## **PVP 19**

Course Code		19E	19EC4801C		Year		IV	5	Semes	mester II			
Course		Progr		Bran	nch		ECE		Course	е Туре	Th	eory	
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	semicor	ductor	devices (	L3)	-		-		-				
C <b>O</b> 5	Analyse	the fu	nctioning	of basi	c elect	ronic	devic	es (L	4)				
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CO5 Average	3		3								2		2
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**PVP 19** 

Carrier Concentrations: The Fermi level, Electron and Hole									
concentrations at Equilibrium, Temperature dependence of carrier									
concentrations, Compensation and Space charge Neutrality.									
Drift of carriers: Conductivity and Mobility, Drift and Resistance,									
Effects of Temperature and Doping on Mobility, High Field effects,									
Hall Effect.									
	002								
III <b>P-N Junctions</b> : Equilibrium conditions: The contact potential,	CO3,								
Equilibrium Fermi levels, Space charge at a junction. Forward and	CO4								
reverse biased Junctions; Steady state conditions: Qualitative	and								
Description of current flow at a junction, Carrier Injection, Reverse	CO5								
bias.Reverse-Bias Breakdown: Zener Breakdown, Avalanche									
Breakdown. Transient and A-C conditions: Time variation of stored									
charge, Reverse recovery Transient, Switching diodes, Capacitance									
of p-n junctions. Deviations from the Simple theory									
IV <b>Field Effect Transistor:</b> The Metal-Insulator-Semiconductor FET:	СОЗ,								
Basic operation, The Ideal MOS Capacitor, Effects of Real Surfaces,	CO4								
Threshold voltage, MOS Capacitance-Voltage Analysis.	and								
The MOS Field-Effect Transistor: Output Characteristics, Transfer	CO5								
characteristics, Mobility models, Short channel MOSFET I-V									
Characteristics, Control of Threshold voltage, Substrate Bias Effects,									
Sub threshold characteristics, Equivalent circuit for the MOSFET									
V <b>Bipolar Junction Transistors</b> : Fundamentals of BJT Operation,	CO3,								
· · ·	CO3, CO4								
Amplification with BJTs, Minority carrier Distributions and	and								
Terminal Currents: Solution of the diffusion equation in the base	CO5								
region, Evaluation of terminal currents, Approximations of the	COS								
terminal currents, Current transfer ratio.									
Generalized Biasing: The coupled-diode model, Charge Control									
Analysis.									
Switching: Cutoff, Saturation, the Switching Cycle, and									
Specifications for Switching Transistors. Small-signal Equivalent									
circuit.									
Learning Resources									
Text Books									
1. Ben G. Streetman, Solid State Electronic Devices, Sixth Edition, Prentice	Hall India,								
2009.									
2. Robert F. Pierret, Semiconductor device fundamentals, Pearson Publications,	, 2006.								
Reference Books									
1. Yuan Taur, Tak.H. Ning, Fundamentals of Modern VLSI Devices, Cambridge									
University Press, 1998									
2. Donald Neamen, Semiconductors Physics and Devices, Tata Mc Graw Hill, 2003									
3. Tyagi, Introduction to Semiconductor Materials and Devices, Wiley Publications,									
2002.									
4. S.M. Sze (Ed), Physics of Semiconductor Devices, 2nd Edition, Wiley Pu	iblications								
1998									
5. Jasprit Singh, Semiconductor Devices, Basic Principles, Wiley Student Edition, 2001									
e- Resources & other digital material									
1. https://onlinecourses.nptel.ac.in/noc20_bt17/preview_									
2. https://www.youtube.com/watch?v=9h10p6M3Jo8									