UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN ELECTRONICS AND COMMUNICATION SCIENCE
SYLLABUS WITH EFFECT FROM 2020-2021

BES-DSC01

CORE-I: BASIC CIRCUIT THEORY

Instr.Hrs.: 6 **Year : I**
Credits : 3 **Semester: I**

COURSE OBJECTIVES

1. To apply circuit theorems to simplify and find solutions to electrical circuits.
2. To solve simple circuits using ohm's law, Kirchhoff's laws and the properties of the elements.
3. To build up basic problem solving skills through organizing available information and applying circuit laws.
4. To Build up strong problem solving skills by effectively formulate a circuit problem into a mathematical problem using circuit laws and theorems.
5. To Simplify circuits using series and parallel equivalents and using Thevenin and Norton equivalents
6. To understand application of resistors capacitors, inductors and transient circuit response.

COURSE OUTCOME

At the end of the course the student should be able to

1. Simplify and identify solutions to electrical circuits.
2. Implement the techniques to solve simple circuits using ohm's law, Kirchhoff's laws and the properties of the elements
3. Categorize series and parallel equivalents and using Thevenin and Norton equivalents
4. Recognize resistors capacitors, inductors and transient circuit responses

UNIT I

Resistors : Introduction to linear and non linear components (active and passive) – Types of resistors (wire wound, carbon composition, film type, Cermets') – Resistor color coding – power rating of resistors – Series and Parallel combination of resistors.

Capacitors : Capacitance-Factors controlling capacitance-Types of capacitors: Fixed Capacitors, Variable Capacitors – Non electrolytic and electrolytic capacitors. Voltage rating of capacitors – capacitors in series and parallel – Energy stored in capacitors

UNIT II

Inductors : Inductors (air core, iron core, ferrite core) – comparison of different cores – Inductance of an Inductor – Mutual Inductance – Coefficient of coupling – Variable Inductors – Inductors in Series and Parallel without M – Reactance and Impedance offered by a coil – Q factor

Transformer: working – turns ratio – voltage ratio – current ratio – power in secondary – autotransformers – transformer efficiency – core losses – types of cores.

UNIT III

Ohm's law – Kirchoff's current law – Kirchoff's voltage law – voltage division technique - concepts of series circuit – current division technique – concepts of parallel circuits – internal

resistance of sources – method of solving a circuit by Kirchoff's laws – loop analysis – nodal analysis – simple problems

UNIT IV

Network Theorems: Super Position Theorem – Thevenin's Theorem – Norton's Theorem – Thevenin to Norton Conversion (Theorem Statement and Simple problems)

UNIT V

Applications of Basic components: Filters (Low Pass Filter, High Pass Filter using passive components.)

AC signal: RMS value– average value–. AC analysis (Pure resistive, Pure inductive circuit and Pure capacitive circuit)

TEXTBOOKS

1. Sedha R S, A Text book of Applied Electronics, S. Chand & Company Ltd
2. Muthusubramanian R, Salivahanan S, Basic Electrical and Electronics Engineering, Tata McGraw Hill Education Private Ltd.
3. Narayanamoorthi M and Others, Electricity and Magnetism, S. Chand & Company Ltd
4. Murugeshan R, Electricity and Magnetism, S. Chand & Company
5. Subharansu Sekhar Dash et al, Basic Electrical Engineering, 2 Edi, Vijay Nicole Pvt Ltd., 2014
6. Giovanni Saggio, Principles of Analog Electronics, CRC Press

REFERENCE BOOKS

1. Sree Harsha N R, Anupama Prakash and D P Kothari D P, The foundations of Basic Circuit Theory, IOP Publishing
2. Hayt and Kemmerly, Engineering Circuit Analysis, 2nd Edition, McGraw Hill
3. Charles K. Alexander, Matthew N. O. Sadiku, Fundamentals of electric circuits, 6th Edition, McGraw Hill
4. Theraja V, Basic Electronics Solid State, S. Chand & Company Ltd
5. Bernard Grob, Basic Electronics, McGraw Hill Book Company

WEBSITES

1. Khan academy. Org
2. NPTEL
3. http://www.electronicsteacher.com
4. http://www.abcofelectronics.com
5. http://www.science-ebooks.com
6. www.ocw.mit.edu
7. www.academic.earth