

DEPARTMENT OF ELECTRONICS
LESSION PLAN
SESSION 2023-24
SEMESTER – I

NAME OF TEACHER: DR. SUBHRO GHOSAL

**PAPER ALLOTTED: ELSDSC101T (ELECTRONICS FOUNDATION-I),
ELSHSE101M (PYTHON)**

Month	Paper	Content	No of classes
August 2023 (08.08.2023)	ELSDSC101T	Unit-1: Electronic Materials A. Basic Quantum Physics 1) Basic postulation of quantum mechanics, Wave representation of particle, Phase velocity and Group velocity, Probability density, Heisenberg Uncertainty principle. 2) Schrodinger wave Equation (time independent), Quantum mechanical operators (position, momentum, energy, operator algebra not included), Particle in one dimensional box, Particle in one dimensional barrier potential, Schrodinger equation applied to periodic potential filed – concept of allowed and forbidden energy bands, Classification of materials – Insulators, Conductors, Semiconductors, Dielectrics.	13
	ELSHSE101M	1. Introduction to Python Python Introduction, History of Python, Introduction to Python Interpreter and program execution, Python Installation Process in Windows and Linux, Python IDE, Introduction to anaconda, python variable declaration, Keywords, Indents in Python, Python input/output operations. 2. Python's Operators Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Ternary Operator, Operator precedence. Simple examples and exercises.	12
September 2023	ELSDSC101T	Unit-1: Electronic Materials B. Classification of Electrical and Electronic Materials 1) Basic behaviour of Insulators; Conductors; Semiconductors; Dielectrics. 2) Conductive Materials: Free Electron Theory, Factors affecting conductivity of metals. 3) Semiconductor Materials: Types and Characteristics; Brief introduction to dependence of particle distribution properties of material–MB, BE and FD distribution (no mathematical derivation required only qualitative discussion using examples),	10
	ELSHSE101M	3. Python's Built-in Data types	12

		String, List, Tuple, Set, Dictionary (characteristics and methods). Simple examples and exercises. 4. Conditional Statements & Loop Conditional Statements (If, If-else, If-elif-else, Nested-if etc.) and loop control statements (for, while, Nested loops, Break, Continue, Pass statements). Simple examples and exercises.	
October 2023	ELSDSC101T	Fermi Energy Level; Intrinsic, Extrinsic and Compound Semiconductors; E-K diagram, Effective mass, Density of States; Temperature dependence of carrier concentrations and mobility; Direct and indirect bandgap semiconductors; Effect of heavy doping and degenerate semiconductors.	10
	ELSHSE101M	5. Function in python Introduction to functions, Function definition and calling, Function parameters, Default argument function, Variable argument function, in built functions in python, Scope of variable in python. Simple examples and exercises.	8
19th October to 15th November 2023	PUJA VACATION (19.10.2023 to 15.11.2023)		
November 2023	ELSHSE101M	6. File Processing Concept of Files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file, some important File handling functions e.g open(), close(), read(), readline() etc. Simple examples and exercises.	8
December 2023	ELSHSE101M	7. Modules Concept of modularization, Importance of modules in python, Importing modules, Built in modules (ex. Numpy). Simple examples and exercises.	5
January 2024		Internal Examination & Class for Slow Learners	8
April 2024		End Semester Examination	
		Total Classes	86

NAME OF TEACHER: DR. PROSENJIT ROY CHOWDHURY

PAPER ALLOTTED: ELSDSC 101P (ELECTRONICS FOUNDATION-I LAB)

Month	Paper	Content	No of classes
August 2023 (08.08.2023)	ELSDSC101P	Expt. 1: Verification of Ohm's Law; Verification of Kirchhoff Current Law. Expt. 2: Verification of equivalent resistance in cases of series and parallel combination of resistors.	9

September 2023	ELSDSC101P	Expt. 3: Introduction to AC source, Introduction to CRO/DSO; Measurement of frequency, amplitude and phase of AC sources; Construct a CR circuit for predefined phase difference and measure phase difference with input signals using Lissajous patterns.	12
October 2023	ELSDSC101P	Expt. 4: (a) Finding capacitance of a capacitor. (b) Finding the phase difference between the current and voltage across the capacitor.	9
19th October to 15th November 2023	PUJA VACATION (19.10.2023 to 15.11.2023)		
November 2023	ELSDSC101P	Expt. 5: (a) Finding inductance of an inductor. (b) Find the phase difference between the current and voltage across the inductor.	6
December 2023	ELSDSC101P	Expt. 6: Measurement of dielectric constant of a liquid/solid sample (using cylindrical electrodes/parallel plate electrodes).	9
January 2024		Internal Examination & Class for Slow Learners	6
April 2024		End Semester Examination	
		Total Classes	51

NAME OF TEACHER: AYAN KANTI PRADHAN

PAPER ALLOTTED: ELSDSC 101T (ELECTRONICS FOUNDATION-I),
ELSDSC 101P (ELECTRONICS FOUNDATION-I LAB), ELSMIN101T (BASIC ELECTRONICS-I)

Month	Paper	Content	No of classes
August 2023 (08.08.2023)	ELSDSC101T	Unit-II: Laws of Electronics and Passive Components A. Basic Laws in Electronics and their applications 1) Charge, Potential, Field, Voltage (DC and AC), Current (DC and AC), Electrical Load, Electrical Power, Root mean square and Average value of AC voltage, Ideal and practical voltage/current sources, Decibel unit in electronics. 2) Coulomb's First and Second Laws in Electrostatics 3) Ohm's Law 4) Kirchhoff Current Law, Kirchhoff Voltage Law 5) First Law of Joule, Second Law of Joule	6
	ELSDSC101P	Expt. 1: Verification of Ohm's Law; Verification of Kirchhoff Current Law.	9

		Expt. 2: Verification of equivalent resistance in cases of series and parallel combination of resistors.	
	ELSMIN101T	Unit-I: Laws of Electronics and Passive Components C. Basic Laws in Electronics and their applications 11) Charge, Potential, Field, Voltage (DC and AC), Current (DC and AC), Electrical Load, Electrical Power, Root mean square and Average value of AC voltage, Ideal and practical voltage/current sources, Decibel unit in electronics. 12) Coloumb's First and Second Laws in Electrostatics 13) Ohm's Law 14) Kirchhoff Current Law, Kirchhoff Voltage Law	6
September 2023	ELSDSC101T	6) Faraday's Law of Electromagnetic Induction (First, Second and Third or Lenz's Law) 7) Biot Savart Law for Electric and Magnetic field 8) Ampere's Circuital Law 9) Gauss's Law 10) Lorentz force (motion of charged particle in magnetic field)	6
	ELSDSC101P	Expt. 3: Introduction to AC source, Introduction to CRO/DSO; Measurement of frequency, amplitude and phase of AC sources; Construct a CR circuit for predefined phase difference and measure phase difference with input signals using Lissajous patterns.	12
	ELSMIN101T	15) First Law of Joule, Second Law of Joule 16) Faraday's Law of Electromagnetic Induction (First, Second and Third or Lenz's Law) 17) Biot Savart Law for Electric and Magnetic field 18) Ampere's Circuital Law 19) Gauss's Law 20) Lorentz force (motion of charged particle in magnetic field)	6
October 2023	ELSDSC101P	Expt. 4: (a) Finding capacitance of a capacitor. (b) Finding the phase difference between the current and voltage across the capacitor.	9
19th October to 15th November 2023	PUJA VACATION (19.10.2023 to 15.11.2023)		
November 2023	ELSDSC101P	Expt. 5: (a) Finding inductance of an inductor. (b) Find the phase difference between the current and voltage across the inductor.	6
December 2023	ELSDSC101P	Expt. 6: Measurement of dielectric constant of a liquid/solid sample (using cylindrical electrodes/parallel plate electrodes).	9
January 2024		Internal Examination & Class for Slow Learners	6
April 2024		End Semester Examination	

		Total Classes	75

NAME OF TEACHER: DR. ASWINI KUMAR MALLICK

PAPER ALLOTTED: ELSDSC101T (ELECTRONICS FOUNDATION-I), ELSMIN101T (BASIC ELECTRONICS-I), ELSMIN101P (BASIC ELECTRONICS-I LAB)

Month	Paper	Content	No of classes
August 2023 (08.08.2023)	ELSDSC101T	B. Basic passive components in electronics and their applications 1) Resistors, their various types, series-parallel combination. 2) Capacitors, Capacitive reactance, their various types, parallel plate capacitor, cylindrical capacitor, series-parallel combination, concept of variable capacitor.	6
	ELSMIN101T	D. Basic passive components in electronics and their applications 6) Resistors, their various types, series-parallel combination. 7) Capacitors, Capacitive reactance, their various types, parallel plate capacitor, cylindrical capacitor, series-parallel combination, concept of variable capacitor.	6
	ELSMIN101P	Expt. 1: (i) Verification of equivalent resistance in cases of series and parallel combination of resistors. (ii) Construct an unbalance Wheatstone bridge. Connect a milliammeter to measure source current in the circuit. Connect a load resistance and milliammeter in series connecting the other two junction of the bridge. Vary the load resistance and measure the currents through the two milliammeters. Short the load and measure short-circuit current. Disconnect the load and measure the open circuit voltage and resistance across those two terminals with the power supply replaced by a short-circuit. Verify Thevenin's equivalent circuit, Norton's equivalent circuit and verify Star-Delta equivalence.	9
September 2023	ELSDSC101T	3) Inductors, Inductive reactance, their various types, Solenoids (Solenoid, Toroid) series-parallel combination, Self-inductance of a coil, Mutual inductance of two coils. 4) Transformers: Operating principles (with mathematical formulation), Construction, Applications. 5) AC and DC behaviour of basic components, concept of quality factor of a component, phasor relationship between R, L and C.	6
	ELSMIN101T	8) Inductors, Inductive reactance, their various types, Solenoids (Solenoid, Toroid) series-parallel combination, Self-inductance of a coil, Mutual inductance of two coils. 9) Transformers: Operating principles, Construction, Applications.	6

		10) AC and DC behaviour of basic components, concept of quality factor of a component, phasor relationship between R, L and C.	
	ELSMIN101P	Expt. 2: Introduction to AC source, Introduction to CRO/DSO; Measurement of frequency, amplitude and phase of AC sources; Construct a CR circuit for predefined phase difference and measure phase difference between input and output signals. Expt. 3: (a) Finding capacitance of a capacitor. (b) Finding the phase difference between the current and voltage across the capacitor.	12
October 2023	ELSMIN101P	Expt. 4: (a) Finding inductance of an inductor. (b) Find the phase difference between the current and voltage across the inductor.	9
19th October to 15th November 2023	PUJA VACATION (19.10.2023 to 15.11.2023)		
November 2023	ELSMIN101P	Expt. 5: Study frequency responses (amplitude of current Vs frequency) of a series LCR circuits. Find the resonance frequency, Q factor and bandwidth for each these circuits.	6
December 2023	ELSMIN101P	Expt. 6: Study I-V characteristics of PN junction diode. Plot forward biased I-V graph. Find reverse saturation current	9
January 2024		Internal Examination & Class for Slow Learners	6
April 2024		End Semester Examination	
		Total Classes	75

NAME OF TEACHER: RUMA BHATTACHARJEE

PAPER ALLOTTED: ELSMIN101T (BASIC ELECTRONICS-I), ELSMIN101P (BASIC ELECTRONICS-I LAB)

Month	Paper	Content	No of classes
August 2023 (08.08.2023)	ELSMIN101T	Unit-II: Network Analysis 11) Network topology and definitions, Mesh analysis, Node analysis. 12) Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum power transfer theorem, inter-conversion of between Thevenin's and Norton's equivalent circuits (for DC circuits), AC circuit analysis using network theorems.	6

	ELSMIN101P	Expt. 1: (i) Verification of equivalent resistance in cases of series and parallel combination of resistors. (ii) Construct an unbalance Wheatstone bridge. Connect a milliammeter to measure source current in the circuit. Connect a load resistance and milliammeter in series connecting the other two junction of the bridge. Vary the load resistance and measure the currents through the two milliammeters. Short the load and measure short-circuit current. Disconnect the load and measure the open circuit voltage and resistance across those two terminals with the power supply replaced by a short-circuit. Verify Thevenin's equivalent circuit, Norton's equivalent circuit and verify Star-Delta equivalence.	9
September 2023	ELSMIN101T	13) Star-Delta transformation Theorem, Delta-Star transformation Theorem. 14) Transient responses of series CR, LR circuits with DC excitation (using differential equation). 15) Power in AC circuits (average power, instantaneous power), Power factor, Phasor diagram, Bode plot, AC analysis of CR, LR, and LCR circuits, Resonance in series and parallel LCR circuits and their frequency responses, Quality factor and bandwidth.	6
	ELSMIN101P	Expt. 2: Introduction to AC source, Introduction to CRO/DSO; Measurement of frequency, amplitude and phase of AC sources; Construct a CR circuit for predefined phase difference and measure phase difference between input and output signals. Expt. 3: (a) Finding capacitance of a capacitor. (b) Finding the phase difference between the current and voltage across the capacitor.	12
	ELSMIN101T	Unit-III: PN Junction Diode and Rectifiers 1) Ideal and practical diodes, formation of depletion layer, Schockley diode equation, I-V characteristics, reverse saturation current, DC load line, static and dynamic resistance. 2) Zener diode and its I-V characteristics, reverse saturation current, Zener and avalanche breakdown, Application of Zener diode as voltage regulation. 3) Half-wave and full-wave centre-tap and bridge rectifiers, expressions for output voltage, PIV, ripple factor and efficiency, Operation with and without shunt capacitor filter.	10
October 2023	ELSMIN101P	Expt. 4: (a) Finding inductance of an inductor. (b) Find the phase difference between the current and voltage across the inductor.	9
19th October to 15th November 2023	PUJA VACATION (19.10.2023 to 15.11.2023)		
November 2023	ELSMIN101P	Expt. 5: Study frequency responses (amplitude of current Vs frequency) of a series LCR circuits. Find the resonance frequency, Q factor and bandwidth for each of these circuits.	6

December 2023	ELSMIN101P	Expt. 6: Study I–V characteristics of PN junction diode. Plot forward biased I–V graph. Find reverse saturation current	9
January 2024		Internal Examination & Class for Slow Learners	6
April 2024		End Semester Examination	
		Total Classes	73