

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Electronics

Lesson Plan - B. Sc.(IT+ELEX,PHY+ELEX) First Year (July 2017 - April 2018)

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 characteristics
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		Characteristics curve of bipolar transistors
50		Characteristics 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
61		

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) First Year (July 2017 - April 2018)

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		1'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.
48		

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) First Year (July 2017 - April 2018)

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) Sem III (July 2017 - Dec 2017)

Subject - THYRISTORS, IC TECHNOLOGY, MICROPROCESSOR AND

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Unit	Topic
1	Unit I:	Rectifiers: Half wave,
2	Power Supplies	Full wave and Bridge Rectifiers
3		Efficiency, Ripple factor and voltage regulation
4		Block Diagram of Regulated Power Supply
5		Series and Shunt Regulation.
6		Three terminal Regulators (78XX and 79XX).
7	Unit II:	JFET, Construction and Characteristics
8	FETs & Amplifiers	Depletion and Enhancement type
9		MOSFET, Construction and Characteristics
10		Depletion and Enhancement type
11		MOSFET, problems related to pinch off voltage
12		IDSS, Vgs, transfer characteristics
13		μ , rd, gm, ID, IDSS relation for FET and threshold voltage.
14		Transistor as an amplifier:
15		Class A,Class B,
16		Class AB and Class C operation and their Applications
17		Class B push pull amplifier,
18		Noise and Distortion in Amplifier
19	Unit III:	concept of feedback
20	Feedback and Oscillators	General theory of feedback,
21		classification of feedback
22		closed loop gain, open loop gain and return difference,
23		stabilization of gain
24		Negative feedback in amplifier,
25		Effect of negative feedback on gain,
26		non linear distortion,
27		Band width, Noise, Input and output impedance,
28		Topologies of feedback
29		Positive feedback and Barkhausen criterion for oscillator,
30		RC phase shift oscillator
31		wien Bridge oscillator, 13 RF oscillator
32		effect of L and C on RF oscillator frequency
33		Hartley oscillator,16 colpitts oscillator,
34		crystal oscillator
35	Unit IV:	Basic Building Block of Op-Amp
36	Operational Amplifier	Differential amplifier and its types
37		. DC and AC analysis of Differential amplifier,
38		Concept of Virtual ground.
39		Op-amp Parameters:
40		Concept of ideal op-amp,
41		Input and output offset voltage, Input offset current,
42		Input bias current, CMRR, PSRR and slew rate,
43		open loop gain, Input and output resistance
44		frequency response. Calculation of CMRR and Slew rate

45	Unit V:	Voltage Amplifier
46	Linear and Non linear	Inverting and non inverting amplifier
47	applications of op-amp	summing amplifier
48		Differential and Instrumentation Amplifiers
49		Comparator, Zero crossing Detector
50		limit detector. Schmitt trigger
51		Differentiator, Integrator
52		Logarithmic amplifier
53		problems related to above topics.
54		

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX)SEM-III (July 2017 -Dec2017)

Subject - PRACTICALS

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Topic
1	Study of Half Wave, Full Wave and Bridge Rectifiers.
2	Study of output and transfer characteristics of JFET/MOSFET.
3	Study of Wien Bridge Oscillator.
4	Study of Hartley Oscillator.
5	Study of Colpitt's Oscillator.
6	Op-Amp 741C as an inverting and non- inverting amplifier.
7	Op-Amp 741C as adder and Subtractor.
8	Op-Amp as Voltage Comparator.
9	Op-Amp as Differential and Instrumentation Amplifier.
10	Op-Amp as Integrator and Differentiator.

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) Sem IV (Jan 2018 - May 2018)

Subject - THYRISTORS, IC TECHNOLOGY, MICROPROCESSOR AND

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Unit	Topic
1	Unit I	Decimal, Binary, Octal,
2	Number Systems,	Codes and Logic
3		Hexadecimal number systems and their interconversions,
4		Gates
5		Signed and fractional binary number representation.
6		BCD, Excess-3, Gray, ASCII & EBCDIC Codes.
7		Basic logic gates & Derived gates(AND, OR, NOT, NAND, NOR, XOR, XNOR):
8		Symbols, Truth Tables
9		Circuit diagrams using switches, diodes and transistors.
10	Unit II:	Boolean Algebra, 2 minterms, maxterms,
11	Boolean Algebra	Boolean expression in SOP form and POS form,
12	and K-map	conversion of SOP/POS expression to its standard SOP/POS form,
13		Demorgan's Theorem. Universal Gates,
14		Simplification of Logic equations using laws of Boolean algebra and
15		Karnaugh map (upto 4 variables)
16	Unit III:	Binary addition, subtraction,
17	Arithmetic &	multiplication & division,
18	Combinational	1's and 2's complement
19	Circuits	Half adder and Full Adder,
20		Half Subtractor and Full Subtractor
21		Binary Adder, 2's complement Adder/Subtractor circuit,
22		Digital Comparator
23		Multiplexer, Demultiplexer,
24		Encoder, Decoder and code converters.
25	Unit IV:	RS & D Latches, RS, D, Flip Flops,
26	Sequential	JK & T Flip Flops
27	Circuits	Concept of racing and JK Master-Slave Flip Flops,
28		Registers & Counters and their different types.
29	Unit V:	Basic D/A Converters: R-2R,
30	A/D &	Binary Weighted Resistor type
31	D/A Converter	A/D Converters: Counter, Ramp,
32		Flash and Successive Approximation.
33		Sample and Hold Circuits: .
34		Basic Concept and Working
35		NUMERICAL BASED ON k MAP
36		REVISION
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38		

Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Electronics

Lesson Plan - B. Sc.(IT+ELEX,PHY+ELEX) IV (Jan 2018 -May2018)

Subject - PRACTICALS

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Topic
1	Study of Basic Logic Gates and Universal Gates.
2	Verification of Demorgan's Theorem.
3	Study of Binary Half and Full Adder Circuit.
4	Study of Binary Half and Full Subtractor Circuits.
5	Study of code conversion binary to gray and gray to binary Circuits.
6	Study of 4 bit Parity Generator/ Checker Circuits.
7	Study of Multiplexer and Demultiplexer Circuits.
8	Study of Decoder and Encoder Circuits.
9	Study of R-S, D and J-K flip flop.
10	Study of 4 - Bit Ripple Up/Down Counter.
11	Study of Left and Right Shift Registers.
12	Study of Digital Comparator.
13	Study of D/A Conversion.
14	Study of A/D Conversion.
15	Study of Ring Counter and Decade Counter.

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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.

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Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) SEM-V(July 2017 -Dec2017)

Subject - PRACTICALS

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Topic
1	Using Microprocessor 8085:-
2	Addition and Subtraction of 8 bit Numbers.
3	Addition and Subtraction of 16 bit Numbers.
4	Addition of 8 bit numbers in BCD Code.
5	Addition of two string of numbers placed in memory location.
6	Multiplication and Division of 8 bit and 16 bit numbers.
7	Find the Largest and Smallest number from a given set of numbers loaded in the memory.
8	To arrange the numbers in Ascending and Descending order.
9	Find 1's & 2's Complement of Numbers.
10	Block Data Transfer in Memory.
11	Display 'HELP'
12	Interfacing of Peripheral IC 8255 with 8085 Microprocessor.

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Department of Electronics

Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) Sem VI (Jan 2018 - May 2018)

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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Lesson Plan - B. Sc. (IT+ELEX,PHY+ELEX) VI (Jan 2018 -May 2018)

Subject - PRACTICALS

Teacher - Dr.Pradeep Purey/Prof. Richa Joshi

Day/Lecture	Topic
1	Study of AM Modulation.
2	Study of Demodulation.
3	Study of FM Modulation.
4	Study of FM Demodulation.
5	Study of PCM Modulation.
6	Study of PCM Demodulation.
7	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).
8	Study of Kelvin Bridge.
9	Study of Maxwell Bridge.
10	Study of Wien Bridge.