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 $I\infty$ for fixed bias
60		collector to base bias and self bias
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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.

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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

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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

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) Sem V (July 2018 - Dec 2018)
Subject - THYRISTORS, IC TECHNOLOGY, MICROPROCESSOR AND
Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Unit	Topic
1	Unit:1	Microprocessor architecture
2	Microprocessor	Block diagram, pin out diagram,
3	Introduction	ALU and Control unit
4		concept of Fetch Cycle, Execution cycle,
5		machine cycle and instruction cycle.
6	Unit II:	8085 based instructions,
7	Programming	Data Transfer, Stack,
8		Arithmetic and Logical Branch I/O and machine control instruction and timing diagram,
9		Stack pointer,
10		Stack related instruction,
11		code conversion, subroutines
12		conditional/unconditional call and return instructions.
13	Unit III:	Hardware and Software interrupt
14	Interrupts	Maskable and Non Maskable,
15		vectored and Non vectored interrupt,
16		priority interrupt and interrupt service routine DMA,
17		Memory mapped I/O and I/O mapped I/O techniques,
18		In and Out instruction & Timing diagrams
19	Unit IV:	1 RAM, ROM, EPROM,
20	Memory	2 Memory interface,
21	Interfacing	3 Interfacing ROM
22		4 2Kx8, 4Kx8, 5 Interfacing. RAM 2Kx8 and 4Kx8.
23		Timing diagram for memory read and memory write Instruction and T Cycle.
24	Unit V:	Interfacing peripheral devices
25	Peripheral	programmable,peripheral, interface, 8255 - Internal architecture,
26	Interfacing	control register and control word 8255.
27		Functional description-
28		Operational programming in mode 0,
29		mode 1 and mode 2.

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) Sem V (July 2018 - Dec 2018)

Subject - PRACTICALS

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Topic
1	Addition and Subtraction of 8 bit Numbers.
2	Addition and Subtraction of 16 bit Numbers.
3	Addition of 8 bit numbers in BCD Code.
4	Addition of two string of numbers placed in memory location.
5	Find the Largest and Smallest number from a given set of numbers loaded in the memory.
6	To arrange the numbers in Ascending and Descending order.
7	Find 1's & 2's Complement of Numbers.
8	To load 7bH in register B, transfer the data to register A and increment it by 2
9	To load 23H in register B and 39H in register C. Substract contents of B from C and there in register D
10	To add the contents of register B with register C, store the result of memory location 20C0H
11	Add contents of memory location 20C0H and 20C2H store the result in register B
12	Add the contents of memory location 20C0H with memory location 20C1 H and store the result in 20C2 H
13	Add the contents of memory location 20C0H and 20C1 H and store the result of memory location 2002H and carry memory location 20C3 H contents of 20C0H is 02 H contents of 20C1 H is 03 H
14	Substract the contents of memory location @0C0 H from 20C1 H and store result in register contents of 20C0H is 12H contents of 20C1 H is 13 H
15	Substract the contents of memory location 20C0 H from 20C1 H and store the difference in 20C2 H and borrow at20C3 H
16	Take 2's complement of 29 H and store result in register B
17	Exchange content of register B with C

Maharaja Ranjit Singh College of Professional Sciences, Indore
Department of Electronics
Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) Sem VI (Jan 2019 - May 2019)
Subject - THYRISTORS, IC TECHNOLOGY, MICROPROCESSOR AND
Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Unit	Topic
1	Unit I :	Measurement and Error Definition,
2	Measuring	accuracy and precision,
3	Instruments	Types of errors
4		probability of errors,
5		limiting errors.
6		PMMC mechanism,
7		DC Voltmeter,
8		Ammeter sensitivity,
9		series and shunt type ohm meter
10		multimeter or VOM. True RMS voltmeter Digital voltmeter
11		Rectifier - amplifier and amplifier - Rectifier type.
12	Unit II:	DC and AC Bridges,
13	Bridges &	Wheat stone Bridge,
14	Transducers	Kelvin Bridge,
15		Maxwell Hay
16		Schering, Wien Bridges,
17		Cathode ray oscilloscope,
18		Block diagram, Basic operation,
19		Transducers and their classification,
20		strain gauge and displacement transducer.
21	Unit III:	Definition of AM and Detection of AM,
22	Amplitude	Modulation index,
23	Modulation	power in AM wave,
24	and Demodulation	linear and square law modulation technique,
25		5 Numerical problems.
26		Definition of Amplitude Demodulation
27		Generation and detection of amplitude demodulation,
28		linear diode detection,
29		choice of RC, Numerical problems
30	Unit IV:	Definition of frequency modulation,
31	Frequency	modulation index,
32	Modulation	frequency spectrum of frequency,
33	and Demodulation	frequency modulation wave,
34		direct and indirect method of FM,
35		Pre-emphasis and de-emphasis
36		Frequency demodulation: Foster seeley and phase locked loop.
37		Numerical problem related to FM demodulation.
38	Unit V:	Pulse code modulation (PCM),
39	Digital Modulation	Amplitude Shift Keying (ASK),
40		Frequency Shift Keying (FSK),
41		Phase Shift Keying (PSK)

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Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) Sem VI (Jan 2019 - May 2019)

Subject - PRACTICALS

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Topic
1	Study of AM Modulation and Demodulation.
2	Study of FM Modulation and Demodulation.
3	Study of PCM Modulation and Demodulation.
4	Study of Phase Locked Loops 565 and 566.
5	Study of CRO(Block Diagram of Internal Circuit of CRO, Measurement of Phase Difference between two waveforms , Frequency , Average DC and Peak Voltage Measurements for Sine, Triangular and Square Waves).
6	Study of Kelvin Bridge.
7	Study of Maxwell Bridge.
8	Study of Wien Bridge.