SUBJECT:	ELECTRICAL CIRCUITS AND NETWORKS			**A.Y: 2025-26**
SEM:	3	**DURATION**	14-07-2025 TO 15-11-2025	
Faculty Name:		Deepika Panda(Lect ETC)	**Dept:**	ETC

Week No.	Class No.	Unit & Topic	Hours	Remarks
1	**Unit I: Network Theorems**			
	1	1.1 Node Analysis	1	Concept + Simple problems
	2	1.1 Mesh Analysis	1	Concept + Simple problems
	3	1.2 Thevenin's Theorem	1	Statement, Explanation, Applications
2	4	1.2 Norton's Theorem	1	Statement, Explanation, Applications
	5	1.2 Superposition, Millman, Reciprocity Theorems	1	Overview of each + Applications
	6	1.3 Numerical Problems on All Theorems	1	Covers Thevenin, Norton, etc.
3	**Unit II: AC Fundamentals**			
	7	2.1 Active & Passive Elements	1	Definitions and examples
	8	2.2 Complex Impedance, Rectangular & Polar Form	1	Explanation + Conversions
	9	2.2 Numerical Problems on Impedance Forms	1	Practice on polar ↔ rectangular
4	10	2.3 Apparent, Real, and Reactive Power	1	Concept + formulae
	11	2.4 Sinusoidal Response: Series R-L Circuit	1	Phasor analysis
	12	2.4 Series R-C & R-L-C Circuit Response	1	Continuation with diagrams
5	13	2.5 Sinusoidal Response: Parallel R-L Circuit	1	Phasor & current division
	14	2.5 Parallel R-C & R-L-C Circuit Response	1	Wrap-up with examples
	Unit III: Resonance			
	15	3.1 Resonance Introduction, Tuned Circuits	1	Use cases, basic principle
6	16	3.2 Series & Parallel Resonance Concept	1	Definitions, circuit behavior
	17	3.3 Series Resonance Parameters	1	Derivations: Z, f_o, I, Q, PF, BW
	18	3.4 Parallel Resonance Parameters	1	Derivations: Z, f_o, Q, BW

7	19	3.5 Comparison of Series & Parallel Resonance	1	Table form + Applications
	20	3.6 Numerical Problems on Resonance	1	Series & Parallel cases
	Unit IV: Filters			
	21	4.1 Passive vs Active Filters	1	Advantages, Disadvantages
8	22	4.2 Fourier Series & Frequency Spectrum	1	Concept only – non-math
	23	4.3 LPF: Construction, Operation, Characteristics	1	Circuit + Graph
	24	4.3 HPF, BPF, BSF Filters – Conceptual	1	With basic sketches
9	25	4.4 Design of LPF – T & π Sections	1	Procedure + example
	26	4.4 Design of HPF – T & π Sections	1	Procedure + example
	27	4.5 Numerical Problems on LPF & HPF	1	Cut-off freq., Z_o etc.
10	28	4.6 Composite Filters (Concept only)	1	No math – idea only
	Unit V: Laplace Transform			
	29	5.1 Definition, Properties of LT	1	Linearity, scaling, etc.
	30	5.2 LT of unit step, impulse, ramp	1	With derivations
11	31	5.2 LT of exponential, sine, cosine, pulse	1	With examples
	32	5.3 LT Theorems: Differentiation, Integration	1	With explanation
	33	5.3 Time Displacement, Initial & Final Value	1	With formula & demo
12	34	5.4 Inverse Laplace – Basics + Problems	1	Partial fractions
	35	5.5 Application to Circuit Theory	1	RL, RC response using LT
	Unit VI: Two-Port Network			
	36	6.1 Linear/Nonlinear & Unilateral/Bilateral	1	Definitions & classification
13	37	6.2 Z-parameters (Open Circuit Impedance)	1	Explanation + example
	38	6.3 Y-parameters (Short Circuit Admittance)	1	Explanation + example

	39	6.4 h-parameters (Hybrid)	1	With practical example
14	40	6.5 Interrelation of Z, Y, h	1	Conversion formulae
	41	6.6 Interconnection of Two-Port Networks	1	Cascade, parallel, series
	42	6.7 Numerical Problems on Z, Y, h	1	Problem-solving
15	43	Revision – Units I to III Recap + Short Quiz	1	Key formulae & shortcuts
	44	Revision – Units IV to VI Recap + Doubt Clearing	1	Final prep
	45	Full Syllabus Practice / Model Test / Assignment Discussion	1	Solve mixed numericals

SUBJECT:	ELECTRONIC DEVICES			**A.Y: 2025-26**	
SEM:	3	**DURATION**	14-07-2025 TO 15-11-2025		
Faculty Name:		Anurag Sethy(Lect ETC)	**Dept:**	ETC	
Sl No."	**Week**	**Class**	**Topic to be Covered**	**Duration (Hours)**	**Remarks**
1	Week 1	Class 1	Introduction to Semiconductor Physics: Review of Quantum Mechanics (1.1)	1	Focus on fundamental concepts.
		Class 2	Electrons in periodic Lattices (1.2)	1	Explain crystal structures and energy levels.
		Class 3	Energy bands in intrinsic and extrinsic silicon (1.3)	1	Discuss doping and its effects.
2	Week 2	Class 4	Carrier transport: Diffusion current (1.4.1), Drift current (1.4.2)	1	Introduce concepts of current flow in semiconductors.
		Class 5	Carrier transport: Mobility and resistivity (1.4.3)	1	Relate these parameters to material properties.
		Class 6	Unit I Review & Problem Solving	1	Consolidate understanding and address queries.
		Class 7	Generation and recombination of carriers (2.1), Poisson and continuity equation (2.2)	1	Lay theoretical foundation for diode operation.

3	Week 3	Class 8	P-N Junction Diodes: Construction (2.3.1), Operating Principle (2.3.2)	1	Explain the basic structure and working.
		Class 9	P-N junction characteristics (2.3.3), I-V characteristics (2.3.4)	1	Discuss forward and reverse bias characteristics.
4	Week 4	Class 10	Small signal switching models (2.3.5), Avalanche breakdown (2.3.6)	1	Introduce dynamic behavior and breakdown phenomena.
		Class 11	Zener diode (2.3.7), Schottky diode (2.3.8)	1	Cover special purpose diodes and their applications.
		Class 12	LED (2.3.9), Photodiode and solar cell (2.3.10)	1	Discuss optoelectronic devices.
5	Week 5	Class 13	Unit II Review & Problem Solving	1	Practice numerical problems related to diodes.
		Class 14	Unit II Advanced Topics/Applications	1	Deeper dive into specific diode applications or advanced models.
		Class 15	Unit II Case Studies/Real-world examples	1	Discuss practical applications of diodes in circuits.

6	Week 6	Class 16	Construction of BJT (3.1), Operating Principle of BJT (3.2)	1	Introduce the structure and basic operation.
		Class 17	Types of BJT (3.3), Working principle of p-n-p and n-p-n BJT (3.4)	1	Differentiate between NPN and PNP transistors.
		Class 18	I-V characteristics (3.5), Ebers Moll Model (3.6)	1	Analyze input and output characteristics.
7	Week 7	Class 19	Different types of transistor connection: Common Base (CB) (3.7.1), Common Emitter (CE) (3.7.2)	1	Explain different configurations.
		Class 20	Different types of transistor connection: Common Collector (CC) (3.7.3)	1	Continue with configurations and their properties.
		Class 21	Input and output characteristics of transistor in different connections (3.8)	1	Compare characteristics across configurations.
		Class 22	Define ALPHA, BETA and GAMMA of transistors in various modes (3.9)	1	Define current gain parameters.

8	Week 8	Class 23	Establish the Mathematical relationship between ALPHA, BETA and GAMMA (3.10)	1	Derive relationships between current gains.
		Class 24	Basic concept of Biasing (3.11), Types of Biasing (3.12)	1	Explain the importance and methods of biasing.
9	Week 9	Class 25	h-parameter model of BJT (3.13)	1	Introduce small-signal equivalent circuit.
		Class 26	Load line and determine the Q-point (3.14)	1	Graphical analysis for operating point.
		Class 27	Types of Coupling (3.15), Working principle and use of R-C Coupled Amplifier (3.16)	1	Discuss coupling methods and amplifier basics.
10	Week 10	Class 28	Frequency Responses of R-C coupled Amplifier (3.17)	1	Analyze amplifier performance over frequency.
		Class 29	FET & its classifications (4.1), Differentiate between JFET & BJT (4.2)	1	Introduction to FETs and comparison with BJTs.
		Class 30	Construction, working principle & characteristics of JFET (4.3)	1	Detail JFET operation and characteristics.

11	Week 11	Class 31	Parameters of JFET & establish relation among JFET parameters (4.4)	1	Define and derive JFET parameters.
		Class 32	JFET as an amplifier (4.5)	1	Analyze JFET amplifier circuits.
		Class 33	Construction and working principle of MOSFET (4.5 - likely 4.6 in syllabus)	1	Introduce MOSFET structure and operation.
12	Week 12	Class 34	Classification of MOSFET (4.6 - likely 4.7 in syllabus)	1	Differentiate between various MOSFET types.
		Class 35	Characteristics (Drain & Transfer) of MOSFET (4.7 - likely 4.8 in syllabus)	1	Analyze MOSFET I-V characteristics.
		Class 36	Explain the operation of CMOS, VMOS & LDMOS (4.8 - likely 4.9 in syllabus)	1	Discuss advanced FET types and their applications.
		Class 37	Define & classify Feedback Amplifier (5.1), Types of feedback - negative & positive feedback (5.2)	1	Introduce feedback concepts.

13	Week 13	Class 38	Characteristics: voltage gain, bandwidth, input/output Impedance, stability, noise, distortion in amplifiers (5.3)	1	Analyze the effects of feedback.
		Class 39	Oscillator: Block diagram of sine wave oscillator (5.4.1), Types, Requirement of oscillation (5.4.2)	1	Introduce the concept of oscillation.
14	Week 14	Class 40	Barkhausen criterion (5.4.3)	1	Explain the conditions for sustained oscillations.
		Class 41	LC oscillators: Colpitts Oscillators (5.5.1)	1	Detail the working of Colpitts oscillator.
		Class 42	LC oscillators: Hartley Oscillators (5.5.2)	1	Detail the working of Hartley oscillator.
15	Week 15	Class 43	LC oscillators: Wien Bridge Oscillators (5.5.3)	1	Detail the working of Wien Bridge oscillator.
		Class 44	Oxidation (6.1), Diffusion (6.2), Ion implantation (6.3)	1	Cover initial steps of IC fabrication.
		Class 45	Photo-lithography (6.4), Etching (6.5), Chemical vapor deposition (6.7), Sputtering (6.8), Twin-tub CMOS process (6.9)	1	Cover remaining fabrication steps and CMOS process.

SUBJECT:	Digital Electronics		A.Y: 2025-26
SEM:	3	DURATION	14-07-2025 TO 15-11-2025
Faculty Name:	PRAKASH CHANDRA SETHI(Sr Lect ETC)	Dept:	ETC

Week	Class No.	Unit & Topics	Hours	Remarks
Week 1		**Unit I: Logic Gates – I**		
	1	Basics of Digital Electronics	1	
	2	Logic gates: OR, AND, NOT	1	
	3	Truth tables, symbols, voltage levels	1	
Week 2		**Unit I: Logic Gates – II**		
	4	NOR, NAND, XOR, XNOR	1	
	5	NOR/NAND as inverters	1	
	6	Fan-in, fan-out	1	
Week 3	**7**	Constructing AND/OR from NAND/NOR	1	
		Unit II: Boolean Algebra – I		
	8	Boolean operations	1	
	9	Laws of Boolean algebra	1	
Week 4	**10**	DeMorgan's Theorems	1	
	11	Logic simplifications	1	
		Unit II: Boolean Algebra – II		
	12	Equivalent gates	1	
Week 5	**13**	SOP, POS forms	1	
	14	K-map introduction (2–4 variables)	1	
		Unit III: Combinational Circuits – I		
	15	Half adder, full adder	1	
Week 6	**16**	Half & full subtractor	1	
	17	4-bit adder	1	
		Unit III: Combinational Circuits – II		
	18	Multiplexer, De-multiplexer	1	
Week 7	**19**	Encoder, Decoder	1	
		Unit III: Combinational Circuits – III		
	20	3-bit comparator	1	
	21	Seven segment decoder	1	
Week 8	**22**	Practice and quiz	1	
		Unit IV: Latches & Flip-Flops – I		
	23	NOR & NAND latch	1	
	24	Gated S-R and D-latch	1	
Week 9	**25**	Flip-flop basics	1	
		Unit IV: Latches & Flip-Flops – II		
	26	Master-slave flip-flops	1	
	27	S-R, D, J-K, T Flip-Flops	1	
Week 10	**28**	Timing diagrams	1	
		Unit V: Counters – I		
	29	Binary, up-down counters	1	
	30	Asynchronous (ripple) counters	1	
		Unit V: Counters – II		

Week 11	**31**	Synchronous counters	1	
	32	Mod-n and decade counters	1	
	33	Divide-by-n, D/JK counter design	1	
Week 12	**Unit VI: Shift Registers**			
	34	Serial input, Serial/Parallel load	1	
	35	Ring, self-starting, Johnson counters	1	
	36	Truth tables & timing diagrams	1	
Week 13	**Unit VII: Semiconductor Memories**			
	37	ROM, RAM, PROM, EPROM	1	
	38	Memory cell structure	1	
	39	Static vs. dynamic memory	1	
Week 14	**Unit VIII: Sequential Circuit Design**			
	40	Combinational vs Sequential circuits	1	
	41	Applications: adders, decoders, MUX, etc.	1	
	42	Introduction to Finite State Machines (FSMs)	1	
Week 15	**Course Recap & Assessment**			
	43	Overall revision	1	
	44	Problem-solving	1	
	45	Internal test / mock exam / assignment review	1	

SUBJECT:	SIGNALS AND SYSTEM(ETCPC209)			**A.Y: 2025-26**
SEM:	3	**DURATION**	14-07-2025 TO 15-11-2025	
Faculty Name:		Deepika Panda(Lect ETC)	**Dept:**	ETC

Week No.	Class No.	Unit & Topic	Hours	Remarks
1	**Unit I: Introduction to Signals and Systems**			
	1	1.1 Signals and systems in daily life	1	Examples and motivation
	2	1.2 Signals/systems in different engineering fields1.3 Electrical, mechanical, biomedical etc.	1	Multi-domain exposure
	3	1.4 Common essence and definitions of signals and systems	1	Abstraction and overview
2	**Unit II: Formalizing Signals**			
	4	2.1 Energy and Power signals	1	With classification examples,calculation
	5	2.2 Signal Properties:2.2.1 Periodicity2.2.2 Absolute Integrability	1	Theory + examples
	6	2.2.3 Deterministic vs Stochastic signals	1	Characteristics explained
3	**7**	2.3 Special Signals:2.3.1 Unit Step2.3.2 Unit Impulse	1	Mathematical expressions
	8	2.3.3 Sinusoid2.3.4 Complex exponential	1	Graphs + equations
	9	2.4 Special Time-limited Signals:2.4.1 Continuous vs Discrete Time2.4.2 Continuous vs Discrete Amplitude	1	Signals types classified
4	**10**	2.5 Formalizing Systems:System properties overview	1	Key features of systems
	11	2.5.1 Linearity2.5.2 Additivity and Homogeneity	1	With examples
	12	2.5.3 Shift-Invariance2.5.4 Causality2.5.5 Stability2.5.6 Reliability	1	Completed system properties

5	**Unit III: Continuous & Discrete Time Systems**			
	13	3.1 LSI Systems3.2 Impulse & Step Response	1	Key concepts
	14	3.3 Convolution (Theory + Intro to Examples)	1	Graphical + analytical
	15	3.4 Input-output behavior of LSI Systems	1	Time-domain analysis
6	**16**	3.5 Cascade Interconnections	1	System design implications
	17	3.6 Causality & Stability of LSI	1	Evaluation methods
	18	3.7 System representation:Diff & Difference Equations	1	Equation-based modeling
7	**Unit IV: Frequency Response & Fourier**			
	19	4.1 Frequency response and its relation to impulse response	1	Concepts with diagrams
	20	4.2 Fourier Series Representation	1	Periodic signals
	21	4.3 Fourier Transform	1	Continuous Time Signals
8	**22**	4.4 Convolution and Multiplication in Frequency DomainMagnitude & Phase response	1	Properties and Duality
	23	4.5 DTFT – Discrete-Time Fourier Transform	1	Basics and application
	24	4.6 DFT – Discrete Fourier Transform	1	Usage in DSP
9	**25**	4.7 Parseval's Theorem4.8 Signal Space, Orthogonal Bases	1	Energy interpretation
	Unit V: Laplace Transform & Systems			
	26	5.1, 5.2 Eigen functions, Basis of Eigen functions	1	For LTI systems
	27	5.3 Region of Convergence (ROC)	1	Stable and causal systems
10	**28**	5.4 System Functions	1	H(s) and its meaning
	29	5.5 Poles and Zeros	1	s-plane representation

	30	5.6 Laplace Domain Analysis	1	Transfer functions
11	**31**	5.7 Solving Differential Equations using Laplace	1	Examples
	32	5.8 Parseval's Theorem – Laplace Domain	1	Power analysis
		Unit VI: System Realization		
	33	6.1 Block Diagram & Interconnection	1	Realization structures
12	**34**	6.2 State Space AnalysisMulti-input, Multi-output (MIMO)	1	Representation method
	35	6.3 State Transition Matrix	1	System evolution over time
	36	6.4 Sampling Theorem	1	Nyquist rate
13	**37**	6.4.1 Spectra of Sampled Signals	1	Spectral aliasing
	38	6.5 Reconstruction:Ideal InterpolatorZero-Order Hold	1	Hold circuits
	39	6.5.3 First-Order Hold	1	Smoother reconstruction
14	**40**	6.6 Aliasing & Effects6.7 Continuous vs Discrete Systems	1	End of Unit VI
	Unit VII: Applications of Signals and Systems			
	41	7.1 Modulation & Filtering	1	Practical use
	42	7.2 Time-Frequency RepresentationUncertainty Principle	1	Resolution trade-offs
15	**43**	7.3 STFT & Wavelet Transforms	1	Intro to advanced tools
	44	Revision & Assignment Discussion(Units I–IV)	1	Key formulae recap
	45	Revision & Practice Problems(Units V–VII)	1	Wrap-up and Q&A

SUBJECT:	ELECTRONICS MEASUREMENT & INSTRUMENTATION		A.Y: 2025-26
SEM:	3	DURATION	14-07-2025 TO 15-11-2025
Faculty Name:	PRAKASH CHANDRA SETHI(Sr Lect ETC)	Dept:	ETC

Week No.	Class No.	Unit & Topic	Hours	Remarks
Week 1		**Unit I – Qualities of Measurement**		
	1	Static and dynamic characteristics	1	
	2	Accuracy, sensitivity, reproducibility, static error	1	
	3	Instrument errors	1	
Week 2	4	Classification and PMMC	1	
	5	Moving Iron instruments	1	
	6	DC & AC Ammeters	1	
Week 3		**Unit II – Indicating Instruments**		
	7	DC & AC Voltmeters	1	
	8	Ohmmeters (Series & Shunt)	1	
	9	Analog Multimeter	1	
Week 4	10	Multi-range meters	1	
	11	Q-meter operation	1	
	12	Applications summary and MCQs	1	
Week 5		**Unit III – Digital Instruments**		
	13	Ramp-type DVM	1	
	14	Digital display, resolution, sensitivity	1	
	15	Digital Multimeter (DMM)	1	
Week 6	16	Digital frequency meter	1	
	17	Digital time measurement	1	
	18	Digital tachometer	1	
Week 7	19	LCR meter	1	
		Unit IV – Oscilloscope		
	20	CRO block diagram and working	1	
	21	Dual trace CRO	1	
Week 8	22	CRO measurements	1	
	23	Lissajous figures	1	
	24	DSO (Digital Storage Oscilloscope)	1	
Week 9	25	High-frequency Oscilloscope	1	
		Unit V – Bridges		
	26	DC bridges: Wheatstone	1	
	27	AC bridges: Maxwell, Hay	1	
Week 10	28	Schering & De Sauty bridges	1	
	29	Q-meter operation	1	
	30	Frequency measurement	1	
Week 11	31	LCR meter & its measurements.	1	
		Unit VI – Transducers & Sensors		
	32	Definition, classification, parameters	1	
	33	Strain gauge & LVDT	1	
	34	Working principle of capacitive transducers (pressure)	1	

Week 12	**35**	Working principle of Load Cell (Pressure Cell)	1	
	36	Working principle of Temperature Transducer (RTD, Optical Pyrometer, Thermocouple, and Thermister)	1	
Week 13	**37**	Thermocouple & Thermistor	1	
	38	Working principle of Current transducer	1	
	39	Working principle of Proximity, and Light sensors	1	
Week 14	**Unit VII – Signal Generators, Wave Analyser & DAS**			
	40	Working principle of AF Sine and Square wave generator	1	
	41	Working principle of the Function Generator	1	
	42	Wave & Spectrum Analyser	1	
Week 15	**43**	Data Acquisition System (DAS)	1	
	Revision + Class Test / Assignment Submission / Discussion			
	44	MCQs, short answer reviews & Doubt clearing	1	
	45	Full Syllabus Practice / Model Test / Assignment Discussion/Real-life applications	1	