City University
Faculty of Science & Engineering
Department of Computer Science and Engineering

Course Outline: Electrical Engineering

1.	Program	:	B.Sc. in Computer Science and Engineering
2.	Course Code	:	EEE 1201
3.	Course Title	:	Electrical Engineering
4.	Pre-requisite	:	n/a
5.	Course Type	:	Theory, Core Course, Compulsory
6.	Credit Value	:	3.0
7.	Contact Hours	:	3.0
8.	Total Marks	:	100
9.	Semester	:	Fall 2024
10.	Course Teacher	:	Md. Ziaul Islam, Lecturer, Dept. of Electrical and Electronic Engineering,
11.	Contact Detail	:	Phone: 01559519044, Email: ziaul18@yahoo.com
12.	Office	:	Room no. 131, Dept. of Electrical and Electronic Engineering
13.	Class Schedule	:	

Batch	Day	Time	Room
64th	Friday	2:00-4:00pm	222

14.	Counseling Hours	:

Day	Schedule
Saturday & Monday	10:00am-12:30pm

15.	Text Book(s)	:	T1: 'Fundamentals of Electric Circuits'– Charles K Alexander and Mathew N O Sadiku, 5th Edition.
16.	Reference Books	:	R1: 'Introductory Circuit Analysis' – Robert L Boylestad.

17. Course Content: **Basic Concept:** Introduction to Electrical Elements and Circuits, system of units, Concepts of Charge, Current and Voltage, Ohm's Law, Power and Energy, Circuit Elements and Examples of Application. **Laws of Circuit Analysis:** Concepts of Nodes, Branches and Loops with Examples, Kirchhoff's Law (KCL, KVL) and Problem Solving, Series and Parallel circuits, Voltage Division and Current Division, Problem Solving, Wye-Delta Transformations and Problem Solving. **Methods of Circuit Analysis:** Nodal Analysis (with Voltage Sources) and Problem Solving, Mesh Analysis (with Current Sources); Nodal vs. Mesh Analysis; Problem Solving. **Network Theorems:** Linearity and Superposition Theorem, Source Transformations and Problem Solving, Thevenin's, Norton's Theorem and Problem Solving, Relation between Thevenin's and Notron's Theorems, Maximum Power

Transfer and Problem Solving. **Capacitors and Inductors:** Introduction to Capacitor and Inductor with Governing Principle, Series and Parallel Capacitors and Inductors, Applications. Magnetic Circuits: Magnetic fields, flux, permeability and reluctance, Ohm's law and Ampere's circuital law, Series, parallel and series-parallel magnetic circuits. **Sinusoid and Phasors:** Introduction, Generation of alternating current, Sinusoids, Phasors, Phasor Algebra, Phasor Relationship for circuit elements. Impedance and admittance, Impedance combinations, Series and parallel RL, RC and RLC circuits and Problem solving, **Sinusoidal Steady State Analysis:** Nodal Analysis and Mesh Analysis, Superposition, Norton and Thevenin Equivalent Circuit. **AC Power Analysis:** Instantaneous and average power, Real and reactive power, Maximum average power transfer, Effective or RMS value, Power factor, power factor correction. Three Phase Circuits: Balanced three-phase voltage, wye-wye, wye-delta, delta-delta connection, unbalance three phase system

18. Rationale of the Course:
Electrical Engineering (EE) forms the backbone of modern technology, influencing every aspect of our interconnected world. In the realm of Computer Science and Engineering (CSE), understanding the principles of electrical engineering is not only beneficial but also often essential for designing, developing, and optimizing computer systems and digital devices. This course aims to bridge the gap between these two disciplines, providing CSE students with a solid foundation in electrical engineering principles and applications tailored to their field.

19. Course Objectives:
The objectives of the course are to
- Ensure students grasp fundamental principles of electrical engineering, including DC, AC, and Magnetic circuits.
- Cultivate students' ability to analyze electrical systems, identify key parameters, and solve problems using mathematical and engineering techniques.

20. Course Learning Outcome (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)
CLOs: Upon successful completion of this course, students will be able to:

CLOs	Description	Bloom's Taxonomy
CLO-1	**Explain** the fundamental concepts of linear electrical circuit elements and magnetic circuits**.**	Cognitive: Understand
CLO-2	**Apply** different circuit laws, analysis techniques, and theorems to solve AC, DC, and Magnetic circuits for unknown quantities	Cognitive: Apply
CLO-3	**Determine** different circuit parameters for the design of real-life applications.	Cognitive: Apply

Mapping of CLOs with PLOs (for details of PLOs, see no. 23):

CLOs	PLOs											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO-1	✓											
CLO-2		✓										
CLO-3		✓										

21. Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy.

Week	Class	Topic	Teaching Learning Strategy	Text/Ref section	Assessment Strategy	CLOs
1	1	**Introductory Session:** Rationale and objectives of the Course, Course learning outcomes, discussion on course outline,	Interactive discussion	Handout	n/a	n/a
	2	**Basic Concept:** Introduction to Electrical Elements and Circuits, system of units, Concepts of Charge, Current and Voltage,	Interactive discussion	T1: 1.1-1.7	Midterm	1
2	3	Ohm's Law, Power and Energy, Circuit Elements and Examples of Application	Lecture, Problem Solving		Midterm, Final	1
	4	**Laws of Circuit Analysis:** Concepts of Nodes, Branches and Loops with Examples, Kirchhoff's Law (KCL, KVL) and Problem Solving,		T1: 2.1-2.7		1, 2
3	5	Series and Parallel circuits, Voltage Division and Current Division, Problem Solving	Lecture, Problem Solving		Assignment, Midterm, Final	2
	6	Wye-Delta Transformations and Problem Solving				2
4	7	**Methods of Circuit Analysis**: Nodal Analysis (with Voltage Sources) and Problem Solving,	Lecture, Problem Solving	T1: 3.1-3.7	Midterm, Final	1, 2
	8	Mesh Analysis (with Current Sources); Nodal vs. Mesh Analysis; Problem Solving				2
5	9	**Network Theorems:** Linearity and Superposition Theorem, Source Transformations and Problem Solving,	Lecture & Problem solving	T1: 4.1-4.8	Class Test, Midterm, Final	1, 2
	10	Thevenin's, Norton's Theorem and Problem Solving,				
6	11	Relation between Thevenin's and Notron's Theorems,	Lecture & Problem solving			2, 3
	12	Maximum Power Transfer and Problem Solving				
7	13	**Capacitors and Inductors**: Introduction to Capacitor and Inductor with Governing Principle,	Lecture & Video tutorial	T1: 6.1-6.5	Midterm, Final	1
	14	Series and Parallel Capacitors and Inductors, Applications				2
Midterm Examination (25 marks)						
8	15	**Magnetic Circuits**: Magnetic fields, flux, permeability and reluctance, Ohm's law and Ampere's circuital law,	Lecture & Problem solving	R1: 11.1-11.14	Midterm, Final	1

	16	Series, parallel and series-parallel magnetic circuits.				2
9	17	**Sinusoid and Phasors:** Introduction, Generation of alternating current, Sinusoids,	Lecture	T1: 9.2-9.7 & R1	Class Test, Final	1
	18	Phasors, Phasor Algebra, Phasor Relationship for circuit elements.	Lecture			1, 2
10	19	Impedance and admittance, Impedance combinations	Lecture, Problem Solving			1, 2
	20	Series and parallel RL, RC and RLC circuits and Problem solving				2, 3
11	21	**Sinusoidal Steady State Analysis:** Nodal Analysis and Mesh Analysis	Lecture, Problem Solving	T1: 10.1-10.6	Final	2
	22	Superposition, Norton and Thevenin Equivalent Circuit				
12	23	**AC Power Analysis:** Instantaneous and average power, Real and reactive power,	Lecture, Problem Solving	T1: 11.2-11.8 & R1	Assignment, Final	1, 2
	24	Maximum average power transfer, Effective or RMS value,				2
13	25	Power factor, power factor correction.	Lecture, Problem Solving			2, 3
	26	**Three Phase Circuits:** Balanced three-phase voltage, wye-wye, wye-delta,		T1: 12.2-12.8		1, 2
14	27	delta-delta connection, unbalance three phase system	Lecture, Problem Solving & Discussion		Final	2
	28	Problem solution and review class		n/a	n/a	n/a
Final Examination (50 marks)						

22. Assessment and Evaluation

1) **Assessment Strategy:**

Class Test/Quiz: Maximum three (3) class test will be taken and best combination of two (2) will be counted for grading.

Assignment: There will be a mathematical problem/creative question in the assignment. There will be no alternative. The students need to answer the questions by their basic understanding and analyzing capabilities. In most cases, the students will have to prepare the assignments by their own handwriting. The students are allowed to take help from books, class lectures or online materials. However, they have to prepare/organize their answers by their own. Three assignments will be assigned and have to submit within declared time and date. Failure of submission will help you to get zero marks. All the assignments will be counted for grading.

Mid and Final Exam: Mid and Final exam are closed book examinations. Tables and a formula sheet will be provided together with the questions if necessary. During exam, the invigilator/faculty members have the authority to check any student if a misconduct is noticed, and the student will be penalized accordingly.

2) **Marks distribution (tentative):**

(a) Continuous Assessment	
Assessment Type	Marks
Class participation	5%
Homework/Assignment/Presentation	10%
Class tests/Quizzes	10%
(b) Summative Assessment	
Midterm	25%
Final Examination	50%
Total	100%

23. Program Learning Outcomes (PLOs) Statement:
Based on the suggestion of the Board of Accreditation for Engineering and Technical Education (BAETE), Bangladesh, the Bachelor in Electrical and Electronic Engineering (EEE) program will have following learning outcomes:

PLO	PLO Statement
1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
2	**Problem analysis:** Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.
3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.
4	**Investigation:** Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
5	**Modern tool usage:** Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	**The engineer and society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
7	**Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, for sustainable development.
8	**Ethics:** Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.
9	**Individual work and teamwork:** Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.
10	**Communication:** Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.
11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multi-disciplinary environments.
12	**Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.