

**DEPARTMENT OF ELECTRONICS**  
**LESSION PLAN**  
**SESSION 2023-24**  
**SEMESTER – V**

**NAME OF TEACHER: DR. ABHIJIT BANERJEE**

**PAPER ALLOTTED: ELSACOR1 1T (MICROPROCESSORS AND  
MICROCONTROLLER), ELSACOR1 1P (MICROPROCESSORS AND  
MICROCONTROLLER LAB)**

Month	Paper	Topic	No of classes
September 2023 (25.09.2023)	ELSACOR11T	<b>Unit-2: Microcontrollers: Introduction, different types of microcontrollers, embedded microcontrollers, processor architectures. Harvard vs. Princeton, CISC vs. RISC architectures, microcontroller memory types, microcontroller features, clocking, I/O pins, interrupts, timers, peripherals.</b>	6
	ELSACOR11P	<ol style="list-style-type: none"> <li>1. Program to transfer a block of data.</li> <li>2. Program for multibyte addition</li> <li>3. Program for multibyte subtraction</li> <li>4. Program to multiply two 8-bit numbers.</li> </ol>	6
October 2023	ELSACOR11T	<p><b>Unit-3: PIC16F887 Microcontroller: Core features, Architecture, pin diagram, memory organization- Program and data memory organization, I/O Ports, oscillator module, Timer modules (Timer 0, Timer 1 and Timer 2), comparator module, analog-to-digital converter (ADC) module, data EEPROM, Enhanced capture/compare/PWM module , EUSART, master synchronous serial port (MSSP) module, special features of the CPU, interrupts, addressing modes, instruction set.</b></p> <p><b>Unit-4: Interfacing to PIC16F887: LED, Switches, Solid State Relay, Seven Segment Display, 16x2 LCD display, 4x4 Matrix Keyboard, Digital to Analog Converter, Stepper Motor and DC Motor.</b></p> <p><b>Interfacing program examples using C language.</b></p>	18
	ELSACOR11P	<ol style="list-style-type: none"> <li>5. Program to divide a 16 bit number by 8 bit number.</li> <li>6. Program to search a given number in a given list.</li> <li>7. Program to generate terms of Fibonacci series.</li> <li>8. Program to find minimum and maximum among N numbers</li> <li>9. Program to find the square root of an integer.</li> <li>10. Program to find GCD of two numbers.</li> <li>11. Program to sort numbers in ascending/descending order.</li> <li>12. Program to verify the truth table of logic gates.</li> </ol>	12
19th October to 15th November 2023	<b>PUJA VACATION (19.10.2023 to 15.11.2023)</b>		
<b>Total Classes</b>			<b>42</b>

**NAME OF TEACHER: DR. PROSENJIT ROY CHOWDHURY**

PAPER ALLOTTED: ELSACOR1 1T (MICROPROCESSORS AND MICROCONTROLLER), ELSACOR1 1P (MICROPROCESSORS AND MICROCONTROLLER LAB)

Month	Paper	Topic	No of classes
September 2023 (25.09.2023)	ELSACOR11T	<b>Unit-1: Introduction to Microprocessor: Introduction, Applications, Basic block diagram, Speed, Word size, Memory capacity, Classification of microprocessors (mention of different microprocessors being used)</b>	4
	ELSACOR11P	<ol style="list-style-type: none"> <li>1. Program to transfer a block of data.</li> <li>2. Program for multibyte addition</li> <li>3. Program for multibyte subtraction</li> <li>4. Program to multiply two 8-bit numbers.</li> </ol>	6
October 2023	ELSACOR11T	<b>Unit-1: Microprocessor 8085: Features, Architecture -block diagram, General purpose registers, register pairs, flags, stack pointer, program counter, types of buses. Multiplexed address and data bus, generation of control signals, pin description of microprocessor 8085. Basic interfacing concepts, Memory mapped I/O and I/O mapped I/O. 8085 Instructions: Operation code, Operand &amp; Mnemonics. Instruction set of 8085, instruction classification, addressing modes, instruction format. Data transfer instructions, arithmetic instructions, increment &amp; decrement instructions, logical instructions, branch instructions and machine control instructions. Assembly language programming examples.</b>	14
	ELSACOR11P	<ol style="list-style-type: none"> <li>5. Program to divide a 16 bit number by 8 bit number.</li> <li>6. Program to search a given number in a given list.</li> <li>7. Program to generate terms of Fibonacci series.</li> <li>8. Program to find minimum and maximum among N numbers</li> </ol>	12
19th October to 15th November 2023	<b>PUJA VACATION (19.10.2023 to 15.11.2023)</b>		
November 2023	ELSACOR11T	<b>Stack operations, subroutine, call and return instructions. Delay loops, use of counters, timing diagrams-instruction cycle, machine cycle, T- states, time delay</b>	6
	ELSACOR11P	<ol style="list-style-type: none"> <li>9. Program to find the square root of an integer.</li> <li>10. Program to find GCD of two numbers.</li> <li>11. Program to sort numbers in ascending/descending order.</li> <li>12. Program to verify the truth table of logic gates.</li> </ol>	12
1st to 3rd Week of Dec 2023	ELSACOR11T	<b>Interrupt structure of 8085A microprocessor, processing of vectored and non-vectored interrupts, latency time and response time; Handling multiple interrupts</b>	4
4th Week of Dec 2023		<b>Internal Examination &amp; Class for Slow Learners</b>	6
Jan 2024	<b>END SEMESTER EXAMINATION</b>		

Total Classes	64
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NAME OF TEACHER: AYAN KANTI PRADHAN

PAPER ALLOTTED: ELSADSE03T (CONTROL SYSTEMS), ELSADSE03P  
(CONTROL SYSTEMS LAB)

Month	Paper	Topic	No of classes
September 2023  (25.09.2023)	ELSADSE03T	<b>Unit-1: Introduction to Control Systems: Open loop and Closed loop control systems, Mathematical modeling of physical systems (Electrical, Mechanical and Thermal), Derivation of transfer function, Armature controlled and field controlled DC servomotors</b>	6
	ELSADSE03P	1. To study characteristics of: a. Synchro transmitter receiver, b. Synchro as an error detector 2. To study position control of DC motor 3. To study speed control of DC motor	6
October 2023	ELSADSE03T	<b>Unit-1: AC servomotors, block diagram representation &amp; signal flow graph, Reduction Technique, Mason's Gain Formula. Effect of feedback on control systems.</b> <b>Unit-2: Time Domain Analysis: Time domain performance criteria, transient response of first, second &amp; higher order systems, steady state errors and static error constants, Performance indices.</b> <b>Concept of Stability: Asymptotic stability and conditional stability, Routh – Hurwitz criterion, relative stability analysis, Root Locus plots and their applications.</b>	18
	ELSADSE03P	4. To find characteristics of AC servo motor 5. To study time response of type 0, 1 and 2 systems 6. To study frequency response of first and second order systems 7. To study time response characteristics of a second order system.	12
19th October to 15th November 2023	<b>PUJA VACATION (19.10.2023 to 15.11.2023)</b>		
November 2023	ELSADSE03T	<b>Unit-3: Frequency Domain Analysis: Correlation between time and frequency response, Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode Plots), gain and phase margins, Nyquist stability criterion, relative stability using Nyquist criterion, constant M &amp; N circles.</b> <b>Unit-4: State Space Analysis: Definitions of state, state variables, state space, representation of systems, Solution of time invariant, homogeneous state equation, state transition matrix and its properties.</b>	20
	ELSADSE03P	8. To study effect of damping factor on performance of second order system 9. To study frequency response of Lead and Lag networks. 10. Study of P, PI and PID controller.	12

1st to 3rd Week of Dec 2023	ELSADSE03T	Unit-4: Controllers and Compensation Techniques: Response with P, PI and PID Controllers, Concept of compensation, Lag, Lead and Lag-Lead networks.	6
4th Week of Dec 2023		Internal Examination & Class for Slow Learners	6
Jan 2024		END SEMESTER EXAMINATION	
Total Classes			86

NAME OF TEACHER: DR. ASWINI KUMAR MALLICK

PAPER ALLOTTED: ELSACOR12T (ELECTROMAGNETICS), ELSACOR12P (ELECTROMAGNETICS LAB), ELSADSE02T (TRANSMISSION LINE, ANTENNA AND WAVE PROPAGATION), ELSADSE02P (TRANSMISSION LINE, ANTENNA AND WAVE PROPAGATION LAB), ELSGDSE02T (ANTENNA THEORY AND WIRELESS NETWORKS)

Month	Paper	Topic	No of classes
September 2023 (25.09.2023)	ELSACOR12T	Unit-1: Vector Analysis: Scalars and Vectors, Vector Algebra, Rectangular (Cartesian) Coordinate System, Vector Components and Unit Vector, Vector Field, Products, Cylindrical Coordinates, Spherical Coordinates, Differential Length, Area and Volume, Line Surface and Volume integrals. Del Operator, Gradient of a Scalar, Divergence and Curl of a Vector, the Laplacian.	6
	ELSACOR12P	1. Understanding and Plotting Vectors. 2. Transformation of vectors into various coordinate systems.	3
	ELSADSE02T	Electromagnetic Wave Propagation: Propagation in Good Conductors, Skin Effect, Reflection of uniform Plane Waves at normal incidence, Plane Wave reflection at Oblique Incidence, Wave propagation in dispersive media, concept of phase velocity and group velocity	6
	ELSADSE02P	1. Program to determine the phasor of forward propagating field 2. Program to determine the instantaneous field of a plane wave 3. Program to find the Phase constant, Phase velocity, Electric Field Intensity and Intrinsic ratio	6
	ELSGDSE02T	Propagation of Radio Waves: Different modes of propagation: Ground waves, Space waves, Space Wave propagation over flat and curved earth, Optical and Radio Horizons, Surface Waves and Troposphere waves, Ionosphere	5
October 2023	ELSACOR12T	Electrostatic Fields: Coulomb's Law and Electric Field, Field due to Discrete and Continuous Charge Distributions, Electric Flux Density, Gauss's Law and Applications, Divergence Theorem and Maxwell's First Equation. Electric Potential, Potential due to a Charge and Charge distribution, Electric dipole. Electric Fields in Conductors, Current and Current Density, Continuity of Current, Metallic Conductor Properties and Boundary Conditions, Method of Images. Dielectric materials, Polarization, Dielectric Constant,	10

		<b>Isotropic and Anisotropic dielectrics, Boundary conditions, Capacitance and Capacitors. Electrostatic Energy and Forces.</b>	
	<b>ELSACOR12P</b>	<b>3. 2D and 3D Graphical plotting with change of view and rotation. 4. Representation of the Gradient of a scalar field, Divergence and Curl of Vector Fields. 5. Plots of Electric field and Electric Potential due to charge distributions. 6. Plots of Magnetic Flux Density due to current carrying wire.</b>	<b>12</b>
	<b>ELSadSE02T</b>	<b>Waveguides and Waveguide Devices: Wave propagation in waveguides, Parallel plate waveguides, TEM, TM and TE modes, Rectangular waveguides, circular waveguides, Power transmission and attenuation, Rectangular cavity resonators, directional couplers, isolator, circulator.</b>	<b>10</b>
	<b>ELSadSE02P</b>	<b>4. Program to find skin depth, loss tangent and phase velocity 5. Program to determine the total voltage as a function of time and position in a loss less transmission line 6. Program to find the characteristic impedance, the phase constant and the phase velocity 7. Program to find the output power and attenuation coefficient 8. Program to find the power dissipated in the lossless transmission line 9. Program to find the total loss in lossy lines</b>	<b>12</b>
	<b>ELSGDSE02T</b>	<b>Wave propagation in the Ionosphere. Critical Frequency, Maximum usable frequency (MUF), Skips distance. Virtual height. Radio noise of terrestrial and extraterrestrial origin. Elementary idea of propagation of waves used in Terrestrial mobile communications.  WIRELESS NETWORKS: Introduction: History of wireless communication, Wireless Generation and Standards, Cellular and Wireless Systems, Current Wireless Systems, Cellular Telephone Systems, Wide Area Wireless Data Services, Broadband Wireless Access, Satellite Networks, Examples of Wireless Communication Systems. Idea about Global Mobile communication system.</b>	<b>14</b>
<b>19th October to 15th November 2023</b>	<b>PUJA VACATION (19.10.2023 to 15.11.2023)</b>		
<b>November 2023</b>	<b>ELSACOR12T</b>	<b>Unit-2: Poisson's Equation and Laplace's Equation: Derivation of Poisson's and Laplace's equation, Uniqueness Theorem, Examples of Solution of Laplace's Equation: Cartesian, Cylindrical and Spherical Coordinates. Magnetostatics: BiotSavert's law and Applications, Magnetic dipole, Ampere's Circuital Law, Curl and Stoke's Theorem, Maxwell's Equation, Magnetic Flux and Magnetic Flux Density, Scalar and Vector Magnetic Potentials. Magnetization in Materials and Permeability, Anisotropic materials, Magnetic Boundary Conditions, Inductors and Inductances, Magnetic Energy, Magnetic Circuits. Inductances and Inductors, Magnetic Energy, Forces and Torques. Unit-3: Time-Varying Fields and Maxwell's Equations: Faraday's Law of Electromagnetic Induction, Stationary Circuit in Time-Varying Magnetic Field, Transformer and Motional EMF,</b>	<b>18</b>

		<b>Displacement Current, Maxwell's Equations in differential and integral form and Constitutive Relations. Potential Functions, Lorentz gauge and the Wave Equation for Potentials, Concept of Retarded Potentials. Electromagnetic Boundary Conditions. Time-Harmonic Electromagnetic Fields and use of Phasors.</b>	
	<b>ELSACOR12P</b>	<b>7. Programs and Contour Plots to illustrate Method of Images 8. Solutions of Poisson and Laplace Equations – contour plots of charge and potential distributions</b>	<b>12</b>
	<b>ELSADSE02P</b>	<b>10. Program to find the load impedance of a slotted line 11. Program to find the input impedance for a line terminated with pure capacitive impedance 12. Program to determine the operating range of frequency for TE<sub>10</sub> mode of air filled rectangular waveguide 13. Program to determine Directivity, Bandwidth, Beamwidth of an antenna</b>	<b>12</b>
	<b>ELSGDSE02T</b>	<b>Unit-2: Modern Wireless Communication Systems: Second Generation (2G) Cellular Networks, Third Generation (3G) Wireless Networks, Wireless Local Loop (WLL), Wireless Local Area Networks (WLANs), Bluetooth and Personal Area Networks (PANs). Idea about Wi-Fi, 4G and LTE, and 5G. Cellular Concept and System Design Fundamentals: Cellular Concept and Cellular System Fundamentals, Frequency Reuse, Channel Assignment Strategies, Handoff strategies, Interference and System Capacity, Trunking and Grade of Service.</b>	<b>12</b>
<b>1st to 3rd Week of Dec 2023</b>	<b>ELSACOR12T</b>	<b>Unit-4: Electromagnetic Wave Propagation: Time- Harmonic Electromagnetic Fields and use of Phasors, the Electromagnetic Spectrum, Wave Equation in a source free isotropic homogeneous media, Uniform Plane Waves in Lossless and Lossy unbounded homogeneous media, Wave Polarization, Phase and Group velocity, Flow of Electromagnetic Power and Poynting Vector. Uniform Plane wave incident on a Plane conductor boundary, concept of reflection and standing wave. Guided Electromagnetic Wave Propagation: Waves along Uniform Guiding Structures, TEM, TE and TM waves, Electromagnetic Wave Propagation in Parallel Plate and Rectangular Metallic Waveguides.</b>	<b>18</b>
	<b>ELSACOR12P</b>	<b>9. Introduction to Computational Electromagnetics: Simple Boundary Value Problems by Finite Difference/Finite Element Methods</b>	<b>6</b>
	<b>ELSADSE02P</b>	<b>14. Program to determine diameter of parabolic reflector 15. Program to find out minimum distance between primary and secondary antenna</b>	<b>6</b>
	<b>ELSGDSE02T</b>	<b>Improving Coverage &amp; Capacity in Cellular Systems. Cell Splitting and Sectoring. Cellular Systems design Considerations (Qualitative idea only).</b>	<b>6</b>
<b>4th Week of Dec 2023</b>		<b>Internal Examination &amp; Class for Slow Learners</b>	<b>6</b>
<b>Jan 2024</b>		<b>END SEMESTER EXAMINATION</b>	
<b>Total Classes</b>			<b>180</b>

**NAME OF TEACHER: RUMA BHATTACHARJEE**

**PAPER ALLOTTED: ELSADSE02T (TRANSMISSION LINE, ANTENNA AND WAVE PROPAGATION), ELSGDSE02T (ANTENNA THEORY AND WIRELESS NETWORKS), ELSGDSE02P (TUTORIAL)**

Month	Paper	Topic	No of classes
September 2023 (25.09.2023)	ELSadSE02T	<b>Unit-2: Transmission Lines: Typical Transmission lines- Co-axial, Two Wire, Microstrip, Coplanar and Slot Lines, Transmission Line Parameters,</b>	<b>04</b>
	ELSGDSE02T	<b><u>Unit 1: Antenna theory</u> Introduction, Types of Antenna, EMFT, Maxwell's equations and applications.</b>	<b>03</b>
October 2023	ELSadSE02T	<b>Unit-2: Transmission Line Equations, Wave propagation in Transmission lines, lowloss, lossless line, Distortionless line, Input Impedence, Standing Wave Ratio Power. and lossy lines, Shorted Line, Open-Circuited Line, Matched Line, Smith Chart, Transmission Line Applications.</b>	<b>10</b>
	ELSGDSE02T	<b><u>Unit 1: Antenna theory</u> Antenna Parameters.</b>	<b>03</b>
19th October to 15th November 2023		<b>Puja vacation (19.10.2023 to 15.11.2023)</b>	
November 2023	ELSadSE02T	<b>Radiation of electromagnetic waves: Concept of retarded potentials, Antenna Parameters: Radiation Mechanism, Current Distribution on a Thin Wire Antenna, Radiation Pattern, Radiation Power Density, Radiation Intensity, Beamwidth, Directivity, Antenna Efficiency, Gain, Beam Efficiency, Bandwidth, Polarization, Input Impedance Antenna Radiation Efficiency, Effective Length and Equivalent Areas, Maximum Directivity and Maximum Effective Area, Friis Transmission Equation and Radar Range Equation.</b>	<b>12</b>
	ELSGDSE02T	<b><u>Unit 1: Antenna theory</u> Antenna as a Transmitter/Receiver Radiation from an infinitesimal small current element, Hertzian dipole</b>	<b>04</b>
1st to 3rd Week of Dec 2023	ELSadSE02T	<b>Types of Antenna: Hertzian dipole, Half wave dipole, Quarter-wave dipole, Yagi-Uda, microstrip, Parabolic antenna, Helical antenna, Antenna array.</b>	<b>5</b>
	ELSGDSE02T	<b><u>Unit 1: Antenna theory</u> Half wave dipole antenna. Radiating wire structures: Monopole, Folded dipole Antenna. Loop, Biconical broadband Antenna , Patch Antenna</b>	<b>02</b>

<b>4th Week of Dec 2023</b>		<b>Internal Examinations and class of slow learners</b>	<b>02</b>
<b>January 2024</b>		<b>END SEMESTER EXAMINATION</b>	
<b>Total classes</b>			<b>45</b>