FIRST SEMESTER 2015-16

Course handout part II

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. **: MEL G611**

Course Title **: IC Fabrication Technology**

Instructor-in-charge **: Anshuman Dalvi**

1. Course Description:

The course describes both theoretical and practical aspects of integrated circuit (IC) fabrication technology. Conversion of a single crystal of silicon into an IC requires several fabrication steps such as epitaxy, oxidation, chemical vapor deposition, metallization, ion implantation, etching, lithography etc. All these process steps will be discussed.

2. Scope and objective of the course:

The objective of the course is not only to introduce the basic principles involved in IC fabrication but also to discuss processing technology. Fabrication of integrated circuits is a joint venture by electrical engineers, chemical engineers, materials scientists and physicists. This interdisciplinary course builds bridges across various disciplines.

3. Text Book: Sze S. M., VLSI Technology, McGraw-Hill, 2nd ed., 1980.

Reference Books: 1) Campbell S A, The science and Engineering of microelectronic fabrication, Oxford 2001. 2) May and Sze, Fundamentals of Semiconductor Fabrication, Wiley'04

4. Course Plan:

Lecture No	Learning Objective	Topics to be covered	Reference Chap/Sec #
1 - 2	To introduce the subject	Introduction and Overview	Lect notes/slides
3- 4	Basic Solid State Physics for understanding of Silicon	Crystal structures (Si, Ge, GaAS), defects, directions, planes	Lect notes/slides

	fundamentals		
5-7	To learn the art of wafer preparation	Single crystal growth to Wafer preparation, dopoant distribution	Ch. 1 Sze
8-12	To introduce a topic	Diffusion (time dependent and independent process)	Notes/slides and chatper 3 Campbell
13-15	To learn the basic oxidation process	Oxidation, Deal and Grove oxidation model	Ch. 3 Sze, May & Sze
16-18	To introduce the topic	Ion Implantation	Ch. 8, Sze
19-20	To learn ion implantation technology	Ion Implantation Equipment and Applications	Ch. 8, Sze
21-22	To introduce the topic	Epitaxy	Ch.2, Sze
23-24	To learn the technology	Epitaxial Reactor and Growth	Ch. 2 Sze
25-26	The model of growth process	Kinetics of growth	Ch. 2 Sze and
27-29	To introduce the topic	Lithography	Ch. 4 Sze
20-31	To introduce the topic	Etching	Ch. 5, Sze
32-33	To know about the equipments used for plasma etching	Equipments for plasma etching	Ch. 5, Sze
34-35	To learn theoretical aspects of etching process	Pattern Transfer and Selectivity	Ch. 5, Sze
36-37	To introduce the topic	Vacuum Science, Plasma and Physical Deposition (Evaporation and Sputtering)	Ch. 10 Campbell's book, notes/slides
38-40	To introduce the topic	Chemical vapor deposition, Poly-Si and dielectric deposition	Ch. 6, notes/slides

5. Presentation Topics: Specific topics will be selected and announced in the class as home assignments. Each course participant will have to give a presentation (15~20 mins) on one of those topics based on a draw, which will be conducted at least 2 weeks before the presentation day.

6. Evaluation Scheme:

Component	Duration	Weightage	Date & Time	Venue	Remarks
Assignments/tutes	-	20%			Closed Book
Project	-	10%			Closed Book
Mid-term test	90 mins	30%	5/10 4:00 - 5:30 PM	-	Closed Book
Comprehensive exam	180 mins	40%	2/12 AN		Open book and closed book

7. **Chamber Consultation Hour:** Tuesday 5-6 PM in my chamber 3263
8. **Notices:** Notices, if any, will be displayed on the **Physics Notice Board.**
9. **Make-up Policy:** Make-up will be given only to genuine cases.

Instructor-in-charge

MEL G611