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	E&E Engg. Dept.	
	AICTE-STTP	
	Schedule	
	AY 2020-21	

SCHEDULE

“AICTE Sponsored STTP-2 on Battery Management and Control Techniques in EVs” 7th to 12th December 2020

Day 1: 07/12/2020		
Time	Programme	
9.00 am – 10.00 am	Inauguration Key Note Address by Dr. Ashok Rao, Former Head, CEDT, IISc Bangalore.	
	Overview and History of Electric Vehicles	
10.00 am – 11.30 am	Session 1:	Climate angle to EV By - Dr. Ashok Rao, Former Head, CEDT, IISc, Bangalore.
11.30 am – 11.45 am	Tea/Coffee Break	
11.45 am – 01.15 pm	Session 2:	EV/HEV Configuration and Architecture. By - Dr. L. Ashok Kumar, Professor, Dept. of EEE PSG College of Technology, Coimbatore.
1.15 pm -2.15 pm	Lunch Break	
2.15 pm – 3.45 pm	Session 3:	Control Applications to HEV. By-Dr Bhanu Pratap Asst. Professor, Dept. of EEE NIT, Kurukshetra


Day 2: 08/12/2020		
Time	Programme	
	Battery Technology	
10.00 am – 11.30 am	Session 1:	Battery Technology and Future trends. By-Mr. Gopal Athani, Automotive Electrical/Electronic Systems Engineer, Tata Technologies, Pune.
11.30 am – 11.45 am	Tea/Coffee Break	
11.45 am – 01.15 pm	Session 2:	Battery Management Systems. By-Dr. Abhijeet Kshirsagar, Asst. Professor, Dept. of Electrical Engg. IIT, Dharwad
1.15 pm -2.15 pm	Lunch Break	
2.15 pm – 3.45 pm	Session 3:	Energy Management in EVs By-Dr Chandrasekhar P, Asst. Professor, School of Electrical Sciences, IIT, Bhubaneshwar.

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Day 3: 09/12/2020		
Time	Programme	
	Electric Drives	
10.00 am – 11.30 am	Session 1:	Electric Drives for EV applications. By-Dr. Ramulu, Asst. Professor, Department of Electrical Engineering, NIT, Warangal.
11.30 am – 11.45 am	Tea/Coffee Break	
11.45 am – 01.15 pm	Session 2:	Suitability of BLDC Motor for EV Application By-Dr. Ragavan K Associate Professor, Dept. Electrical Engineering, IIT, Gandhinagar.
1.15 pm -2.15 pm	Lunch Break	
2.15 pm – 3.45 pm	Session 3:	SRM Drives for EVs. By- Dr. D. S. More, Professor, Electrical Engg. Dept. Walchand College of Engg. Sangli.

Day 4: 10/12/2020		
Time	Programme	
	P. E. Converters and Controls	
10.00 am – 11.30 am	Session 1:	P. E. Converters for EVs. By- Dr. B. V. Madiggond, Professor and Head, Dept.of EEE Hirasugar Institute of Technology, Nidasoshi.
11.30 am – 11.45 am	Tea/Coffee Break	
11.45 am – 01.15 pm	Session 2:	Automotive P. E. Converters for EVs. By- Dr. Satish Naik, Asst. Professor, Department of Electrical Engineering, IIT, Dharwad.
1.15 pm -2.15 pm	Lunch Break	
2.15 pm – 3.45 pm	Session 3:	Control Techniques for P. E. Converters. By- Dr. Suryanarayana K, Professor, EEE Dept. NMAMIT, Nitte.

Day 5: 11/12/2020		
Time	Programme	
	Modeling and Simulations	
10.00 am – 11.30 am	Session 1:	Modeling and Simulations of PE Converter for EVs. By- Mr. Jayaprakash Sabarad, Engineering Technical Leader, GE Transportation, Bangalore.
11.30 am – 11.45 am	Tea/Coffee Break	
11.45 am – 01.15 pm	Session 2:	Modeling and Simulations of PE Converter for EVs. By- Mr. Jayaprakash Sabarad, Engineering Technical Leader, GE Transportation, Bangalore.
1.15 pm -2.15 pm	Lunch Break	
2.15 pm – 3.45 pm	Session 3:	G2V, V2G Communication By- Dr. Dharavath Kishan, Asst. Professor, Dept. of EEE NIT, Surthkal

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Day 6: 12/12/2020		
Time	Programme	
	Charging of EVs	
10.00 am – 11.30 am	Session 1:	Chargers for EVs. By- Dr. Sanjeev Nayak, Specialist and Project Manager, L&T Tech. Services, Bengaluru
11.30 am – 11.45 am	Break	
11.45 am – 01.15 pm	Session 2:	Research Avenues in EVs. By- Dr Sreejith S, Asst. Professor, Dept. of EEE, NIT, Silchar
1.15 pm -2.15 pm	Lunch Break	
2.15 pm – 3.45 pm	Session 3:	Test & Valedictory -


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**"AICTE Sponsored STTP-2 on
Battery Management and Control Techniques in EVs"
7th to 12th December 2020****Proceedings of STTP-2**

Day: 1	Date: 07/12/2020
Session: 1	"Climate angle to EV"
Resource Person:	Dr. Ashok Rao, Former Head, CEDT, IISc, Bangalore.
Abstract:	Concepts of energy were discussed in detail. "Energy is greatest Emperor of all", what is energy? Why energy? Current issues like global warming-economics & social inequity were discussed. Dimensions & dynamics of energy convention & alternate energy issues were also discussed. Conservation & consequences of Vehicles & EV's were highlighted. Different Battery Technologies & Innovations taking place in the area of EV's were briefed.

Day: 1	Date: 07/12/2020
Session: 2	"EV/HEV Configuration and Architecture"
Resource Person:	Dr. L. Ashok Kumar, Professor, Dept. of EEE, PSG College of Technology, Coimbatore.
Abstract:	The rapid consumption of fossil fuel and increased environmental damage caused by it have given a strong impetus to the growth and development of fuel-efficient vehicles. Hybrid electric vehicles (HEVs) have evolved from their inchoate state and are proving to be a promising solution to the serious existential problem posed to the planet earth. Not only do HEVs provide better fuel economy and lower emissions satisfying environmental legislations, but also they dampen the effect of rising fuel prices on consumers. HEVs combine the drive powers of an internal combustion engine and an electrical machine. The main components of HEVs are energy storage system, motor, bidirectional converter and maximum power point trackers (MPPT, in case of solar-powered HEVs). The performance of HEVs greatly depends on these components and its architecture. Different architectures of Electric Vehicles and control of Hybrid Electric Vehicles were discussed. Major requirements of HEVs, Electric propulsion were highlighted. Hybrid Electric Vehicles challenges and safety aspects were highlighted. Vehicle to Grid Technology (V2G) was discussed. Electric Vehicle charging infrastructure and charging location, limitations of Electric Vehicles were discussed.



Day: 1	Date: 07/12/2020
Session: 3	"Control Applications to HEV"
Resource Person:	Dr Bhanu Pratap Asst. Professor, Dept. of EEE, NIT, Kurukshetra
Abstract:	Basic concepts of Real time embedded control systems discussed in the session. Highlighted the Anti-lock braking system (ABS) requirements and its various components. Lane Departure Warning System (LDWS) design was elaborated. Universal Digital PID Controller was explained and highlighted the main objectives of formulating the present long term research. Modeling and simulation of HEVs were also discussed.

Day: 2	Date: 08/12/2020
Session: 1	"Battery Technology and Future trends"
Resource Person:	Mr. Gopal Athani, Automotive Electrical/Electronic, Systems Engineer, Tata Technologies, Pune.
Abstract:	In this session, today's battery technologies and future options were discussed. Batteries have been one of the main focuses of automotive development in the recent years. Technologies that have been in use for a very long time, such as the lead-acid battery, are indispensable but need improvement. New technologies such as the lithium-ion battery are entering the market. Supercapacitors (also known as electrochemical double-layer capacitors) can be used for high-power requirements such as regenerative braking. The variety of vehicles has increased with the introduction of hybrid vehicles, plug-in hybrid vehicles and electric vehicles and, for each type, suitable battery types are being used or under development. Appropriate battery system designs and charging strategies are needed. Battery technologies can be classified according to their energy density, their charge and discharge characteristics, system integration and the costs. Further relevant performance parameters are the calendar lifetime, the cycle lifetime, the low- and high-temperature performances and the safety.

Day: 2	Date: 08/12/2020
Session: 2	"Battery Management Systems"
Resource Person:	Dr. Abhijeet Kshirsagar, Asst. Professor, Dept. of Electrical Engg. IIT, Dharwad
Abstract:	Early electric vehicles (EV), hybrid electric vehicles (HEVs) and plug-in hybrid electric vehicles (PHEVs) used either lead-acid batteries or NiMH batteries for storage. However, these batteries were not optimal: EVs, HEVs, and PHEVs require impressive energy storage that even NiMH batteries, with specific energy, aren't capable of. In search of higher energy-efficiency, many manufacturers have turned to lithium-ion batteries, such as lithium-titanate, lithium-phosphate and lithium-manganese, for electric vehicles. Optimal and safety use of these batteries requires a battery management system (BMS). Because each BMS function takes energy, BMS designers



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must prioritize designs. Many BMS do not log data, for example, and they may fall short when estimating the battery's present state or overall state. However, one of the most critical functions is protecting the life of the EV's battery. Safety is vital in today's modern electric vehicle. Due to the high energy contained in the battery and the risk in the event of a collision or short circuit, safety is a major consideration when choosing a battery management system.

Day: 2	Date: 08/12/2020
Session: 3	"Energy Management in EVs"
Resource Person:	Dr Chandrasekhar P, Asst. Professor, School of Electrical Sciences, IIT, Bhubaneswar.
Abstract:	Presence of an alternative energy source along with the Internal Combustion Engine (ICE) in Hybrid Electric Vehicles (HEVs) appeals for optimal power split between them for minimum fuel consumption and maximum power utilization. Hence HEVs provide better fuel economy compared to ICE based vehicles/conventional vehicle. Energy management strategies are the algorithms that decide the power split between engine and motor in order to improve the fuel economy and optimize the performance of HEVs. In this session, various energy management strategies available in the literature were discussed. A lot of research work has been conducted for energy optimization and the same is extended for Plug-in Hybrid Electric Vehicles (PHEVs). Numerous methods and several control strategies were discussed in the session. These control strategies were summarized during the session in a coherent framework.

Day: 3	Date: 09/12/2020
Session: 1	"Electric Drives for EV applications"
Resource Person:	Dr. Ramulu, Asst. Professor, Department of Electrical Engineering, NIT, Warangal.
Abstract:	In the present electric vehicles, there are several main drive systems which consists of DC motor, the variable frequency drive system for induction motor (IM), the drive system for permanent-magnet motor (PM) and switched reluctance drive system(SRM).In this session it was explained about general electrical configurations of EV Motor. Different EV systems and operation on DC motor drives, induction motor drives, PM brushless motor drives and switched reluctance motor drives were discussed and also highlighted on applications on various motor drives in EV.



Day: 3	Date: 09/12/2020
Session: 2	"Suitability of BLDC Motor for EV Application"
Resource Person:	Dr. Ragavan K Associate Professor, Dept. Electrical Engineering, IIT, Gandhinagar.
Abstract:	BLDC motor has higher power-to-weight ratio, but its maintenance cost, cost of controller is high. Three phase induction motor and BLDC motor are the two most widely used motors by electric vehicle manufacturers. In this session it was discussed about electromechanically and electronically commutated machine and characteristics of vehicle- load which are necessary to understand suitability of BLDC motor. Operation of BLDC motor, armature mmf and field mmf was explained.

Day: 3	Date: 09/12/2020
Session: 3	"SRM Drives for EVs"
Resource Person:	Dr. D. S. More, Professor, Electrical Engg. Dept. Walchand College of Engg. Sangli
Abstract:	Nowadays, switched reluctance motor drives are one of the most promising alternatives for the elimination of permanent magnets in the electric traction systems, due to their well-known advantages such as simple and rugged construction, high efficiency, better speed- torque characteristic .In this session it was explained about the SRM drives for battery operated EV. It was also discussed about construction & working principle of SRM drives and its torque & speed control. A detailed explanation about Converters for SRM drives and its Operating modes were discussed. Concluded the session with application of SRM to EVs.

Day: 4	Date: 10/12/2020
Session: 1	"P. E. Converters for EVs"
Resource Person:	Dr. B. V. Madiggond, Professor and Head, Dept.of EEE Hirasugar Institute of Technology, Nidasoshi.
Abstract:	In Hybrid Power Systems, the power-electronic converters are considered as the key elements that interface their power sources to the drive train of the EVs. In order to design highly efficient converters for the EV's power system, advanced DC/DC and DC/AC converters are required to adapt the output voltage and current levels with high power quality. Power electronic converter and their vehicular applications were discussed in this session. Power electronic converter requirements and evolution of Power Electronics in EVs are explained. Classification of DC-DC Converters with their topologies and comparison of DC-DC Converter topologies were main highlights of the session.



Day: 4	Date: 10/12/2020
Session: 2	"Automotive P. E. Converters for EVs"
Resource Person:	Dr. Satish Naik, Asst. Professor, Department of Electrical Engineering, IIT, Dharwad
Abstract:	Overview of Electric Vehicle including structure and components of Electric Vehicles were discussed. Role of Power Electronics in Electric vehicles and Merits and demerits of converter topologies (AC-DC and DC-DC) for Fast Charging Stations (FCHARs) are discussed in detail. Overview of Electric Vehicle Supply Equipment (EVSE) and types of Electric Vehicle battery chargers and its levels were the main highlights of the session.

Day: 4	Date: 10/12/2020
Session: 3	"Control Techniques for P. E. Converters"
Resource Person:	Dr. Suryanarayana K, Professor, EEE Dept. NMAMIT, Nitte
Abstract:	Power converter technology is basic and important because it supports and delivers all types of electronic equipment and devices. Need of power Electronic converters and Impact of source, load and control parameters variation in DC-DC converters are discussed. Need of converter modeling, transfer functions were explained. The regulatory design concepts and compensator design were discussed and Development of Omni Electric Vehicle and other hardware systems which are developed in EEE department NMAMIT, Nitte research laboratory were demonstrated at the end of the session.

Day: 5	Date: 11/12/2020
Session: 1	"Modeling and Simulations of PE Converter for EVs"
Resource Person:	Mr. Jayaprakash Sabarad, Engineering Technical Leader, GE Transporation, Bangalore.
Abstract:	Session started with introduction to batteries, different types of batteries, battery charging circuit. Battery charging characteristics are discussed by considering temp, charge-discharge & SOC parameters. Importance of mathematical modeling, different types of modeling & modeling of integrated circuit were discussed and performed hands on using MATLAB platform.

Day: 5	Date: 11/12/2020
Session: 2	"Modeling and Simulations of PE Converter for EVs"
Resource Person:	Mr. Jayaprakash Sabarad, Engineering Technical Leader, GE Transporation, Bangalore.
Abstract:	Session is continued with discussion of modulation technique and modeling of electrical circuits. Buck converter plays an important role in EVs to supply low voltage loads like 12V/24V/48Volts from a DC link bus of 400V, in view of this modeling of buck converter having various configurations is performed hands-on in MATLAB software with participants. State flow modeling in MATLAB is also performed hands on, AC motor control is also demonstrated.



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Day: 5	Date: 11/12/2020
Session: 3	"G2V, V2G Communication"
Resource Person:	Dr. Dharavath Kishan, Asst. Professor, Dept. of EEE, NIT, Surthkal
Abstract:	In this session, the present status and implementation impact of V2G/G2V (Vehicle- to-Grid and Grid-to-Vehicle) technologies are discussed on Distributed Generation (DG) systems, illustrating requirements, benefits, challenges and strategies for interfaces of both individual vehicles and fleets. Two of the key aspects for the diffusion of these technologies are those related to batteries and charging systems were highlighted.

Day: 6	Date: 12/12/2020
Session: 1	"Chargers for EVs"
Resource Person:	Dr. Sanjeev Nayak, Specialist and Project Manager, L&T Tech. Services, Bengaluru
Abstract:	In this session, Different types of batteries and their charging methods, charging of e-bus, on-board, off-board and bidirectional charger were discussed. Charging and discharging of batteries and super capacitors, EV charger and its impact on grid and power quality issues with EVs were discussed. EV charging infrastructure and environmental impacts were discussed.

Day: 6	Date: 12/12/2020
Session: 2	"Research Avenues in EVs"
Resource Person:	Dr Sreejith S, Asst. Professor, Dept. of EEE, NIT, Silchar
Abstract:	In recent years, due to the pressure of energy crisis and environmental pollution, Electric Vehicle (EV) has gained opportunities for development. With the large-scale construction of charging station, the wide use of EV will cause the rapid growth of the power load in local areas. As the essential part of grid loads in the future, the charging station load forecasting, especially the short-term load forecasting, will play a very important role in production arrangement, economic dispatching and safe operation of electric power system. In this session various research avenues in electric Vehicle were highlighted. And discussed how to reduce losses in Vehicle to Grid(V2G) and Grid to Vehicle(G2V) technology and how to manage power at charging. Cyber security issues in Electric Vehicle were discussed in the session.

06/01/2021

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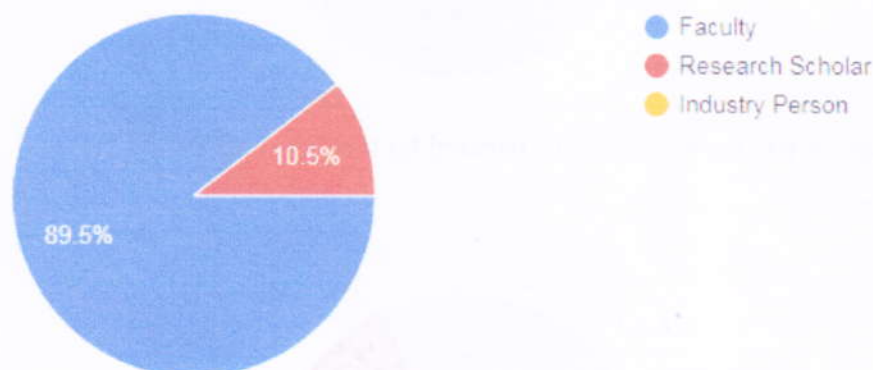


**Overall Feedback (7.12.2020-12.12.2020) : AICTE Sponsored One Week STTP on
"Battery Management and Control Techniques in EVs" organized by Dept of
EEE, H.S.I.T Nidasoshi, Belagavi, Karnataka**

Impact Analysis

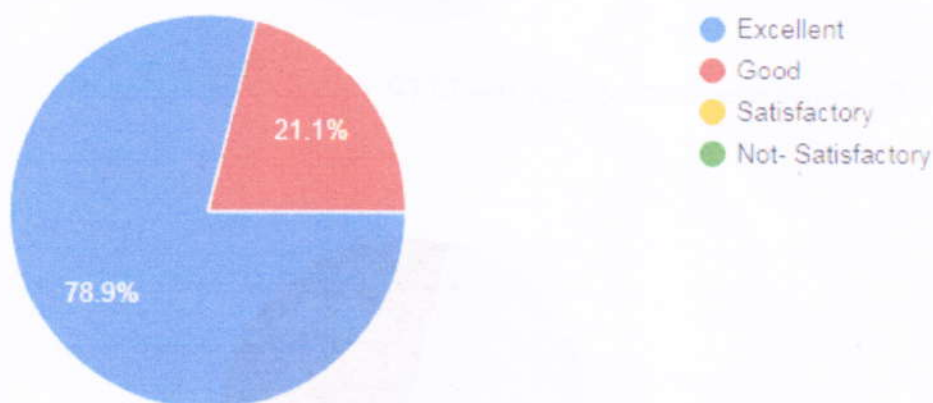
Profession

38 responses



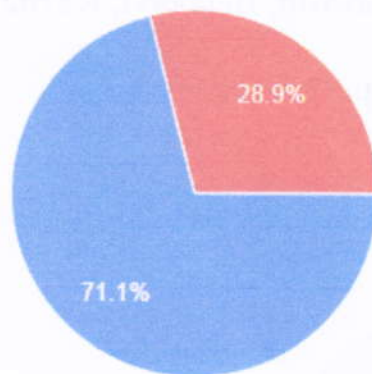
Effectiveness in conduction of STTP

38 responses



**Relevance of the contents delivered**

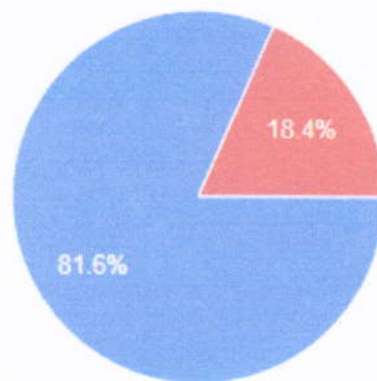
38 responses



- Excellent
- Good
- Satisfactory
- Not Satisfactory

Relevance of the sessions in regard to the title of the STTP

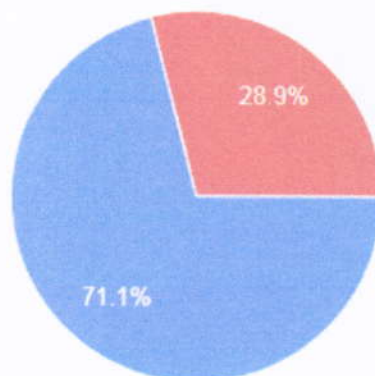
38 responses



- Excellent
- Good
- Satisfactory
- Not-Satisfactory

Overall experience about the STTP

38 responses



- Excellent
- Good
- Satisfactory
- Not- Satisfactory

Programme Coordinator

H. O. B.

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