BITS PILANI – Hyderabad Campus
FIRST SEMESTER 2018-2019

Course Handout Part II

20th Jul 2019

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 G631

Course title: Physics and Modeling of Microelectronic Devices

Instructor-in-charge: Dr. Sayan Kanungo

Prerequisite: This course assumes that the students have a prior knowledge of semiconductor physics and devices (or their equivalent) at least at the undergraduate level.

Scope and objective of the course:

1. Understanding the relationship between atomic structure and physical properties of semiconductors.
2. Interpreting the electronic band structure using quantum mechanics.
3. Identifying the semiconductor properties that determine the performance of electronic devices.
4. Understanding the basic physics of charge carriers in solids and carrier transport in semiconductors.
5. Understanding the underlying physics of semiconductor-semiconductor and metal-semiconductor junctions.
6. Analysis and modelling of field effect transistor devices.
7. Understanding the basics of optoelectronic devices.

Text books:

1. Donald A. Neamen, “Semiconductor Physics and Devices”, 3e Mc Graw Hill

Reference books:

1. Mark Lundstrom, “Fundamentals of Nanotransistors”, World Scientific

Course plan:

No	*Learning objectives*	*Page*
1	Introduction to Quantum Mechanics	T1: C2
2	Quantum Theory of Solids	T1: C3
3	Semiconductor Review	T1: C4
4	Physics and modelling of different junctions	T1: C7, C9
5	Analysis and modelling of the MOSFETs	R1:C3, C4, C5
6	Analysis and modelling of short channel effects in MOSFETs	R1:C6-C8, C10-C11

Evaluation scheme:

No	*Component*	*Duration*	*Weightage*	*Marks*	*Date & time*	*Nature*
1	Mid semester	90 min	20%	40	05/10 – 9:00 – 10:30 am	Closed
3	Quiz	45 min	20%	40	TBD	Open
4	Laboratory	120 min/wk	20%	40	TBD	Open
5	End semester	180 min	40%	80	13/12 FN	Closed
	Total		100%	200		

Chamber consultation hour: To be announced in class.

Notices: All notices for the course will be announced in the class and displayed only on the CMS.

Make-up policy: Make-up requests will be entertained ONLY for extremely serious cases where in

1. Parents of the concerned student have to request the course IC for the makeup for their ward.
2. Written & signed documentary evidence needs to be provided from the Hostel Warden confirming the reason for absence from scheduled examination.
3. In case of medical emergencies, students must produce a documentary evidence from the surgeon.

Instructor-in-charge