

**AICTE-ISTE INDUCTION/REFRESHER  
PROGRAMMES – 2018-19**

**ONE WEEK ONLINE INDUCTION/REFRESHER PROGRAMME On**

**“ELECTRIC HYBRID VEHICLE” PHASE-III**

**(19-04-2021 to 24-04-2021)**



**REPORT**

AICTE -ISTE sponsored online Induction/Refresher Programme on “ELECTRIC HYBRID VEHICLE” Phase- III is organized by Department of Electrical and Electronics Engineering, Sree Vidyanikethan Engineering College (Autonomous), Tirupati, Andhra Pradesh. India during April 19<sup>th</sup> -24<sup>th</sup>, 2021.

The online Induction/Refresher Programme is conducted using the Google Meet platform. A total of 92 participants from 10 states of the country participated in the Programme. The participants are the faculty and research scholars of various engineering colleges and government institutions across the country. Further, the participants are trained by the industry and academic experts. The Induction/Refresher Programme has received an overwhelming response from the participants. A total of 18 sessions are conducted. Out of 18, 16 are technical sessions and one is on “stress management” to promote the FIT INDIA movement across the country.

Electric hybrid vehicles play a very prominent role in future days to reduce the greenhouse gases. The vehicle is lighter and roomier than pure electrical vehicle because it will carry fewer batteries than the pure electrical vehicles. They are more reliable, economical, and safe in operations. Electric hybrid vehicle design needs the knowledge in electrical, electronics, mechanical, instrumentation and computer engineering for the purpose of designing, quantitatively evaluating, predicting, measuring and improving vehicle technology. Hence the Programme is considered as interdisciplinary.

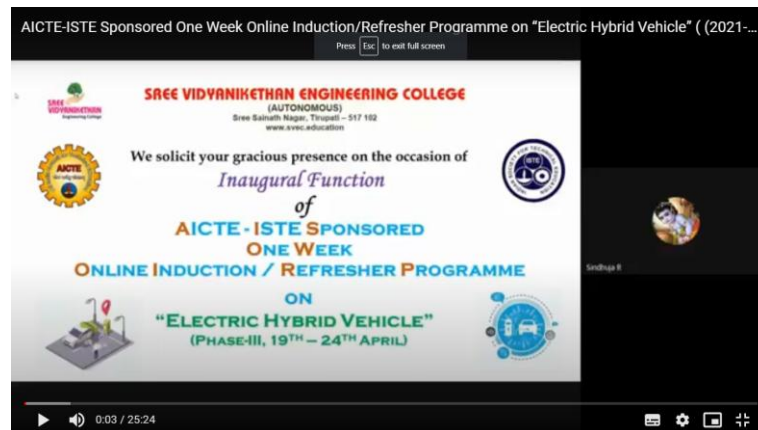
The outcomes of FDP are as follows:

- ❖ Acquire knowledge in hybrid electric vehicle technology.
- ❖ Motivates the faculty members to enhance research work in this area.

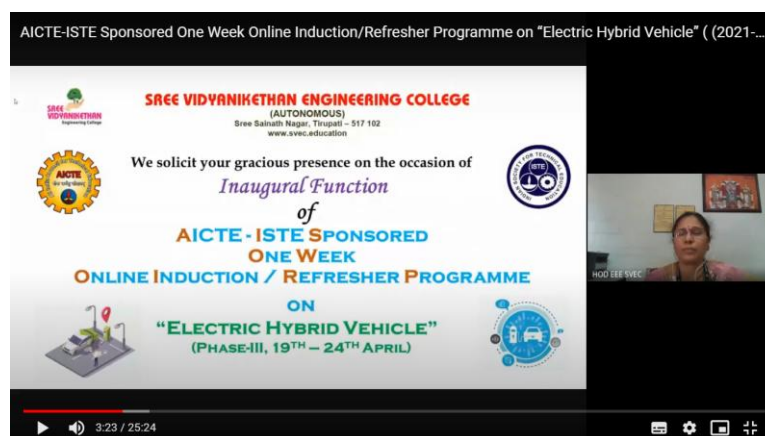
- ❖ Idealize different solutions to solve the same problem and evaluate (justifying) which one is the best with respect to its design quality.
- ❖ The programme also promotes a basic understanding of alternative fuel and HEV vehicle technology.

## INAUGURAL SESSION

The inaugural function of the online FDP is scheduled on March 1, 2021 at 10:00 AM. In the inaugural function, Ms. R. Sindhuja, Assistant Professor, Department of EEE welcomed the chief guest **Col. B. Venkat**, Director (FDP-AICTE), Dr. Mani Muthu, Research Fellow, Energy Research Institute, NTU Singapore and Guest of Honor **Prof. L. Venugopal Reddy**, Advisor cum Director, SVET and Principal, directors and vice-principal of SVEC and all participants. The event is started with a prayer song.



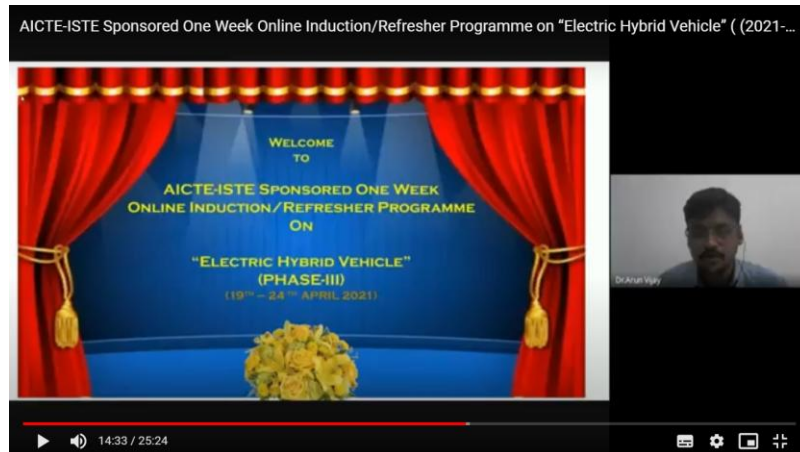
**Ms. R. Sindhuja**, Assistant Professor, Department of EEE is welcoming the chief guest and the participants.



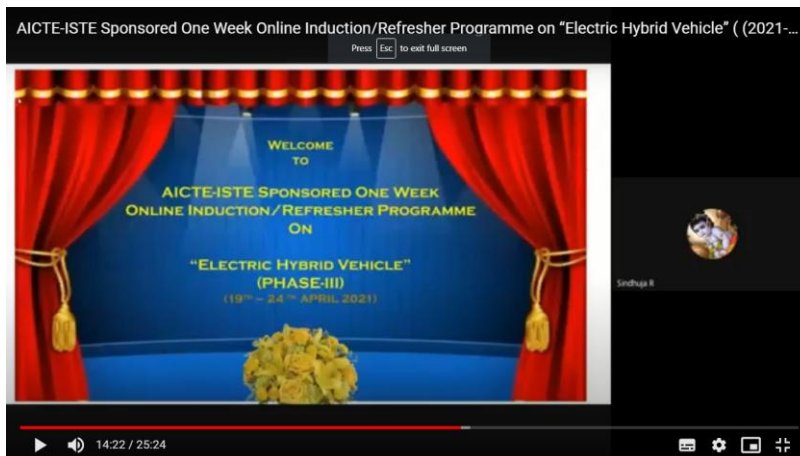
**Dr. M. S. Sujatha**, Professor & Head, Department of EEE is giving the welcome speech.

Dr. M.S. Sujatha, Professor and Head, Department of EEE given the welcome speech. In the welcome speech, the Professor and Head, Department of EEE welcomed the chief guest, Guest of Honor, Directors and Principal & vice-principal, of SVEC and all participants and also thanked the ISTE and AICTE sponsored the FDP. Further, Professor and Head, Department of EEE highlighted the objectives of the FDP, the topics to be

discussed, the outcomes of the FDP. Later, the coordinator of FDP **Dr. V.Arun**, Associate Professor, Department of EEE introduced the chief guests to the participants.

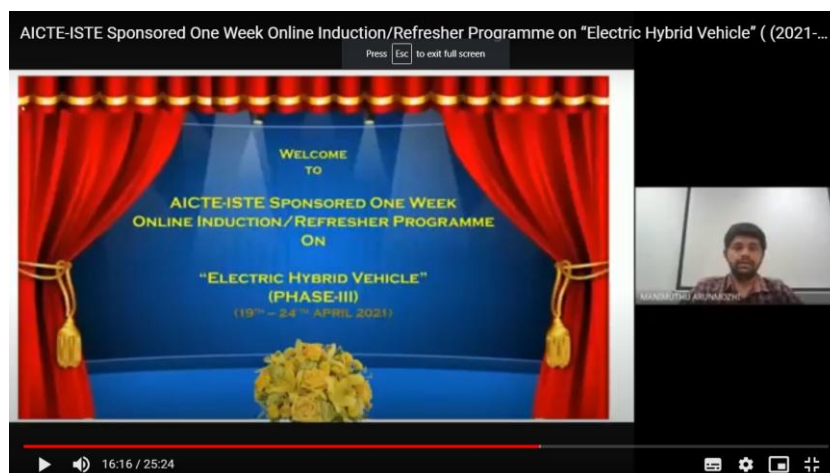


**Dr. V. Arun**, Coordinator, FDP is introducing the chief guest to the participants.



Chief Guest inaugurating the event.

**Prof. Vijay D. Vaidya**, Executive Secretary, ISTE has emphasized the skills that can gain by the participants after learning the Electric Hybrid Vehicle concepts and Prof. Vijay D. Vaidya appreciate the participants and faculties of sreevidyanikethan college to organise this FDP.



Chief Guest **Dr. Mani Muthu**, is addressing the participants.

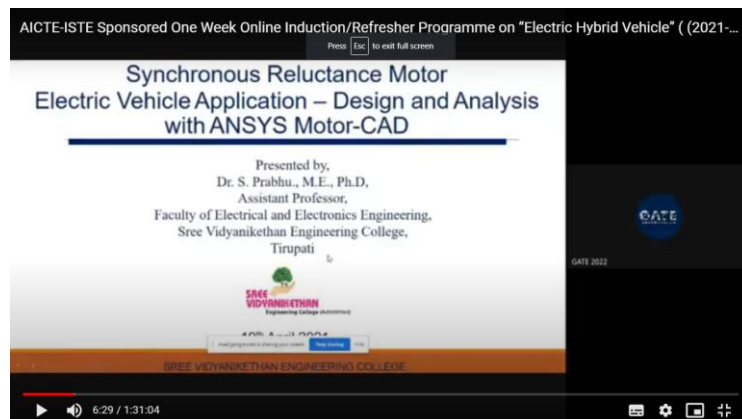
## TECHNICAL SESSIONS

### **April 19, 2021 (Day – 1, Session – 2 & 3)**

Dr.S.Prabhu, Associate professor, Sreevidyanikethan Engineering College, acted as a resource person for Second and Third session of Day-1

In this sessions Dr.S.Prabhu, explained synchronous reluctance motor electric vehicle application-Design and Analysis with ANSYS Motor -CAD. The participants have gained the knowledge on the following concepts.

- Sizing of synchronous reluctance motor
- ANSYS Motor- CAD
- Electromagnetic Analysis
- Thermal Analysis
- Mechanical Analysis
- Ansys electronics Desktop Export
- Effect for selecting lamination core material for EV motor
- Sensitivity analysis of EV motor
- Impact of cogging torque due to permanent magnet
- Causes of radial forces in EV motor
- Usage of Cooling coefficient in heat distribution for EV motor



**Dr. S. Prabhu** is explaining about SRM Motors with different configuration.

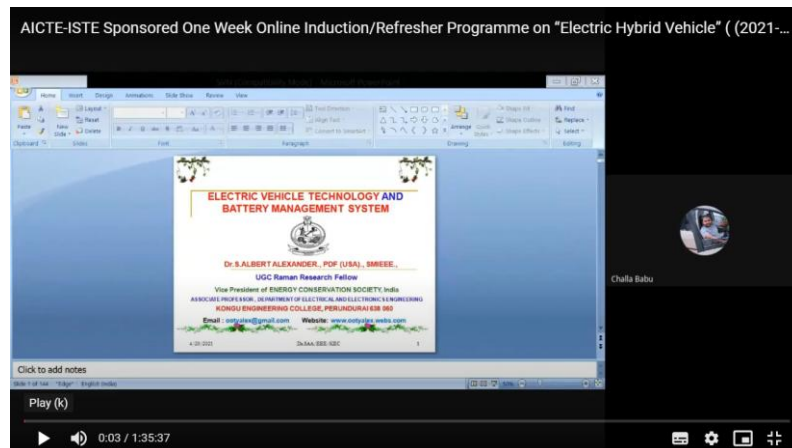
### **April 20, 2021 (Day –2, Session – 1)**

**Dr. S. Albert Alexander**, Postdoctoral research fellow (USA), Associate Professor of EEE Kongu Engineering College Tamilnadu acted as a resource person for two sessions of Day-2 to deliver Electric vehicle technology and Battery management system. The first session of Day-2 was started at 10:00 AM.

In this session, the participants have gained the partial knowledge on the following:

- Introduction to EV

- Types of EV
- Control of EV
- Control strategies for the Charging system in electric vehicles
- Selection of motors for electric vehicles Applications
- Battery Management System
- Battery modelling
- Requirements of BMS for EV applications
- Calculation of SoC, SoH, DoD
- Ongoing and upcoming research issues in EV technology
- Selection of motors for EV
- Power supply design for hypersonic
- EV application
- Grid integration of renewable energy sources.



**Dr. S. Albert Alexander**, is explaining the applications of Power electronics.

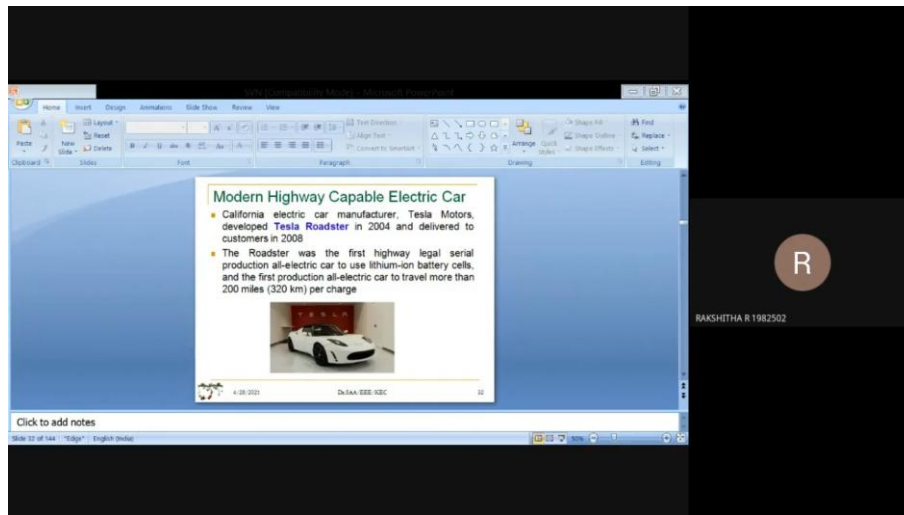
**April 20, 2021 (Day – 2, Session – 2)**

The session 2 of the Day-6 was started at 12:00 AM. In this session, the participants have introduced the concepts of V2G and dynamics of vehicle.

The topics that are discussed in this session are:

- Modern high way cars
- Electric Vehicle dynamics
- Range calculation
- Economical calculation
- Electrification of vehicle
- Structure of hybrid system
- Degrees of hybridization
- Energy loss: in various driving condition
- Well to wheels efficiency

- Hybrid electric vehicle
- Advantages over conventional engines
- Electric energy storage systems

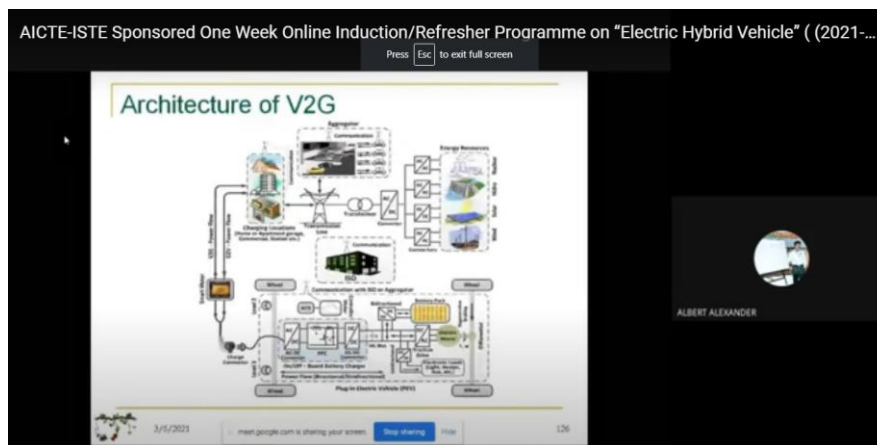


**Dr. S. Albert Alexander**, is explaining the concepts of modern highway capable electric car

### **April 20, 2021 (Day – 2, Session – 3)**

The third session of the Day-3 was started at 2.30 PM. In this session, **Dr. S. Albert Alexander** has explained the following concepts.

- V2G technology
- V2G
- Benefits of V2G
- Challenges in V2G
- Architecture of V2G
- Batteries used in EV.



**Dr. S. Albert Alexander**, is describe about Architecture of V2G

### **April 22, 2021 (Day – 2, Session – 1)**

**Dr. Tarakanath Kobaku**, DST-INSPIRE Faculty Fellow, Electrical Engineering Department, IIT Goa acted as a resource person for all the three sessions of Day-2. The first session of Day-3 was started at 10:00 AM.

In this session **Dr. Tarakanath Kobaku**, explained the Power electronics converter topologies and control. The participants have gained the practical knowledge on the following concepts.

- IMC controller for converter
- Digital servo control scheme
- Robust internal loop compensator
- Analysis of Robust internal loop compensator

**Dr. Tarakanath Kobaku** is Explaining vibration analysis of SRM

**April 21, 2021 (Day – 3, Session – 2)**

The second session of the Day-3 was started at 12.30 AM. In this session, **Dr. Tarakanath Kobaku** has brief the following concepts.

- Analysis of Robust internal loop compensator
- Objective of RIC
- Application to DC-Dc boost converter

**Dr. Tarakanath Kobaku** is Explaining vibration analysis of SRM

**April 21, 2021 (Day – 3, Session – 3)**

The session was started at 2.30 PM. In this session, **Dr. S.Prabhu** has delivered a lecture on Finite Element Analysis of Switched reluctance magnetic gear motor for EV

Applications. **Dr. S.Prabhu** practically shown the design of Switched reluctance magnetic gear motor.



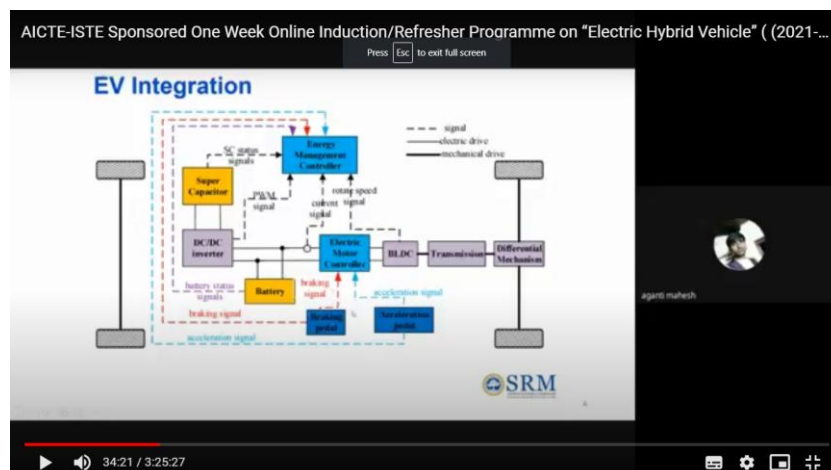
**Dr. S. Prabhu** is demonstrating SRM with ANSYS software.

**April 22, 2021 (Day – 4, Session – 1)**

**Dr. C. Bharatiraja** , Associate professor, SRM institute of science and technology, Chennai acted as a resource person for all the three sessions of Day-4. The first session of Day-4 was started at 10:00 AM.

In this session **Dr. C. Bharatiraja** , explained the Power electronics converter topologies and emobility and implementation. The participants have gained the practical knowledge on the following concepts.

- Converter and inverter topologies and control,
- EV motor drive
- MLI based Induction motor drive
- Different configuration of topologies



**Dr. C.Bharatiraja** is explaining EV motor drive

**April 22, 2021 (Day – 4, Session – 2)**

The second session of the Day-4 was started at 12.30 AM. In this session, **Dr. C.Bharatiraja** has demonstrated the following concepts.



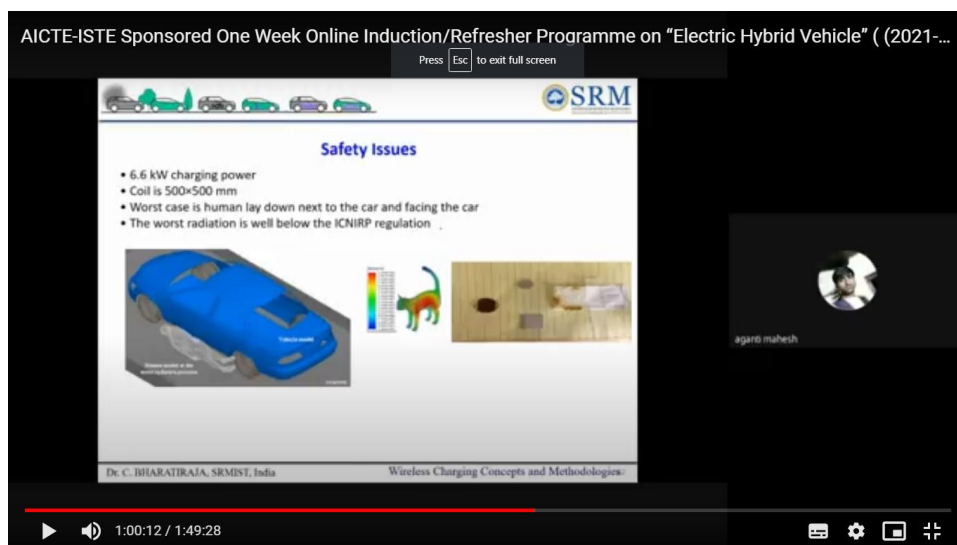
- E mobility
- Batteries
- Battery management systems
- Charging of EVs and charger
- Bidirectional charger
- Charging methods



**Dr. C.Bharatiraja** is explaining car Body battery pack

### **April 22, 2021 (Day – 4, Session – 3)**

The session was started at 2.30 PM. In this session, **Dr. C.Bharatiraja** has delivered a lecture on PV plants with micro grid concepts, smart city and roll of power converters. He explained the various tags and styles that are used to design micro grid and smart grid. In addition, **Dr. C.Bharatiraja** practically shown the design of wireless charger for EV that help the participants to gain practical knowledge on EV and Charger.



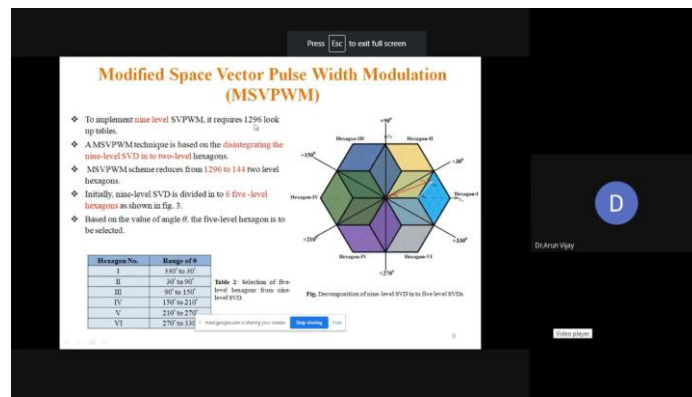
**Dr. C.Bharatiraja** is demonstarating Safety issues in wireless charging concepts

**April 23, 2021 (Day – 5, Session – 1)**

**Dr.B.Hemanth kumar**, Assiant Professor, Sreevidyanikethan Engineering college acted as a resource person for all the three sessions of Day-5. The first session of Day-5 was started at 10:00 AM.

The topics that are discussed in this session are:

- Multilevel inverter-Space vector pulse width modulation techniques for EV Applications
- Components of EV
- Space vector pulse width modulation techniques
- Modified Space vector pulse width modulation techniques
- Multilevel inverter topologies and simulation & real time studies.

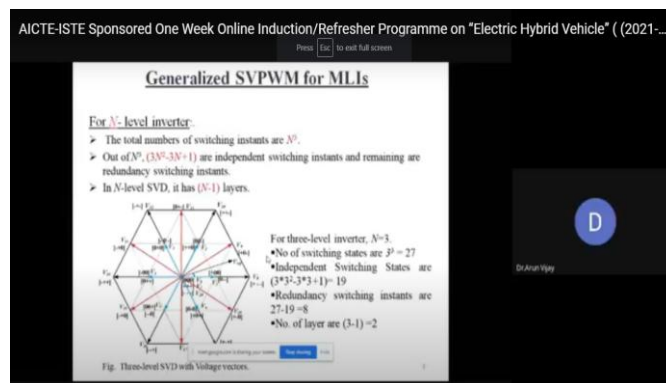


**Dr.B.Hemanth kumar**, is explaining modified space vector pulse width modulation techniques

**April 23, 2021 (Day – 5, Session – 2)**

The second session of Day-5 was started at 12.00 Noon. **Dr.B.Hemanth kumar**, explained the following to the participants.:

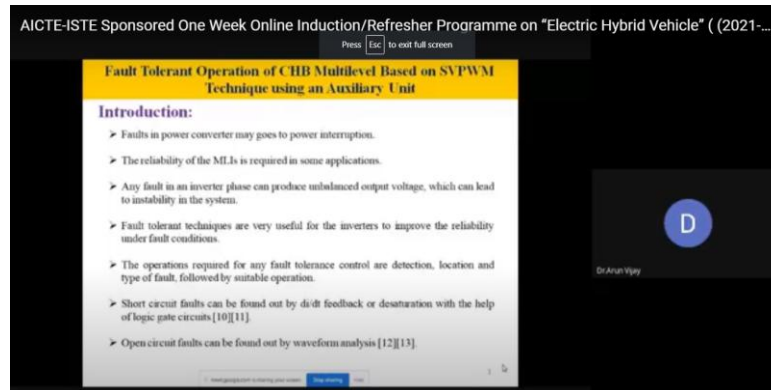
- Space vector PWM techniques
- Generalized SVPWM for Multilevel inverter
- Selection of vectors
- Dwell time calculations
- Switching states



**Dr.B.Hemanth kumar**, is explaining SVPWM switching techniques

### **April 23, 2021 (Day – 5, Session – 3)**

The session was started at 2.30 PM. In this session, **Dr.B.Hemanth kumar**, has delivered a hands lecture of matlab simulation of Controls of various multilevel inverters for EV. **Dr.B.Hemanth kumar**, practically shown the design of multilevel inverters and control techniques, Fault tolerant operations of CHB Multilevel Based on SVPWM technique using an auxiliary unit



**Dr.B.Hemanth kumar**, is explaining Fault tolerant operations of CHB Multilevel Based on SVPWM technique using an auxiliary unit

### **April 24, 2021 (Day – 6, Session – 1)**

The first session of the Day-6 was started at 10.00 AM. In this session, Dr. Mani Muthu, Research Fellow, Energy Research Institute, NTU Singapore.

He delivered a session on Autonomous vehicles and threats involved in Electric Vehicles. In this session, the participants have gained the knowledge on the following:

- Autonomous vehicles
- Threats involved in EV
- Cyber-attack.
- Cyber threats
- Safety elements of EV and AV
- Charging infrastructure
- Real time example



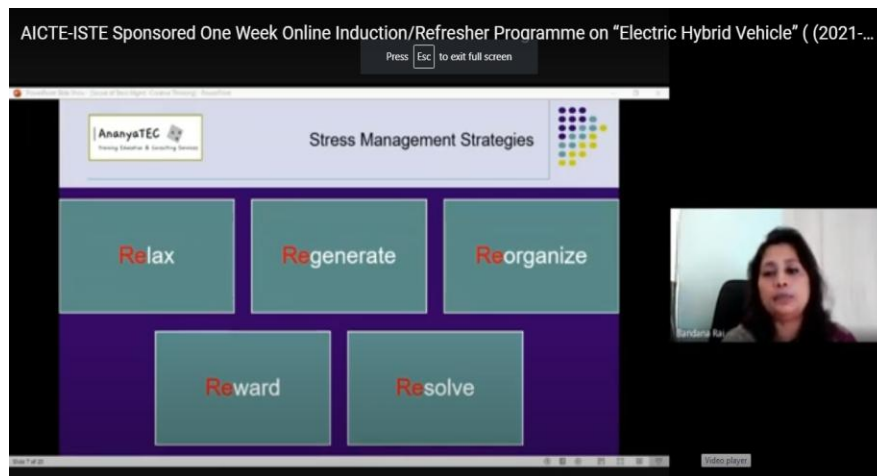
**Dr. Mani Muthu**, is explaining security Threats in E-Vehicles.

### **April 24, 2021 (Day – 6, Session – 2)**

The second session of Day-6 was started at 12.00 Noon. As a part of FIT INDIA movement and to promote it across the country, the session on “**Creative Thinking for Stress Managent**” is conducted. This session was delivered by **Sri Bandana rai**, Founder and Chief mentor, Ananya Tec.

**Sri Bandana rai** explained the following:

- Under standing stress
- Causes of stress
- Stress management
- Strategies of emotional intelligence include self-awareness, self-management, social awarness and relationship management.
- Positive and negative emotions.

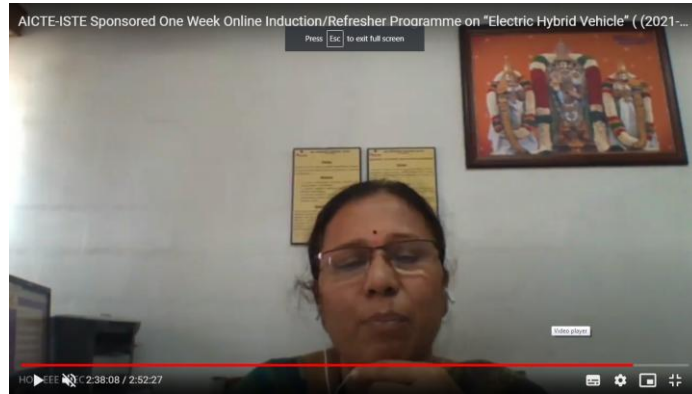


**Sri Bandana rai** is explaining Stress management strategies

### **VALEDICTORY FUNCTION**

### **April 24, 2021 (Day – 6, Session – 3)**

The valedictory function of online Faculty Development Programme (FDP) on “ELECTRIC HYBRID VEHICLE” was started at 2.00 PM on March 13, 2021. In the valedictory function, **Dr. Mani muthu**, and **Dr. M.S.Sujatha, coordinator, ISTE-SVEC** are invited as chief guest.



**Dr. M.S.Sujatha**, is addressing to the participants



**Dr. V. Arun**, Coordinator, has proposed a Vote-of-Thanks.

Initially, the coordinator thanked the Core team of AICTE and ISTE for sponsoring the FDP to organize at national level and also for their suggestions, support and guidance to conduct the FDP. Later, he thanked the participants of various engineering colleges and government institutions across the country for their enthusiastic participation. At the end, he conveyed his heartfelt thanks to the management, Sree Vidyanikethan Engineering College (Autonomous), Tirupati, Andhra Pradesh, the Principal, Head of the Department, EEE, Dr. S.Prabhu, Co-coordinator for their constant support to make this event a grand success.