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M. Visvesvaraya Marg, Indore, Madhya Pradesh 452003 www.sgsits.ac.in

Department Of Electronics &Instrumentation Engineering

LESSON PLAN

Course Name & Course Code: Circuits Analysis & Synthesis EI-27001 (JULY-DEC 2023)

S.No.	UNIT	CONTENT TO BE COVERED		LECTURE NO	Remark
1	GEN	DISCUSSION ABOUT SUBJECT NOMENCULTURE		1	
2	1	IDEAL NON IDEAL SOURCES		2	
3		DEPENDENT SOURCES		3	
4		SOURCE TRANSFORMATION		4	
5	2	SUPERPOSITION THEOREM PROBLEMS		5	
6		THEVENIN-NORTONS THEOREM		6	
7	3	FREQ. RESPONSE SELECTIVE NETWORK		7	
8	5	STEP INPUT TO INTEGRATOR CIRCUIT		8	
9	3	AC FUNDAMENTALS. COUPPLED CIRCUIT		9	
10		THEVENIN-NORTONS PROBLEM OF COUPPLED CIRCUIT		10	
11	5	STEP INPUT TO DIFFRENCIATOR CIRCUIT		11	
					CT- 1
12		INITIAL VALUE IN CIRUCIT ALIMENTS CONCEPT OF DUALITY		12	
13		FIRST AND SECOND DARIVATIVE OF INTIAL VALUES		13	
14		PROBLEM ON CIRCUIT TRANSAINTS		14	
15		TIME CONSTANT & SOLUTION TO FIRST ORDER CIRCUITS		15	
16	4	TWO PORT PARAMETERS (Z-Y-h) & IT'S INVERSE		16	
17		TWO PORT PARAMETERS PROBLEMS		17	
18		CONDITON OF RACIPROCITY AND SYMMETRY (TWO PORT)		18	
19		APPLICATION OF TWO PORT PARAMETER		19	
20		SERIES AND PARALLEL TWO PORT NETWORK AND PROBLEMS		20	
21	3	DAMPING ANALYSIS. STEP INPUT TO SERIES RLC CIRCUIT.		21	
22	2	RECEPROCITY THEOREM		22	
					QUIZ

23	**3**	**SERIES AND PARALLEL RESONANCE.**		**23**	
24	**5**	**PROPERTIES OF LAPLACE RANSFORM**		**24**	
25		**APPLICATION OF LAPLACE TRANSFORM**		**25**	
					CT-2
26	**4**	**POLES AND ZEROS , PR FUNCITONS**		**26**	
27		**CAUER FIRST AND SECOND FORM OF NETWORK SYNTHESIS**		**27**	
28	**2**	**3-PH NETWORK AND PHESOR DIAGRAM. AC POWERS**		**28**	
29		**TELLEGEN'S THEOREM**		**29**	
30	**1**	**POWER AND ENERY RELETION**		**30**	
31	**3**	**RLC CIRCUITS AND DAMPING**		**31**	
32	**1**	**BASIC OF GRAPH THEORY**		**32**	
33	**2**	**COMPENSATION THEOREM**		**33**	
34		**MIILER 'S THEOREM**		**34**	
35	**ALL**	**RIVISIONOF FULL SYLLEBUS**			**REMEDIAL CLASSES 6-8 NOV 23**

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Department Of Electronics & Instrumentation Engineering

LESSON PLAN- July-Dec-2023

Course Name & Course Code: EI 27002- FUNDAMENTALS OF MEASUREMENT

S.No.	Content to be Covered	Unit	Lecture no.	Remark
1	Fundamental methods of measurement,	I	1	
2	Classification of measuring instruments,	I	2	
3	Static and dynamic characteristics,	I	2-5	
4	Error classification and analysis,	I	6	
5	Standards for displacement, force, time	I	7	
6	Standards for frequency, temperature	I	8	
7	Electrical standards, IEEE standards	I	9	
8	Construction and operation	II	10	
9	Measurement of amplitude, phase and frequency with CRO,	II	11	
10	Lissajous patterns.	II	12	
11	Fundamentals of EMI, RF measurement techniques,	II	13-14	
12	Network analysers	II	15	
13	Noise reduction techniques	II	16	
14	Compatibility of measuring instruments	II	17	
15	Analog indicating type instrument based on various operating principles, ammeters, voltmeters, ohmmeters	III	18-21	
16	Extension of instrument range,	III	22-23	
17	Measurement of low resistances Voltage, current, phase, frequency, power and energy	IV	24-26	
18	Q factor, resistance, noise etc.,	IV	27	
19	Testing of measuring instruments	IV	28	
20	A.C bridges for measurement of inductance	V	29	
22	Measurement of capacitance	V	30	
2	Q factor and loss angle	V	31	
25	Universal impedance bridge	V	32	
26	Design aspects of digital multimeter	V	33	
27	Design aspects and panel meters.	V	34	
28	Distortion and spectrum analysis	V	35	

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Department of Electronics and Instrumentation Engineering

LECTURE PLAN

(July-Dec-2023)

Subject Name & Subject Code: EI27003-ELECTRONICS DEVICES & CIRCUITS

Sr.	Unit No	Topics to be covered	Lecture No	Remarks
1.	I	Semiconductor theory-Review, Compound semiconductor, types and applications, Mass-action law	**01**	
2.		Diffusion current, drift current, relation, continuity equation	**02**	
3.		Hall effect, derivation and numerical.	**03**	
4.		Pn junction, theory, characteristics, diode equation and numerical, Diode capacitances, resistances	**04**	
5.		Types of diodes: Zener, tunnel, varactor, LED, Photo diode, operation, applications	**05**	
6.	II	Modelling of diode, Clippers and Clampers.	**06**	
7.		Rectifiers: HWR, FWCTR, Bridge, analysis, numerical and applications, comparison	**07-08**	
8.		BJT, construction, operation Configuration-CB, CE, CC, current gain-alpha, beta, gamma, input-output characteristics, operating point(Q), DC load line	**9-10 & 11**	
9.		Biasing of BJT: types stabilization of Q-point, methods, thermal runaway, numericals etc	**12, 13**	
10.	III	Millers' theorem and its dual, numerical, BJT Modelling: Ebers Moll model, Hybrid parameter model	**14, 15, 16**	
11.		BJT amplifier: CE amplifier: analysis of gain, input impedance, output impedance, calculations of h-parameters: hie, hoe, hfe & hoe	**17, 18, 19**	
12.		Cascode amplifier, Darlington pair, bootstrapping, FET as VVR	**20, 21**	
13.		FET, JFET, pinch off, comparison with BJT, FET configuration	**22, 23**	
14.	IV	MOSTFET: construction, operation, VI characteristics.	**24, 25**	
15.		Threshold voltage, Pinch-off condition, Derivation of drain current in linear, saturation region.	**26, 27**	
16.		Channel length modulation and its equation for drain current, body effect, numerical.	**28, 29**	
17.		MOS capacitors: oxide and junction related capacitances Short channel MOS: effects- drain punch through, DIBL, velocity saturation, hot electron, sub threshold current.	**30, 31**	
18.	V	IC fabrications process: oxidation, diffusion, ion implantation, Photolithography	**32, 33**	
19.		Introduction to power electronics devices: SCR construction, operation and VI characteristics, UJT	**34, 35**	

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Department of Electronics and Instrumentation Engineering

LECTURE PLAN

(July-Dec-2023)

Subject Name & Subject Code: EI27006-DIGITAL ELECTRONICS

S. No	Unit No	Topic to be Covered	Lectures No.	Remark
1	I	Boolean Algebra and laws De- Morgan's - Boolean expression. NAND and NOR realization.	1	
2		Minimization of Boolean expressions- Minterm-Maxterm - Sum of Products (SOP) Product of Sums (POS) Karnaugh map Minimization (4,5 Variable)	2,3,4	
3		Quine-Mc-Cluskey method of minimization. (Tabulation method)	5,6	
4	II	Design procedure Half adder Full Adder Half subtractor Full subtractor	7	
5		Parallelbinary adder, Fast Adder - Carry Look Ahead adder	8	
6		Multiplexer/Demultiplexer, decoder, encoder (Boolean function implementation)	9,10	
7		Parity checker code converters - Binary to Grey and Grey to Binary, Magnitude Comparator.	11,12	
8	III	Latches, Flip-flops - SR, JK, D, T, and Master-Slave Characteristic table and equation Application table	13,14	
9		Master and Slave flip flop, Edge triggeringLevel Triggering Realization of one flip flop using other flip flops	15	
10		Asynchronous Up/Down counter - Synchronous counters Synchronous Up/Down counters	16	
11		Design of Synchronous counters: state diagram-State table State minimization State assignment - Excitation table and maps Circuit implementation (Modulo n counter)	17,18,19	
12		Registers shift registers - Universal shift registers Shift register counters Ring counter, Johnson Counter-Shift counters	20,21	
13	IV	Introduction of memory, Memory architecture, Classification of memories: ROM - ROM organization - PROMEPROM EEPROM, EAPROM	22	

14		RAM, RAM organization, Write operation, Read operation. Static RAM Cell-Bipolar RAM cell, MOSFET RAM cell Dynamic RAM cell	23,24	
15		Implementation of combinational logic circuits using ROM, PLA, PAL.	25,26,27	
16	**V**	Synchronous Sequential Circuits: General Model Classification	28	
17		Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits	29,30	
18		State reduction technique. Table method & Merger graph method	31,32	
19		Designing of hazard free switching circuits.	33	

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LECTURE PLAN

(July-Dec-2023)

Subject Name & Subject Code: EI37006-MICROPROCESSOR SYSTEMS

S. No	Unit	Name of Topic	Lectures no.	Remark
1	I	Introduction: Evolution of Microprocessors, organization of Microcomputers, Types of microprocessors	1	
2		8085 Microprocessor Architecture, arithmetic logic unit and control unit, registers	2,3	
3		Instruction Set of 8085 (Arithmatic, logical etc)1,2,3 byte	4,5,6	Instruction set covered in lab sessions
4		Addressing Modes-direct, indirect, register etc	7	
5	II	Interfacing Memory and I/O devices: Memory mapped I/O and I/O mapped I/O (use of latch and buffers)	8,9,10	
6		Breif about-Data transfer synchronous vs asynchronous, interrupt driven and serial transmission	11	
7	III	Programmable peripherals interface 8155 and 8255	12,13,14	
8		Programmable interrupt controller 8259	15,16,17	
9		USART 8251	18,19,20	
10		keyboard controller 8279	20,21	
11		direct memory access data transfer (DMA)	22,23	
12	IV	Analog and Digital input/output subsystem, interfacing with data converters(ADC and DAC)	23,24,25	
13		Applications of Microprocessor in monitoring of physical variables, data acquisition	26	
14	V	Introduction to Intel‘s 16 bit microprocessor, pin description(Block diagram, registers)	27,28	
15		operating modes (minimum & maximum mode)	29,30	
16		functional unit of 8086	31,32	
17		Addressing modes of 8086	32,33	
18		Single Chip Microcomputers, Introduction to ARM processors(RISC vs CISC)	34	

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Department Of Electronics & Instrumentation Engineering

Session:- July-Dec 2023

Course Name &Course Code: CO37253 Artificial Intelligence

S.No.	Content to be Covered	Unit	Lecture no.	Remark
1	Definition, Comparison between Human Intelligence and Artificial Intelligence,	I	1	
2	Types of AI techniques, Characteristics of AI applications	I	2	
3	Intelligent Agents, Agents & Environment, Nature of Environment,	I	3	
4	Structure of Agents, Goal-Based Agents, Utility-Based agents,	I	4	
5	Problem-Solving, State Space Search	I	5-7	
6				
7	Heuristic Search Techniques.	I	8-9	
8				
9	Representations and Mappings, Approaches to Knowledge Representation, issues,	II	10-11	
10	First Order Predicate logic, conversion to clause form,	II	12-13	
11	resolution, unification algorithm	II	14	
12	forward and backward reasoning,	II	15-16	
13	Semantic Nets, Conceptual Dependency, frames and scripts,	II	17-18	
14	Statistical reasoning, Bayes Theorem and Rule-based system.	III	19-21	
15	Importance of Machine Learning, Types of Machine Learning,	III	22	
16	Performance Measures: Confusion Matrix	III	23	
17	Precision and Recall, R-squared	III	24	
18	Precision/Recall Tradeoff, The ROC Curve.	III	25	
19	Linear Regression, Cost function, Gradient Descent,	IV	26	
20	Logistic Regression, Cost function	IV	27	
21	Problem of overfitting, Bias-Variance tradeoff	IV	28	
22	Linear SVM Classification,	IV	29	
23	Case Study 1 - Predicting Atrial Fibrillation using the ECG data.	V	30	
24	Decision Tree model, Measuring Purity and information gain,	V	31	
25	Learning process, Computational Complexity,		32	
26	Regularization, Regression tree,	V	33	
27	Random Forests and XGBoost.	V	34	
28	Dimensionality Reduction and Unsupervised learning: Principal component analysis	V	35	
29	Clustering algorithms, Partition based,	V	36	
30	Hierachical based, Divisive clustering,	V	37	
31	Optimization objective, Expectation-maximization algorithm	V	38	
32	Case Study 2 – Defect detection in manufacturing with unsupervised learning.	V	39	

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LECTURE PLAN (Session- July-Dec 2023)

Subject Name & Subject Code: Process Instrumentation (EI-47053)

Sr. No	Unit No	Topics to be covered	Lecture No	Remarks
1	1	Introduction to process control.	1	
2	1	Control system Evaluation, Objective. ON-OFF control.	2	
3	2	Time proportional control, proportional control,	3	
4	2	Integral control, Derivative control,	4	
5	2	Typical PID controller characteristics and related terminology	5	
6	2	Pneumatic controller: P, PD,	6	
7	2	Pneumatic controller: PI, PID controllers.	7	
8	2	Hydraulic controller: P, PI, PD, PID controller	8	
9	2	Hydraulic controller: PD, PID controller	9	
10	3	Electronic controller.	10	
11	3	Complex control schemes: ratio control systems,	11	
12	3	split range controls, cascade controls, feed forward control.	12	
13	3	Tuning of controllers: Ziegler-Nicolas methods and other methods	13	
14	3	Introduction to programmable logic controllers: Evolution, basic block diagram, characteristics, advantages, types,	14	
15	3	Introduction to programmable logic controllers: Evolution, basic block diagram, characteristics, advantages, types,	15	
16	3	PLC Vs PC. Ladder diagram, Ladder design,	16	
17	3	development of Ladder diagrams for various logic gates, logics.	17	
18	3	PLC timers and counters, Application of PLCs: Industrial applications.	18	
19	4	Final control elements: Mechanical, Electrical,	19	
20	4	Fluid valves: control valve principles, valves port and plug and characteristics,	20	
21	4	Control valve types, Valve sizing and selection.	21	
22	4	Type of actuators: Pneumatic actuators, Hydraulic actuators.	22	
23	5	Feedback and connecting elements in the loop flow, pressure level and temperature control loops,	23	
24	5	Feedback and connecting elements in the pressure level and temperature control loops,	24	
25	5	Pneumatic transmission, electric transmission,	25	

26	**5**	Thermal element lag, pressure element lag.	**26**	
27	**5**	Complex control schemes: ratio control systems,	**27**	
28	**5**	split range controls, cascade controls, feed forward control.	**28**	
29	**5**	Tuning of controllers: Ziegler-Nicolas methods and other methods	**29**	
30	**5**	CSTR configuration	**30**	

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Department of Electronics and Instrumentation Engineering
LECTURE PLAN
(JULY-DEC-2023)
SUBJECT: VLSI Design (EI47055)

S. No.	Unit No.	Topic to be Covered	Lecture No.	Remark
01.	I	The need of EDA Tools in VLSI, Front End–backend tools	01	
02.		Recent advancement in VLSI industry, VLSI design flow.	02	
03.		Gajeski's chart, Various design approaches: Top-down, Bottom-upMixed	03	
04.		PLDbaseddesignflow, Synthesis,Simulation	04	
05.		Physical Design: Placement & Routing, Floor planning.	05	
06.		Verification, Back-annotation etc.	06	
07.	II	Introduction to HDLs, their features,	07	
08.		HDL based design, Features of VHDL & programming methodologies	08	
09.		Circuit designing with HDL, few examples, Test Benches	09	
10.		Programmable Logic Devices, Full custom and Semi-custom design, performance comparison	10	
11.		Programming strategies, Circuit implementation, CPLD & FPGA architectures	11	
12.		Case study of Xilinx4000/3000 series FPGA&9500 series CPLDs, their features and programming	12	
13.	III	OperationofNMOS/PMOS ,Basicsof CMOS/BICMOS	13	
14.		VTCofCMOS invertor	14	
15.		powerdissipationexpression	15	
16.		Risetimeandfall time of CMOS invertor	16	
17.		CMOSinvertordesignexample	17	
18.		CMOS logic structures: Domino logic NP Zip per Logic, CVSL, DVSL	18	
19.	IV	Basics of Static CMOS Design	19	
20.		Implementation of Logic functions,	20	
21.		Few examples of combinational circuit	21	
22.		Few examples of Sequential circuit	22	
23.		Fan-in, fan-out, standard cell design, cell libraries	23	
24.		ASICs: various types, design flow, packaging and testing.	24	
25.	V	Introduction to Mealy & Moore machines, state diagrams	25	
26.		Conversion from Mealy to Moore and Vice Versa	26	
27.		State table reduction techniques for state tables	27	
28.		Basics of FSM Design, few examples	28	
29.		Design of sequential circuits using FSMs	29	
30		VHDL coding for FSMs	30	

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LECTURE PLAN Session:- July-Dec 2023

Subject Name & Subject Code: E147257: Fiber Optics & Photonics

Sr. No	Unit No	Topics to be covered	Lecture No	Remarks
1	1	Requirement/necessity of the subject, Intro. to the Optical Technology	1	
2		Optical fiber usage, Various types, Light propagation in OFC, Modes	2	
3		Attenuation and its measurement, Numerical aperture and its measurement	3	
4		Dispersion, *lntermodal .and lntramodal*, Multiplewavelength measurement	4	
5		Preform, Fabrication of optical fibers, Numerical problems	5	
6		Cutback Method for attenuation measurement	6	
7	2	Introduction to Optical Instrumentation, Optical Fiber Sensors	7	
8		Intrinsic and Extrinsic sensors	8	
9		Temperature, Flow and Displacement sensors	9	
10		Optical power meter	10	
11		OTDR: Optical time domain reflectometer and its working	11	
12		Optical Spectrum analyzer	12	
13	3	Optical Communication Systems	13	
14		Optical Transmitters	14	
15		Optical Receivers	15	
16		Basic optical data and voice comm., Numerical problems	16	
17		Optical Networking concepts	17	
18		Optical Modulators for WDM networks	18	
19	4	Optoelectronic Materials	19	
20		Characterization of Ternary and Quaternary materials	20	
21		Photonic Integrated ICs	21	
22		Design and development of PIC	22	
23		Applications of PIC	23	
24		Lasers Fundamentals, Light emission in lasers, Resonance	24	
25	5	LED,s and its types, Bandgap engineering	25	
26		Quantum well lasers, DFB lasers, DBR lasers	26	
27		Optical amplifiers, EDFA, Semiconductor Optical Amplifier	27	
28		Photo-detection principles, noises, Design issues	28	
29		PIN, APD working and adv./disadv., Numerical problems	29	
30		Transit time, Bandwidth of photodiodes and its limiting factors, Numericals	30	