

SSLC, HSE, DIPLOMA, B.E/B.TECH, M.E/M.TECH, MBA, MCA

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## **OEC751 ELECTRONIC DEVICES**

### DETAILED SYLLABUS

#### **OBJECTIVES:**

The Student should be made to

- Introduce the concept of diodes, Bipolar Junction Transistors and FET
- Study the various model parameters of Transistors
- Learn the concept of special semiconductor devices, Power & Display devices
- Impact the knowledge of various configurations, characteristics and applications.

#### **UNIT-I SEMICONDUCTOR DIODE**

PN junction diode, Current equations, Energy Band diagram, Diffusion and drift current densities, forward and reverse bias characteristics, Transition and Diffusion Capacitances, Switching Characteristics, Breakdown in PN Junction Diodes.

#### **UNIT-II BIPOLAR JUNCTION TRANSISTORS**

NPN -PNP -Operations-Early Effect-Current equations – Input and Output characteristics of CE, CB, CC - Hybrid - $\pi$  model - h-parameter model, Ebers Moll Model- Gummel Poon-model, Multi Emitter Transistor.

#### **UNIT-III FIELD EFFECT TRANSISTORS**

JFETs – Drain and Transfer characteristics, -Current Equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage -Channel length modulation, D-MOSFET, E-MOSFET- Characteristics – Comparison of MOSFET with JFET.

#### **UNIT-IV SPECIAL SEMICONDUCTOR DEVICES**

Metal-Semiconductor Junction - MESFET, FINFET, PINFET, CNTFET, DUAL GATE MOSFET, Point Contact Diode, p-i-n Diode, Avalanche Photodiode, Schottky barrier diode- Zener diode-Varactor diode –Tunnel diode- Gallium Arsenide device, LASER diode, LDR.

#### **UNIT-V POWER DEVICES AND DISPLAY DEVICES**

UJT, Thyristor - SCR, Diac, Triac, Power BJT- Power MOSFET- DMOS-VMOS. LED, LCD, Opto Coupler, Solar cell, CCD.

#### **OUTCOMES:**

**After this course, the student should be able to:**

- Analyze the characteristics of semiconductor diodes.
- Analyze and solve problems of Transistor circuits using model parameters.

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- Identify and characterize diodes and various types of transistors.
- Analyze the characteristics of special semiconductor devices.
- Analyze the characteristics of Power and Display devices.

### **TEXTBOOKS:**

1. Millman and Halkias, "Electronic Devices and Circuits", 4<sup>th</sup> Edition, McGraw Hill, 2015.
2. Mohammad Rashid, "Electronic Devices and Circuits", Cengage Learning Pvt. Ltd, 2015.
3. Salivahanan. S. Suresh Kumar. N, "Electronic Devices and Circuits", 4<sup>th</sup> Edition, McGraw Hill, 2016.

### **REFERENCES:**

1. Donald A Neaman, "Semiconductor Physics and Devices ", 4<sup>th</sup> Edition, McGraw Hill, 2012
2. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory" Pearson Prentice Hall, 11th Edition, 2014.
3. Bhattacharya and Sharma, "Solid State Electronic Devices", 2nd Edition, Oxford University Press, 2014.
4. R.S.Sedha, "A Textbook of Electronic Devices and Circuits", 2nd Edition, S.Chand Publications, 2008.
5. David A. Bell, "Electronic Devices and Circuits", 5th Edition, Oxford University Press, 2008.