, shaded pole motor, Applications.

Text Books:

1. P.S.Bimbhra, *Electrical Machinery*, Khanna Publishers 2006.
2. D.P. Kothari and I.J. Nagrath, *Electrical Machines,* Tata McGraw Hill, 4th Edition, 2010.
3. J.B Gupta, S.K. Kataria & Sons, "Theory and performance of electrical machines", 14th Edition, 2014.

Reference Books:

1. Irving L. Kosow, *Electric Machinery and Transformers,* PPH, Pearson Education 2nd Edition, 2009.
2. A.E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
3. Ashfaq Hussain "Electrical Machines" Dhanapat Rai and sons, 3rd Edition 2012.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPC504EE	**POWER ELECTRONICS**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
---	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• To be able to understand about different power switching devices. • To understand the operation of rectifiers and choppers. • To be able to understand the design and operation of inverters.	1. Understand the characteristics and performance of various power electronic devices. 2. Analyze single and three phase controlled rectifier circuits. 3. Understand choppers circuits and AC voltage controllers. 4. Understand the performance of single-phase inverter circuits. 5. Analyze the operation of three phase voltage source inverters.

UNIT I – Power Switching Devices

Power diode, characteristics, Recovery characteristics, Types of power diodes, General purpose diodes, Fast recovery diodes, their applications. Bipolar Junction Transistors (BJT), Power MOSFET, IGBT Basic structure and working, Steady state and switching characteristics, Gate drive circuits for MOSFET and IGBT, Comparison of BJT, MOSFET and IGBT, Their applications.. **Silicon Controlled Rectifier (SCR):** SCR-Static characteristics, Two transistor analogy, Protection of SCRs, Dynamic characteristics, Series and parallel operation of SCRs, SCR trigger circuits-R, RC and UJT triggering circuits, Commutation methods of SCR.

UNIT II – Thyristor Rectifiers

Single-phase half-wave, full-wave and semi controlled rectifiers with R-load and highly inductive load; Three-phase half wave, full wave and semi controlled bridge thyristor rectifier with R-load and highly inductive load; Input current wave shape and power factor.

UNIT III – DC-DC Converters

Elementary chopper with an active switch and diode concepts of duty ratio and average voltage, power circuit and operation of buck, boost and buck-boost converters in continuous conduction mode, duty ratio control of output voltage.

AC-AC Converter: Power circuit and operation of single-phase AC Voltage Controller with R & RL Load. Basic concepts of Cyclo-converter and Matrix converter.

UNIT IV – Single-phase Inverter

Power circuit and operation of single-phase voltage source inverter in square wave mode, sinusoidal pulse width modulation (Unipolar and bi-polar), relation between modulation index and output voltage. Calculation of performance parameters of inverter.

UNIT V – Three-phase Inverter

Power circuit and operation of three-phase voltage source inverter in 180^0 and 120^0 modes, Bi-polar sinusoidal pulse width modulation, relation between modulation index and output voltage. Elementary operation of CSI, Comparison of Voltage Source Inverter and Current source Inverter

Text Books:

1. M. H. Rashid, Power Electronics: Circuits, Devices and Applications, Pearson Education India, 2009.
2. N. Mohan and T. M. Undeland, Power Electronics: Converters, Applications and Design, John Wiley & Sons, 2007.
3. Dr. P.S. Bhimbra, Power Electronics, Khanna Publishers, 2009.

Reference Books:

1. BIN Wu, 'High Power Converters and AC Drives', IEEE press Wiley Interscience, 2006.
2. L. Umanand, Power Electronics: Essentials and Applications, Wiley India, 2009.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(AUTONOMOUS)
Affiliated to Osmania University, Accredited by NBA & NAAC A Grade
Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPC503EE	**ELECTRICAL MEASUREMENTS & INSTRUMENTATION**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
---	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• 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 andfrequency. • To understand the operation and applications of Ballistic Galvanometer, Flux meter and DC/ACPotentiometer. • To understand the application of CRO for measurement of Amplitude, Phase and frequency ofsinusoidal signals.	1. Learn about the different instruments that are used in Electrical & Electronics. 2. Choose the suitable instrument like Ammeter, Voltmeter for AC/DC applications. 3. Select suitable Bridge for measurement of electrical parameters and quantities. 4. Use CRO for measurement of Amplitude, Phase and frequency of sinusoidal signals. 5. Use Potentiometers for calibrating different instruments.

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 testingcompensation, Maximum demand indicator, Power factor meters, Electrical resonance and Weston type of synchro scope.

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 Halleffect 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.

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.

Text Books:

1. Shawney A.K., *Electrical and Electronics Measurements and Instruments,* Dhanpatrai & Sons, Delhi,2000.
2. Umesh Sinha, *Electrical, Electronics Measurement and Instrumentations,* Satya Prakashan, NewDelhi.

Reference Books:

1. Golding E.W., *Electrical Measurements and Measuring Instruments,* Sir Issac & Pitman & Sons Ltd.,London.
2. U.A.Bakshi, A.V.Bakshi, *Electrical and Electronic Instrumentation,* Technical publications.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPC504EE	**POWER SYSTEMS – I**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
---	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• To be able to learn and understand the conventional and renewable generating power stations and economics of generation. • To be able to understand design concepts of transmission lines and cables. • To be able understand the calculation of inductance and capacitance.	1. Acquire knowledge in different thermal and nuclear power plants. 2. Understand the need of non-conventional energy sources. 3. The students will acquire knowledge in economics of generation. 4. Acquire knowledge regarding the design concepts of transmission lines and cable. 5. Analyze the calculation of inductance and capacitance of different transmission line configurations.

UNIT I – Thermal Power Stations

Choice of site, Layout & various parts of station, Boilers, Turbines, Super Heaters, Economizers, Air pre-heaters etc. and their Pulverized fuel, Coal handling. Hydro-Electric Power plants: Estimation Hydrograph, Flow duration curve, Mass curve, Storage and poundage, Types electric plants and layouts, Prime movers for hydro- electric plants.

UNIT II – Nuclear Power Plants & Basics of NCES

Fissile materials, working principle of nuclear plants and reactor control, Shielding, Types of reactors. Non-Conventional Energy Sources – Basic principles of Wind, solar, biomass and gas turbines.

UNIT III – Economics of Power Generation

Load Curve, Load Demand and Diversified factors, Base Load and Peak load operation, Types of costs and depreciation fund calculations, Methods of power factor improvement, Economics of power factor improvement, Tariffs, Distribution: 2 wire and 3 wire distributors, Ring mains, AC distribution calculations.

UNIT IV – Over-Head Lines

Supports sag and tension calculations, Effect of wind and ice, Erection conditions, Insulators: Types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, Testing of insulators. Insulated Cables: Conductors for cables, insulating materials, Mechanical protection, Low voltage cables, grading of cables, three phase high voltage cables and Super voltage cables, Capacitance of three-core cables.

UNIT V – Inductance and Capacitance of Transmission Lines

Inductance and capacitance of overhead line conductors, Single phase and three-phase with symmetrical composite conductors, GMR and GMD Spacing, Transposition, bundled conductors, Effect of earth capacitance.

Text Books:

1. Wadhwa C.L., Electrical Power Systems, New Age International (P) Ltd., 4 th Edition, 2007.
2. Wadhwa C.L., Generation, Distribution and Utilization of Electrical Energy, New Age International (P) Ltd., 4 th Edition, 2006.
3. V.K.Mehta, Principles of Power Systems, S. Chand and Co., 2007.

Reference Books:

1. M.V. Deshpande –Elements of Electrical Power Station Design, Third Edition, Wheeler Pub. 1998
2. H.Cotton& H. Barber-The Transmission and Distribution of Electrical Energy, Third "V.K Mehta and Rohit Mehta", "Principles of Power Systems", S. Chand& Company Ltd, New Delhi, 2004.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core/Elective
SOE903EC	**Fundamentals of IOT**						**Elective**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	40	60	3

Course Objectives:

1. To introduce the fundamentals, applications and requisite infrastructure of IoT.
2. To describe Internet principles and communication technologies relevant to IoT.
3. To discuss hardware and software aspects of designing an IoT system.
4. To explain the concepts of cloud computing and data analytics.
5. To illustrate the business models and manufacturing strategies of IoT products.

Course Outcomes:

1. UnderstandthevariousapplicationsofIoTandotherenablingtechnologies.
2. Comprehend various protocols and communication technologies used in IoT.
3. Construct simple IoT systems with requisite hardware and P ython programming.
4. Understand the relevance of cloud computing and data analytics to IoT.
5. ApplythebusinessmodelofIoTfromdevelopingaprototypetolaunchingaproduct.

UNIT-I

Introduction to Internet of Things: Introduction to Internet of Things: Physical Design of IoT: Things in IoT, IoT protocols, Logical Design of IoT: IoT functional Blocks, Communication Models, APIs, IoT enabling technologies: Wireless Sensor Networks, Cloud Computing, Big Data Analytics, IoT Applications: Smart Home, Smart Cities, Smart Environment, Smart Energy, Smart Retail and logistics, Smart Agriculture and Industry, Smart Industry and smart Health

UNIT-II

Internet Principles and communication technology: Internet Communications: An Overview – IP, TCP, IP protocol Suite, UDP. IP addresses – DNS, Static and Dynamic IP addresses, MAC Addresses TCP and UDP Ports, Application Layer Protocols – HTTP, HTTPS,

UNIT-III

Prototyping and Programming: Cost Vs Ease of Production, Prototypes and Production, Open-Source Vs Closed Source. Prototyping Embedded Devices – Sensors, Actuators, Microcontrollers, SoC, Choosing a platform, Prototyping Hardware platforms – Arduino, Raspberry Pi. Prototyping the physical design – Laser Cutting, 3D printing, CNC Milling

Introduction to Python, Data Types and Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/Time Operations., Classes, Python packages for IoT, IoT Physical Devices and Endpoints: Raspberry Pi, Interfaces of Pi, Programming pi with Python - Controlling LED and LDR using Pi with python programming.

UNIT-IV

Cloud computing and Data analytics: Introduction to Cloud storage models -SAAS, PAAS, IAAS. Communication APIs, Amazon web services for IoT, Skynet IoT Messaging Platform. Introduction to Data Analytics for IoT -Apache Hadoop-Mapreduce job execution workflow.

UNIT-V

IoT Case Studies: Case studies illustrating IoT Design – Smart Lighting, Weather Monitoring, Smart Irrigation, Business model for IoT product manufacturing, IoT Startups, Mass manufacturing, Ethical issues in IoT

Suggested Readings:

1. InternetofThingsConvergingTechnologiesforsmartenvironmentsandintegratedecosystems, River Publishers. Adrian McEwen (Author), Hakim Cassimally, "Designing the Internet of Things", Wiley India Publishers.
2. Fundamentals of IoT by Dr.M.R.Arun, Notion press publisher, Revised edition

Reference Books:

1. Fundamentals of Python, Kenneth A Lambert and B.L. Juneja, Cenage Learning
2. Internet of Things (A Hands-on-Approach), Vijay Madisetti , Arshdeep Bahga, VPT Publisher, 1st Ed., 2014.
3. Fundamentals of IoT by Dr Madhura K, phoenix international publications, Edition 2023

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(AUTONOMOUS)
Affiliated to Osmania University, Accredited by NBA & NAAC A Grade
Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core/Elective
SPC511EE	**ELECTRICAL MACHINES – II LAB**						**Core**
Prerequisite	Contact Hours per Week				CIE	SIE	Credits
	L	T	D	P			
SPC501EE	**-**	**-**	**-**	**4**	**40**	**60**	**2**

Course Objectives	**Course Outcomes**
• To learn operation and performance characteristics of induction machines by conducting various experiments and tests practically. • To understand the operation and performance characteristics of synchronous machines by conducting various experiments and tests	1. Understand Performance characteristics of induction motor. 2. Understand the importance of Voltage regulation of an alternator. 3. Explain different methods used to measure the voltage regulation of an alternator.

List of Experiments:

1. No-load test, blocked rotor test and load test on 3-phase induction motor.
2. Speed control of 3-phase induction motor by Rotor resistance control
3. Power factor improvement of three phase Induction motor using capacitors.
4. Dynamic braking of 3-phase induction motor.
5. Load characteristics of induction generator.
6. Performance characteristics of single-phase induction motor.
7. Voltage regulation of an alternator by Synchronous impedance method
8. Voltage regulation of an alternator by Ampere - turn method
9. Voltage regulation of an alternator by Z.P.F. method.

10. Regulation of alternator by slip test.
11. Determination of V curves and inverted V curves of synchronous motor.
12. Power angle characteristics of a synchronous machine.

Note: Minimum Ten experiments should be conducted.

Contents Beyond the Syllabus:

- Simulation of three phase induction motor under unbalanced voltages
- Simulation of Alternator considering symmetrical faults
- Simulation of Alternator considering unsymmetrical faults

Text Books:

1. Kothari D.P. & Nagrath I.J., Electrical Machines, Tata McGraw Hill, 2017.
2. Bhimbra P.S., Generalized Theory of Electrical Machines, Khanna Publications, 2000.
3. Say MG., The Performance and Design of AC. Machines, Pitman Publication, 2002.
4. Satish Kumar Peddapelli and Sridhar Gaddam., Electrical Machines-A Practical Approach, De Gruyter Publisher, Germany, 2020.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(AUTONOMOUS)
Affiliated to Osmania University, Accredited by NBA & NAAC A Grade
Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core/Elective
SPC512EE	**POWER ELECTRONICS LAB**						**Core**
Prerequisite	Contact Hours per Week				CIE	SIE	Credits
	L	T	D	P			
SPC502EE	**-**	**-**	**-**	**3**	**40**	**60**	**1.5**

Course Objectives	**Course Outcomes**
• 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 principal operation, characteristics and applications	1. Able to understand speed control of motors by using controlled rectifier. 2. Able to understand the applications of cyclo-converters 3. Able to simulate different power electronic devices using software.

List of Experiments:

1. R, RC, UJT Trigger Circuits for SCR's.
2. Design and fabrication of trigger circuits for single phase half 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 10 experiments are to be conducted.

Contents Beyond the Syllabus:

- Simulation of three phase fully controlled bridge rectifier with R, RL and RLE Loads using MATLAB/Simulink.
- Simulation of sinusoidal pulse width modulation based three phase inverter using MATLAB/Simulink.
- Simulation of bridge rectifier-based DC motor speed control using MATLAB/Simulink.

Text Books:
1. Bimbra.P.S., Power Electronics, Khanna Publications, 2006.
2. Rashid M.H., Power Electronics Circuits, Devices and Applications, PHI, 2004.
3. Singh. M.D., Khanchandani K.B., Power Electronics, TMH, 14th reprint, 1999.
4. Mohan, Undeland and Robbins, Power Electronic Converters. Applications and Design, John Wiley & Sons, 3rd Edition, 2007.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(AUTONOMOUS)
Affiliated to Osmania University, Accredited by NBA & NAAC A Grade
Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core/Elective
SPC513EE	**MEASUREMENTS & INSTRUMENTATION LAB**						**Core**
Prerequisite	Contact Hours per Week				CIE	SIE	Credits
	L	T	D	P			
SPC503EE	**-**	**-**	**-**	**3**	**40**	**60**	**1.5**

Course Objectives	**Course Outcomes**
• 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	1. Measure the inductance, capacitance and resistance using various bridges. 2. Measure resistance and calibrate ammeter, voltmeters and wattmeter using A.C. and D.C. potentiometers. 3. Have hands on experience on the operation of CRO. 4. Validating the given power factor meter. 5. Validating and determining the energy bill of given energy meter.

List of Experiments:

1. Measurement of low resistance by Kelvin's Double Bridge.
2. Calibration of single-phase energy meter.
3. Measurement of inductance by Maxwell's bridge
4. Measurement of inductance by Anderson's bridge.
5. Measurement of capacitance by Desauty's and Schering's bridges.
6. Measurement of Iron losses by Lloyd, Fishers magnetic square.
7. Measurement of Resistance and calibration of Ammeter using D.C. potentiometer.
8. Calibration of voltmeter and wattmeter using D.C. potentiometer.
9. Measurement of unknown voltage and impedance using A.C. potentiometer.

10. Calculation of iron losses using B-H curve with oscilloscope.
11. Measurement of relative permittivity (Ɛr) of a dielectric medium using Schering bridge.
12. Measurement of frequency of unknown sinusoidal signal with CRO.
13. Measurement of phase and amplitude using CRO.
14. Calibration of given power factor meter using calibrated voltmeter, ammeter and wattmeter.

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

Contents Beyond the Syllabus:

- Simulation of Kelvin Double Bridge using MATLAB/Simulink.
- Simulation of Maxwell and Anderson Bridges using MATLAB/Simulink.
- Simulation of Desauty and Schering Bridges using MATLAB/Simulink

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

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(AUTONOMOUS)
Affiliated to Osmania University, Accredited by NBA & NAAC A Grade
Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPW511EE	**INDUSTRIAL VISIT**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	**1 or 2 Days**	**50**	**-**	1

Course Objectives	**Course Outcomes**
• To give an experience to the students by taking them to the respective place. • To give an opportunity to integrate different aspects of learning with reference to real life problems. • To enhance the confidence of the students while communicating with industry engineers and give an opportunity for useful interaction with them and familiarize with work culture and ethics of the industry.	1. To create practical awareness. 2. To enrich students' knowledge and wisdom. 3. Creating practical exposure by visiting any respective place. 4. Learn about how to make a technical report. 5. Understand the difference between theory and practical things.

Industrial visit is an essential part in curriculum to enrich students' knowledge practically. By taking them to particular Power Plant/Industry/National Laboratory for a period of one or two days. This primary objective of this visit is to create practical awareness about whatever they have learned theoretically. This visit can be done during the time of V Semester. One faculty member will act as an internal guide for each batch to monitor the entire visit.

After the completion of the visit, students will submit a brief technical report on the visit about what they have experienced and present the work through a seminar talk to be organized by the department. Award of sessional are to be based on the performance of the student at the work place to be judged by allocated faculties and internal guide followed by presentation before the committee constituted by the department (Total 50 Marks). One faculty member will co-ordinate the overall activity of this Industrial Visit.

Batch: 2021 – 25
VI Semester Detailed Syllabus

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SHS601BM	**FINANCE AND ACCOUNTING**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
---	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• To provide basic understanding of Financial and Accounting aspects of a business. • To provide understanding of financial statements and system. • To provide inputs necessary to evaluate the viability of projects and to provide the skills necessary to analyze the financial statements	1. Evaluate the financial performance of the business unit. 2. Take decisions on selection of projects. 3. Take decisions on procurement of finances. 4. Analyze the liquidity, solvency and profitability of the business unit. 5. Evaluate the overall financial functioning of an enterprise.

UNIT I – Basics of Accounting

Financial Accounting–Definition- Accounting Cycle – Journal - Ledger and Trial Balance-Cash Book-Bank Reconciliation Statement (including Problems)

UNIT II – Final Accounts

Trading Account-Concept of Gross Profit- Profit and Loss Account-Concept of Net ProfitBalance Sheet (including problems with minor adjustments)

UNIT III – Financial System and Markets

Financial System-Components-Role-Considerations of the investors and issuers- Role of Financial Intermediaries. Financial Markets-Players- Regulators and instruments – Money Markets Credit Market- Capital Market (Basics only)

UNIT IV – Basics of Capital Budgeting Techniques

Time Value of money- Compounding- Discounting- Future Value of single and multiple flows- Present Value of single and multiple Flows- Present Value of annuities Financial Appraisal of Projects– Payback Period, ARR- NPV, Benefit Cost Ratio, IRR (simple ratios).

UNIT V – Financial Statement Analysis

Financial Statement Analysis- Importance-Users-Ratio Analysis-liquidity, solvency, turnover and profitability ratios.

Text Books:

1. Satyanarayana. S.V. and Satish. D., Finance and Accounting for Engineering, Pearson Education.
2. Rajasekharan, Financial Accounting, Pearson Education.

Reference Books:

1. Sharma.S.K. and Rachan Sareen, Financial Management, Sultan Chand.
2. Jonathan Berk, Fundamentals of Corporate Finance, Pearson Education.
3. Sharan, Fundamentals of Financial Management, Pearson Education.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(AUTONOMOUS)
Affiliated to Osmania University, Accredited by NBA & NAAC A Grade
Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPC601EE	**POWER SYSTEMS – II**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
SPC504EE	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• 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. • To be able to know about voltage control, reflection, refracted and incident waves in transmission line.	1. Acquire modeling of different short, medium and long transmission lines 2. Understand the impact of symmetrical faults on overhead transmission lines and calculation of fault currents and their significance. 3. Understand the impact of unsymmetrical faults on overhead transmission lines and calculation of fault currents and their significance. 4. Explain the reasons for voltage variation, importance of maintaining constant voltage in power system and different voltage control methods. 5. 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 - Reactances 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 overhead lines - Junction of three lines of different natural impedances- Bewley Lattice diagram.

Text Books:

1. CL Wadhwa – Electrical Power Systems, New Age International, 4th Edition, 2018.
2. Nagarath and Kothari – Modern Power System Analysis, Tata McGraw Hill, 4th Edition, 2012.

Reference Books:

1. Grainger and Stevenson – Power System Analysis, Tata McGraw Hill, 4th Edition, 2003.
2. V. K. Mehta – Principles of Power Systems, S. Chand and Co., 2007.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPC602EC	**MICROPROCESSORS AND MICROCONTROLLERS**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
----	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• To be able to understand in details about 8086 microprocessor architecture, programming and interfacing. • To be able to understand about 8051 microcontroller architecture, and programming • To be able to know the differences between Microprocessors and Microcontrollers.	1. Acquire the knowledge of architecture of 8086 Microprocessor. 2. Understand how to write assembly language programming of 8086 Microprocessor. 3. Understand how to interface 8086 to different devices. 4. 1. Acquire the knowledge of architecture of 8051 Microcontroller. 5. Understand how to write assembly language programming of 8051 Microcontroller.

UNIT I – Introduction to Microprocessor

Architecture of 8086 – Segmented memory, Addressing modes, Instruction set, Minimum and maximum mode operations.

UNIT II – Introduction to Programming of 8086

Assembly language programming, Assembler directives, Simple programs using assembler, Strings, Procedures, Macros timing.

UNIT III – Interfacing to Microprocessor

Memory and I/O interfacing, A/D and D/A interfacing, 8255(PPI), Programmable Internal Timer (8253), Keyboard and display interlace, Interrupts of 8086.

UNIT IV – Microcontroller Architecture

Types of Micro Controllers, 8051 MC – Architecture input/output pins, Ports and circuits, Internal and external memories, counters and timers, serial data input/output, Interrupts & timers.

UNIT V – Introduction to Programming of 8051

Basic Assembly language programming, instruction cycle, Addressing modes, 8051 instruction set, Classification of instructions, Simple programs.

Text Books:

1. Krishna Kant – microprocessors and Microcontrollers – Architecture, Programming and System Design 8085, 8086, 8051, 8096, Prentice-Hall india-2007.
2. Douglas, V. Hall microprocessors and Interfacing- Tata McGraw Hill-Revised 2nd Edition, 2017.

Reference Books:

3. Kenneth. J. Ayala – The 8051 Microcontroller Architecture Programming and Applications, Thomson publishers, 2nd Edition, 2007.
4. Waiter A. Triebel & Avtar Singh – The 8088 and 8086 Microprocessor – Pearson Publishers, 4th Edition, 2007.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPC603EE	**DIGITAL SIGNAL PROCESSING**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
SPC303EE	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• To gain knowledge about discrete time signal and systems; their representation, operations and properties. • To understand the importance of frequency domain representation of discrete time signals and calculating DTFT, DFT and FFT. • To learn to represent discrete time signals and systems in Z-domain and finding solution of difference equations using z-transform. • To design IIR and FIR filters. • To familiarize with the digital signal processor TMS320C5X	1. Produce discrete time signals and analyze them and determine discrete time system output for the given discrete time input signals. 2. Determine frequency domain representation DTFT, DFT and FFT. 3. Use z-transforms effectively in the analysis and solutions of discrete time systems. 4. Design IIR and FIR filters. 5. Explain the architecture, memory and peripherals of Digital Signal Processor.

UNIT I – Introduction to Digital Signal Processing

Discrete time signals & sequences - Linear shift Invariant systems - Stability and causality- Linear constant coefficient difference equations - Frequency domain representation of discrete time signals and systems.

UNIT II – Discrete Fourier Series

Properties of Discrete Fourier Series - DFS representation of periodic sequences - Discrete Fourier Transforms- Properties of DFT - Linear convolution of sequences using DFT - Computation of DFT- Fast Fourier Transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms inverse FFT.

UNIT III – Applications of Z-Transforms

Solution of difference equations of digital filters - System function - Stability criterion - Frequency response of stable systems - Realization of digital filters - Direct, Canonic, Cascade & Parallel forms.

UNIT IV – IIR Digital Filters

Analog filter approximations - Butterworth and Chebyshev - Design of IIR Digital filters from analog filters - Bilinear transformation method - Step & Impulse invariance techniques - Spectral Transformations.

FIR Digital Filters: Characteristics of FIR Digital Filters - Frequency response - Design of FIR filters using Window Techniques.

UNIT V – Introduction to digital signal processors

TMS320xxx architecture – CALU, ARAU, PLU, MMR, on chip memory, on chip peripherals, Digital signal processing applications.

Text Books:
1. Proakis & Manolakis, "Digital Signal Processing Principles", P Pub. 1994.
2. Sahivahanam, Valtavaraj & Gnanapariya, "Digital Sign Processing", TMGH Pub. 2001.

Reference Books:
1. Oppenheim & Sehaffter, "Digital Signal Processing", PHI Pub.
2. S.K. Mitra, "Digital Signal Processing", TMH, 1996.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPE601EE	**LINEAR INTEGRATED CIRCUITS**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
---	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• To familiarize and able to understand Op-amps. • To understand the different linear and non-linear applications of op-amp. • To understand the voltage regulators and active filters by using op-amps.	1. Understand the basics and design of operational amplifier. 2. Design different circuits using op-amps. 3. Generate different waveforms using op-amps. 4. Ability to design and use voltage regulators. 5. Design of active filter and its applications.

UNIT I – Operational Amplifiers

Characteristics, Open Loop Voltage gain, Output Impedance, Input Impedance, Common Mode Rejection Ratio – Offset balancing techniques - Slew rate, Frequency response – Basic applications- Inverter summer, Analog integrator, Differentiator, Current to Voltage converter, Voltage to Current Converter, Voltage Follower, A.C Amplifier.

UNIT II – Circuits using Op–Amp

Circuits using Op–Amp: Voltage Limiter, Clipper and damper, Precision rectifier – full wave and half wave, Peak detector, Comparator, Zero crossing detector, Schmitt trigger, Monostable, astable and bistable multivibrators, Multiplier, Divider, Difference amplifier, Instrumentation amplifier.

UNIT III – Waveform Generation using Op-amps

Sine, Square, Triangular and Quadrature oscillators, 555 timer- Functional diagram, Operation as monostable and astable, Voltage to frequency converter using 555, 565.

UNIT IV – Voltage Regulators using Op-amp

Series voltage regulators _ Shunt regulators using Op- amp – Switching regulators using Op-amps, Buck, Boost, Buck- boost regulators - Regulators using IC 723 – Dual voltage regulator – Fixed voltage regulators – Current sensing and current fold back protection.

UNIT V – RC Active Filters

Butterworth – First order – Second order for low pass – High pass – band pass – Band reject – Notch – State variable filter – Switched capacitor filter – Universal filter – Power amplifiers – Power boosters - Monolithic power amplifiers features.

Text Books:

1. Gayakwad W.A., Op-Amps and Linear Integrated Circuits, 4 th Edition, Prentice Hall of India,2015.
2. Malvino Albert Paul, Electronic Principles, 6 th Edition, Tata McGraw Hill, 1999N. C. Jagan and C. Lakshminarayan, Network Theory, 2nd Edition, Anshan, 2005

Reference Books:

1. Roy Choudhury, Shail Jam, Linear Integrated Circuits, New Age International, 2 nd Edition,2003.
2. William D. Stanley, OP Amps with Linear Integrated Circuits, Pearson, 2000.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(AUTONOMOUS)
Affiliated to Osmania University, Accredited by NBA & NAAC A Grade
Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPE602EE	**DIGITAL CONTROL SYSTEMS**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
SPC402EE	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• To impart knowledge in the significance and features of design of discrete- time control system. • To review on the different transform techniques for digital control system design. • To impart knowledge on the techniques to analyze the system performance in the discrete-time domain. • To impart knowledge in discrete state space controller design.	1. Understand the various issues related to digital control systems such as effects of sampling and quantization, discrete time signals and models. 2. Represent a discrete-time control system using state space technique. 3. Analyze stability of open loop and closed loop discrete-time systems. 4. Design and analyze digital controllers. 5. Design state feedback and output feedback controllers.

UNIT I – Discrete Representation of Continuous Systems

Basics of digital control systems, Discrete representation of continuous systems, Sample and hold circuit, Mathematical Modeling of sample and hold circuit, Effects of Sampling and Quantization, Choice of sampling frequency. ZOH equivalent, Introduction to first-order-hold equivalent, transformation between s-plane, z-plane and w-plane, z-Domain description of sampled continuous-time systems. Controller design Controller Design using transform techniques: Root locus and frequency domain analysis compensator design.

UNIT II – State space theory Control system analysis using state variable method

Vector and matrices, state-variable representation, conversion of state variable to transfer function and vice versa, conversion of transfer function to canonical state variable models, system realization, solution of state equations. Solution of discrete-time state equation, Computational methods.

UNIT III –State Space Approach for Discrete Time Systems

State space models of discrete systems, State space analysis, Lyapunov, Stability, Controllability, reach-ability, Reconstructibility and observability analysis. Effect of pole zero cancellation on the controllability & observability

UNIT IV – Design of Digital Control System

Design of Discrete PID Controller, Design of discrete state feedback controller, Design of set point tracker, Design of Discrete Observer for LTI System, Design of Discrete compensator.

UNIT V – Discrete Output Feedback Control

Design of discrete output feedback control, Fast output sampling (FOS) and periodic output feedback controller design for discrete time systems.

Text Books:

1. K. Ogata, Discrete Time Control Systems, Prentice Hall India, 2nd edition, 2005.
2. M. Gopal, Digital Control and State Variable Methods, Tata McGraw Hill, 4th edition. 2017.
3. R. Isermann, Digital Control Systems Vol 1&2, Springer-Verlag, 1991.

Reference Books:

1. G. F. Franklin, J. D. Powell and M. L. Workman, "Digital Control of Dynamic Systems", Addison Wesley, 1998.
2. B.C. Kuo, "Digital Control System", Holt, Rinehart and Winston, 1980.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPE603EE	**SPECIAL ELECTRICAL MACHINES**						**Elective**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
SPC501EE	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• To explain theory of operation and control of switched reluctance motor.	1. Explain theory of operation and control of switched reluctance motor.
• To explain the performance and control of stepper motors, and their applications.	2. Explain the performance and control of stepper motors, and their applications.
• To describe the operation and characteristics of permanent magnet dc motor.	3. Describe the operation and characteristics of permanent magnet dc motor.
• To distinguish between brush dc motor and brush less dc motor.	4. Distinguish between brush dc motor and brush less dc motor.
• To explain the theory of travelling magnetic field and applications of linear motors.	5. Explain the theory of travelling magnetic field and applications of linear motors.

UNIT I - Stepper Motors

Constructional features, Principle of operation, Variable Reluctance (VR) stepping motor Single Stack, Multi-Stack, Permanent Magnet Step motor, Hybrid Step Motor, Torque Equation Open Loop Drive, Open loop and closed loop control of Step Motor, Applications.

UNIT II – Switched Reluctance Motors

Constructional features, Principle of Operation, Torque equation, Torque speed characteristics, Power Converter for SR Motor-Asymmetrical converter, DC Split converter, Control of SRM, Rotor Position sensors, Current Controllers, Applications.

UNIT III – Permanent Magnet Synchronous Motor

Constructional features, Principle of operation, Permanent magnets and their characteristics, Synchronous Machine with PM's-Machine Configurations-SPM, SIPM, IPM and Interior PM with circumferential, Flux Density Distribution, line-Start PM Synchronous Machines, Types of PM Synchronous Machines, Sensorless control, Applications.

UNIT IV – Brushless DC Motor

Construction, Principle of Drive operation with inverter, Torque speed Characteristics, Closed loop control, Sensor less control, Applications.

UNIT V – Linear Induction Motors and Linear Synchronous Motors

Linear induction motor, Construction details, LIM Equivalent Circuit, Linear Synchronous Motor: Principle and Types of LSM, LSM Control, Applications.

Text Books:

1. R. Krishnan, Electric Motor Drives, Pearson Education, 2007.
2. B.K. Bose, Modern Power Electronics and AC Drives, PHI, 2005.

Reference Books:

1. Venkataratnam, Special electrical Machines, University Press, 2008.
2. E.G. Janardanan, Special Electrical Machines, PHI, 2014.
3. T.J.E. Miller, Brushless Permanent Magnet and Reluctance Motor Drive, Clarendon Press, Oxford, 1989.

.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPE604EE	**HIGH VOLTAGE ENGINEERING**						**Elective**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
---	3	-	-	-	**40**	**60**	3

Course Objectives	**Course Outcomes**
• To understand the concepts of Conduction and Break down of Gaseous Insulating Materials, Liquid and Solid dielectrics. • To make the students understand the Generation, Measurement and Testing of High Voltage DC, AC & impulse Currents • Conduct high voltage test of materials and apparatus	1. Explain the fundamentals of conduction and breakdown in gaseous insulating materials. 2. Describing the basics about conduction and breakdown in liquid and solid dielectrics. 3. Able to design the circuits used in high voltage AC, DC generation. 4. Design the circuits used in measurement and Testing of high voltage and currents. 5. Able to understand the significance of standard impulse wave shapes and radio interference measurement.

UNIT I - Conduction and Breakdown of Gaseous Insulating Materials:

Ionization 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:

Classification of Liquid Dielectrics-Pure Liquids- Commercial Liquids-Various mechanisms of breakdown in liquid dielectrics - Liquid dielectrics used in practice- Various breakdown processes - Breakdown in solid dielectrics- Solid dielectrics used in practice.

UNIT III – Generation of High Voltages and Currents:

Generation of high D.C voltages using voltage multiplier circuits - Van de Graff generator. Generation of high alternating voltages using cascade transformers- Production of high frequency A.C 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 D.C voltage measurement techniques - Methods of measurement for power frequency A.C voltages - Sphere gap measurement technique - Potential divider or impulse voltage measurements -Measurement of high D.C, A.C and Impulse currents - Use of CRC for impulse voltage and current measurements.

UNIT V – High Voltage Testing:

Tests on insulators - testing on bushings - Testing of isolators and circuit breakers - Cable testing of transformers, Surge diverter testing - Radio interference measurement.

Text Books:

1. M.S. Naidu and V. Kamaraju, *High Voltage Engineering,* Tata McGraw Hill, 1982.
2. E. Kuffel and M. Abdullah, *High Voltage Engineering,* Pergamon Press, 1970.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(AUTONOMOUS)
Affiliated to Osmania University, Accredited by NBA & NAAC A Grade
Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core/Elective
SPC611EE	**DIGITAL SIGNAL PROCESSING LAB**						**Core**
Prerequisite	Contact Hours per Week				CIE	SIE	Credits
	L	T	D	P			
SPC603EE	**-**	**-**	**-**	**3**	**40**	**60**	**1.5**

Course Objectives	**Course Outcomes**
• To develop MATLAB code to generate different discrete signals and perform basic operations. • To develop MATLAB code to convert continuous to discrete by DFT and FFT computations, to obtain Convolution of sequences and sampling theorem. • To develop MATLAB code to design FIR and IIR filters. • To use DSP kit and CCS, write code to obtain convolution of sequences, design of FIR and IIR filters, compute DFT and FFT algorithms, Impulse response and generate basic waves.	1. Compute and write MATLAB code to generate basic waves and perform basic operations on them. 2. Compute and write MATLAB code to apply sampling theorem, to obtain convolution and compute DFT and FFT. 3. Compute and write MATLAB code to design FIR and IIR filters. 4. Compute and write MATLAB code to obtain convolution of sequences, Design of FIR and IIR filters, 5. Compute DFT and FFT algorithms, Impulse response and generate basic waves using DSP kit

List of Experiments:

1. Generation of different discrete signal sequences and Waveforms.
2. Basic Operations on Discrete Time Signals
3. DFT Computation and FFT Algorithms.
4. Verification of Convolution Theorem.
5. Verification of sampling theorem.
6. Design of Butterworth and Chebyshev LP and HP filters.
7. Design of LPF using Rectangular, Hamming and Kaiser Windows.
8. To perform linear and circular convolution for the given sequences.

9. Design and implementation of FIR and IIR filter.
10. Computation of DFT using DIT and DIF algorithm.
11. Generation of basic waves.
12. Impulse response.

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

Contents Beyond the Syllabus:

- Calculation of total harmonic distortion (THD) of a given waveform.

Text Books:
1. Proakis & Manolakis, "Digital Signal Processing Principles", P Pub. 1994.
2. Sahivahanam, Valtavaraj & Gnanapariya, "Digital Sign Processing", TMGH Pub. 2001.

Reference Books:
1. Oppenheim & Sehaffter, "Digital Signal Processing", PHI Pub.
2. S.K. Mitra, "Digital Signal Processing", TMH, 1996.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(AUTONOMOUS)
Affiliated to Osmania University, Accredited by NBA & NAAC A Grade
Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core/Elective
SPC612EC	**MICROPROCESSORS AND MICROCONTROLLERS LAB**						**Core**
Prerequisite	Contact Hours per Week				CIE	SIE	Credits
	L	T	D	P			
SPC602EC	**-**	**-**	**-**	**4**	**40**	**60**	**2**

Course Objectives	**Course Outcomes**
• To introduce the architecture of 8, 16, and 32-bit microprocessor and microcontroller • To impart microcontroller programming skills in students • To familiarize the students with data transfer and interrupt services	1. Apply the design concepts for development of a process and interpret data. 2. Demonstrate knowledge of programming environment, compiling, debugging, linking and executing variety of programs 3. Demonstrate documentation and presentation of the algorithms/flowcharts /programs in a record form. 4. Validate the process using known input-output parameters.

For 8086
Section 1: Using MASM/TASM

1. Programs for signed/unsigned multiplication and division
2. Programs for finding average of N 16-bit numbers
3. Programs for finding the largest and smallest number in an array
4. Programs for code conversion like BCD numbers to 7-segment
5. Programs for compute factorial of a positive integer number

Section 2: Using 8086 Kit (Interfacing)

1. 8279 – Keyboard Display: Write a small program to display a string of characters.
2. 8255 – PPI: Write ALP to generate triangular wave using DAC
3. 8253 – Timer/Counter: Application of different modes

4. 8251- USART: Write a program in ALP to establish communication between two processors
5. Traffic Signal Controller

For 8051:

Section 3: Using 8051 Kit (Sample Programs)

1. Data Transfer – Block move, Exchange, sorting, Finding largest element in an array.
2. Arithmetic Instructions: Multibyte operations
3. Boolean & Logical Instructions (Bit manipulations)
4. Programs to generate delay, programs using serial port and on-Chip timer/Counter.
5. Use of JUMP and CALL instructions.

Section 4: Program Development using 'C' cross compiler for 8051

1. Square Wave Generation using timers
2. Interfacing of keyboard and 7-segment display module
3. ADC interfacing for temperature monitoring
4. DAC interfacing for Generation of Sinusoidal wave
5. Stepper motor control (clockwise, anticlockwise and in precise angles)

Note: At least five experiments for 8086 and at least five experiments for 8051.

Contents Beyond the Syllabus:

- Write an ALP to find LCM of given two numbers using 8086.
- Write an ALP to find GCD of given two numbers using 8086.
- Write an ALP to find the power of given number using 8086.
- Demonstrating the differences between microprocessors and microcontrollers.

Text Books:
1. Douglas, V. Hall microprocessors and Interfacing- Tata McGraw Hill-Revised 2nd Edition, 2017.
2. Krishna Kant – microprocessors and Microcontrollers – Architecture, Programming and System Design 8085, 8086, 8051, 8096, Prentice-Hall india-2007.

Reference Books:
1. Kenneth. J. Ayala – The 8051 Microcontroller Architecture Programming and Applications, Thomson publishers, 2nd Edition, 2007.
2. Waiter A. Triebel & Avtar Singh – The 8088 and 8086 Microprocessor – Pearson Publishers, 4th Edition, 2007.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPW611EE	**MINI PROJECT**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
---	-	-	-	**1 or 2 Days**	**50**	**-**	1

Course Objectives	**Course Outcomes**
• To enhance practical and professional skills and familiarize tools and techniques of systematic literature survey and documentation • To expose the students to industry practices and team work. • To encourage students to work with innovative and entrepreneurial ideas	1. Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems. 2. Evaluate different solutions based on economic and technical feasibility. 3. Effectively plan a project and confidently perform all aspects of project management. 4. Demonstrate effective implementation, written, presentation and oral communication skills

The students are required to carry out mini projects in any of the areas such as Power Electronics, Power Systems, Electrical Machines, Microprocessors, Microcontrollers, IoT applications, Smart Grid, Renewable Energy, Micro Grid, Electric Vehicles etc.

Problems Statements are suggested to be taken from Smart India Hackathon (SIH) Portal invited from the Ministries / PSUs / MNCs / NGOs to be worked out through.

The project could be classified as hardware, software, modeling, simulation etc. The project should involve one or many elements of techniques such as analysis, design, and synthesis. The department will appoint a project coordinator who will coordinate the following:

1. Grouping of students (maximum of 3 students in a group)
2. Allotment of projects and project guides.
3. All projects allotment is to be completed by the 4th week of the semester so that the students get sufficient time for completion of the project.
4. Disseminate guidelines given by monitoring committee comprising of senior faculty members to the students and their guides.

- Sessional marks are to be awarded by the monitoring committee.
- Common norms will be established for the final presentation and documentation of the project report by the respective departments.
- Students are required to submit a presentation and report on the mini project at the end of the semester.

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

Affiliated to Osmania University, Accredited by NBA & NAAC A Grade

Chapel Road, Abids, Hyderabad – 500001, Telangana

Course Code	Course Title						Core / Elective
SPW612EE	**INTERNSHIP – 2**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
---	-	-	-	**Four to Six Months**	**50**	**-**	1

Course Objectives	**Course Outcomes**
• To give an experience to the students in solving real life practical problems with all its constraints. • To give an opportunity to integrate different aspects of learning with reference to real life problems. • To enhance the confidence of the students while communicating with industry engineers and give an opportunity for useful interaction with them and familiarize with work culture and ethics of the industry.	1. Design/develop a small and simple product in hardware or software. 2. Complete the task or realize a pre-specified target, with limited scope, rather than taking up a complex task and leave it. 3. Learn to find alternate viable solutions for a given problem and evaluate these alternatives with reference to pre-specified criteria. 4. Implement the selected solution and document the same. 5. Able to write a technical report and present it to appropriate audience.

Summer Internship is introduced as part of the curriculum for encouraging students to work on problems of interest to industries. A batch of two or three students will be attached to a person from an Electronics Industry / R & D Organization / National Laboratory for a period of two to four weeks. This will be during the summer vacation following the completion of the VI Semester course. One faculty member will act as an internal guide for each batch to monitor the progress and interacts with the Industry guide.

After the completion of the summer internship, students will submit a brief technical report on the internship executed and present the work through a seminar talk to be organized by the department. Award of sessional are to be based on the performance of the student at the work place to be judged by industry guide and internal guide (25 Marks) followed by presentation before the committee constituted by the department (25 Marks). One faculty member will co-ordinate the overall activity of Summer Internship.

***Students have to undergo summer internship of Two to Four Weeks duration at the end of VI semester and One Credit will be awarded in the VII Semester after evaluation.**

FACULTY OF ENGINEERING

Scheme of Instructions & Examination

For

Four Year Degree Programme of

Bachelor of Engineering (B.E)
in
Electrical and Electronics Engineering

(Accredited by NBA)

(With effect from Academic Year 2022-23)

Empower Women - Impact the World

Issued by **Dean, Academics**

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)

(Affiliated to Osmania University)

(Accredited by NAAC with 'A' Grade)

Abids, Hyderabad - 500 001, Telangana

Abbreviation	Meaning
HS	Humanities, Social Sciences and Management
BS	Basic Sciences including Mathematics, Physics and Chemistry
ES	Engineering Sciences including Workshop, Drawing, Basic Electrical / Electronics
PC	Professional Core Courses
PE	Professional Elective Courses
OE	Open Elective Courses
PW	Project Work
MC	Mandatory Courses
AC	Audit Courses
PY	Philosophy
EC	Electronics and Communication Engineering.
CE	Civil Engineering,
MP	Mechanical / Production Engineering
IT	Information Technology
CS	Computer Science Engineering
EE	Electrical and Electronics Engineering
CM	Computer Engineering
AD	Artificial Intelligence and Data Science
L	Lecture
T	Tutorial
P	Practical
G	Grade
D	Drawing
CIE	Continuous Internal Evaluation
SEE	Semester End Evaluation
	Each contact hour is a clock hour
	The duration of the Practical class is two hours; however, it can be extended wherever necessary, to enable the student to complete the experiment.

Keywords	Definition
HS	Courses offered in the area of humanities and social sciences like communication & managerial skills.
BS	Courses of foundational nature in the areas of Mathematics, Physics, Chemistry, Biology etc.
ES	Courses belonging to the basic evolutionary aspects of a Particular Engineering from all other branches of Engineering.
PC	Courses that are fundamental and compulsory constituents of the respective engineering discipline.
PE	Courses those are discipline-specific to stream line the graduates to different emerging fields as per their choice.
OE	Courses of interdisciplinary nature offered to all the students of various programmes across the Institute.
PW	To make a perfect, Hands-on experienced Professionals.
MC	Compulsory non-credit courses that a student need to study to become a responsible citizen, as per supreme court guidelines.
AC	An audit course (Non-credit) facilitates the student to get awareness of different issues which enhance their skill sets to improve their employability.

III Semester

Sl. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs per Week	CIE	SEE	See Duration in Hours	
Theory Courses										
1	SBS301MT	Probability Theory and Stochastic Process	3	1	-	4	40	60	3	4
2	SPC301EE	Electrical Circuit Analysis	3	-	-	3	40	60	3	3
3	SPC302EE	Electromagnetic Fields	3	-	-	3	40	60	3	3
4	SPC303EE	Signals and Systems Analysis	3	-	-	3	40	60	3	3
5	SPC304EC	Analog Electronics	3	-	-	3	40	60	3	3
6	SAC904CS	Fundamentals of Computer Science	3	-	-	3	-	-	-	-
Practical/Laboratory Courses										
7	SES311CS	Data Structures Lab	2	-	2	4	40	60	3	3
8	SPC311EE	Circuits & Simulation Lab	-	-	4	4	40	60	3	2
9	SPC312EC	Analog Electronics Lab	-	-	3	3	40	60	3	1.5
		TOTAL	**20**	**1**	**9**	**30**	**320**	**480**	**24**	**22.5**

IV Semester

Theory Courses										
1	SHS401EG	Effective Technical Communication	3	-	-	3	40	60	3	3
2	SPC401EE	Electrical Machines – I	3	-	-	3	40	60	3	3
3	SPC402EE	Control Systems	3	-	-	3	40	60	3	3
4	SPC403EC	Switching Theory and Logic Design	3	-	-	3	40	60	3	3
5	SOE4xxxx	Open Elective – I	3	-	-	3	40	60	3	3
Practical/Laboratory Courses										
6	SPC411EE	Electrical Machines - I Lab	-	-	4	4	40	60	3	2
7	SPC412EE	Control Systems Lab	-	-	3	3	40	60	3	1.5
8	SPC413EC	Switching Theory and Logic Design Lab	-	-	3	3	40	60	3	1.5
9	SPW511EE	Internship- 1	The students have to undergo an Internship of 2 week duration after IV- Semester SEE				50	-	-	1
		TOTAL	**15**	**-**	**10**	**25**	**370**	**480**	**24**	**21**

III Semester Detailed Syllabus

Course Code	Course Title						Core / Elective
SPC303MT	Probability Theory and Stochastic Process						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	1	–	–	40	60	4

Course Objectives:

1. To familiarize the fundamentals of probability and random variables.
2. To give insights of the distribution functions of random variables.
3. To introduce stochastic processes and their temporal characteristics.
4. To define spectral characteristics of stochastic processes.
5. To comprehend the concepts of statistics and linear regression.

Course Outcomes: On successful completion of the course, the students will be able to

1. Understand and use the concepts of probability and random variables.
2. Choose appropriate distribution functions for determination of probabilistic characteristics.
3. Apply stochastic processes and use their temporal characteristics.
4. Explain and apply spectral characteristics of stochastic processes.
5. Illustrate the concepts of statistics and linear regression.

UNIT-I: Probability and Random Variable

Probability: Concepts of Probability, Events, Conditional Probability, Bernoulli Trials, Bernoulli's Theorem, Total Probability, Bayes' Theorem.

Random Variable: Definition and types - Discrete, Continuous and Mixed Random Variables, Probability Mass Function (PMF) /Probability Density Function (pdf), Cumulative Distribution Function (CDF), Expectation, Moments.

UNIT-II: Distribution Functions of Single Random Variable

Binomial, Poisson, Uniform, Gaussian, Rayleigh –Properties, Mean, Variance, Moment Generating Function, Characteristic Function.

Two Random Variables and operations: Bi-variate Distributions, One Function of Two Random Variables, Joint Distribution and Density Function and their properties, Joint Moments, Joint Characteristic Functions, Conditional Distributions, Central Limit Theorem: statement and applications.

UNIT-III: Stochastic Processes – Temporal Characteristics

Concepts of stationarity-First and Second order- wide sense stationary and strict sense stationary, statistical independence, Time averages and ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Definition and Properties - Autocorrelation Function, Cross-Correlation Function, Covariance.

Linear System Response of Mean and Mean-squared Value.

Qualitative study of Gaussian and Poisson Random Processes.

UNIT-IV: Stochastic Processes-Spectral Characteristics

Power Spectral Density and its properties; Relationship - Power Spectrum and Autocorrelation Function; Cross-Power Spectrum and Cross-Correlation Function; Response to linear systems and stochastic inputs.

UNIT-V: Statistics & Linear Regression

Measures of Central Tendency, Moments. Curve fitting using Method of Least Squares: Fitting of straight line, second-degree parabolas, and power curves, Correlation, Rank correlation and Linear Regression.

Reference Books:

1. Peyton Z. Peebles, Probability, Random Variables & Random Signal Principles, 4th edition, Tata McGraw Hill, 2001.
2. Athanasius Papoulis and S. Unnikrishna Pillai, Probability, Random Variables and Stochastic Processes, 4th edition, McGraw Hill, 2006.
3. P. Ramesh Babu, Probability Theory and Random Processes, 1st edition, McGraw Hill Education (India) Private Limited, 2015.

Suggested Readings:

1. Henry Stark and John W. Woods, Probability and Random Processes with Application to Signal Processing, 3rd edition, Pearson Education, 2014.
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, 11th edition, S. Chand, 2006.
3. T. Veerarajan, Probability, Statistics and Random Processes, 3rd Edition, McGraw Hill Companies, 2010.
4. T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham, V. S. S. N. Prasad, Mathematical Methods, S. Chand, 2010.

Course Code	Course Title						Core / Elective
SPC301EE	Electrical Circuit Analysis						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
SES102EE	3	–	–	–	40	60	3

Course Objectives:

1. To learn about AC resonance and different theorems applications
2. To understand the behaviour of DC and AC transients.
3. Application of Laplace transform in electric circuits and understanding of Two port networks.

Course Outcomes:

1. Obtain steady-state response and resonance of electrical circuits.
2. Apply network theorems for the analysis of electrical circuits.
3. Analyse solution of first and second order RL, RC and RLC networks.
4. Apply Laplace transforms for electrical circuits
5. Analyse the behavior of two port networks

UNIT I – Sinusoidal steady state analysis

AC circuit analysis, effective or RMS values, average power and complex power, series and parallel resonances. Analysis of three-phase circuits, analysis of magnetically coupled circuits with dot Convention.

UNIT II – Network Theorems with DC and AC

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

UNIT III – DC and AC Transients

Initial and final conditions in network elements, forced and free response, time constants.
DC Transients: Analysis of series and parallel R-L, R-C, R-L-C circuits with DC excitation.
AC Transients: Analysis of series and parallel R-L, R-C, R-L-C circuits with AC excitation.

UNIT IV – Electrical Circuit Analysis Using Laplace Transforms

Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network with initial conditions.

UNIT V – Two Port Network and Network Functions

Two Port Network parameters, impedance, admittance, transmission hybrid and inter-relationship of parameters, interconnections of two port networks. Driving point and Transfer functions.

Text Books:

1. William Hart Hayt, Jack Ellsworth Kemmerly, Steven M. Durbin (2007), Engineering Circuit Analysis, 8th Edition, McGraw-Hill Higher Education, New Delhi, India, 2018.
2. Charles K. Alexander and Matthew N.O. Sadiku, Fundamentals of Electric Circuits,7th Edition, Tata McGraw Hill, New Delhi, 2015.
3. N. C. Jagan and C. Lakshminarayan, Network Theory, 2nd Edition, Anshan, 2005

Reference Books:

1. A. Sudhakar, Shyammohan S. Palli, Network Analysis, 4th Edition, Tata Mc Graw Hill, New Delhi, 2009.
2. A. Chakrabarthy (2010), Electrical Circuits, 5th Edition, Dhanpat Rai & Sons Publications, New Delhi,2010.
3. M. E. Van Valkenburg, Network Analysis, Pearson India Education Services Pvt. Ltd T hird edition, 2019.
4. Robert L Boylested, Introductory Circuit Analysis, Pearson, 2018.

Course Code	Course Title						Core / Elective
SPC302EE	Electromagnetic Fields						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
SES102EE	3	–	–	–	40	60	3

Course Objectives:

1. Understanding of vector calculus.
2. To learn about Electric and Magnetic static fields.
3. Understanding of Time varying fields and Electromagnetic waves.

Course Outcomes:

1. Understand the vector calculus for electromagnetism.
2. Obtain the electric fields for simple configurations under static conditions.
3. Analyse and apply the static magnetic fields.
4. Understand Maxwell's equation in different forms and different media.
5. Understand the propagation of EM waves

UNIT I – Review of Vector Calculus

Vector algebra-addition, subtraction, components of vectors, scalar and vector multiplications, triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical). Vector calculus-differentiation, partial differentiation, integration, vector operator del, gradient, divergence and curl, integral theorems of vectors. Conversion of a vector from one coordinate system to another.

UNIT II – Static Electric Field and Conductors, Dielectrics and Capacitance

Coulomb's law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

Current and current density, Ohms Law in Point form, Continuity of current, Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials, Capacitance, Capacitance of a two-wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation, Application of Laplace's and Poisson's equations with single variable.

UNIT III – Static Magnetic Fields and Magnetic Forces, Materials and Inductance

Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors.

Force on a moving charge, Force on a differential current element, Force between differential current elements, Nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, Magnetic circuits, inductances and mutual inductances.

UNIT IV – Time Varying Fields and Maxwell's Equations

Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive forces. Electrical and Magnetic boundary conditions.

UNIT V – Electromagnetic Waves

Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasor form, Wave equation in Phasor form, Plane waves in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors, Skin effect. Poynting theorem.

Text Books:

1. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012.2. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.

Reference Books:

1. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009.
2. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
3. W.J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1990.
4. B. D. Popovic, "Introductory Engineering Electromagnetics", Addison-Wesley Educational Publishers, International Edition, 1971.

Course Code	Course Title						Core / Elective
SPC303EE	Signals and Systems Analysis						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
SES102EE	3	–	–	–	40	60	3

Course Objectives:

1. To understand the classification of continuous-time and discrete-time signals and systems
2. To develop ability to solve systems represented by differential equations and difference equations using analytical methods and Laplace and Z-transforms.
3. To acquire the knowledge of representing the signals in frequency domain using Fourier series and Fourier transform.

Course Outcomes:

1. Classify and analyze the continuous time signals and discrete time signals and systems.
2. Generate discrete time signals through sampling process and reconstruct them.
3. Determine the responses of continuous and discrete-time systems which are represented by differential equations and difference equations.
4. Analyze continuous time systems with the help of Laplace transform and discrete time system with Z-transform.
5. Analyze the continuous and discrete-time systems in frequency domain with the help of Fourier series and Fourier Transform.

UNIT I – Introduction to Continuous and Discrete Time Signals

Examples of signals and systems as seen in everyday life in relation to engineering and science. Signal properties: periodicity, absolute integrability, determinism and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time- limited signals; Introduction to discrete-time signals - Sampling and Reconstruction: The Sampling Theorem and its implications. Spectra of sampled signals. Aliasing and its effects. Reconstruction: ideal interpolator, zero-order hold and first-order hold. Classification of discrete time signals.

UNIT II – Behavior of Continuous and Discrete-time LTI systems

System properties: linearity: additivity and homogeneity, shift-invariance, causality and stability. Linear time invariant system, properties convolution integral and convolution sum. System representation through differential equations and difference equations.

UNIT III – Frequency Domain Representation of Continuous Time Signals

Fourier series representation of periodic signals, Waveform Symmetries, Calculation of Fourier Coefficients. Fourier Transform, properties, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality.

UNIT IV – Frequency Domain Representation of Discrete Time Signals

The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.

UNIT V – Laplace Transforms and Z – Transforms

Review of the Laplace Transform for continuous time signals and systems, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behavior.

The z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, z-domain analysis and solution to difference equations.

Text Books:

1. A. V. Oppenheim, A. S. Willsky and S. H. Nawab, Signals and systems, Prentice Hall India, 1997.
2. J. G. Proakis and D. G. Manolakis, Digital Signal Processing: Principles, Algorithms, andApplications, Pearson, 2006.

Reference Books:

1. H. P. Hsu, Signals and systems, Schaum's series, McGraw Hill Education, 2010.
2. S. Haykin and B. V. Veen, Signals and Systems, John Wiley and Sons, 2007.
3. A. V. Oppenheim and R. W. Schafer, Discrete-Time Signal Processing, Prentice Hall, 2009.
4. M. J. Robert, Fundamentals of Signals and Systems, McGraw Hill Education, 2007.
5. B. P. Lathi, Linear Systems and Signals, Oxford University Press, 2009.

Course Code	Course Title						Core / Elective
SPC304EE	Analog Electronics						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	3

Course Objectives:

1. To give insights of the diode characteristics in forward and reverse bias and diode applications.
2. To comprehend the construction and working of Bipolar Junction Transistor in various modes and JFET.
3. To familiarize with feedback concepts and its applications.
4. To describe various classes of power amplifies.
5. To give insights of the operation of OPAMP and its applications.

Course Outcomes: On successful completion of the course, the students will be able to

1. Interpret the characteristics and apply diode models to analyze various applications of diodes.
2. Discriminate the BJT configurations to recognize appropriate transistor configuration for any given application and design the biasing circuits with good stability.
3. Analyze and compare feedback amplifiers.
4. Distinguish various classes of Power Amplifiers.
5. Analyze the operation of OPAMP and its applications.

UNIT-I

Basics of Semiconductors: intrinsic and extrinsic semiconductors, Carrier transport, diffusion current, drifts current, mobility and resistivity. Generation and recombination of carriers, Poisson and continuity equations, Qualitative treatment of Hall Effect.

Junction Diodes and Applications:

P-N junction characteristics, V-I characteristics, Avalanche breakdown, Zener diode, Applications of Diodes as rectifiers. L and C Filters, LED, photodiode. Basic One level Clipping and clamping circuits using diodes.

UNIT-II

Bipolar Junction Transistor and Applications – BJT construction and V-I characteristics and configurations of CE, CB, CC**,** JFET construction, its V-I **-** characteristics and configurations of CS, CG, CD. Small signal models of BJT and JFET. MOSFET.

Transistor Biasing: Fixed bias, collector to base bias, self-bias, thermal stability.

BJT Applications: Analysis of BJT as an amplifier, estimation of voltage gain, current gain, input resistance, output resistance, Analysis of transformer coupled amplifier in mid frequency, Low frequency and high frequency regions with BJT.

UNIT-III

Feedback Amplifiers with Qualitative treatment: The Positive and negative feedback concept, negative feedback topologies: Voltage Series, Current Series, Voltage Shunt and Current Shunt feedback amplifiers, effect of negative feedback on input and output impedances, gain, bandwidth etc., and concept of stability

UNIT-IV

Oscillators: Concept of positive feedback, Barkhausen criterion, RC oscillators: phase shift, Wien bridge, LC oscillators: Hartley, Colpitt, Qualitative treatment of Crystal Oscillator,

Power Amplifiers: Qualitative treatment for Various classes of operation: Class A, B, and AB, their power efficiency and distortion.

UNIT-V

Operational Amplifiers and its Applications:

OP-AMP Block diagram, Ideal OP-AMP, DC and AC Characteristics, Inverting and Non-Inverting Amplifiers, Adder/Subtractor, Integrator, Differentiator, Comparator, Zero crossing detector, Square and Triangular wave generators, Sample and Hold circuit.

Reference Books:

1. Jacob Millman, Christos C. Halkias, and Satyabrata Jit, Electronic Devices and Circuits, 3rd ed., McGraw Hill Education, 2010.
2. S Salivahanan, N Kumar, and A Vallavaraj, Electronic Devices and Circuits, 2nd ed., McGraw Hill Education, 2007.
3. Jacob Milliman and Herbert Taub, "Pulse, Digital and Switching Waveforms", 3rd Edition.

Suggested Readings:

1. A. Anand Kumar "Pulse and Digital circuits".
2. Ramakanth A. Gayakwad, "Op-Amps and Linear Integrated Circuits" Pearson, 2018, 4th Edition.

Course Code	Course Title						Core/Elective/Audit
SP–AC	Fundamentals of Computer Science						Audit
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	2	–	–	–	50	–	–

Course Objectives:

1. Describe various types and services of operating system.
2. To become familiar with different types of data structures and their applications and learn different types of algorithmic techniques and strategies.
3. Introduce the basics of computer networks to students through a study of layered models of computer networks and applications.

Course Outcomes:

1. Explain the basic of an operating system viz. system programs, system calls, user mode and kernel mode.
2. Analyze the Information Systems as socio-technical systems, its need and advantages as compared to traditional file-based systems.
3. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies, sub-netting and routing mechanism.
4. Understanding the problem and corresponding requirement for development of software and describe the various phases of the system development life cycle.
5. Use the Internet to send mail and surf the World Wide Web

UNIT – I: Overview of Operating Systems (10 Periods)

Definition of Operating Systems, Types of Operating Systems, Operating System Services, User operating system interface, System Calls, Types of System Calls, System Programs, Operating System Structure, Virtual Machine, Benefits of Virtual Machine.

UNIT – II: Overview of Database Management Systems (10 Periods)

Basic concepts, Advantages of a DBMS over file processing system, Data Abstraction, Database Languages, Data Independence. Components of a DBMS and overall structure of a DBMS. Three views of Data (External View, Conceptual View, Internal View), Three level architecture of DBMS, Data Independence, Client Server Architecture.

UNIT – III: Overview of Computer Networks (10 Periods)

Introduction: Organization of the Internet, ISP, Network criteria, Categories of networks, Network performance and Transmission Impairments. Network Devices, OSI Model, TCP/IP Protocol Suite, layering principles, Line Encoding, Switching technique and Multiplexing.

UNIT–IV: Introduction to Software Engineering (10 periods) System Concepts:

Types of systems : (open, closed, static and dynamic systems). Introduction, Programmes v/s Software Products

Emergence of Software Engineering: Early Computer Programming, High-level Language Programming, Control flow based Design, Data Structure Oriented Design, Object Oriented Design. Concept of Testing, Testing type cycle (V-Model), Verification v/s Validations, Unit Testing, Black Box Testing, White Box Testing, Integration testing, System testing, Configuration management, Overview of test cases.

UNIT – V: Fundamentals of Internet (12 Periods)

Concepts of computer Network, Client Server Model, Peer to Peer Model, Networking Devices: Switch, Router, Hub, Bridge, Gateway, LAN, MAN, WAN, Topology, Internet, Intranet, Extranet, internet service provider and its relevance, role of the modem in accessing the internet, installation procedure of a modem using control panel, purpose of web browser software, URL,URI, URN, WWW, FTP,HTTP,RDC(Remote Desktop Connection), Telnet, Email, process of sending and receiving e-mail, transmission modes, IP address and its format, MAC Address, DNS, search engines, social network sites, internet security, Firewall, Cloud Computing and its services

Text Books

1. Silberschatz A., Galvin B. P. and Gagne G., Operating System Concepts, John Wiley & Sons Inc (2013) 9th Edition.
2. Silverschatz A., Korth F. H. and Sudarshan S., Database System Concepts, Tata McGraw Hill (2010) 6th Edition.
3. Forouzan A. B., Data communication and Networking, McGraw Hill (2012) 5th Edition.
4. Software Engineering: A Practitioner's Approach, Roger S Pressman, 9th Edition TMH, and Bruce Maxim ISBN10: 1259872971, ISBN13: 9781259872976
5. Fundamentals of Computer by E Balagurusamy,T ata McGraw Hill Education Pvt.Ltd, New Delhi

Reference Books:

1. Stallings W., Operating Systems Internals and Design Principles, Prentice Hall (2018) 9th Edition.
2. Elmasri R. and Navathe B. S., Fundamentals of Database Systems, Pearson (2016) 7th Edition.
3. Tanenbaum S. A. and Wetherall J. D., Computer Networks, Prentice Hall (2013) 5th Edition.
4. Pankaj Jalote's Software Engineering: A Precise Approach, Wiley publications
5. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi

Course Code	Course Title						Core / Elective
SES311CS	Data Structures Laboratory						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
SES101CS	–	–	–	2	40	60	1

Course Objectives: The course should enable the students to:

1. Understand various data representation techniques in the real world.
2. Implement linear and non-linear data structures.
3. Analyze various algorithms based on their time and space complexity.

Course Outcomes: The student will have the ability to:

1. Understand the concept of data structures, C Programming and apply algorithm for solving problems like Sorting, searching, insertion and deletion of data.
2. Understand linear data structures for processing of ordered or unordered data.
3. Explore various operations on dynamic data structures like single linked list, circular linked list and doubly linked list.
4. Explore the concept of non linear data structures such as trees and graphs.
5. Understand the binary search trees, hash function, and concepts of collision and its resolution methods.

1. Write a C program that uses functions to perform the following:

a. Create a singly linked list of integers.
b. Delete a given integer from the above linked list.
c. Display the contents of the above list after deletion.
d. Check whether two given lists are containing the same data.

2. Write a C program that uses functions to perform the following:

a. Create a double linked list of integers.
b. Delete a given integer from the above double linked list.
c. Display the contents of the above list after deletion.
d. Find the largest element in a given doubly linked list.

3. a. Write a C program to implement stack using linked list.
b. Write a C program that uses stack operations to convert a given infix expression into its postfix equivalent, implement the stack using an array.
c. Write a C program to reverse the elements of the stack using recursion.

4. Write C programs to implement a double ended queue ADT using

a. Array b. Double linked list

5. Write a C program that uses functions to perform the following:

a. Create a binary search tree of characters.

b. Traverse the above binary search tree recursively in post order.

c. Count the number of nodes in the binary search tree.

6. Write a C program that uses functions to perform the following:

a. Create a binary search tree of integers

b. Traverse the above binary search tree non recursively in inorder

7. Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order.

a. Insertion sort b. Merge sort

8. Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order.

a. Quick sort b. Selection sort

9. Write a C program to perform the following operation:

a. Insertion into a B-Tree b. Heap Sort

10. Write a C program to implement all the functions of a dictionary (ADT) using hashing.

11. Write a C program for implementing Knuth-Morris-Pratt pattern matching algorithm.

12. Write C programs for implementing the following graph traversal algorithms:

a. Depth first traversal b. Breadth first traversal

List of Reference Books:

1. Gilberg and Forouzan, Data Structure- A Pseudo code approach with C, Thomson publication
2. Data Structure in C, Tanenbaum,PHI publication/Pearson Publication.
3. Pai, Data Structures & Algorithms; Concepts, Techniques & Algorithms, Tata McGraw Hill.

Course Code	Course Title						Core / Elective
SPC311EE	Circuits and Simulation Lab						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
SPC301EE	–	–	–	4	40	60	2

Course Objectives:

1. To Train the Students for acquiring practical knowledge in time response and frequency response of series / parallel RC, RL and RLC Circuits.
2. To prepare the students for finds out parameters of a given two port network.
3. To make the students for understanding the verification of theorems.

Course Outcomes:

1. Evaluate the time response and frequency response characteristics of R, L, C series and parallel circuits.
2. Able to validate the network theorems.
3. Able to find various parameters of a two-port network.
4. Able to simulate electrical circuits.
5. Analyze the measurement of power in balanced and unbalanced circuits.

Suggested List of Experiments / Demonstrations:

Hardware Experiments

1. Frequency Response of a series RLC circuit.
2. Frequency Response of a parallel RLC circuit.
3. Parameters of Two Port Network.
4. Series, Parallel and Cascade Connection of Two Port Networks.
5. Verification of Thevenin's and Norton's Theorems.
6. Verification of Superposition and Maximum Power Transfer Theorems.
7. Verification of Compensation and Reciprocity Theorems.
8. Measurement of Power by using Two Wattmeter Method.

Simulation Experiments

1. Simulation of series and parallel resonance.
2. Simulation of Thevenin's and Norton's theorems with dependent sources.
3. Simulation of Maximum Power Transfer theorem with DC & AC.

Note: Minimum Ten experiments should be conducted from hardware and simulation experiments.

Contents Beyond the Syllabus

1. Simulation of Millman's and Tellegen's theorems.
2. Simulation of balanced and unbalanced 3-phase power measurement.
3. Simulation of interrelation of two port network parameters.

Text Books:

1. William Hart Hayt, Jack Ellsworth Kemmerly, Steven M. Durbin (2007), Engineering Circuit Analysis, 8th Edition, McGraw-Hill Higher Education, New Delhi, India, 2018.
2. Agam Kumar Tyagi, MATLAB and Simulink for Engineers, Oxford, 2011.
3. Muhammad H. Rashid, Introduction to Pspice Using Orcad for Circuits and Electronics, Prentice-Hall of India Pvt. Ltd, 2003.

Reference Books:

1. A. Chakrabarthy (2010), Electrical Circuits, 5th Edition, Dhanpat Rai & Sons Publications, New Delhi, 2010.
2. M. E. Van Valkenburg, Network Analysis, Pearson India Education Services Pvt. Ltd T hird edition, 2019.
3. Robert L Boylested, Introductory Circuit Analysis, Pearson, 2018.

Course Code	Course Title						Core / Elective
SPC312EC	Analog Electronics Lab						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	–	–	–	3	40	60	1.5

Course Objectives:

1. To give insights of the design of basic circuits of rectification with and without filters using diodes and wave shaping circuit using diodes.
2. To explain the basic design of single and multistage amplifier circuits.
3. To demonstrate negative feedback in amplifier circuits.
4. To demonstrate positive feedback in oscillators.
5. To familiarize with waveform generation using OPAMP.

Course Outcomes: On successful completion of the course, the students will be able to

1. Calculate ripple factor, efficiency and % regulation of rectifier circuits
2. Analyze feedback amplifiers and op-amp oscillator circuits
3. Design single, and multi-stage amplifier, wave shaping and controller circuits
4. Understand the characteristics of electronics devices
5. Design using basic op-amp based applications.

List of Experiments:

1. Characteristics of Silicon, Germanium and Zener Diode in forward bias and reverse bias
2. Application of diode as a full wave rectifier with and without filters. Calculation of Ripple factor, voltage regulation and efficiency with various loads
3. Static characteristics of BJT in CE configuration
4. Frequency response of Single BJT amplifier in CE configuration
5. Inverting amplifier using op-amp.
6. Non-inverting amplifier using op-amp.
7. Design of integrator and differentiator using op-amp.
8. RC Phase Oscillator using op-amp.
9. Wein Bridge Oscillator using op-amp

10. Clipping circuits
11. Voltage multiplier using op-amp
12. Generation of triangular and square wave using op-amp.

Note: Any TEN experiments should be conducted in the semester.

Suggested Readings:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, Basic Electronics, A text-Lab Manual, 7th Edition. Mc-Graw-Hill Higher Education 2001.
2. D Roy Chaudhary, Shail B Jain, Linear Integrated circuits, New Age International Publishers, 2007.
3. Analog Electronics laboratory manual of Stanley college of Engineering and Technology for Women.
4. Datasheets of Devices.

IV Semester Detailed Syllabus

Course Code	Course Title						Core / Elective
SPC401EG	Effective Technical Communication						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	3

Course Objectives: On successful completion of the course, the students should be able to:

1. Overcome the barriers of communication.
2. Handle technical and business communication effectively.
3. Build any kind of business correspondence.
4. Draft efficient reports.
5. Acquire adequate skills of manual writing

Course Outcomes:

1. To understand the process and barriers of communication
2. To learn the aspects of communication and presentation.
3. To comprehend the types of business correspondence
4. To analyze the techniques of report writing
5. To get the knowledge of basics of manual writing

UNIT I – Introduction to Communication

1. Definition and process of communication
2. Channels of Communication
3. ABC of Written Communication
4. Barriers of Technical Communication

UNIT II – Aspects of Communication

1. Importance of listening and types of listening.
2. Verbal communication and non-verbal communication (proxemics, kinesics)
3. Persuasive techniques
4. Presentation skills

UNIT III – Manual Writing

1. Types of manuals
2. User manual
3. Product and Process manual
4. Operations manual

UNIT IV – Business Correspondence

1. Email etiquette and Mobile etiquette
2. Agenda, Minutes of the Meeting and 1OM (Inter Office Memorandum)
3. Business letters (enquiry and response; complaint and adjustment; and sales)
4. Business proposals

UNIT V – Report Writing

1. Types of reports (Informative, analytical, periodic and special, formal and informal)
2. Structure of a report
3. Feasibility report
4. Progress report

Course Code	Course Title						Core / Elective
SPC401EG	Electrical Machines I						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
SES102EE	3	–	–	–	40	60	3

Course Objectives:

1. To understand the concepts of magnetic circuits.
2. To understand electrical principle, laws, and working of DC Generators and Motors.
3. To understand working of transformer and also conduct various tests on the transformer.

Course Outcomes:

1. Understand the concepts of magnetic circuits.
2. Understand electrical principle, laws, and working of DC machines.
3. Analyse the construction and characteristics and application of various types of DC generators.
4. Analyse the construction and characteristics and application of various types of DC motors and testing of motors.
5. Understand electrical principle, laws, and working of transformer and losses and also conduct various tests on the transformer.

UNIT I – Fundamentals of Electromechanical Energy Conversions

Introduction, Flow of Energy in Electromechanical devices, Energy in Magnetic Systems, Singly Excited System, Determination of Mechanical Force, Mechanical Energy, Torque Equation, Doubly Excited System, energy stored in magnetic field, Electromagnetic Torque, Generated EMF in Machines, Torque in Machines with Cylindrical air-gap, General classifications of Electrical Machines.

UNIT II – DC Machines: Generators

Basic construction of a DC machine, Principle of operation, Windings, Armature Reaction, Commutation, EMF Equation, Types of field excitations–separately and self-excited, shunt, series and compound. Open circuit characteristic of separately excited DC generator, generated

EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed, characteristics of DC generators, Parallel operation.

UNIT III – DC Machines: Motors

Armature circuit equation for motoring, Back EMF equation, torque-speed characteristics of separately excited, shunt, series motors and compound motors. Speed control methods. Losses and efficiency, Testing - brake test, Swinburne's test, Hopkinson's test and Field's test.

UNIT IV – Single Phase Transformers

Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses, all day efficiency calculation, advanced testing of transformers.

UNIT V – Auto Transformers and Three Phase Transformers

Autotransformers - construction, principle, applications and comparison with two winding transformer. Scott connection, three-phase to six-phase conversion, Tap-changing transformers - No-load and on-load tap changing of transformers, Three-winding transformers.

Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of single-phase and three-phase transformers.

Text Books:

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

Reference Books:

1. A. E. Clayton and N. N. Hancock, Performance and design of DC machines, CBS Publishers,2004.
2. M. G. Say, Performance and Design of AC Machines, CBS Publishers, 2002.
3. Smarajit Ghosh, Electrical Machines, Pearson Education, 2018.
4. P. Satish Kumar, G. Sridhar, Electrical Machines – A Practical Approach, De Gruyter Publication, Germany, 2020.

Course Code	Course Title						Core / Elective
SPC402EE	Control Systems						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	3

Course Objectives:

1. To develop basic skills of utilizing mathematical tools needed to analyze and design classical linear control systems.
2. To understand the stability analysis in time and frequency domains.
3. To understand and develop the state space representation of control systems.

Course Outcomes:

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

UNIT I – Introduction to Control Systems

Classification 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

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.

Text Books:

1. Nagrath I.J. and Gopal.M, Control System Engineering, Wiley Eastern, 2003.
2. K. Ogata, Modern Control System, Prentice Hall of India, 4th Edition, 2002.

Reference Books:

1. B.C.Kuo, Automatic Control Systems, Wiley India, 7th Edition, 2002.
2. Norman N Nise, Control Systems Engineering, John Wiley & Sons, Inc. 605 Third Ave. New York, NY, United States, 5th Edition, 2008.
3. N.C.Jagan, Control Systems, B.S Publications, 2nd Edition, 2008.

Course Code	Course Title						Core / Elective
SPC403EE	Switching Theory and Logic Design						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	3

Course Objectives

1. To develop Boolean algebra and arithmetic circuits.
2. To describe combinational digital circuits for logic functions
3. To build sequential digital circuits for logic functions
4. To study the A/D and D/A converters
5. To design Semiconductor memories and Programmable logic devices.

Course Outcomes On successful completion of the course, the students would be able to

1. understand and apply the Boolean algebra, including CMOS gates and arithmetic circuits.
2. apply combinational digital circuits for logic functions
3. use the concepts of Boolean Algebra for the analysis & design of sequential logic circuits
4. design various A/D and D/A converters
5. design various logic gates starting from simple ordinary gates to complex programmable logic devices and arrays.

UNIT- I

Fundamentals of Digital Systems and logic families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT-II

Combinational Digital Circuits: Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD

arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/ drivers for display devices-M method of function realization.

UNIT-III

Sequential circuits and systems: A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J, K, T and D-type flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT-IV

A/D and D/A Converters(Qualitative Analysis Only): Digital to analog converters: weighted resistor/converter, R-2R Ladder digital to analog converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, Analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter.

UNIT-V

Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

Reference Books:

1. M. M. Mano, Digital logic and Computer design, Pearson Education India, 2016.
2. A. Kumar, Fundamentals of Digital Circuits, Prentice Hall India, 2016.

Suggested Readings:

1. R. P. Jain, Modern Digital Electronics, McGraw Hill Education, 2009.
2. David A., Bell Operational Amplifiers & Linear ICs,2e, Oxford Publication.

Course Code	Course Title						Core / Elective
SPC901CS	OOP Using JAVA						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	3

Course Objectives: Student will be able to

1. Develop java applications using OO concepts and packages write multi-threaded programs with synchronization
2. Implement real world applications using java collection frame work and I/O classes
3. Write Event driven GUI programs using AWT/Swing

Course Outcomes

1. To introduce fundamental object oriented concepts of Java programming Language such as classes, inheritance, packages and interfaces
2. To introduce concepts of exception handling and multi-threading
3. To use various classes and interfaces in java collection framework and utility classes
4. To understand the concepts of GUI programming using AWT controls
5. To introduce Java I/O streams and serialization

UNIT – I

Object Oriented System Development: understanding object oriented development, understanding object oriented concepts, benefits of object oriented development.

Java Programming Fundamentals: Introduction, overview of Java, data types, variables and arrays, operators, control statements.

UNIT – II

Java Programming OO concepts: classes, methods, inheritance, packages and interfaces. Exceptional Handling, Multithreaded Programming.

UNIT – III

I/O Basics, Reading Console Input and Output, Reading and Writing Files, Print Writer Class, String Handling Exploring Java. Lang, Collections Overview, Collection Interfaces, Collection Classes, Iterators, Random Access Interface, Maps, Comparators, Arrays, Legacy Classes and Interfaces, String Tokenizer.

UNIT – IV

Introducing AWT working with Graphics: AWT Classes, Working with Graphics.

Event Handling: Two Event Handling Mechanisms, The Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces

AWT Controls: Control Fundamentals, Labels, Using Buttons, Applying Check Boxes, Check Box Group, Choice Controls, Using Lists, Managing Scroll Bars, Using Text Field, Using Text Area, Understanding Layout Managers, Menu bars and Menus, Dialog Boxes, File Dialog, Handling events by Extending AWT Components, Exploring the controls, Menus and Layout Managers.

UNIT – V

Java I/O Classes and Interfaces, Files, Stream and Byte Classes, Character Streams, Serialization.

Suggested Reading:

1. Herbert Schildt, The Complete Reference JAVA, Tata McGraw Hill, 7thEdition, 2005
2. James M Slack, Programming and Problem Solving with JAVA, Thomson learning, 2002
3. C.Thomas Wu, An Introduction to Object-Oriented Programming with Java, Tata McGraw Hill, 5th Edition, 2005.

Course Code	Course Title						Core / Elective
SPC902CS	Python Programming						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	3

Course Objectives:

1. To learn to solve problems using Python conditionals and loops.
2. To define Python functions and use function calls to solve problems.
3. To use Python data structures – lists, tuples, dictionaries to represent complex data.

Course Outcomes: Upon completion of the course, students will be able to

CO1: Develop and execute simple Python programs.

CO2: Write simple Python programs using conditionals and looping for solving problems.

CO3: Decompose a Python program into functions.

CO4: Represent compound data using Python lists, tuples, dictionaries etc.

CO5: Read and write data from/to files in Python programs.

UNIT I :

Python Overview: History of python, python features, python installation and Local Environment Set-up, python basic syntax.

Variable types and basic operations: Assign value to a variable, multiple assignments, standard data types in python, type of operators, arithmetic operator, comparison operator, assignment operator, bitwise operator, logical operator, membership operator, identity operator, mathematical functions in python

Decision making: if statement, if-elif-else statements,nested if statements, single statement suites.

UNIT II

Loops: While loop, for loop,nested loop, loop control statements,break and continue statement, pass statement, iterator and generator

Functions: Defining a function, calling a function, Return statement, Pass by Reference vs Value, Function Arguments, Required Arguments, keyword Arguments, Default Arguments, Variable length Arguments, global Vs local variables. The Anonymous Functions

Strings: Accessing values in string, updating string, escape charters, string special operators, string formatting operator, built-in string functions and methods, string module

UNIT III

Lists: Python list, accessing values in list, basic list operations, list indexing, slicing and matrixes, built-in list functions and methods, list aliasing, list cloning, list comprehension

Tuples: Accessing values in Tuples, updating tuples,delete Tuple elements, basic Tuples operations, indexing slicing and matrixes, built-in Tuple functions

Dictionaries: Accessing values in Dictionary, updating dictionary,delete dictionary elements, Properties of Dictionary Keys, Built-in Dictionary Functions & Methods

UNIT IV: FILES, MODULES, PACKAGES

Modules: The import Statement, The from...import Statement, The from ...import * Statement, Executing Modules as Scripts, Namespaces and Scoping, The globals() and locals() Functions,Packages in Python.

Files I/O: Printing to the Screen, Reading Keyboard Input, The input Function Opening and Closing Files, The file Object Attributes, The close() Method, Reading and Writing Files, The write() Method, The read() Method.

UNIT-V: Exceptions Handling

Exceptions Handling: Standard Exceptions, Assertions in Python .What is Exception?, Handling an Exception, The except Clause with No Exceptions, The except Clause with Multiple Exceptions, The try-finally Clause, Argument of an Exception, Raising an Exception, User-Defined Exceptions

Regular Expressions: The match Function, The search Function, Matching Versus Searching, Search and Replace, Regular Expression Modifiers: Option Flags, Regular Expression Patterns, Regular Expression Examples, Character classes

Text Books:

1. Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016.
2. Karl Beecher, “Computational Thinking: A Beginner's Guide to Problem Solving and programming”, 1st Edition, BCS Learning & Development Limited, 2017.

References:

1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, “Computational Thinking: A Primer for Programmers and Data Scientists”, 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data“, Third Edition, MIT Press

Course Code	Course Title						Core / Elective
SPC411EE	Electrical Machines – 1 Lab						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
SPC401EE	–	–	–	4	40	60	2

Course Objectives:

1. To learn operation and performance characteristics of D.C. machines by conducting various experiments and tests practically.
2. To understand the operation and performance characteristics of transformers by conducting various experiments and tests.
3. To learn about simulation of DC machine performance considering different faults.

Course Outcomes:

1. Estimate the efficiency and voltage regulation of D.C. generator and transformers under various loading conditions.
2. Acquire the knowledge of efficiency and speed regulation D.C. Motors under various loading conditions.
3. Able to understand the speed control of DC motor by conducting different experiments
4. Analyze the transformer performance by performing different tests.

UNIT – I

Suggested List of Experiments/Demonstrations:

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 characteristics of series, shunt and compound motors.
4. Separation of iron and friction losses and estimation of parameters in D.C. machine.
5. Speed control of D.C. Shunt motor using field control and armature control methods.
6. Swinburne's test.
7. Hopkinson's test.
8. Retardation test.
9. Separation of core losses in a single phase transformer.
10. Open circuit and short circuit and load test on a single phase transformer.
11. Sumpner's test on two identical transformers.

12. Testing of transformers: Polarity test, High voltage test and double voltage and double frequency test.
13. Three phase transformer connections

Note: Minimum Ten experiments should be conducted.

Contents Beyond the Syllabus

1. Simulation of D.C. Machine considering short circuit and open circuit faults.
2. Simulation of Three Phase Transformer by connecting different three phase loads.
3. Simulation of converting three phases into two phase by using Scott connection.

Text Books:

1. P. S. Bimbhra, Electrical Machinery, Khanna Publishers, 2011.
2. A. E. Fitzgerald and C. Kingsley, Electric Machinery, New York, McGraw Hill Publisher, 2013.

Reference Books:

1. I. J. Nagrath and D. P. Kothari, Electric Machines, McGraw Hill Education, 2010.
2. A. E. Clayton and N. N. Hancock, Performance and design of DC machines, CBS Publishers, 2004.
3. M. G. Say, Performance and Design of AC Machines, CBS Publishers, 2002.
4. Smarajit Ghosh, Electrical Machines, Pearson Education, 2018.
5. P. Satish Kumar, G. Sridhar, Electrical Machines – A Practical Approach, De Gruyter Publication, Germany, 2020.

Course Code	Course Title						Core / Elective
SPC412EE	Control Systems Lab						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
SPC402EE	–	–	–	3	40	60	1.5

Course Objectives:

1. To develop basic skills of utilizing mathematical tools needed to analyze and design classical linear control systems.
2. To learn about design of different controllers.
3. To understand and develop the state space representation of control systems.

Course Outcomes:

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

UNIT – I

Suggested List of Experiments/Demonstrations:

1. Frequency response of second order system.
2. Step response of second order system.
3. Characteristics of synchro's.
4. D.C. Position control system.
5. A.C. Position control system.
6. Performance of P, PI and PID Controller on system response.
7. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB.
8. State space model for classical transfer function using MATLAB.

9. Transfer function of DC Motor
10. Design of lag and lead compensation.
11. Characteristics of D.C. and AC. Servomotor and their transfer function.
12. Simulation of Transfer function of DC Generator.

Note: Minimum Ten experiments should be conducted in the semester.

Contents Beyond the Syllabus

1. Simulation of Integrator and Differentiator.
2. Simulation of mathematical modelling of DC Motor.
3. Simulation of PI Control design to maintain Stability.

Text Books:

1. Nagrath I.J. and Gopal.M, Control System Engineering, Wiley Eastern, 2003.
2. K. Ogata, Modern Control System, Prentice Hall of India, 4th Edition, 2002.

Reference Books:

1. B.C.Kuo, Automatic Control Systems, Wiley India, 7th Edition, 2002.
2. Norman N Nise, Control Systems Engineering, John Wiley & Sons, Inc. 605 Third Ave. New York, NY, United States, 5th Edition, 2008.
3. N.C.Jagan, Control Systems, B.S Publications, 2nd Edition, 2008.

Course Code	Course Title						Core / Elective
SPC413EE	Switching Theory and Logic Design Lab						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
Switching Theory and Logic Design (SPC403EC)	–	–	–	3	40	60	1.5

Course Objectives:

1. To comprehend the concepts of digital logic design.
2. To design and implement the logic circuits using Combinational and Sequential Circuits.
3. To define the design and simulation method Logic Circuits, error detecting encoder/ decoder using VHDL/Verilog/Multisim.
4. To study functional characteristics of digital circuits using Verilog HDL.
5. To explain the design of counters.

Course Outcomes: On successful completion of the course, the students will be able to

1. Understand working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Use PLCs to implement the given logical problem.
5. Analyze synchronous and asynchronous counters.

List of Experiments

1. Realization of different logic gates
2. Realization of inverter using different logic families
3. Multiplexer application for logic realization and parallel to serial Conversions
4. Synchronous counters
5. Asynchronous counters
6. Half adder, full adder and subtractor and realization of combinational logic
7. A / D converters and D / A converters
8. Experiment on Sample and hold circuit

9. Simulation of error detecting codes using VHDL/Verilog/Multisim
10. Simulation of encoder/decoder using VHDL/Verilog/Multisim
11. Simulation of flip/flops using VHDL/Verilog/Multisim
12. Experiment on programmable logic devices (ROM/RAM/PLA/PAL/FPGA)

Note: Any **TEN** experiments should be conducted in the semester.

Suggested Readings:

1. R. P. Jain, *Modern Digital Electronics*, McGraw Hill Education, 2009.
2. M. M. Mano, *Digital logic and Computer Design*, Pearson Education India, 2016.
3. A. Kumar, *Fundamentals of Digital Circuits*, Prentcice Hall India, 2016.
4. Switching Theory and Logic Design Lab Manual, SCETW.
5. Data sheets of the electronic devices.

Course Code	Course Title						Core / Elective
SPW511EE	Internship – 1						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	–	–	–	4	50	–	1

Course Objectives:

1. To give an experience to the students in solving real life practical problems with all its constraints.
2. To give an opportunity to integrate different aspects of learning with reference to real life problems.
3. To enhance the confidence of the students while communicating with industry engineers and give an opportunity for useful interaction with them and familiarize with work culture and ethics of the industry.

Course Outcomes:

1. Design/develop a small and simple product in hardware or software.
2. Complete the task or realize a pre-specified target, with limited scope, rather than taking up a complex task and leave it.
3. Learn to find alternate viable solutions for a given problem and evaluate these alternatives with reference to pre-specified criteria.
4. Implement the selected solution and document the same.
5. Able to write a technical report and present it to appropriate audience.

Summer Internship is introduced as part of the curriculum for encouraging students to work on problems of interest to industries. A batch of two or three students will be attached to a person from an Electronics Industry / R & D Organization / National Laboratory for a period of two to four weeks. This will be during the summer vacation following the completion of the IV Semester course. One faculty member will act as an internal guide for each batch to monitor the progress and interacts with the Industry guide.

After the completion of the summer internship, students will submit a brief technical report on the internship executed and present the work through a seminar talk to be organized by the department. Award of sessional are to be based on the performance of the student at the work place to be judged by industry guide and internal guide (25 Marks) followed by presentation before the committee constituted by the department (25 Marks). One faculty member will co-ordinate the overall activity of Summer Internship.

***Students have to undergo summer internship of Two to Four Weeks duration at the end of IV semester and One Credit will be awarded in the V Semester after evaluation.**