



A
Report on
Short Term Course on
“Research Scope in Electric Vehicles”
(In collaboration with ANSYS)
December 5 - 9, 2022



Jointly Organized by:
Department of Electrical Engineering
&
Department of Mechanical Engineering
Swami Keshvanand Institute of Technology, Management &
Gramothan, Jaipur

Submitted by:
Dr.Pooja Jain, Mr.Naveen Kumar Sain
Host Institute Coordinators

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Our Inspiration

"Mass illiteracy is the root cause behind backwardness of India. If we want speedy progress of nation we need to root it out as early as possible."

– Swami Keshvanand

Swami Keshvanand, an orphan, illiterate, nomadic man who never received formal education, was the founder of more than 300 schools, 50 hostels and innumerable libraries, social service centers and museums. Swami Keshvanand had a deep understanding of the rural society of the desert region. He explained the peculiarities of the desert region, identified the problems, and suggested appropriate and logical solutions. It was Swami Keshvanand's lifelong endeavor to eradicate social evils like untouchability, child marriage, indebtedness, poverty, backwardness, alcohol abuse, moral dissipation etc.

1.ABOUT SKIT:-

Swami Keshvanand Institute of Technology, Management & Gramothan (SKIT) has been Ranked No.1 Engineering Institute in Rajasthan by RTU Kota consecutively for the last five years. The institute was established in the year 2000 by a team of committed professionals and academicians. During all the past years SKIT has emerged as a premier center of technical education not only in Rajasthan but also in Northern India which has been realized through efficient and dedicated faculty members, innovative teaching learning methods, and core value of discipline. The various undergraduate programmes of the institute are accredited by the National Board of Accreditation (NBA).

2.ABOUT DEPARTMENT OF ELECTRICAL ENGINEERING:-

The Department of Electrical Engineering is distinctly focused towards integrating academics with cutting edge technology in the field of Electrical Engineering. The B. Tech. Program has been accredited four times in succession by NBA since 2009.

Department is also conducting M. Tech. and PhD Program in Power Systems specialization. All efforts are subtly harnessed with the aim of preparing the budding engineers to face the challenging dimensions of technical excellence in areas such as Analog & Digital Electronics, Electrical Machines, Control & Automation, Power Systems Design and Power Electronics. The department puts in consistent efforts for field exposure to students through various research-oriented projects taken up for meeting the industry demands. The department offers a perfect blend of electrical, electronics and computer related courses to help students pursue a professional career or higher studies.

3. ABOUT DEPARTMENT OF MECHANICAL ENGINEERING:-

The Department of Mechanical Engineering at SKIT was established in the year 2003 with an annual intake of 60 students in the B. Tech. program. Presently the department is running the B. Tech program with an intake of 60 students and M. Tech programs in Renewable Energy Technology with intakes of 18.

Department is also a recognized *Ph. D. Research Center of RTU*.

The B. Tech. program of the department has been **accredited three times by the National Board of Accreditation (NBA)**.

Being the mother branch of all engineering courses, the branch of Mechanical Engineering incorporates valuable contributions for achieving solutions to the emerging challenges in industry and varied sectors of engineering education. The Department of Mechanical Engineering at SKIT has a potent realization of the fact and thus continuously sets in motion sincere efforts to bring in quality change in the related areas. These efforts have started yielding results as our students with the active support of the faculty have been successful in developing highly perceptive projects and professional careers.

4.ABOUT THE STC

Electrical Vehicle (EV) is a prominent solution of fuel crises and environmental pollution for global transportation sector. This Programme is designed to provide

the state-of-the-art trends and advancements in Electric Vehicle. The Programme will focus on theoretical aspects as well as providing hands on experience to the participants. It will enable them to promote industry and institute collaborations by working on current research problems. The participants will be introduced to fundamentals of Electric Vehicles, components such as cables, battery, drives and controllers used in of Electric Vehicles and develop the understanding of how to use optimization techniques such as AI and ML to improve the features of EV. The participants will be trained with hands-on approach in order to have an in-depth insight into the domain of Automobile and expose them to Feasibility & future scope of EV.

5.VISION, MISSION & QUALITY POLICY OF THE INSTITUTE:-

Vision

To promote higher learning in advanced technology and industrial research to make our country a global player

Mission

To promote quality education, training and research in field of Engineering by establishing effective interface with industry and to encourage faculty to undertake industry sponsored projects for students.

Quality Policy

We are committed to ‘achievement of quality’ as an integral part of our institutional policy by continuous self-evaluation and striving to improve ourselves.

Institute would pursue quality in

- All its endeavors like admissions, teaching- learning processes, examinations, extra and co-curricular activities, industry institution interaction, research & development, continuing education, and consultancy.
- Functional areas like teaching departments, Training & Placement Cell, library, administrative office, accounts office, hostels, canteen, security services, transport, maintenance section and all other services.”

6.BROCHURE OF THE STC:-



COURSE CONTENT

- BASICS OF EV TECHNOLOGY
- EV MODELLING - SIMULATION AND HARDWARE
- EV MOTOR DRIVE
- EV BATTERY MANAGEMENT AND SUPERCAPACITORS
- EV MEASUREMENTS FOR POWER QUALITY STUDIES
- **HARDWARE DEMO OF EV**
- HANDS ON PRACTICES ON MOTOR AND POWER ELECTRONICS DESIGN OF EV USING ANSYS

STC ON

RESEARCH SCOPE IN ELECTRIC VEHICLES (IN COLLABORATION WITH ANSYS)

5TH TO 9TH DECEMBER, 2022

TO KNOW MORE JOIN US ONLINE
Register via link
<https://fdp.nitttrchd.ac.in/backingup/>

FOR DETAILS , CONTACT
Dr. Shimi Sudha Letha
Assistant Professor, EE
NITTTR, Chandigarh
shimi.reji@nitttrchd.ac.in
+91 9417588987

Access to ANSYS software will be provided to all registered participants for practice sessions



7.SCHEDULE OF THE STC:-

National Institute of Technical Teachers Training and Research, Chandigarh

Electrical Engineering Department

Online STC on

Research Scope in Electric Vehicles (In collaboration with ANSYS) (O. PLAN No. EE153)

05/12/2022 to 09/12/2022

TENTATIVE TIME-TABLE

DAY & DATE	Live Session - 1 9.30 AM to 11. 00 AM (IST)	Live Session - 2 11.30 AM to 1.00 PM (IST)	Live Session - 3 2.30 PM to 4.00 PM (IST)
Monday 05/12/2022	Electric Vehicle Technology Basics and standards (SSL)	Research scope in EV Power Quality studies (SSL)	EV modelling - simulation and hardware implementation (AG)
Tuesday 06/12/2022	Battery Management System for EVs (PS)	HIL testing Battery Management System controller using OPAL-RT (ST)	Electric Drives for EVs (RT)
Wednesday 07/12/2022	Issues and Research scope in EVs with respect to industrial perspectives (TB)	EV issues and challenges in ABB (KK)	EV hardware demo and Research Scope (Expert V Instruments, TN)
Thursday 08/12/2022	Hands on Practices Design and Development of Electric Drives for Electric Vehicles (ARK / Ansys Expert / SSL)		
Friday 09/12/2022	Hands on Practices Design and Development of Electric Drives for Electric Vehicles (ARK /Ansys Expert / SSL)		Valediction, Feedback and Quiz (SSL)

SSL : Dr. Shimi S.L, Assistant Professor, NITTTR Chandigarh

RT : Dr. Ravi Teja, Assistant Professor, IIT Ropar

PS : Dr. Pavitra Sukhla (Ph.D (IIT Delhi)), R&D Engineer, Caterpillar, India

TB: Dr. Tatiano Busatto, System Engineer at Unjo AB, Sweden

ST: Sai Teja, OPAL-RT

KK : Khusro Khan, Manager, ABB, India

KKJ : Mr Kartikesh Kumar Jha, Application Engineer, ARK Infosolutions Pvt. Ltd.

KJ : Mr Kailash Jagtap, Application Engineer, ARK Infosolutions Pvt. Ltd.

AG: Ajay Godara, Director, Enovation Lab, LLP, Chandigarh

Course Coordinator: Dr. Shimi S.L, Assistant Professor, Electrical Engineering Department, NITTTR Chandigarh

8.OBJECTIVE OF THE STC:-

The main objectives of this STC are:

- To gain thorough understanding of the essentials and the way to Green Energy.
- To inculcate the methodological insight of Electric Vehicles modelling simulation and hardware.
- To understand EV Motor Drives and Battery Management Systems.
- To induct research on EV Measurements for Power Quality Studies.
- To get practical exposure by Hands on Practices Design and Development of Electric Drives for Electric Vehicles.

This STC promotes the aims of a research, such as expanding knowledge, support values require for collaborative work and mutual respect.

9.EXPECTED OUTCOME OF THE STTP:-

After attending this STTP, Participants will be able to:

O1: Understand fundamentals of Electric Vehicles, components such as cables, battery, drives and controllers used in Electric Vehicles.

O2: Develop understanding of How to use optimization techniques such as AI and ML to improve the features of EV.

O3:Get insightful knowledge by Hands-on approach on ANSYS and OPAL-RT and expose them to Feasibility & future scope of EV.

The short term course outcomes are mapped with the program outcomes indicators of UG program. The matrix is shown in **Table 1**:

Table 1: Mapping with BL level PO & PSO indicators

Outcomes	Bloom's Level	PO Indicators	PSO Indicators
O1	L2	1.2.1,1.3.1,1.4.1,2.1.3,2.2.2,2.2.3,2.3.1,2.4.2,7.1.1,7.1.2,7.2.2,12.1.2,12.2.1,12.2.2,12.3.1,12.3.2	1.1.1,1.1.3,1.2.1,2.2.1,2.2.2
O2	L2	1.1.2,1.3.1,1.4.1,2.1.1,2.1.3,2.2.2,2.2.3,2.2.4,2.3.1,2.3.2,2.4.2,2.4.3,2.4.4,3.1.3, 3.1.6, 3.2.1, 3.2.2, 3.2.3, 3.3.1,3.4.1, 4.1.1,4.1.2,4.1.3,4.2.1, 4.3.1, 5.1.2, 5.2.1, 5.2.2, 5.3.1, 5.3.2, 7.1.1,7.1.2,7.2.2 , 12.1.2,12.2.1,12.2.2,12.3.1,12.3.2	1.1.1,1.1.2,1.1.3,1.2.1,2.1.1, 2.2.1,2.2.2
O3	L3	1.1.2,1.3.1,1.4.1,2.1.1,2.1.3,2.2.2,2.2.3,2.2.4,2.3.1,2.3.2,2.4.2,2.4.3,2.4.4,3.1.3, 3.1.6, 3.2.1, 3.2.2, 3.2.3, 3.3.1,3.4.1, 4.1.1,4.1.2,4.1.3,4.2.1, 4.3.1, 5.1.2, 5.2.1, 5.2.2, 5.3.1, 5.3.2, 7.1.1,7.1.2,7.2.2, 12.1.2,12.2.1,12.2.2,12.3.1,12.3.2	1.1.1,1.1.2,1.1.3,1.2.1,2.1.1, 2.2.1,2.2.2

Table 2:Workshop Outcomes-PO-PSO mapping

Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
O1	2	2	-	-	-	-	3	-	-	-	-	3	3	3
O2	2	3	2	2	3	-	3	-	-	-	-	3	3	3
O3	2	3	2	2	3	-	3	-	-	-	-	3	3	3
Average	2	3	2	2	3	-	3	-	-	-	-	3	3	3

10. ATTENDANCE RECORD OF PARTICIPANTS FOR THE DURATION OF THE EVENT

Attendance

Name of the Course: Research Scope in Electric Vehicles (In collaboration with ANSYS) (O. PLAN No. EE153)

Dates: 05/12/2022 to 09/12/2022

Venue (Nodal Centre) : Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur, Rajasthan		Signature of the participants		Signature of the participants		Signature of the participants		Signature of the participants		Signature of the participants	
		12/5/2022		12/6/2022		12/7/2022		12/8/2022		12/9/2022	
Sr. No.	Name of the Participant	Name of the Institute	09.30 am -1.00 pm	09.30 am -1.00 pm	09.30 am -1.00 pm	09.30 am -1.00 pm	09.30 am -1.00 pm	09.30 am -1.00 pm	09.30 am -1.00 pm	09.30 am -1.00 pm	09.30 am -1.00 pm
1	ABHISHEK GUPTA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN	of	of	of	of	of	of	of	of	of
2	AJAY KUMAR DHANOPIA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN	of	of	of	of	of	of	of	of	of
3	AMIT JHALANI	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN	of	of	of	of	of	of	of	of	of
4	AMIT KUMAR BANSAL	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN	of	of	of	of	of	of	of	of	of
5	ANKIT KUMAR AGARWAL	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN	of	of	of	of	of	of	of	of	of
6	ANKUSH TANDON	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN	of	of	of	of	of	of	of	of	of
7	ARUN BENIWAL	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN	of	of	of	of	of	of	of	of	of
8	ASHISH NAYYAR	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN	of	of	of	of	of	of	of	of	of
9	ASHISH PANT	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN	of	of	of	of	of	of	of	of	of
10	AVADHESH KUMAR SHARMA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN	of	of	of	of	of	of	of	of	of
11	BAIBHAV BISHAL	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN	of	of	of	of	of	of	of	of	of

Attendance

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Sr. No.	Name of the Participant	Name of the Institute	09.30 am -1.00 pm	2.30pm -4.00pm	09.30 am -1.00 pm	2.30pm -4.00pm	09.30 am -1.00 pm	2.30pm -4.00pm	09.30 am -1.00 pm	2.30pm -4.00pm	09.30 am -1.00 pm	2.30pm -4.00pm	09.30 am -1.00 pm	2.30pm -4.00pm	09.30 am -1.00 pm	2.30pm -4.00pm
12	BRIJ MOHAN SHARMA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMMOTHAN														
13	CHANDAN KUMAR	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMMOTHAN														
14	DINESH KUMAR	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMMOTHAN														
15	DINESH KUMAR SHARMA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMMOTHAN														
16	DR DHANRAJ CHITARA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMMOTHAN														
17	DR SUMAN SHARMA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMMOTHAN														
18	DR. DEEPAK KUMAR	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMMOTHAN														
19	DR. NEHA JANU	MANIPAL UNIVERSITY														
20	DR.SANDHYA SHARMA	SURESH GYAN VIHAR UNIVERSITY														
21	GARVIT GUPTA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMMOTHAN														
22	HEMANT KUMAR VIJAYVERGIA	GOVT MAHILA ENGINEERING COLLEGE														





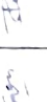

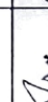


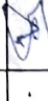
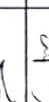


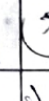
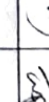




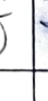


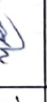
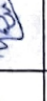














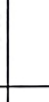
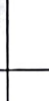



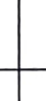


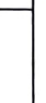

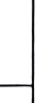
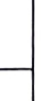










Attendance
Name of the Course: Research Scope in Electric Vehicles (In collaboration with ANSYS) (O. PLAN No. EE153)
Dates: 05/12/2022 to 09/12/2022

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34	POOJA JAIN	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
35	RAJ KUMAR	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
36	SANDEEP KUMAR BHASKAR	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
37	SANJAY CHOUDHARY	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
38	SANTOSH MEENA	MAHILA ENGINEERING COLLEGE										
39	SARFARAZ NAWAZ	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
40	SAURABH GUPTA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
41	SUJEET KUMAR	SURESH GYAN VIHAR UNIVERSITY JAIPUR										
42	SUMITA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
43	TANUJ RAWAT	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
44	TARUN NARUKA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										

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Dates: 05/12/2022 to 09/12/2022





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45	TRIVENDRA KUMAR SHARMA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
46	VIKAS RANVEER SINGH MAHALA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
47	VIKASH GAUTAM	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
48	VINAY SINGH MARWAL	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
49	VIVEK SHARMA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										
50	YOGENDRA KUMAR GUPTA	SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT AND GRAMOTHAN										

11. IMAGES OF THE STC





12.SAMPLE COPY OF CERTIFICATES

	Certificate No: ICT-19739/22
<p>National Institute of Technical Teachers Training and Research Chandigarh</p> <p>MINISTRY OF EDUCATION, GOVERNMENT OF INDIA</p> <p>Certificate</p> <p><i>This is to certify that</i></p> <p>POOJA JAIN</p> <p>SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT AND GRAMOTHAN, JAIPUR RAJASTHAN</p> <p><i>Participated in the AICTE Recognized Faculty Development Programme</i></p> <p>on</p> <p>Research Scope in Electric Vehicles (In collaboration with ANSYS)</p> <p><i>Conducted by</i></p> <p>Electrical Engineering Department</p> <p>from</p> <p>05/12/2022 to 09/12/2022 (One Week)</p> <p>at</p> <p>Swami Keshvanand Institute of Technology, Management and Gramathan, Jaipur, Rajasthan</p>	
	<p> Coordinator</p> <p> Director</p>

13 DAY WISE DETAILED REPORT OF THE STC:-

One week Online Short Term Course on Research Scope in Electric Vehicles(In collaboration with ANSYS) was organized by Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur as a remote center of NITTTR, Chandigarh for this STC on 5th December 2022. This workshop was jointly organized by Departments of Electrical Engineering and Mechanical Engineering (in association with NITTTR, Chandigarh).The coordinator of the events were Dr. Pooja Jain(EE Deptt.) and Mr. Naveen Kumar Sain (ME Deptt.).

In this STC, On the very first day, First Two sessions were taken by Dr. Shimi S.L., Assistant Professor, NITTTR, Chandigarh on the basics of Electric Vehicles and future scope of Electric Vehicles for Power Quality studies. She gives us very insightful knowledge by taking consideration of beginners for this topic. The third session on the first day was taken by Mr. Ajay Godara, Director, Enovation lab,LLP, Chandigarh on modelling of Electric Vehicles by simulation and hardware implementation .

Second day, the first session was taken by Dr. Pavitra Shukla, R& D Engineer, Caterpillar, India on Battery Management System for EVs. Second session was taken by Sai Teja, OPAL-RT on HIL testing Battery management system using OPAL-RT software. The third session was taken by Dr. Ravi Teja, Assistant Professor, IIT Ropar, on Electric Drives used for EVs.

Third day, the first session was taken by Dr. Tatiano Busatto, System Engineer at UNJO,AB, Sweden on EVs industrial perspectives. Second session was taken by Khusro Khan ,Manager, ABB ,India on issues and challenges in EVs in ABB. Third session on hardware demo of EVs was taken by Dr.TN, Expert V instruments.

Fourth day, hands on training on Design and development of Electric Drives for EVs was given by Mr. Kartikesh Kumar Jha & Mr. Kailash Jagtap Application Engineer, ARK Infosolutions Pvt. Ltd., and Dr. Shimi S.L., Assistant Professor ,NITTTR ,Chandigarh.

On fifth day, further basic projects based on EVs were simulated and hands-on training was provided by the same experts. They motivated the faculty members to face new challenges and think about innovative ideas and develop these in EVs.

