1. EEE141 Course Outline

Fundamentals of Electric circuit (North South University)

NORTH SOUTH UNIVERSITY

Department of Electrical & Computer Engineering

Summer 2020

I - Course Code: EEE/ETE 141

II - Course Title: Electrical Circuits I

III - Credit: 3 credit hours (3 hours of theory per week)

IV- Nature: Major Core Course

V - Prerequisite: MAT 120 (Calculus and Analytic Geometry I)

VI- Lecture Hours: ST: 01:00 PM-02:30 PM **Section:** 08

VII- Lecture Venue: SAC 311

VIII- Course Description:

This course introduces the basic Elements, Parameters, Laws and Methods of DC circuit design and analysis. Definition of Voltage, Current, Resistance, Power, Energy; Ohm's Law, Kirchhoff's Voltage law (KVL); Voltage divider rule, Kirchhoff's Current Law (KCL); Current divider rule; Open and short circuits, Series-Parallel network; Methods for solving such networks, Source conversion; Branch current analysis; Mesh Analysis; Super-Mesh Analysis; Nodal Analysis; Super-Node Analysis; Y-Delta and Delta-Y conversions; Dependent Current Source, Dependent Voltage Source; Superposition Theorem; Thevenin's Theorem; Norton's Theorem; Maximum Power Transfer Theorem; Electric Field; Capacitance; Dielectric strength; leakage current, Transients in Capacitive networks: Charging Phase; Discharge phase; Energy stored by capacitor; Stray capacitance; Capacitors in series and parallel; Magnetic Field; Magnetic flux density, Permeability. Inductor; Faraday's law of electromagnetic induction; Lenz's law; Self-inductance; R-L transient: Storage cycle; Decay phase; Inductors in series and parallel; R-L and R-C circuits with DC inputs; Energy stored by an inductor; Related problems. This course has a separate mandatory laboratory session every week.

IX – Course Objectives:

a. To introduce basic circuit laws applied in simple DC circuits to compute voltage, current, equivalent resistance and power.
b. To analyze complex circuits using nodal and mesh methods.
c. To simplify circuit analysis using various circuit theorems.
d. To examine the transient analysis of series RC and RL circuits.
e. To enable the students to build circuits and conduct experiments on it in a laboratory setting.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

Sl.	CO Description	Weightage (%)
CO1	**apply** circuit solution principles to analyze DC resistive circuits.	50
CO2	**iIllustrate** the transient analysis of series RC and RL circuits.	25
CO3	**conduct** experiments on DC circuits	25

Mapping of CO (Course Outcomes)-PO (Program Outcomes):

Sl.	CO Description	POs	Bloom's taxonomy domain/level	Delivery methods and activities	Assessment tools
CO1	**Apply** circuit solution principles to analyze DC resistive circuits.	**a**	Cognitive/ Apply	Lectures, Notes	Quiz, Exam
CO2	**Illustrate** the transient analysis of series RC and RL circuits.	**a**	Cognitive/ Understand	Lectures, Notes	Exam
CO3	**Conduct** experiments on DC circuits	**d**	Psychomotor/ Manipulation	Lab class	Lab reports, exam

X – Tentative Course Outline:

Topics	Time Frame	Suggested Activities
Introduction and Series Circuits: Voltage and Current; Resistance; Ohm's Law, Power and Energy, Total resistance of a series circuit; Voltage sources in series, Kirchhoff's Voltage law (KVL); Voltage divider rule.	Lectures 1-3	
Parallel Circuits: Parallel Network, Total resistance and conductance of a parallel circuit, Kirchhoff's Current Law (KCL); Current divider rule; Voltage sources in parallel; Open and short circuits. Dependent Current Source, Dependent Voltage Source.	Lectures 4-6	**Quiz-1** Introduction and Series Circuits Parallel Circuits

The faculty reserves the right to change, amend, add or delete any of the contents.

Series-Parallel Circuits: Series-Parallel network, Methods for solving such networks, Ladder networks.	Lectures 7-9	
Methods of Analysis: Source conversion; Current sources in parallel, current sources in series; Branch current analysis; Mesh Analysis, Super-Mesh Analysis, Nodal Analysis; Super-Node Analysis. Y-Delta and Delta-Y conversions; Related problems	Lectures 10-13	**Quiz-2** Series-Parallel Circuits Methods of Analysis
	Lecture 14	**Mid-Term Exam** **Lectures 1-13**
Network Theorems: Superposition Theorem; Thevenin's Theorem; Norton's Theorem; Maximum Power Transfer Theorem; Related problems.	Lectures 15-18	
Capacitors: Electric Field; Capacitance; Dielectric strength; leakage current, Transients in Capacitive networks: Charging Phase; Discharge phase; Continuation of transients in Capacitive networks; Energy stored by capacitor; Stray capacitance; Capacitors in series and parallel.	Lectures 19-21	**Quiz-3** Network Theorems
Inductors: Magnetic Field, Magnetic Flux Density, Permeability, Faraday's law of electromagnetic induction; Lenz's law; Self-inductance; R-L transient: Storage cycle; Related Problems. R-L transient: Decay phase; Inductors in series and parallel; R-L and R-C circuits with DC inputs; Energy stored by an inductor.	Lectures 22-24	**Quiz-4** Capacitors
		Final Exam **Lectures 14-24**

XI– Teaching Method:

Maximum topics will be covered from the textbook. For the rest of the topics, reference books will be followed. Class lectures will be uploaded on the Google Classroom. All types of assessments will be taken through Google Classroom.

XII - Course Requirements

1. Student Attendance
All students are expected to attend all scheduled classes, study previous assigned chapters or materials, and solve the necessary homework /problems before attending the class. 80% Attendance is Mandatory to participate in both Mid-Term and Final-Term Exam.

2. Class Participation
Students are expected to participate actively in the class. Performance tests will be taken frequently. Questioning in the class is highly encouraged.

3. Quiz & Exam
There will be four Quizzes in total and best three Quizzes will be counted for grading. One Mid-Term exam and one Final-Term exam will be taken.

XIII -Online group: Google Classroom

- Go to https://classroom.google.com and login using your NSU email id and password
- Join group using the class code.
- If you do not have NSU Email yet, please get it ASAP

XIV – Textbook/ References:

TEXT BOOKS

[1] Robert L. Boylestad, "Introductory Circuit Analysis", 11th Edition, Prentice Hall Inc.

[2] Charles K. Alexander & Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", 5th edition, The McGraw-Hill companies.

REFERENCE MATERIAL:

[1] Robert P. Ward, "Introduction to Electrical Engineering", 3rd Edition,Prentice Hall Inc

[2] David E. Johnson & Johny R. Johnson," Electric Circuit Analysis", 2nd Edition, Prentice Hall Inc.

XV-Evaluation

Class Performance:	10%
Assignments	15%
Quiz:	15%
Midterm exam:	30%
Final term	30%
Total:	100%

XVI- Grading policy

As per NSU grading policy:

Grades	Range
A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	60-66
F	0-60

XVII - Faculty Information

Faculty Name: Syeda Sarita Hassan. **Faculty Initial:** SSH1
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