



## LESSON PLAN

Sub Code & Name : U15EC301 & Electron Devices  
Branch : ECE

Semester: III



### UNIT-1 JUNCTION ANALYSIS

S.No	Topics To Be Covered	Duration in Minutes	Teaching Aid	Books Referred
1.	PN junction Diode, Basic Structure, Energy Band Diagrams	45	BB	T1
2.	PN junction Diode energy band diagrams	45	BB	T1
3.	Zero Applied Bias, Forward Applied Bias, Reverse Applied Bias	45	BB	T1,R1
4.	PN Junction current, Small signal model of PN junction	45	BB	T1
5.	Generation and recombination of currents	45	PPT	T1
6.	Junction breakdown, Zener Diode, Breakdown mechanisms	45	BB	T1,R1
7.	Characteristics, Effect of Temperature, Application as voltage regulator and backward diode	45	BB	T1,R2
8.	Varactor diode, Working and characteristics, Tunnel diode, V-I Characteristics and working	45	BB	T1
9.	TED (Transferred Electron Device), Basic concept	45	BB	T1,R1
10.	TED Negative differential resistance	45	BB	T1,R2
11.	V-I Characteristics and working of Gunn Diode	45	BB	T1,R2
12.	IMPATT, Static and Dynamic Characteristics.	45	PPT	T1,R2

### UNIT-II BIPOLAR TRANSISTOR

S.No	Topics To Be Covered	Duration in Minutes	Teaching Aid	Books Referred
1.	BJT: The bipolar transistor action	45	BB	T1,R1
2.	Minority carrier distribution	45	BB	T1,R2
3.	Low-frequency common- base current gain	45	PPT	T1
4.	Low-frequency common- base current gain	45	BB	T1
5.	Non-ideal effects, Ebers-Moll Model	45	PPT	T1,R2
6.	Gummel-Poon Model, Hybrid-Pi Model	45	BB	T1
7.	Gummel-Poon Model, Hybrid-Pi Model	45	PPT	T1,R1
8.	Frequency Limitations	45	BB	T1
9.	HBT (Heterojunction bipolar transistor): Current gain in HBT	45	BB	T1,R1
10.	HBT (Heterojunction bipolar transistor): Current gain in HBT	45	BB	T1
11.	Basic n-p-n HBT structure with band diagram.	45	PPT	T1,R2
12.	Basic n-p-n HBT structure with band diagram.	45	BB	T1,R2

### UNIT-III FIELD EFFECT TRANSISTORS

S.No	Topics To Be Covered	Duration	Teaching	Books
1.	JFET: Construction, operation and device characteristics	45	PPT	T1,R1
2.	V-I relationship and transconductance	45	BB	T1,R2
3.	Small signal equivalent model	45	BB	T1,R1
4.	Frequency limitation factors and cut-off frequency	45	BB	T1
5.	MOSFET Two terminal MOS structure	45	BB	T1
6.	MOSFET construction	45	BB	T1
7.	Band diagrams under equilibrium and external bias	45	PPT	T1
8.	Threshold Voltage	45	BB	T1
9.	V-I and CV characteristics	45	BB	T1,R2
10.	MESFET: Device structure principle of operation	45	BB	T1

11.	V-I characteristics, High frequency performance.	45	PPT	T1,R2
12.	Problems	45	BB	T1,R1

#### UNIT-IV OPTICAL DEVICES

S.No	Topics To Be Covered	Duration in Minutes	Teaching Aid	Books Referred
1.	Optical absorption: Photon absorption coefficient	45	PPT	T1,R1
2.	EHP generation rate	45	PPT	T1,R1
3.	Problems on EHP rate	45	BB	T1
4.	Solar Cells: The PN junction	45	BB	T1
5.	Solar Cells: The PN junction	45	BB	T1
6.	Hetero-junction and amorphous silicon solar cells	45	BB	T1
7.	Photo detectors: Photoconductor	45	PPT	T1,R2
8.	Photo detectors: Photoconductor	45	BB	T1,R1
9.	Photodiode, PIN photodiode	45	BB	T1
10.	APD (avalanche photodiode), phototransistor	45	BB	T1,R1
11.	Opto-couplers: Operation, construction	45	BB	T1
12.	Specifications and applications	45	PPT	T1,R2

#### UNIT-V RECENT TRENDS IN MEDICAL INSTRUMENTATION

S.No	Topics To Be Covered	Duration in Minutes	Teaching Aid	Books Referred
1.	PNPN Diode: Basic structure and characteristics	45	BB	T1,R1
2.	PNPN Diode: Basic structure and characteristics	45	BB	T1,R2
3.	SCR Basic structure, characteristics	45	BB	T1,R1
4.	SCR Two transistor analogy	45	BB	T1,R1
5.	DIAC Basic Structure and characteristics	45	BB	T1,R1
6.	TRIAC Basic Structure and characteristics	45	BB	T1,R1
7.	GTO Basic structure and characteristics	45	BB	T1,R2
8.	PUT Operation and characteristics	45	BB	T1,R2
9.	PUT Operation and characteristics	45	BB	T1,R1
10.	UJT Operation, characteristics, parameters	45	PPT	T1,R2
11.	UJT as a relaxation oscillator	45	PPT	T1,R2
12.	UJT as a relaxation oscillator	45	PPT	T1,R1

**TEXT BOOK:**

1. Donald A. Neamen, "Semiconductor Physics and Devices" Tata McGraw Hill, Third Edition.
2. David Bell, "Electronic Devices and Circuits", Oxford, Fifth Edition.

**REFERENCES:**

1. S. M. Sze, "Semiconductor Devices: Physics and Technology", Wiley, Second Edition
2. Sung-Mo Kang, Yusuf Leblebici, "CMOS Digital Integrated Circuits", Tata McGraw Hill, 3<sup>rd</sup> Edition
3. Gordon W. Roberts and Adel S. Sedra, "Spice", Oxford, Second Edition

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