

Electronics & Communications Engineering Syllabus

Year & Sem: E1S1	Course Code: EC1101	Course Name: Electronic Devices and Circuits	No. of Credits: 4	L 2	T&PS 2	P 0
UNIT I: Introduction to Semiconductors Thermal Equilibrium and steady state, Wave particle Duality, Energy band formation, Metal, insulator and semiconductor. UNIT II: Types of Semiconductors Intrinsic Semiconductor: Bond and band models, Generation and recombination, Hole-The positively charged carrier, Effective mass of a carrier, Fermi level in intrinsic Semiconductor. Extrinsic Semiconductor: Majority and minority carriers, Bond and band models. UNIT III: Carrier transport: Fermi level in extrinsic semiconductor, carrier concentration and temperature dependence, drift of carriers in fields, conductivity and carrier mobility, effect of temperature on mobility, Hall effect, diffusion of carriers, Einstein Relation. UNIT IV: P N Diode and Zener Diode: p-n junction structure, invariance of Fermi level at equilibrium, the contact potential, current flow at the junction: forward and reverse biased junctions, reverse bias breakdown, diode equivalent models. Use of Diode in Rectifiers (Half Wave Rectifiers, Full Wave Rectifiers without and with capacitor filters). Zener diodes and Zener diode as voltage regulator. UNIT V: Transistors basics: BJT: BJT construction, operation and characteristics, Early effect, Input and output characteristics of common emitter, common base, and common collector configurations. Transistor as an amplifier, Concept of biasing & different biasing of BJT circuits. Stability factors and stability factors for different biasing circuits. BJT circuits at DC. FET: JFET and MOSFET construction, operation and characteristics. Comparison between FET and BJT. UNIT VI: Operational Amplifiers and Other Semiconductor Devices Op-amps: Introduction to differential amplifier, concept of op-amp, ideal op-amp characteristics, Op-amp as inverting and non-inverting amplifier. Other semiconductor devices: Introduction to and construction of APD, PIN diode, Photo-transistor, LED, Solar cells, tunnel diode and SCR. References/Text Books: 1. Streetman & Banerjee, "Solid State Electronic Devices", PHI learning private limited, 6th edition, 2009 2. Donald A. Neamen, "Semiconductor physics and devices", McGraw Hill 4th edition., 2012 3. AS Sedra & KC Smith, "Microelectronics Circuits", OXFORD university press, 5th edition., 2004 4. Boylestad, "Electronic Devices and Circuit Theory", PHI learning private limited, 10th edition, 2009 .						

Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations.

Video Lectures (Web Links):

<http://nptel.ac.in/courses/117106091/>

<http://nptel.ac.in/courses/117103063/>

<http://nptel.ac.in/courses/115102014/>

<http://nptel.ac.in/courses/122106025/>

Study Materials (Web Links):

<http://nptel.ac.in/courses/117102061/>

<http://nptel.ac.in/courses/117107095/>

Problems & Solutions (Web Links):

1.

2.

Assignments (Web Links):

1.

2.