1/4 B.Tech - SECOND SEMESTER

EC2T4 Electronic Devices and Circuits Credits: 4

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<tr>
<th>Lecture : 4 periods/week</th>
<th>Internal assessment: 30 marks</th>
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<td>Tutorial: 1 period /week</td>
<td>Semester end examination: 70 marks</td>
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Course Objectives:

- To study in detail about construction of several electronic devices
- To analyse the characteristics of various electronic devices and circuits
- To get familiarize in biasing and stabilization concepts

Learning Outcomes:

Students will get in-depth knowledge about

- The Semiconductor Devices like Diode, BJT, Uni-polar devices like JFET, MOSFET and UJT
- Analysis and operation of simple electronic circuits like rectifiers, regulators and amplifiers.

UNIT-I

**Junction Diode Characteristics** : Open circuited P N Junction, Forward and Reverse Bias, Current components in PN Diode, Diode Equation, Volt-Amper Characteristic, Temperature Dependence on V – I characteristic, Step Graded Junction, Diffusion Capacitance and Diode Resistance (Static and Dynamic), Energy Band Diagram of PN Diode,

UNIT-II

**Special Diodes**

UNIT-III

**Rectifiers and Filters**
Halfwave Rectifier, Full wave and Bridge Rectifier, derivation of Ripple factor, Form factor, peak factor, efficiency of Half wave, full wave and Bridge rectifiers. Filters – C, L-section, LC and CLC filters, Comparison of filters.

UNIT-IV

**Opto-Electronic Devices**
Introduction to optical devices, Photo resister- construction, characteristics, applications, Photo diode-construction, characteristics, applications, LED - construction, characteristics, applications, LCD, comparison between LED and LCD

UNIT-V

**Transistors** :
Junction transistor, Transistor current components, Transistor as an amplifier, Characteristics of Transistor in Common Base and Common Emitter Configurations, Analytical expressions for Transistor Characteristics, Punch Through/ Reach Through, Typical transistor junction voltage values, Photo Transistor,
UNIT-VI
Transistor Biasing and Thermal Stabilization: Operating point, Basic Stability, Collector to Base Bias, Self Bias Amplifiers, Stabilization against variations in $V_{BE}$, and $\beta$ for the self bias circuit, Stabilization factors, (S, $S'$, $S''$). Bias Compensation, Thermistor and Sensitor compensation, Compensation against variation in $V_{BE}$, $I_{co}$, Thermal runaway, Thermal stability

UNIT-VII
Field Effect Transistors: JFET characteristics (Qualitative and Quantitative discussion), MOSFET characteristics (Enhancement and depletion mode), Symbols of MOSFET, UJT and their characteristics,

UNIT-VIII
FET Biasing: Introduction, Fixed Biasing, Self Bias, Voltage divider bias and related problems.

Learning resources

Text books:

References: