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| Course code | Course Title | Core/ Elective |
| 4ES202EE | PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING | Core |
| L | T | P/D | Credits | CIE | SEE |
| 3 | 0 | 0 | 3 | 40 | 60 |
| **Prerequisite:** ---**Course Objectives:** The objective of this course is to make the student* Familiarize with electrical networks, circuits and different Laws used to solve electrical circuits.
* Understand various network reduction techniques to analyze electrical circuits.
* Understand the concept of network theorems for reducing complex networks.
* To know the basics of semiconductors and different diodes with their applications.
* To acquire knowledge of Construction and operation of different transistors along with their applications.

**Course Outcomes:** After completion of the course, the student will be able to* CO.1 Understand the concepts of electrical circuits and basic Laws.
* CO.2 Apply various network reduction techniques to obtain any response in an electrical circuit.
* CO.3Analyze complex electrical circuits with the help of different network theorems.
* CO.4 Explain the operation and application of various diodes.
* CO.5 Knowledge about different configurations and applications of various transistors.
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| **Unit-I: (07 Hrs.)**Introduction to Electrical Circuits: Circuit Concept, R-L-C Parameters, Voltage and Current Sources, Independent and Dependent Sources, Source Transformation, Voltage – Current relationship for Passive Elements, Ohm’s Law, Kirchhoff's Laws. **Unit-II: (10 Hrs.)**Network Reduction Techniques: Series, Parallel, Series Parallel, Star –to-Delta or Delta-to-Star Transformations, Nodal Analysis, Mesh Analysis, Super node and Super mesh Analysis.**Unit-III: (09 Hrs.)**Network Theorems for DC Excitations: Superposition, Thevenin's, Norton's, Maximum Power Transfer, Reciprocity, Milliman's, Tellegen's and Compensation theorems.**Unit-IV: (07 Hrs.)**P-N Junction Diode: P-N Junction as a Diode, Diode Equation, Volt-Ampere |

Characteristics, Ideal versus Practical – Resistance levels (Static and Dynamic), Transition and Diffusion Capacitances, Diode Equivalent Circuits, Breakdown Mechanisms in Semiconductor Diodes, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Zener Diode Characteristics, Voltage Regulation using Zener Diode. **Unit-V: (07 Hrs.)**

BJT, UJT & MOSFET: Transistor Construction, BJT Operation, BJT Symbol, Transistor as an Amplifier, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation, BJT Specifications, UJT and its Characteristics, MOSFET Construction, principle of operation, symbol, MOSFET Characteristics in Enhancement and Depletion modes.

# Text Books:

T1. Fundamentals of Electric Circuits, Charles k. Alexander and Matthew N.

O. Sadiku, Tata McGraw Hills Education, Edition 3, 2013.(Unit 1-3)

T2. Electrical Circuit Analysis, William H Hayt and Jack Kemmerly , 8th Edition, 2014 (Unit 1-3)

T3.Electronic Devices, Floyd, Pearson Publications, Seventh Edition, 2019. (Unit 4-5)

# References/ Suggested Reading:

R1. ―Basic Electrical Engineering‖, N. K. De, Universities Press, 2015. R2. ―Fundamentals of Electrical Engineering and Electronics‖, J.B. Gupta,

S. K. Kataria & Sons Publications, 2002.

R3. ―Electronic Devices and Circuits‖, Theodore F Bogart, Pearson

Publications,2004.

R4. ―Electronics Devices and Circuits‖, J B Gupta, Katson Educational

Series, 6th Edition.