

LOK JAGRUTI UNIVERSITY (LJU)
INSTITUTE OF ENGINEERING & TECHNOLOGY

Department of Electronics and Communication (707)

Bachelor of Engineering (B.E.) – Semester – II

Course Code:	017073201
Course Name:	Electronics Devices and Circuits
Category of Course:	Professional Core Course (PCC)
Prerequisite Course:	Physics (017071192)

Teaching Scheme				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Total Hours
5	0	2	6	50

Syllabus				
Unit No.	Topic	Prerequisite Topic	Successive Topic	Teaching Hours
01	Basic Semiconductor and PN junction Diode			5 (10%)
	1.1 Energy-band Diagram of Semiconductor, Conductor and Insulators	Properties and types of Semiconductors (017071192 -Unit-7.1)	---	
	1.2 PN Junction Diode	PN junction diode (017071192 -Unit-8.1)	Power Diodes and it's types (017073701 – Unit-1.1)	
	1.3 Diode Approximations	PN junction Diode (017073201 – Unit-1.3)	---	
	1.4 Diode Testing	PN junction Diode (017073201 – Unit-1.3)	---	
02	Rectifiers and Filters			6 (12%)
	2.1 Block Diagram of DC Power Supply	---	---	
	2.2 Half Wave Rectifier	Block diagram of DC Power Supply (017073201 – Unit-2.1)	---	
	2.3 Full Wave and Bridge rectifier	Block diagram of DC Power Supply (017073201 – Unit-2.1), Half Wave Rectifier (017073201 – Unit-2.2)	---	
	2.4 Filters: RC and LC	Half Wave Rectifier (017073201 – Unit-2.2), Full Wave and Bridge rectifier (017073201 – Unit-2.3)	---	
03	Clipper, Clamper and Multiplier			6 (12%)
	3.1 Series Clipping Circuits	PN junction Diode (017073201 – Unit-1.3)	---	
	3.2 Shunt Clipping Circuits		---	
	3.3 Clampers		---	
	3.4 Voltage Multipliers		---	
04	Special Purpose Diode			3 (6%)
	4.1 Zener Diode and its Application as Voltage Regulator	Properties and types of Semiconductors (017071192 -Unit-7.1), PN junction Diode (017073201 – Unit-1.3)	---	
	4.2 Tunnel Diode		---	
	4.3 Varactor Diode		---	
	4.4 PIN Diode		---	
	4.5 LED		---	
	4.6 Photo Diode		---	
4.7 Schottky Diode	---			
05	Bipolar Junction Transistor			6 (12%)
	5.1 Types of BJT and its Operation	PN junction Diode (017073201 – Unit-1.3)	Basic concept of BJT & Push-pull amplifier (017073302 – Unit-1.1)	
	5.2 CE Configuration	Types of BJT and its Operation (017073201 – Unit-5.1)	---	
	5.3 Transistor as a Switch	CE Configuration (017073201 – Unit-5.2)	---	
	5.4 CB Configuration	Types of BJT and its Operation (017073201 – Unit-5.1)	---	
	5.5 CC Configuration	---	---	
06	Transistor Biasing			6 (12%)
	6.1 DC Load Line Concepts & Q Point Stabilization	CE Configuration (017073201 – Unit-5.2)	---	
	6.2 Fixed Bias		---	
	6.3 Collector to Base Bias		Power BJT (017073701 – Unit-1.2)	
	6.4 Voltage Divider Bias		---	
	6.5 Thermal Runaway	DC Load Line Concepts & Q Point Stabilization (017073201 – Unit-6.1)	---	
07	AC analysis of BJT			4 (8%)
	7.1 Importance of Coupling and Bypass Capacitor	---	---	
	7.2 AC Load Line	---	---	
	7.3 Small Signal Operation	CE Configuration (017073201 – Unit-5.2)	---	
	7.4 Transistor Models (T and π)	---	---	
	7.5 AC Analysis of CE Amplifier	Transistor Models (T and π) (017073201 – Unit-7.4)	---	

	7.6 Introduction to Power Amplifiers	---		
08	Multi Stage Amplifiers			
	8.1 Two Stage Direct Coupled and RC Coupled Amplifier	CE Configuration (017073201 – Unit-5.2)	---	4 (8%)
	8.2 Block Diagram and Gain of Multistage Amplifier		---	
	8.3 Multistage CE Amplifier		---	
	8.4 Darlington Amplifier		---	
09	JFET and its biasing			
	9.1 N - Channel JFET	---	UJT (017073701 – Unit-2.6)	5 (10%)
	9.2 P - Channel JFET	---	---	
	9.3 JFET Switching	---	---	
	9.4 JFET Biasing	N - Channel JFET (017073201 – Unit-9.1)	---	
10	MOSFET			
	10.1 Depletion MOSFET	---	Power MOSFET (017073701–Unit-1.3)	5 (10%)
	10.2 Enhancement MOSFET	---	---	
	10.3 CS MOSFET as an Amplifier	Depletion MOSFET (20EC201 – Unit-10.1), Enhancement MOSFET (20EC201 – Unit-10.2)	---	
	10.4 MOSFET Switch	---	---	

Sr No.	Practical Title	Link to Theory Syllabus
1	To plot input and output waveforms of the (a) Half Wave Rectifier without filter (b) Half Wave Rectifier with Filter.	Unit-1,2
2	To plot input and output waveforms of the (a) Full Wave Rectifier without Filter (b) Full Wave Rectifier with Filter.	Unit-1,2
3	To perform the Half wave doubler and draw the input and output waveforms.	Unit-3
4	To Apply various input waveforms (square, triangle) to the Series Positive and Series Negative Clipper circuits and draw its input to output waveforms.	Unit-3
5	To observe the waveforms of Parallel Positive clipper and Parallel Negative Clipper circuits.	Unit-3
6	To observe the waveform of Bi-directional (Two-way) Clipper circuit and draw its waveform.	Unit-3
7	To observe the waveforms of the unbiased Positive and Negative clamping circuits.	Unit-3
8	To analyze the input and output characteristics of an NPN transistor in Common Emitter mode.	Unit-5
9	To verify the operation of transistor as a switch on bread board along with LED.	Unit-5
10	To plot drain and transfer characteristics of Field Effect Transistor (FET).	Unit-9

Major Components/ Equipment	
Sr. No.	Component/Equipment
1	Trainer Kit (Half wave rectifier with filter), Connecting Wires, Bread-Board, DC Power Supply, DSO, Function generator.
2	Trainer Kit (Full wave rectifier with filter), Connecting Wires, Bread-Board, DC Power Supply, DSO, Function generator.
3	Trainer Kit (Half wave Doubler), Connecting Wires, Bread-Board, DC Power Supply, DSO, Function generator.
4	Trainer Kit (Series Clipper Circuit), Connecting Wires, Bread-Board, DC Power Supply, DSO, Function generator.
5	Trainer Kit (Parallel Clipper Circuit), Connecting Wires, Bread-Board, DC Power Supply, DSO, Function generator.
6	Trainer Kit (Bidirectional Clipper Circuit), Connecting Wires, Bread-Board, DC Power Supply, DSO, Function generator.
7	Trainer Kit (Clamper Circuit), Connecting Wires, Bread-Board, DC Power Supply, DSO, Function generator.
8	Trainer Kit of CE Configuration.
9	Transistor as a switch kit.
10	Trainer Kit FET.

**Proposed Theory + Practical Evaluation Scheme by Academicians
(% Weightage Category Wise and it's Marks Distribution)**

L :	5	T:	0	P:	2
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**Note : In Theory Group, Total 4 Test (T1+T2+T3+T4) will be conducted for each subject.
Each Test will be of 25 Marks.
Each Test Syllabus Weightage: Range should be 20% - 30%**

Group (Theory or Practical)	Group (Theory or Practical) Credit	Total Subject Credit	Category	% Weightage	Marks Weightage	
Theory	5	6	MCQ	46%	55	
Theory			Theory Descriptive	12%	15	
Theory			Formulas and Derivation	0%	0	
Theory			Numerical	25%	30	
Expected Theory %	83%			Calculated Theory %	83%	100
Practical	1		Individual Project	0%	0	
Practical			Group Project	5%	30	
Practical			Internal Practical Evaluation (IPE)	12%	70	
Practical			Viva	0%	0	
Practical			Seminar	0%	0	
Expected Practical %	17%		Calculated Practical %	17%	100	
Overall %	100%			100%	200	

Course Outcome

	<i>Upon completion of the course students will be able to</i>
CO1	Understand the current voltage characteristics of semiconductor devices.
CO2	Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation.
CO3	Analyze and design electronic circuits using BJT.
CO4	Comprehend the operation of MOSFET and FET

Suggested Reference Books

1	David A. Bell, "Electronic Devices and Circuits", Oxford University Press, Fifth edition
2	Albert Malvino & David, "Electronic Principles", Tata McGraw-Hill, Seventh edition
3	R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education
4	Jacob Millman, Chritos Halkias, Chetan D Parikh, "Integrated Electronics", Tata McGraw-Hill, Second edition
5	Albert Malvino & David, "Problems and Solutions in Basic Electronics, McGraw Hill Education

List of Open Source Software/Learning website

1	https://www.allaboutcircuits.com
2	https://www.electrical4u.com
3	https://www.electronicsoach.com

Practical Project/Hands on Project		
Sr. No.	Project List	Linked with Unit
1	AC to DC Converter using Bridge rectifier.	Unit 1,2
2	Design AC to 5 V DC power supply.	Unit 1,2
3	Emergency Switch using Photodiode during Power cutoff.	Unit 4
4	Design Alarm System - Water level indicator in Dam.	Unit 4,5
5	Design Mobile Battery Charger using Voltage Quadrupler.	Unit 3
6	Design Audio Amplifier.	Unit 7,8
7	Analog ON/OFF Switch using JFET/MOSFET.	Unit 9,10
8	Design Digital Logic NOT gate using Transistor. (BJT/MOSFET)	Unit 5,6,9,10
9	Design JFET Multiplexer.	Unit 9,10

