Semester-III
Branch-Electrical Engineering & EEE
Paper- Electronics Engineering
Subject Code : ELE306
Total Hours : 42
Full Marks-100 (80+20)

Chapter	Topics	Hours
01.	Semiconductor Diode: 1.1 Semiconductor Theory • Review of Semiconductor theory (No Question to be set in theory paper) • Intrinsic semiconductor, Extrinsic semiconductor, doping, dopant • trivalent & pentavalent impurities, P-Type and N-Type Semiconductor. 1.2 Semiconductor Diode • PN Junction • Junction theory: Barrier voltage, Depletion region, Junction capacitance, Forward and reverse biased junction. • V-I characteristics of P-N Junction diode. • Circuit diagram for characteristics (Forward & Reverse) 1.3 Specification of diode • Forward Voltage Drop, Reverse Saturation Current, Maximum Forward Current, Power Dissipation. • Ideal Diode Model. 1.4 Zener Diode • Construction & Symbol • Circuit diagram for characteristics (Forward & Reverse) • Specification of zener diode: zener voltage (VZ), Maximum Power dissipation (PD max), Break over current, zener resistance. • Special Purpose diodes: Schott key diode, Point-contact diode, Varacter Diode (Construction, Symbol, Characteristics and application). • Optical diodes: LED, IRLED, Photodiode and Lased diode (Symbol, Operating Principle and application of each)	04
02	Rectifiers and Filters 2.1 Rectifiers • Need of rectifier • Types of rectifier: Half wave rectifier, Full wave	06

	rectifier (Bridge and centre tapped).	
	• working with waveform (IP/OP) waveforms for voltage and current, Average (DC) value of current and voltage (No derivation).	
	• Ripple, ripple factor, ripple frequency, PIV of diode used, transformer utilization factor, efficiency of rectifier.	
	• Comparison of three types of rectifiers (HWR, FWR (Bridge & Centre Tapped)).	
	2.2 Filters	
	• Need of Filters	
	• Types of Filters: Shunt capacitor, series inductor, LC filter, π filter (circuit diagram, operation, DC O/P voltage, ripple factor (Formula), ripple frequency, dependence of ripple factor on load.	
	• I/P and O/P waveforms, Limitations and Advantages of all types of filters.	
03	Bipolar Junction Transistor 3.1 transistor • Transistor definition • Types: NPN, PNP Junction transistors (Symbols, operating principle) • Transistor configuration: Common emitter (CE), Common Collector (CC), Common base (CB). • Characteristics in CE configuration (Circuit diagram, I/P and O/P characteristics, different points of characteristics (Cut-off, Active and Saturation), input resistance, Output resistance, current gain (α and β) Transistor Biasing). • Need of biasing, DC load line, Operating Point. • Types of Biasing Circuits: Fixed bias circuit, Base biased with emitter feedback, Base biased with collector feedback, voltage divider bias, emitter biased. • Transistor Model of h-parameters. 3.2 Transistor as an amplifier (CE configuration only) • Graphical representation, Current gain, Voltage gain, Power gain (No derivation), Input Output resistance, Phase Shift between input and output. • AC Load Line. • Single Stage CE amplifier: Circuit diagram, Function of each component. Frequency response and bandwidth. 3.3 Need of Cascaded amplifier • Types of coupling: RC couple, Transformer couple, Direct Couple (Circuit diagram and function of each component). • Application of each amplifier • Transistor as a switch-(Circuit diagram, Operation,	12

	Application).	
	UJT	
	• Symbol, characteristics and working principle of UJT.	
04	Field Effect Transistor (Unipolar Transistor)	
	4.1 FET	
	• Types, Symbols and working principle.	
	• Characteristics of FET, Circuit diagram for drain characteristics, Operating regions of characteristics.	08
	• Drain resistance, Mutual capacitance, amplification factor and their relation, Pinch off voltage of FET.	
	• Comparison of BJT and FET. (Type of carriers, switching speed, Thermal stability, space in case of IC fabrication, control parameter, input impedance, offset voltage, power gain at audio frequencies)	
	4.2 MOSFET	
	• Types, Symbol, working principle.	
	• Application of FET and MOSFET.	
05	Regulated Power Supply	
	5.1	
	• Definition of regulator, Need of regulator, Voltage regulation factor	
	• Concept of load regulation and line regulation.	
	• Zener diode as a voltage regulator.	04
	• Basic block diagram of DC Power supply	
	• Transistorized Series voltage regulator, Transistorized Shunt Voltage regulator, (Circuit diagram and operation).	
	5.2 Regulator IC's	
	• IC's 78XX, 79XX (Functional Pin diagram)	
	• IC 723 as fixed, variable and Dual regulator.	
06	OP Amp	
	• Block diagram, Basic definition of Terms	
	• Equivalent Circuit	08
	• Open Loop & closed Loop, OP Amp	
	• Inverting & Non inverting OP Amp	
	• Adder and Subtractor	
	• Integrator, differentiator & Comparator circuit using OP Amp.	
	Total	42

Reference Books :

01	Principles of Electronics by Malvino
02	Electronics device & circuits by Neselski & Boylsted
03	Electronics device & circuits by Grove
04	Electronics device & circuits by by Milliman & Holkias
05	Electronics device & circuits by V.K. Mehta
06	Op Amp by Gaikwad

Electronics Lab :-
Subject Code :-ELE309

Practical :-
Skills to be developed
Intellectual Skills :
1. Identification & selection of Components
2. Interpretation of Circuits
3. Understand working of rectifier, filter, amplifier and Oscillator circuits

Motor Skills :
1. Ability to drow the circuits
2. Ability to measure various parameters
3. Ability to test the components using Multimeter
4. Ability to read data sheets of components
5. Follow standard test procedures

List of Practicals
1. Forward & Reverse characteristics of diode
2. Characteristics of Zener diode
3. Study of Rectifiers (Half wave & Full wave) & Filters (Capacitor & Inductor filter)
4. Input & Output Characteristics of transistor in CE mode
5. Characteristics of FET
6. Characteristics of UJT
7. Load & Line regulation Characteristics of Regulator
8. Frequency response of single stage RC coupled amplifier.
9. To Study the V-I Characteristics of PN Junction diode.
10. Determination of h parameter.