



Loyola-ICAM College of Engineering and Technology (LICET)
Department of Electrical and Electronics Engineering
Electrical Engineers League (EEL)

Under

AICTE – Scheme for Promoting Interests, Creativity and Ethics among Students
(SPICES)

Event Report

Category: **Guest Lecture**

Title of the Event: **Circuit Model and Analysis (Session – 1)**
Motor Selection for Electric Vehicles (Session – 2)

Date: 26-09-2022

Venue: G01 (Auditorium)

Details of Participants

- Total No. of Participants: 112
- II EEE (Batch: 2021 – 2025) : 57
- III EEE (Batch: 2020 – 2024): 55
- IV EEE (Batch: 2019 – 2023): 33

Technological/ Academic/ Other benefits generated by conducting the event with respect to:

(a) the institution	<ul style="list-style-type: none">● Networking & building brand recognition - promote the institution and help people connect with our brand● Showcase the facilities at the institution by bringing the faculty from premium institutions
(b) the faculty	<ul style="list-style-type: none">● Strengthen faculty community and build relationships with each other● Meet like-minded individuals in person and encourage active engagement
(c) Students	<ul style="list-style-type: none">● To stay on the top of current trends, especially with technology, causing rapid change across many different industries.● Academic engagement/ engagement in scholarly activities
(d) Industry/ Society	<ul style="list-style-type: none">● Clarifying the image of the avenues of development in the near future● Contributing to make the literacy rate rise higher thereby helping build a more educated, empowered and aware society

Proceedings of the event

Category: Guest Lecture

Report on **Circuit Model and Analysis**

Date: 09-02-2023

Time: 08:00 am to 09:50 am

Venue: G01 (Auditorium)

Resource Person: Dr. Ragavan Kanagaraj, Associate Professor, Electrical Engineering, Indian Institute of Technology Gandhinagar.

Audience: II EEE (Batch: 2021 – 2025); III EEE (Batch: 2020 – 2024) & IV EEE (Batch: 2019 – 2023)

The Department of Electrical and Electronics Engineering and Electrical Engineers League (EEL) under AICTE-Scheme for promoting interests, creativity and ethics among students (SPICES) conducted a guest lecture for the students of II, III & IV year EEE on 09.02.2023 at G01 from 08:00 to 09:50 a.m. The speaker introduced the historical rivalry between Edison and Tesla towards promoting DC and AC respectively. He then familiarized the concepts related to finding average and rms values of periodic functions; Reason for Tesla to choose sinusoidal waveforms out of other waveforms like triangular, trapezoidal, square, spike waveforms – Considering a load connected to the source via a transmission line (which is modelled as an equivalent RLC circuit), if a triangular waveform is flown through inductor and capacitor, the signal will be differentiated following the fashion: Triangular -> Square -> Spike. Thus, loads connected at different distances will receive different functions as input. If same input should be received at different distances, the input type should be either exponential or sinusoidal. Exponential waveform is not of use, as energy keeps on increasing/ decreasing. Also, its not possible to be closer to generating station always. The speaker quoted the above analysis by Tesla and mentioned that when no one did this analysis, Tesla identified the potential of sinusoidal waveform and spoke for AC.

He also reminded the participants the life experiences of Einstein. He also mentioned that ‘once when Einstein was asked by the reporters how do you feel being the person who used the brain to the maximum extent (nearly 7%), Einstein replied “Go and ask this question to Tesla. Tesla and Marconi invented radio using 17 of Tesla patents/ ideas. Tesla invented death ray - destroyed it and others could not find the technology as he doesn't note things systematically. Tesla invented induction motor 6000Hp Train motor - 4 motors of 1500 Hp Induction motors one of the top 10 inventions in Electrical Engineering. Westinghouse company came out with a royalty deal with Tesla to give 1 dollar for 1 Hp. As the requirement of AC motor increased, the royalty hiked. At this time, when Westinghouse was worried about paying royalty as it's costing their company, Tesla generously tore the agreement. Tesla tower research stopped after working for 5 years because of lack of funds. Throughout life he lived in hotel. A Pigeon got wounded, he nursed it and the pigeon often visits him; he has written his love for that pigeon Maxwell published 20 equations with 20 different variables; Oliver gave the credit to maxwell and Invented pointing vector, Differential equation defines the dynamics of the system- introduced D-operator and said it could be solved as algebraic equation later this was replaced as s-operator. Steinmetz proposed the concept of Hysteresis loss which is a history independent

behavior - Edison invited him to Join GE. Steinmetz refused to join Edison stating that “Whatever I have done so far is because of Rudolph”.

Thus, the speaker not only mentioned the important contributions of many pioneers in the field of Electrical Engineering but also explained from their perspective in modelling as well as analysing circuits. He also advised the students to develop the habit of note-taking in classroom by quoting the life experience of Tesla. He insisted that students should inculcate in them to be loyal and thankful by quoting the life of Steinmetz. Students enjoyed the session as the speaker made the students interactive by giving small gifts when they answer and also found the lecture to be highly informative.

Report on **Motor Selection for Electrical Vehicles**

Date: 09-02-2023

Time: 10:10 am to 12:40 pm

Venue: F11 (Seminar Hall)

Resource Person: Dr. Ragavan Kanagaraj, Associate Professor, Electrical Engineering, Indian Institute of Technology Gandhinagar.

Audience: II EEE (Batch: 2021 – 2025); III EEE (Batch: 2020 – 2024) & IV EEE (Batch: 2019 – 2023)

The second session was on Motor Selection. The resource person started revisiting the working principles of motors by making students recollects the concepts learnt in school, like – metal attracted by magnet follows the direction of magnet when moved (principle of Induction Motor); magnet attracted by the opposite pole of another magnet moves simultaneously with other (Principle of Synchronous motor – Magnetic interlocking). Then he mentioned that the motors should be selected by considering the load requirement. He explained the selection of motors by projecting the load characteristics. The speaker explained the choice of motor by explaining a simple case considering the characteristics of vehicle load and that of different motors like shunt motor, induction motor, separately excited DC motor and synchronous motor. He also clarified why induction motor is preferred for traction applications. He then discussed the challenges related to saturation of iron core. The speaker mentioned the thumb rule followed in fixing the air-gap flux (not beyond 1 Tesla) to avoid saturation.

The resource person also stated the following facts with regard to application of motors for traction applications:

- DC series motor was preferred for trains before independence.
- BLDC motor is also a synchronous motor; Synchronous motor and induction motor can be used for traction if the speed characteristics could be shifted using V/f control

He also briefed the challenges in V/f control like increasing the voltage beyond the nominal value, which leads to failure of insulation and consecutively towards failure of equipment. Then the speaker informed the audience that Tesla had lectured the Energy is directly proportional to the mass even before Einstein and the history of inventing Transistor and Thyristor families. Following which he also clarified why transistor family is preferred in power electronic devices.

The facts highlighted by the speaker during the lecture are given below:

- DC motor gets heated fast and so high maintenance is required
- Transistors are fully controlled switches both Turn on and off control possible

- Thyristor – Turn on control possible; Turn off depends on the inductance of the device
- The thyristor family could handle up to 1 kHz; But the Power electronic devices used for motor control use almost 10 kHz. This could not be handled by thyristor family devices and so transistors are used.

The speaker then reminded students why high-power circuit is kept stationary while designing motors and thereby how thermal equilibrium is attained. He also discussed if its possible to change its location of high-power circuit from rotor to stator. The speaker discussed the above topics in detail and also insisted on preparing students for placement drives. The speaker was great in convincing the students to learn the UG courses with great passion. The guest lecture was highly beneficial to the students as he motivated them in great deal to prepare for the placement drives and competitive exams. He also briefed the various benefits and opportunities available at IIT-Gandhinagar and the way to enter their institution. He also encouraged students to pursue higher studies and research.

Relevant Courses in the current semester

Electrical Machines – I
Protection and Switchgear

Electrical Machines – II
Power Electronics and Drives

Special Electrical Machines
Electronic Devices and Control

Relevant Program Outcomes

- PO5 – Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6 – The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7 – Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.
- PO8 – Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO12 – Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

