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

NAME OF TEACHER: DR. SUBHRO GHOSAL

PAPER ALLOTTED: ELSACOR06T (DIGITAL ELECTRONICS), ELSACOR06P (DIGITAL ELECTRONICS LAB)

Month	Paper	Topic	No of classes
September 2023 **(25.09.2023)**	**ELSACOR06T**	**Unit-1: Number System and Codes: Decimal, Binary, Hexadecimal and Octal number systems, base conversions, Binary, octal and hexadecimal arithmetic (addition, subtraction by complement method, multiplication), representation of signed and unsigned numbers, Binary Coded Decimal code.**	**6**
	ELSACOR06P	**1. To verify and design AND, OR, NOT and XOR gates using NAND gates.** **2. To convert a Boolean expression into logic gate circuit and assemble it using logic gate IC's.**	**6**
October 2023	**ELSACOR06T**	**Unit-1: Logic Gates and Boolean algebra: Introduction to Boolean Algebra and Boolean operators, Truth Tables of OR, AND, NOT, Basic postulates and fundamental theorems of Boolean algebra, Truth tables, construction and symbolic representation of XOR, XNOR, Universal (NOR and NAND) gates.** **Digital Logic families: Fan-in, Fan out, Noise Margin, Power Dissipation, Figure of merit, Speed power product, TTL and CMOS families and their comparison.** **Unit-2:Combinational Logic Analysis and Design: Standard representation of logic functions (SOP and POS), Karnaugh map minimization, Encoder and Decoder, Multiplexers and Demultiplexers, Implementing logic functions with multiplexer, binary Adder, binary subtractor, parallel adder/subtractor.**	**16**
	ELSACOR06P	**3. Design a Half and Full Adder.** **4. Design a Half and Full Subtractor.** **5. Design a seven segment display driver.** **6. Design a 4 X 1 Multiplexer using gates.**	**12**
19th October to 15th November 2023		**PUJA VACATION** **(19.10.2023 to 15.11.2023)**	
November 2023	**ELSACOR06T**	**Unit-2:Combinational Logic Analysis and Design; Karnaugh map minimization, Encoder and Decoder, Multiplexers and Demultiplexers, Implementing logic functions with multiplexer, binary Adder, binary subtractor, parallel adder/subtractor.**	**18**

		Unit-3:Sequential logic design: Latches and Flip flops , S-R Flip flop, J-K Flip flop, T and D type Flip flop, Clocked and edge triggered Flip flops, master slave flip flop, Registers, Counters (synchronous and asynchronous and modulo-N), State Table, State Diagrams, counter design using excitation table and equations. , Ring counter and Johnson counter.tandard representation of logic functions (SOP and POS),	
	ELSACOR06P	**7. To build a Flip- Flop Circuits using elementary gates. (RS, Clocked RS, D-type).** **8. Design a counter using D/T/JK Flip-Flop.** **9. Design a shift register and study Serial and parallel shifting of data.**	**12**
1st to 3rd Week of Dec 2023	**ELSACOR06T**	**Programmable Logic Devices: Basic concepts- ROM, PLA, PAL, CPLD, FPGA**	**4**
4th Week of Dec 2023		**Internal Examination & Class for Slow Learners**	**6**
January 2024		**End Semester Examination**	
		Total Classes	**80**

Name of Teacher: **Dr. Prosenjit Roy Chowdhury**

Paper Allotted: ELSACOR05T (Electronic circuits), ELSACOR05P (Electronic circuits Lab), ELSSSEC01M (PCB Design), ELSGCOR03T (Communication electronics), ELSGCOR03P (Electronic circuits Lab)

Month	Paper	Topic	No of classes
September 2023 **(25.09.2023)**	**ELSACOR05T**	**Diode Circuits: Ideal diode, piecewise linear equivalent circuit, dc load line analysis, Quiescent (Q) point. Clipping and clamping circuits. Rectifiers: HWR, FWR (center tapped and bridge). Circuit diagrams, working and waveforms, ripple factor & efficiency, comparison. Filters: types, circuit diagram and explanation of shunt capacitor filter with waveforms. Zener diode regulator circuit diagram and explanation for load and line regulation, disadvantages of Zener diode regulator.**	**6**
	ELSACOR05P	**1. Study of the half wave rectifier and Full wave rectifier.** **2. Study of power supply using C filter and Zener diode.** **3. Designing and testing of 5V/9 V DC regulated power supply and find its load-regulation**	**6**
	ELSSSEC01M	**PCB Fundamentals: PCB Advantages, components of PCB, Electronic components, Microprocessors and Microcontrollers, IC's, Surface Mount Devices (SMD).** **Classification of PCB - single, double, multilayer and flexible boards, Manufacturing of PCB, PCB standards.**	**4**

	ELSGCOR03T	**Unit-1: Electronic communication: Introduction to communication – means and modes. Need for modulation. Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI). Electromagnetic communication spectrum, band designations and usage. Channels and base-band signals. Concept of Noise, signal-to-noise (S/N) ratio.**	**5**
	ELSGCOR03P	**1. To design an Amplitude Modulator using Transistor 2. To study envelope detector for demodulation of AM signal 3. To study FM - Generator and Detector circuit**	**6**
October 2023	**ELSACOR05T**	**Bipolar Junction Transistor: Review of CE, CB Characteristics and regions of operation. Hybrid parameters. Transistor biasing, DC load line, operating point, thermal runaway, stability and stability factor, Fixed bias without and with RE, collector to base bias, voltage divider bias and emitter bias (+VCC and –VEE bias), circuit diagrams and their working. Transistor as a switch, circuit and working, Darlington pair and its applications.BJT amplifier (CE), dc and ac load line analysis, hybrid model of CE configuration, Quantitative study of the frequency response of a CE amplifier, Effect on gain and bandwidth for Cascaded CE amplifiers (RC coupled). Feedback Amplifiers: Concept of feedback, negative and positive feedback, advantages and disadvantages of negative feedback, voltage (series and shunt), current (series and shunt) feedback amplifiers, gain, input and output impedances . Barkhausen criteria for oscillations, Study of phase shift oscillator, Colpitts oscillator and Hartley oscillator.**	**18**
	ELSACOR05P	**4. Study of clipping and clamping circuits . 5. Study of Fixed Bias, Voltage divider and Collector-to-Base bias Feedback configuration for transistors. 6. Designing of a Single Stage CE amplifier. 7. Study of Class A, B and C Power Amplifier.**	**12**
	ELSSSEC01M	**Schematic & Layout Design: Schematic diagram, General, Mechanical and Electrical design considerations, Placing and Mounting of components, Conductor spacing, routing guidelines, heat sinks and package density, Net list, creating components for library, Tracks, Pads, Vias, power plane, grounding.**	**9**
	ELSGCOR03T	**Unit 2: Analog Modulation: Amplitude Modulation, modulation index and frequency spectrum. Generation of AM (Emitter Modulation), Amplitude Demodulation (diode detector), Concept of Single side band generation and detection. Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM using VCO, FM detector (slope detector), Qualitative idea of Super heterodyne receiver**	**12**

	ELSGCOR03P	**4. To study AM Transmitter and Receiver 5. To study FM Transmitter and Receiver 6. To study Time Division Multiplexing (TDM) 7. To study Pulse Amplitude Modulation (PAM)**	**12**
19th October to 15th November 2023		**PUJA VACATION (19.10.2023 to 15.11.2023)**	
November 2023	**ELSACOR05T**	**MOSFET Circuits: Review of Depletion and Enhancement MOSFET, Biasing of MOSFETs, Small Signal Parameters, Common Source amplifier circuit analysis, CMOS circuits. Power Amplifiers: Difference between voltage and power amplifier, classification of power amplifiers, Class A, Class B, Class C and their comparisons.Operation of a Class A single ended power amplifier. Operation of Transformer coupled Class A power amplifier, overall efficiency. Circuit operation of complementary symmetry Class B push pull power amplifier, crossover distortion, heat sinks.**	**18**
	ELSACOR05P	**8. Study of the Colpitt's Oscillator. 9. Study of the Hartley's Oscillator. 10. Study of the Phase Shift Oscillator 11. Study of the frequency response of Common Source FET amplifier.**	**12**
	ELSSSEC01M	**Technology OF PCB: Design automation, Design Rule Checking; Exporting Drill and Gerber Files; Drills; Footprints and Libraries Adding and Editing Pins, copper clad laminates materials of copper clad laminates, properties of laminates (electrical & physical), types of laminates, soldering techniques. Film master preparation, Image transfer, photo printing, Screen Printing, Plating techniques etching techniques, Mechanical Machining operations, Lead cutting and Soldering Techniques, Testing and quality controls.. PCB Technology: Trends, Environmental concerns in PCB industry.**	**12**
	ELSGCOR03T	**Analog Pulse Modulation: Channel capacity, Sampling theorem, Basic Principles-PAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing. Digital Pulse Modulation: Need for digital transmission, Pulse Code Modulation, Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), and Binary Phase Shift Keying (BPSK).**	**14**
	ELSGCOR03P	**8. To study Pulse Width Modulation (PWM) 9. To study Pulse Position Modulation (PPM) 10. To study ASK, PSK and FSK modulators**	**12**
1st to 3rd Week of Dec 2023	**ELSACOR05T**	**Single tuned amplifiers: Circuit diagram, Working and Frequency Response for each, Limitations of single tuned amplifier, Applications of tuned amplifiers in communication circuits.**	**6**

4th Week of Dec 2023		**Internal Examination & Class for Slow Learners**	**6**
January 2024		**End Semester Examination**	
		Total Classes	**170**

Name of Teacher: Ayan Kanti Pradhan

Paper Allotted: ELSACOR07T (C Programming), ELSACOR07P (C Programming Lab), ELSGCOR03T (Communication Electronics), ELSGCOR03P (Communication Electronics Lab)

Month	Paper	Topic	No of classes
September 2023 **(25.09.2023)**	**ELSACOR07T**	**Unit-1: C Programming Language: Introduction, Importance of C, Character set, Tokens, keywords, identifier, constants, basic data types, variables: declaration & assigning values. Structure of C program** **Arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, bit wise operators, expressions and evaluation of expressions, type cast operator, implicit conversions, precedence of operators. Arrays-concepts, declaration, accessing elements, storing elements, two-dimensional and multi-dimensional arrays. Input output statement and library functions (math and string related functions).**	**6**
	ELSACOR07P	**1. Generate the Fibonacci series up to the given limit N and also print the number of elements in the series.** **2. Find minimum and maximum of N numbers.** **3. Find the GCD of two integer numbers.** **4. Calculate factorial of a given number.** **5. Find all the roots of a quadratic equation Ax2 + Bx + C = 0 for non – zero coefficients A, B and C. Else report error.**	**6**
	ELSGCOR03T	**Unit-4: Introduction to Communication and Navigation systems: Satellite Communication– Introduction, need, Geosynchronous satellite orbits, geostationary satellite advantages of geostationary satellites.**	**4**
	ELSGCOR03P	**1. To design an Amplitude Modulator using Transistor** **2. To study envelope detector for demodulation of AM signal** **3. To study FM - Generator and Detector circuit**	**6**
October 2023	**ELSACOR07T**	**Unit-2: Decision making, branching & looping: Decision making, branching and looping: if, if-else, else-if, switch statement, break, for loop, while loop and do loop. Functions: Defining functions, function arguments and passing, returning values from functions.** **Structures: defining and declaring a structure variables, accessing structure members, initializing a structure, copying and comparing structure variables, array of structures, arrays**	**19**

		within structures, structures within structures, structures and functions. Pointers. Introduction to C++: Object oriented programming, characteristics of an object-oriented language.	
	ELSACOR07P	6. Calculate the value of sin (x) and cos (x) using the series. Also print sin (x) and cos (x) value using library function. 7. Generate and print prime numbers up to an integer N. 8. Sort given N numbers in ascending order. 9. Find the sum & difference of two matrices of order MxN and PxQ. 10. Find the product of two matrices of order MxN and PxQ. 11. Find the transpose of given MxN matrix. 12. Find the sum of principle and secondary diagonal elements of the given MxN matrix. 13. Calculate the subject wise and student wise totals and store them as a part of the structure.	12
	ELSGCOR03T	Unit-4: Satellite visibility, transponders (C - Band), path loss, ground station, simplified block diagram of earth station. Uplink and downlink. Mobile Telephony System – Basic concept of mobile communication, frequency bands used in mobile communication, concept of cell sectoring and cell splitting, SIM number,	10
	ELSGCOR03P	4. To study AM Transmitter and Receiver 5. To study FM Transmitter and Receiver 6. To study Time Division Multiplexing (TDM) 7. To study Pulse Amplitude Modulation (PAM)	12
19th October to 15th November 2023		PUJA VACATION (19.10.2023 to 15.11.2023)	
November 2023	ELSACOR07T	Unit-3: Data Structures: Definition of stack, array implementation of stack, conversion of infix expression to prefix, postfix expressions, evaluation of postfix expression. Definition of Queue, Circular queues, Array implementation of queues. Linked List and its implementation, Link list implementation of stack and queue, Circular and doubly linked list. Unit-4: Searching and sorting: Insertion sort, selection sort, bubble sort, merge sort, linear Search, binary search. Trees	20
	ELSACOR07P	14. Maintain an account of a customer using classes. 15. Implement linear and circular linked lists using single and double pointers. 16. Create a stack and perform Pop, Push, Traverse operations on the stack using Linear Linked list 17. Create circular linked list having information about a college and perform Insertion at front, Deletion at end. 18. Create a Linear Queue using Linked List and implement different operations such as Insert, Delete, and Display the	12

		queue elements. 19. Implement polynomial addition and subtraction using linked lists. 20. Implement sparse matrices using arrays and linked lists. 21. Create a Binary Tree to perform Tree traversals (Preorder, Postorder, Inorder) using the concept of recursion.	
	ELSGCOR03T	Unit-4: IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitative only). GPS navigation system (qualitative idea only)	10
	ELSGCOR03P	8. To study Pulse Width Modulation (PWM) 9. To study Pulse Position Modulation (PPM) 10. To study ASK, PSK and FSK modulators	12
1st to 3rd Week of Dec 2023	ELSACOR07T	Unit-4: Introduction to trees, Binary search tree, Insertion and searching in a BST, preorder, postorder and inorder traversal (recursive)	5
	ELSACOR07P	22. Implement binary search tree using linked lists. Compare its time complexity over that of linear search. 23. Implement Insertion sort, Merge sort, Bubble sort, Selection sort.	6
4th Week of Dec 2023		Internal Examination & Class for Slow Learners	6
January 2024		End Semester Examination	
		Total Classes	146

Name of Teacher: Dr. Aswini Kumar Mallick

Paper Allotted: ELSACOR06T (Digital Electronics and Verilog/VHDL), ELSACOR06P (Digital Electronics and Verilog/VHDL Lab)

Month	Paper	Topic	No of classes
September 2023 (25.09.2023)	ELSACOR06T	Unit-4: Introduction to VHDL: A Brief History of HDL, Structure of HDL Module, Comparison of VHDL and Verilog, Introduction to Simulation and Synthesis Tools, Test Benches. VHDL Modules, Delays, data flow style, behavioural style, structural style, mixed design style, simulating design.	6
	ELSACOR06P	1. Write code to realize basic and derived logic gates. 2. Half adder, Full Adder using basic and derived gates. 3. Half subtractor and Full Subtractor using basic and derived gates.	6
October 2023	ELSACOR06T	Unit-4: Introduction to Language Elements, Keywords, Identifiers, White Space Characters, Comments, format. VHDL terms, describing hardware in VHDL, entity, architectures, concurrent signal assignment, event scheduling, statement	12

		concurrency, structural designs, sequential behaviour, process statements, process declarative region, process statement region, process execution, sequential statements, architecture selection, configuration statements, power of configurations. Behavioural Modelling: Introduction to behavioural modelling, inertial delay, transport delay , inertial delay model, transport delay model, transport vs inertial delay, simulation delta drivers, driver creation, generics, block statements, guarded blocks.	
	ELSACOR06P	**4. Clocked D FF, T FF and JK FF (with Reset inputs). 5. Multiplexer (4x1, 8x1) and Demultiplexer using logic gates. 6. Decoder (2x4, 3x8), Encoders and Priority Encoders. 7. Design and simulation of a 4 bit Adder.**	**12**
19th October to 15th November 2023		**PUJA VACATION (19.10.2023 to 15.11.2023)**	
November 2023	**ELSACOR06T**	**Unit-4: Sequential Processing: Process statement, sensitivity list, signal assignment vs variable assignment, sequential statements, IF, CASE ,LOOP, NEXT, ,EXIT and ASSERT statements, assertion BNF, WAIT ON signal, WAIT UNTIL expression, WAIT FOR time expression, multiple wait conditions, WAIT Time-Out, Sensitivity List vs WAIT Statement Concurrent Assignment, Passive Processes.**	**12**
	ELSACOR06P	**8. Code converters (Binary to Gray and vice versa). 9. 2 bit Magnitude comparator. 10. 3 bit Ripple counter.**	**12**
1st to 3rd Week of Dec 2023	**ELSACOR06T**	**Unit-4: Data types: Object types-signal, variable, constant, Data types –scalar types, composite types, incomplete types, File Type caveats, subtypes, Subprograms and functions**	**6**
4th Week of Dec 2023		**Internal Examination & Class for Slow Learners**	**6**
January 2024		**End Semester Examination**	
		Total Classes	**72**

NAME OF TEACHER: RUMA BHATTACHARJEE

PAPER ALLOTTED: ELSGCOR03P (COMMUNICATION ELECTRONICS LAB)

Month	Paper	Topic	No of classes
September 2023 (25.09.2023)	**ELSGCOR03P**	**EXPERIMENT NO. 01** **To design an Amplitude Modulator using transistor.** **EXPERIMENT NO. 02** **To study envelop detector for demodulation of AM signal.** **EXPERIMENT NO. 03** **To study FM-Generator and Detector circuit.**	**04**
October 2023	**ELSGCOR03P**	**EXPERIMENT NO. 04** **To study AM Transmitter and Receiver.** **EXPERIMENT NO. 05** **To study FM Transmitter and Receiver** **EXPERIMENT NO. 06** **To study Time Division Multiplexing (TDM).**	**04**
19th October to 15th November 2023		**Puja vacation** **(19.10.2023 to 15.11.2023)**	
November 2023	**ELSGCOR03P**	**EXPERIMENT NO. 07** **To study Pulse Amplitude Modulation (PAM).** **EXPERIMENT NO. 08** **To study Pulse Width Modulation (PWM).** **EXPERIMENT NO. 09** **To study Pulse Position Modulation (PPM).**	**04**
1st to 3rd Week of Dec 2023		**EXPERIMENT NO. 10** **To study ASK, PSK and FSK modulators.**	**01**
4th Week of Dec 2023		**Internal Examinations.**	**01**
January 2024		**END SEMESTER EXAMINATION**	
Total classes			**14**