**An – Najah Notional University**

**Physics Department**

**Fall I 2018/2019**

 **Instructor :** Dr. Iyad SAADEDDIN/Physics Department .

**Office : Science Building (14),Room No .2460**.

**Grading :** 1st Midterm 25 % (13/10/2019) Sunday

 2nd Midterm 25 % (24/11/2019) Sunday

 Final Exam 50%

**Course Objectives :**

Students successfully completing the course will understand semiconductor materials Semiconductor alloys ,binary , ternary and quaternary alloys of semiconductor materials , Crystal structure for semiconductor materials basic principles of p-n junction and how it works explain the characteristic of simple devices as photodiode , light emitting diode, rectrfieres solar cells , varictor diode (voltage dependant capacitor ) ,Tunnel diode , zener diode .

**Text book :** Solid State Electronic Devices , Ben G .

 Streetman, 6th edition (2006), Prentice Hall .

**References** :

1. Physics of Semiconductor Devices . S.M.Sze 2nd edition (1981) , John Wiley & sons
2. Introductory Semiconductor Device Physics Greg Parker (1994) Prentice Hall .
3. Solid State Electronics , G.B. Rutkoviski and J.E.Oleksy,4th edition ,(1992), Macmillan/McGraw-Hill
4. Physics and Technology of Semiconductor Devices A.S. Grove (1967) John Wiley & Sons Inc .
5. Fundamentals Of Semiconductor Devices, E.S. Yang (1978), McGraw-Hill Book Company.

**Course Outline :**

I CH. 1: CRYSTAL PROPERTIES AND GROWTH OF

 SEMICONDUCTORS .

1.Semiconductor Materials

 2.Crystal lattices

 3.Crystal Growth

 a) Bulk Crystal Growth

 b) Epitaxial Growth

II CH . 3: ENERGY BANDS AND CHARGE CARRIERS IN

 SEMICONDUCTORS .

 Bonding Forces and Energy Bands in Solids

 1.Charge Carriers in Semiconductors

 2.Carrier Concentrations

 3.Drift of Carriers in Electric and Magnetic Fields .

 4.Invariance of Fermi Level at Equilibrium .

**First Hour Exam**

III CH 4: EXCESS CARRIERS IN SEMICONDUCTORS

 1.Optical Absorption

 2.Luminescence

 3.Carrier Lifetime and Photoconductivity .

 4.Diffusion of Carriers .

IV CH 5: JUNCTIONS

 1.Fabrication of a p-n Junction .

 2. Equilibrium Conditions .

 3. Forward and Reverse-Biased Junctions .

 4. Reverse Bias Breakdown

**Second Hour Exam .**

 5.4 Capacitance of p-n junction

 7.Metal-Semiconductor Junctions (Schottky Diodes )

 8.Hetrojunctions .

**Extra material will be given if time allowed**

V CH 8: OPTOELECTRONIC DEVICES

 1. Photodiodes

 2.Light Emitting Diodes (light emitting matrials )

VI CH 10: NEGATIVE CONDUCTANCE MICROWAVE DEVICES

 1. Tunnel Diodes .

Good Luck

Dr. Iyad SAADEDDIN