INSTRUCTION DIVISION

FIRST SEMESTER 2016-2017

Course Handout Part II

Date:03/08/2016

In addition to part -I (General Handout for all courses appended to the Time Table), this portion gives further specific details regarding the course.

Course No.	**:**	**EEE/INSTR F 214**
Course Title	**:**	**Electronic Devices**
Instructor-in-Charge	**:**	**V K CHAUBEY (vkc@pilani.bits-pilani.ac.in)**
Instructors	**:**	**Abhijit R Asati, Arnab Hazra, Vinita Tiwari,kari Babu Ravi Teja, Lucky Sharan.**

1. Scope and Objective:

The course provides a comprehensive understanding of the basic theory of semiconductors and devices made out of it. Starting by explaining the fundamentals of semiconductors like energy band formation, electron and hole concepts, effect of electric and magnetic fields on charge carriers, the course helps in developing the understanding about excess carriers in semiconductors and its device application. In-depth study on 'junctions' prepares the students for even a detailed study on devices to be studied later like FET and BJT viz. commonly employed in Integrated Circuit (IC) technology . Concepts of some advanced semiconductor devices suitable for high frequency and infrared-optical range will also be discussed.

2. Text Book:

B. G. Streetman, and Sanjay Banerjee, "Solid State Electronic Devices", 6th ed., PHI learning Private Limited, New Delhi, 2009

3. Reference Books:

1. D A. Neaman, "Semiconductor Physics and Devices", 3rd edition, Tata Mc Graw Hill, New Delhi
2. M S Tyagi , " Introduction to Semiconductor Materials and Devices" John, NewYork 1991.

4. Course Plan:

Lecture No.	Topic	Learning Objectives	Reference to text
1-3	Introduction to subject and review of semiconductor fundamentals.	Basics of Semiconductor materials, Direct and Indirect semiconductors, Band gap, effective mass.	Class notes and 3.1.3, 3.1.4, 3.2
4-5	Charge carriers in semiconductors,	Fermi level, equilibrium carrier concentrations, temperature dependence, space charge neutrality	3.3
6-7	Effect of electric and magnetic fields on drift of carriers	Conductivity and mobility, Hall effect	3.4-3.5
8-10	Excess carriers in semiconductors	Photon induced carrier generation, generation recombination of excess carriers, quasi-fermi levels in non equilibrium	4.1 – 4.4
11-16	PN Junction	Equilibrium conditions, Fermi levels, IV	5.2 – 5.6

		characteristics, biasing, transient and AC conditions, secondary effects	
17-18	Metal Semiconductor Junction	Schottky Barrier, Rectifying contacts and ohmic contacts.	5.7
19-22	Field Effect Transistors	To understand the structure and working of JFET, Metal-Semiconductor FET and MISFET, MOS capacitors (ideal and real)	6.2 – 6.4
23-25	Field Effect Transistors	MOSFET, I-V characteristics and secondary effects	6.5 and Lecture notes
26-30	Bipolar Junction Transistors	BJT operations, amplifications, carrier distribution, I-V characteristics etc. and secondary effects	7.3 – 7.5 and Lecture notes
31-34	Optoelectronic devices	Photodiodes, Solar cells, LEDs, Lasers and Semiconductor Lasers	8.1 – 8.4
35-38	High frequency and high power devices	Basic Structure and conduction mechanism of Tunnel diodes, IMPATT diodes, Gunn diodes	10.1 – 10.6
39-40	Recent trends in semiconductor devices	Device Integration and Introduction to Integrated Circuits and recent advancement	Lecture Notes

5. Evaluation Scheme:

Component	Duration	Marks (300)	Date & Time	Evaluation type
Mid Sem. Exam	90 mins	100		Closed Book
Assignment	--	30	--	Quiz based on Assignments (Closed Book)
Tutorial Quizzes	10 mins	50		Closed Book
Compre. Exam.	3 hours	120		Closed Book+ Open Book

6. Tutorials: Tutorial sheets will be distributed in all tutorial hours.

7. Chamber Consultation hours: To be announced in the class.

8. Notices: All notices concerning the course will be displayed on EEE notice board.

9. Make-up Examination: Make-up will be given **ONLY** in cases of **sickness (hospitalization)** or **urgency** for going out of station. (no make-up will be given for assignments and surprise quizzes)

Instructor-in-Charge
EEE C381