Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) First Year (July 2019 - April 2020)

Subject - BASICS OF SEMICONDUCTORS & DEVICES

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Unit	Topic
1	Unit:1	Resistors — Symbol, colour coding, resistor tolerance, Power rating,
2	PASSIVE COMPONENTS	Types of resistors.
3	Introduction	Capacitors — Symbol, Colour coding, Tolerance, Voltage rating
4		concept of Fetch Cycle, Execution cycle,
5		Types of capacitors.
6		Inductors - Symbol, Types of Inductors, Knowledge of values available in the market
7		Introduction of Chokes, Practical Significance of above Components.
8		Transformers -Principle, Turns ratio, Voltage ratio, Current ratio
9		Transformer efficiency, Types of Cores: Air, Iron and ferrite cores
10		Types of Transformers.
11		PCB: Introduction to Insulating materials & their types.
12		PCB - Types of PCB, Layout Techniques
13		Cables and Connectors.
14	Unit II:	Phasor Representation of Voltage and Current
15	RESONANCE CIRCUITS AND NETWORK THEOREMS	Basic Idea of the Impedance of LCR Circuits
16		Series and Parallel Resonance
17		Quality Factor
18		Integration and Differentiation using RC circuits
19		Network Theorems — Network definition, loop and nodal analysis
20		Superposition theorem
21		Thevenin's theorem
22		Norton's theorem
23		Maximum Power transfer theorem
24		Reciprocity Theorem
25		Numericals Based on Theorem
26	Unit III :	Basic idea of crystal structure and energy bands'
27	SEMICONDUCTOR PHYSICS	Difference between Conductor, Semiconductor and Insulator
28		Carrier concentration at normal equilibrium in an intrinsic semiconductor
29		Law of Mass Action. Donors and acceptors
30		physical picture of electrons and holes as majority carriers. Fermi level for intrinsic and extrinsic semiconductors
31		dependence of Fermi level for intrinsic and extrinsic semiconductors

32		dependence of Fermi level on donor and acceptor concentration
33		Idea of drift and diffusion.
34	Unit IV :	Formation of depletion region and Potential barrier
35	PN JUNCTION	PN junction as a Diode
36		Forward & Reverse Bias
37		The resistance of P-N junction diode and its variation with biasing
38		Static and dynamic resistance of a diode, Current- Voltage characterstics
39		Derivation of potential barrier. Definition of transition capacitance
40		Junction capacitance voltage relationship for an abrupt p-n junction diode
41		Avalanche breakdown and Zener effect
42		Zener diode
43		The basic idea and working of a varactor diode
44		Solar cell, LED
45		Schottky diode, Tunnel diode
46	Unit V:	PNP and NPN transistor
47	TRANSISTOR-	Transistor Action
48		Definition of Alpha, Beta & Gamma and their inter relationship
49		Characterstics curve of bipolar transistors
50		Characterstics curve of bipolar transistors
51		Interpretation of Active, Cutoff and Saturation regions
52		Determination of A.C. & D.C. load lines
53		Operating Point for CB, CE configurations
54		Operating Point for CC configurations
55		Hybrid models of a CE, CB transistor circuit and their equivalent circuits
56		Hybrid models of a CC transistor circuit and their equivalent circuits
57		Basic idea of Junction Capacitance
58		Transistor biasing, bias stability factor
59		stabilization against change in I∞ for fixed bias
60		collector to base bias and self bias

Maharaja Ranjit Singh College of Professional Sciences, Indore
Department of Electronics
Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) First Year (July 2019 - April 2020)
Subject - ELECTRONIC CIRCUITS AND FUNDAMENTALS OF DIGITAL ELECTRONICS
Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Unit	Topic
1	Unit:1	Half wave, Full wave and Bridge rectifiers
2	RECTIFIERS AND POWER SUPPLY	Ripple factor and Power conversion efficiency for the half wave and full wave rectifiers
3	Introduction	Filter —Need for filter in Power Supply
4		Series inductor, shunt capacitor
5		L section, it section, T section filters
6		Power Supply — Block diagram of simple power supply
7		Regulated Power Supply, Line & Load regulation
8		Characteristics of Power Supply
9		Zener diode as a voltage regulator
10		Three terminal IC Power supply (IC 78XX & 79XX)
11	Unit II:	The construction and working of JFET
12	FIELD EFFECT TRANSISTORS-	The idea of channel width
13		Field dependent mobility showing current dependence of voltage
14		Physical explanation of different regions of I-V curves
15		Various parameters of FET
16		MOS Devices, Basic Structure and energy level diagram
17		The basic construction of MOSFET and its working
18		Physical explanation of the curves
19		enhancement and depletion modes
20		MOSFET parameters.
21	Unit III :	Different terms used in Amplifiers, such as Signal, Source, Input, Output, Voltage and Current Gain, Power Gain, Decibel, Input and Output Impedance
22	AMPLIFIERS- Amplifiers -	Classification according to the frequency Response
23		Class A Power amplifiers
24		Class B
25		Class C amplifiers
26		Analysis and design considerations of Push pull amplifier
27		RC Coupled Amplifier - Gain for high, mid and low frequency range
28		Calculation of half power points
29		Band width and figure of merit
30		Feedback in amplifiers Advantage of negative feedback in amplifiers
31		Voltage and current feedback circuits
32	Unit-IV	clipping circuits
33	APPLICATIONS OF DIODES AND TRANSISTORS-	clamping circuits
34		Multivibrators: Astable, Monostable and Bistable- Circuit
35		Working and Applications
36		Oscillators - Barkhausen criterion for self sustained oscillations

37		Circuit and Working of Hartley
38		Colpitt, Phase shift and Wein bridge oscillators
39	Unit V:	Binary numbers
40	BASICS OF DIGITAL ELECTRONICS-	Binary to Decimal conversion
41		Decimal to Binary conversion
42		Binary additions, Binary subtraction
43		I's Complements, 2's Complements
44		Binary multiplication and division
45		Octal and Hexadecimal numbers
46		Inter-conversions of various number systems
47		BCD code and Grey code.

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) First Year (July 2019 - April 2020)

Subject - PRACTICALS

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Topic
1	Testing & Identification of different Components(Resistance, Capacitors, Inductors, Cables).
2	Measurement of frequency and voltage of sine, square and triangular waves using CRO and function generator.
3	Study of charging & Discharging of an Electrolyte Capacitor and Calculate the Time Constant.
4	Study of forward bias & reverse bias characteristics of PN junction diode.
5	Study of reverse bias characteristics of Zener diode.
6	Study of Thevenin's Theorem for two mesh network.
7	Study of Half wave rectifiers.
8	Study of Full wave rectifiers.
9	Study of WeinBridge Oscillator.
10	Study of Regulated Power Supply using Zener Diode.
11	Study of LED
12	Study of Hartley Oscillator.
13	Study of Regulated Power Supply using IC 78Xx & 79XX series.
14	Testing and Identification of different types of Diodes & Transistors.
15	Study of Output Characteristics Curve of Bipolar Junction Transistor in Common Emitter Configuration
16	Study of Output Characteristics Curve of Bipolar Junction Transistor in Common Common base Configuration
17	Study of Output Characteristics Curve of Bipolar Junction Transistor in Common Collector Configuration

Maharaja Ranjit Singh College of Professional Sciences, Indore
Department of Electronics
Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) Second Year (July 2019 - April 2020)
Subject - DIGITAL ELECTRONICS & MICROPROCESSOR
Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Unit	Topic
1	Unit:1	Basic Logic Gates- Symbols and truth tables of AND, OR, NOT, NAND, NOR, XOR and XNOR logic Gates
2	Logic Gates:	Positive and Negative logic
3		transistorized Circuits of Basic Logic gates
4		Arithmetic Circuits: Half Adder and Full adder, Boolean Laws, De' Morgan's Theorems
5		Karnaugh Map Simplifications upto 4 variables
6		Karnaugh Map Simplifications upto 4 variables
7		Flip Flops: RS Flip Flop
8		D Flip Flop, J K Flip Flop
9		Positive and Negative triggered flip flop
10		JK Master Slave Flip Flop
11		Elementary idea of MUX, DMUX
12		encoder and decoder circuits.
13	Unit 2:	Classification of logic families
14	Logic Families:	Definition of fan-in, fan-out, noise immunity, Propagation delay time
15		Various Logic Families- RTL, DTL, TTL, ECL, CMOS
16		Counter and Registers: Ripple counter
17		synchronous Counter
18		up- Down Counter, Decade Counter
19		Buffer Register, Shift Registers- Types and Uses.
20	Unit 3:	D/A converters: Binary Weighted Resistor method
21	D/A and A/D Converter:	R-2R Ladder method
22		A/D Converters: Counter Method
23		Dual Ramp method
24		Successive Approximation Method
25		Memories: Volatile and Non volatile memories
26		Read only memory (ROM), PROM, EPROM, EEPROM, Random Access Memory.
27	Unit 4:	Pin Out diagram of Microprocessor INTEL 8085
28	Introduction to Microprocessor:	Microprocessor 8085 Architecture- Bus Organization Addressing modes
29		Memory organization, General purpose Registers, Stack Pointer and Program
30		Instruction Set of Microprocessor 8085
31		Types of Instructions, Data transfer, Arithmetic, Logical, Branching & Loopig
32		Stack, I/O & machine control instructions
33		Programming- Basic Straight line programming (Additiom, Subtraction, Multiplication and Division)
34		Basic Programs
35	Unit 5:	Introduction to Interfacing with microprocessor 8085
36	Interfacing and Interfacing Devices:	Interfacing with ROM, Interfacing with RAM
37		Input/Output Interfacing Internal Architecture

38		pin out diagram of the 8155/ 8156 and 8355/8755 multipurpose programmable Devices
39		pin out diagram of the 8155/ 8156 and 8355/8755 multipurpose programmable Devices
40		Introduction to Personal Computer
41		Classification and Architecture (Block Diagram only)
42		Input and Output Devices.

Maharaja Ranjit Singh College of Professional Sciences, Indore
Department of Electronics
Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX)Second Year (July 2019 - April 2020)
Subject - OPERATIONAL AMPLIFIER AND INSTRUMENTATION
Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Unit	Topic
1	Unit:1	Emitter coupled differential amplifier and its different configurations
2	Difference Amplifier	DC analysis
3		AC analysis
4		Voltage Gain, Input and Output Impedance of difference amplifier
5		Overview of Operational Amplifier
6		Block diagram of Ideal Operational amplifier
7		Equivalent circuit of an Op-Amp, symbol, Integrated circuits, Pin -out configuration of IC 741
8		Inverting and Non Inverting Amplifiers
9		Inverting and Non Inverting Amplifiers
10		Parameters of Op Amp: Input offset voltage, Input Bias current, Differential Input resistance
11		Common Mode Rejection Ratio (CMRR), Slew rate, Large signal voltage gain, Output Resistance
12	UNIT-II :	Adder, Subtractor
13	Applications of Op-Amp:	Integrator, Differcntiator
14		Comparator
15		Instrumentation Amplifier: construction and working
16		Active Filters: Elementary idea of Active Filters
17		Butterworth & Chebyshev response, First order Low pass
18		High pass & Band pass Filters
19		Butterworth filters: working and frequency response
20		Signal Generators: Sweep Frequency generator
21		Pulse and Square wave generator
22		Astable Multivibrator using transistors
23		IC 555 timer for square and triangular wave generator
24		Block diagram of Function generator
25		IC 8038 as complete function generator
26	UNIT-III :	Cathode Ray Oscilloscope
27	Cathode Ray Oscilloscope:	Block diagram of a CRO
28		Basic operation
29		Electrostatic focusing, Electrostatic deflection
30		Screen for CRT, Horizontal deflection system
31		Vertical deflection system Lissajous Figures
32		Frequency and Phase measurement using CRO
33		Liquid Crystal Displays
34		Liquid Crystal, Modes of Operation
35		Operation of twisted nematic LCD, Operating characteristics of LCD
36		Liquid Crystal Materials, construction and advantages of LCD.
37	UNIT-IV :	Q Meter — Basic Circuits: measuring method in series and parallel connections
38	Measuring Instruments:	Electronic Voltmeter, DC Voltmeter

39		AC Voltmeter
40		Digital Voltmeter Integrating type
41		Staircase Ramp, Sample and Hold circuits
42		Analog Multimeter- Voltage, Current and Resistance measurement
43		Digital Multimeter, Voltage, Current and Resistance measurement
44		Comparison between Analog and Digital Multimeter
45		Elements of Electronic Counter, Universal Counter
46		Measurement modes-Frequency, Time interval and Period measurement
47	UNIT-V :	ECG Fundamentals- Electrodes
48	Biomedical Instrumentation:	Block Diagram of ECG machine
49		ECG Leads, Direct Writing Recorder, Inkjet recorder
50		Multi channel ECG Machines, Cardiac Monitor
51		Cardiac Monitor Using Digital Memory
52		X-Ray Machine: Production of X-rays, X-ray machine
53		High Voltage Generator, High Frequency Generators, High Tension Cable
54		

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) Second Year (July 2019 - April 2020)

Subject - PRACTICALS

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Topic
1	Verification of truth table of Basic logic Gates AND, OR, NOT, NAND, NOR, XOR and XNOR using ICs 74XX.
2	Study of R-S Flip-Flop.
3	Study of J-K Flip- Flop.
4	Study of Half and Full adder.
5	Study of Digital to Analog converter and Analog to Digital.
6	write a Program in Assembly language for microprocessor 8085: (I) Addition (II) Subtraction
7	write a Program in Assembly language for microprocessor 8085: (I)Multiplication (II) Division
8	Write a program in Assembly language for Microprocessor 8085: (I) Largest No. finding (II) Smallest No. finding
9	Verification of De'Morgan's Theorems using logic gates. I I. Realization of Boolean Circuits
10	Study of Operational Amplifier in Inverting and Non Inverting mode.
11	Study of Operational Amplifier as Integrator
12	Study of Operational Amplifier as differentiator
13	Study of Astable Multivibrator using Transistor.
14	Measurement of amplitude, frequency and phase difference using CRO.
15	Study of Zener Diode as a voltage regulator.
16	Study of Multiplexer
17	Study of DeMultiplexer

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) Third Year (July 2019 - April 2020)

Subject - THYRISTORS, IC TECHNOLOGY, MICROPROCESSOR AND

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Unit	Topic
1	Unit:1	UJT : Structural Description and working and Characteristic Curve of Unijunction Transistor (UJT)
2	Power Devices	WI as a relaxation Oscillator
3		SCR: Structural description
4		Working and Characteristic Curve of Silicon Controlled Rectifier
5		Two Transistor Analogy of SCR
6		Forward and Reverse Blocking States
7		Triggering Methods
8		Construction, Working and Characteristic curves of DIAC and TRAC
9		TRIAC as a switch
10	Unit-II	SCR as a static AC switch
11	Applications of SCR	Phase Controlled Rectification
12		Half Wave and Full wave Rectifiers using SCR with resistive
13		capacitive and inductive load
14		Power Inverters using SCR: with and without reactive feedback
15		Power Inverters using SCR: with and without reactive feedback
16	Unit-III	Refining and growth of Silicon Crystals
17	IC Technology	Production of electronic grade silicon
18		Crystal growth apparatus
19		Silicon Wafer Preparation: Ingot Trimming and Slicing
20		Wafer Polishing and Cleaning
21		Wafer Processing Considerations, Diffusion of Dopant Impurities, Diffusion Systems
22		Ion Implantation, Ion Implantation System, Properties of Ion Implantation
23		Thermal Oxidation: Utility of Thermal Oxidation
24		Photolithography Process steps, Idea of relative plasma etching
25		Chemical Vapour Deposition: Epitaxial deposition
26	Unit-IV	Register Organization of INTEL 8086
27	INTEL 8086 Microprocessor	Architecture, Pinout Description of 8086
28		Physical Memory Organization, General Bus Operation
29		I/O Addressing Capability, Minimum and maximum modes
30		Addressing Modes of 8086
31		Instruction set of 8086: Data Copy/Transfer Instructions, Arithmetic and Logical Instructions
32		Branch Instructions, Loop Instructions, Machine Control Instructions
33		Shift and Rotate Instructions
34		Simple Programs for arithmetic operations
35		Simple Programs
36	Unit-V	Types of motors
37	Electrical Motors	DC Motor: Design and Working Principles
38		Induction motors: Idea of rotating magnetic field, Starting and Rotating Torque, Slip
39		Asynchronous Motor
40		Equivalent circuit of an induction motor
41		Synchronous motor: principle of operation
42		Single phase induction motor: different circuits to make it self starting

Maharaja Ranjit Singh College of Professional Sciences, Indore
Department of Electronics
Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX)Third Year (July 2019 - April 2020)
Subject - COMMUNICATION ELECTRONICS
Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Unit	Topic
1	Unit:1	Introduction of Noise
2	Noise	Thermal Noise, Shot Noise, Partition Noise
3		Low Frequency and transit time noise
4		Generation and Recombination Noise, Equivalent Noise Resistance, Signal-to-noise ratio, Noise Factor, Noise Temperature
5		Introduction of Radio Wave Propagation
6		Propagation in Free Space
7		Tropospheric Propagation
8		lonopheric Propagation, Surface Wave
9		HF and VHF propagation
10		Ground wave, Sky wave and Space wave propagations
11		Dead zones, Skip Distance, Maximum Usable Frequency
12		Stratification of Ionosphere
13	Unit-II	Introduction of Modulation
14	Modulation	Principle of Modulation and need and advantage of Modulation
15		Amplitude Modulation
16		Principle and waveform, Modulation Index
17		Derivation for the modulated wave and modulation index
18		Linear and Square Modulators
19		Balanced Modulator
20		Single side band transmission: advantages, disadvantages and methods of generation
21		Single side band transmission: advantages, disadvantages and methods of generation
22		Elements of Frequency and Phase Modulation
23		Frequency spectrum of FM waves. Phase modulation; Modulation Indices
24	Unit III	Introduction of Frequency Modulation
25	Generation of Frequency Modulation	Direct and Indirect Methods
26		Varactor Diode and FET circuits
27		FM Demodulation: Foster Seelay Discriminator and Ratio Detector
28		Pulse Modulation
29		Pulse Transmission, Pulse Amplitude Modulation
30		Pulse Position and Pulse Width Modulation
31		Idea of Multiplexing
32		Time Division Multiplexing. Frequency Division Multiplexing
33		Pulse Code Modulation: Block diagram of PCM
34		Transmitting and receiving Systems of PCM
35	Unit-IV	Introduction of Antenna
36	Antenna	Antenna Equivalent Circuits, Radiation Fields, Polarization, Isotropic Radiator
37		Power Gain, Effective area, Half Wave Dipole
38		Vertical Antenna, Folded Elements, Loop and ferrite core receiving antennas
39		YAGI Antenna, non-resonant antenna, driven arrays
40		parasitic arrays, Microwave antenna
41		Characteristics of Human Eye, Persistence of Vision and Flicker

42		Scanning Process, Interlaced Scanning, Composite Video Signal
43		Vestigial Sideband Signal, Standard Channel Characteristics
44		Block diagram of TV Transmitter and Receiver
45	Unit-V	Introduction to Optical Fibers
46	Fiber Optic Communication	Principles of Light Transmission in a Fiber
47		Propagation within a Fiber Effect of Index Profile on Propagation
48		Modes of Propagation, Number of Modes supported by a fiber
49		Losses in Fiber, Dispersion, Light Sources for Optical Fibers
50		Photo Detectors, Connector and Slices
51		Introduction to Cellular Telephony
52		Cells, Frequency Re-use Principle, Transmission, Reception
53		I landoff, Roaming, Generations of Cellular Telephony
54		Introduction of Global System for Mobile Communication (GSM)
55		Switching System, Base Station System
56		Operation and Support System, GSM Specifications, VSAT
57		Operation and Support System, GSM Specifications, VSAT

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Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) Third Year (July 2019 - April 2020)

Subject - PRACTICALS

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Topic
1	Study of SCR Characteristics.
2	Study of DIAC Characteristics.
3	Study of TRIAC Characteristics.
4	Study of LIT Characteristics
5	Study of UJT as relaxation oscillator
6	Study of Amplitude Modulation
7	Study of Amplitude Demodulation
8	Study of Frequency Modulation
9	Study of Frequency Demodulation
10	Study of Pulse Code Modulation.
11	Study of UJT.