"Empowerment through quality technical education"

AJEENKYA DY PATIL SCHOOL OF ENGINEERING

Dr. D. Y. Patil Knowledge City, Charholi Bk., Via. Lohegaon, Pune – 412 105.

Academic Year 2022-23 **Form No. IQAC/44**

Best Practice – I

Competency Based Education and Assessment

Name of the faculty: - Mr. Riyaj L. Kazi

Name of the Subject :- Power Devices and Circuits.

Department: E&TC

Class: T.E. Div: A & B

Competency Based Learning (Part A and Part B)

It is an active, adaptive, experiential and participatory learning where students' choice and voice are present in order to bring variety and variation in learning.

Note- Part A and B should cover latest developments, advancements, innovations and technologies in the subject domain.

{Select at least Three from each of Part-A & Part-B for every subject and map the outcome of activity}

Part A- Experiential Learning (Learning by Doing) (Reference: NAAC Manual Pg. 72)

Is a process of learning through experience and is more specifically defined as "learning through reflection on doing".

The following statements/ questions are related to the subject you teach in this semester

1. Is it possible to develop any prototype or model by the students related to the subject? Yes / No
   If Yes, mention the related UNIT No. ..... and Prototype Name - .....
2. Do you want to show any product demo to the students related to any topic / UNIT? Yes ✓ / No
   If Yes, mention the related UNIT No. VI. and Name of the Demo - AC Voltage Controller
3. Do you want to assign any mini / major project to the students related to any topic? Yes / No
   If Yes, mention the related UNIT No. ..... and the Project Name- .....
4. Are you going to arrange any industrial / Field / Laboratory visit? Yes / No
   Name of Industry /Field/Lab visit - Visit to Solar Power Plant.

Yes ✓ / No

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5. Do you want to discuss a case studies related to the subject domain?

   If Yes, mention the UNIT No. ..... and Title of the case study - .....

6. Do you want to focus on any simulation/gaming based learning in the subject? Yes / No

   If Yes, mention the UNIT No. ..... and Name of the Simulation/Game- .....

7. Do you want to assign any mentor from industry /company to the students so that they can understand the subject well? Yes / No

   If Yes, Name of the mentor and Industry name – .....

8. Is there any student club at department /college level related to the subject domain? Yes / No

   If Yes, Number of students to be enrolled to the club –

9. Do you want to conduct any workshop related to the subject domain? Yes / No

   If Yes, Name of the workshop- ..... No. of students enrolled –

10. Do you want to invite any expert / guest from an industry related to the subject? Yes ✓ / No

    If Yes, Name of the expert- Mr. Ayaz Sayyad Name of the Topic – Power Devices & Applicat's – Live Demo

11. Do you want to empower the students to join an ad-on- course related to the subject? Yes / No

    If Yes, Name of the Ad-on-courses available - .....No. of students to be enrolled –

12. Do you want to empower the students to join a skill and practical oriented courses related to the subject? Yes / No

    If Yes, Name of the course available - .....No. of students to be enrolled –

13. Do you want to show a few videos on advances, latest development and technology in the domain or subject? Yes / No

    If Yes, Number of Videos to be shown (maintain the record)- 6 videos. One on each unit.

14. Any course available for the students w.r.t the subject domain at different learning platforms like Udemy, Coursera, Skillshare, MasterClass, Edx, Udacity etc. Yes ✓ / No

    Name of the courses -4 NPTEL Courses available 1) nptel.ac.in/courses/108/105/108105066/ 2) nptel.ac.in/courses/108/102/108102145/ 3) nptel.ac.in/courses/108/107/108107128/ 4) nptel.ac.in/courses/108/108/108108077/

Part –B Participative Learning (Learning by participating) (Reference- NAAC Manual Pg. 75)

Participatory Learning and Action is a family of approaches, methods, attitudes, behaviours and relationships, which enable and empower people to share, analyze and enhance their knowledge of their life and conditions, and to plan, act, monitor, evaluate and reflect.

1. Do you want to ask open ended questions in the domain? Yes / No

   UNIT No.- ..... Question 1:- .....

   UNIT No.- ..... Question 2:- .....

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UNIT No.- ..... Question 3:- .....

2. Do you want to conduct group discussion/ Buzz sessions in the subject domain? Yes / No

   UNIT No.- ..... Topic - .....

   UNIT No.- ..... Topic - .....

3. Do you want to use a question bowl approach in the discussion? Yes / No

   Topic- Power Devices and Applications.....

4. Do you want to conduct news analysis with the help of student on any topic? Yes / No

   Unit No. ..... Example .....

5. Do you want to focus on peer learning w.r.t. the subject? Yes / No

   Unit No. V & VI ..... Example Power Devices Protection & Applications

6. Do you want to use survey methods with the help of student to understand any topic? Yes / No

   Unit No. ..... Example .....

7. Do you want to use Brainstorming session to understand the topic better? Yes / No

   Unit No. ..... Name of the Topic .....

8. Do you want to conduct a small scale research in the subject domain with the help of students? Yes / No

   Unit No. ..... Topic .....

9. Do you take any initiative with the help of the students to collect information related to a topic for better learning? Yes / No

   Unit No. VI ..... Topic Batteries: Architecture/charging models for EV

10. Is there any possibility of using a critical incident in the subject domain for better teaching and learning? Yes / No

    Unit No. ..... Incident .....

11. Do you want to use the approach of video viewing and discussion? Yes / No

12. Do you want to use any other participatory approach or method or game in teaching and learning? Yes / No

    Name of the approach /method/game - .....

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Best Practice – II

Bridging the Gap between Education and Employment through Industry Connect

Name of the faculty: - Mr. Riyaj Kazi

Name of the Subject: - Power Devices & Circuits Class: T.E. Div: A & B

Sector of the industry Identified: - Power Electronics

Name of the industry to be connected:- .....

Plan of Action (PoA):- {Select at least five for each subject and map the outcome of activity}

1. Do you want to sign Sign MoU with the industry? Yes No Tentative date to sign the MoU:- ...../...../2023
2. Are there any hot topics, areas, trends, advances, technologies in the industry sector? ✓ Yes No
   Mention Names- Power Electronics in Electric Vehicles.
3. Do you want to identify issues, problems and challenges in the industry? Yes No
   List the issues.....
4. Do you want to conduct the product survey of the industry with the help of students? ✓ Yes No
5. Do you want to let the students to understand the website of the industry? Yes No
6. Do you want to arrange a physical visit to the industry? Yes No
7. Do you want to arrange a virtual visit of the industry? Yes No
8. Do you want to arrange a guest lecture? Yes No
   Title of the guest lecture -.....
9. Is it possible to get sponsored project(s) from the industry for the final year students? Yes No
10. Is it possible to get internship for the SE/TE students from the industry? Yes No

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11. Do you want to write a conference paper/article on the best practices of the industry by involving students? Yes / No

12. Do you want to arrange a hands-on workshop for the subject in collaboration with the industry?
Title of the workshop - Power Electronic System Design, Working & Demonstration. Yes / No

13. Is there any skill development course available in the market w.r.t the subject? Yes / No
Title of the course - Basics of Power Electronics. [Si, SiC, GaN, LTSpice, DC/DC Converters, Inverters etc]

14. Are there any skilling, upskilling, reskilling or multiskilling trainings /workshops available at, NSDC/Skill India/Make in India for the subject? Yes / No
Names of the courses –

15. Do you want to motivate the students to participate in National/international employability tests or exams in the subject? Yes / No
Name of the tests - .....

Sign of Subject Teacher:

Sign of HoD

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Best Practice-I

Competency-Based Education and Assessment

Sr. No	Activity Title
1	Educational Visit to Electric Vehicle Charging Station
2	Educational Visit to Solar Power Plant
3	Question Bowl approach in discussion
4	Peer Learning Activity: Advanced Learner -Electric Vehicle Batteries

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Form No. IQAC/30

Date: 26/04/2023

Event Report

Academic Year: 2022-23 **Semester-II**

Name of the event: Educational Visit to EV charging Station

Date and Time	Wednesday, 26/04/23, 11:30 AM
Event Venue	Dr. D Y Patil Knowlegde City
Organized by	Department of E&TC
Targeted Audience	TE Students & Staff
Resource Person	Mr. Riyaj Kazi

Contents:

1. Introduction to EV Charging
2. Working of EV Charging Station
3. Technical Details
4. Levels of EV Charging Stations
5. Solar Powered EV Charging Stations
6. Government of India Initiative

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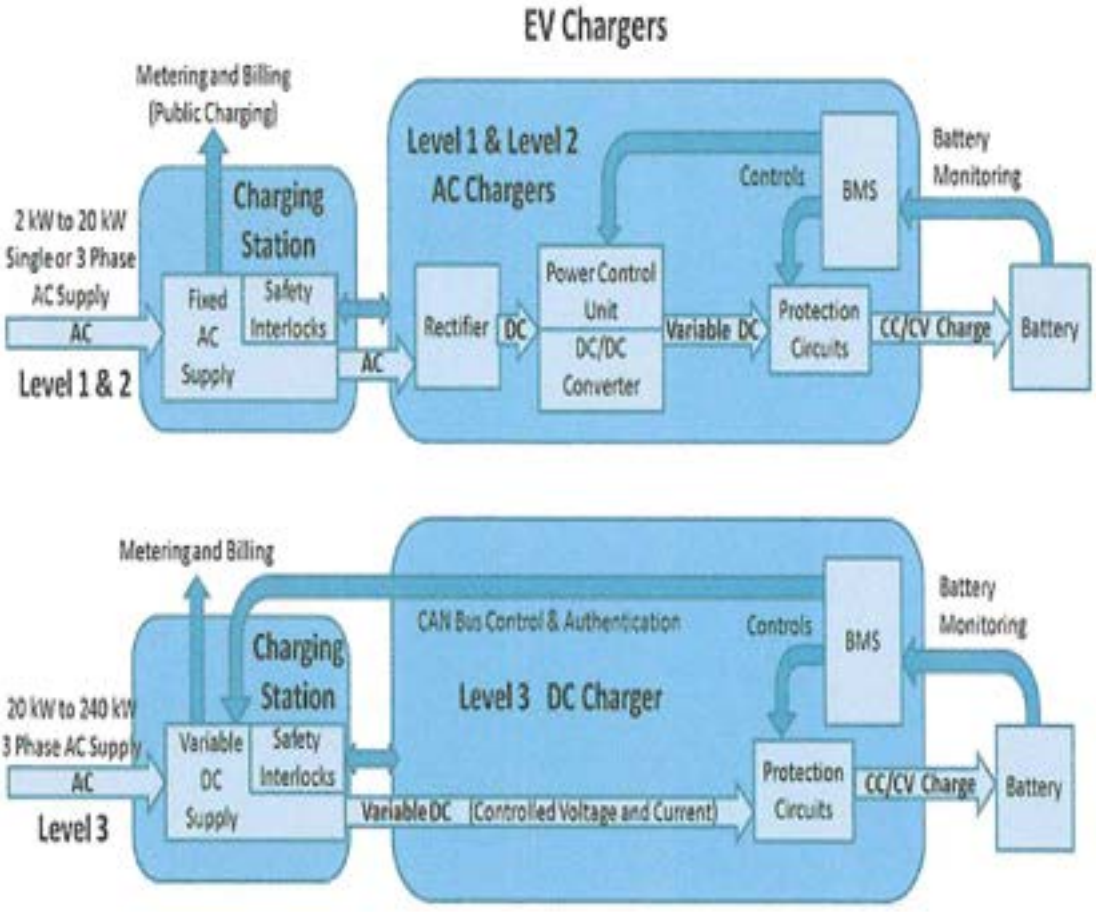
INTRODUCTION:

Electric charging station is an element in an infrastructure that supplies electric energy for the recharging of electric vehicles, such as plug-in electric vehicles, including electric cars, plug-in hybrids, etc.

Charging stations are inevitable part of electric vehicle ecosystem. In case of India, with road network of 54,72,144 kilometers, the country needs nation wide network of charging stations for electric vehicles as government is planning to sell only EVs by 2030.

WORKING:



Electricity from the grid is delivered as alternating current (AC) but requires direct current (DC). A rectifier needs to sit between the grid and the battery to convert one to the other. For home and

third party public charging this AC-to-DC conversion is done by the EVs on-board rectifier. AC current at the charge port is converted to DC for the battery by the rectifier.

Superchargers deliver high voltage, high current DC electricity directly to the EVs battery, bypassing the on-board rectifier. This allows the Supercharger to push electricity into the battery as fast as the battery can take it typically ten times faster than home charging.

TECHNICAL DETAILS:

For those of a technical bent, here's how atypical DC charging station is configured the whole setup, takes a 12 kV, 750 kVA feed from the utility, steps it down to 480V three phase on site, pushes that into 2000A switch gear which feeds four banks of charging units at 480V/200A. Each unit contains twelve 10 kW rectifiers (the same rectifier that is found in EVs) giving a total of 120 kW per pair of pods.

LEVELS OF EV CHARGING STATION:

Level 1, 120 Volt Charging The slowest form of charging. Uses a plug to connect to the on-board charger and a standard household outlet.This setup provides between 2-5 miles per hour.

Level 2, 220/240 Volt Charging Provide power at 220v or 240v and up to 30 amps. Drivers can add 10-25 miles of range in an hour of charging at home or at a public station.

Level 3, 480 Volt Charging Some refer to this charging as DC Fast charging. In this case, the charger is a gas pump-sized machine. All fast chargers deliver about 80 charge in 30 minutes.

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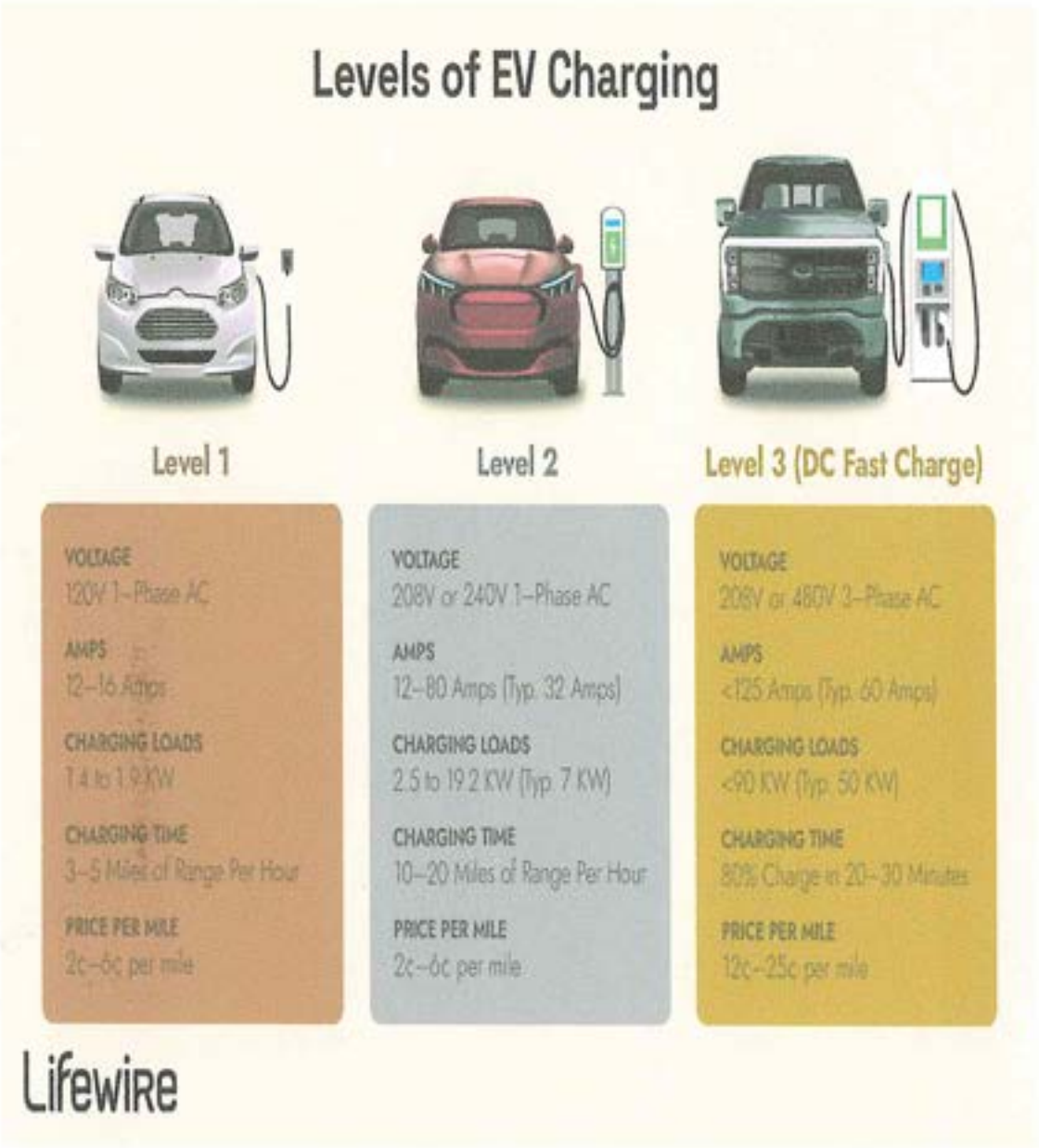

SOLAR POWERED EV CHARGING STATION:

- Charging stations can also be powered by solar energy.
- Number of solar panels can be placed on roof of charging station. This solar panel will deliver power to charging point.
- Use of solar will reduce load on power grid and will also save considerable amount of fossil fuel used in producing electricity

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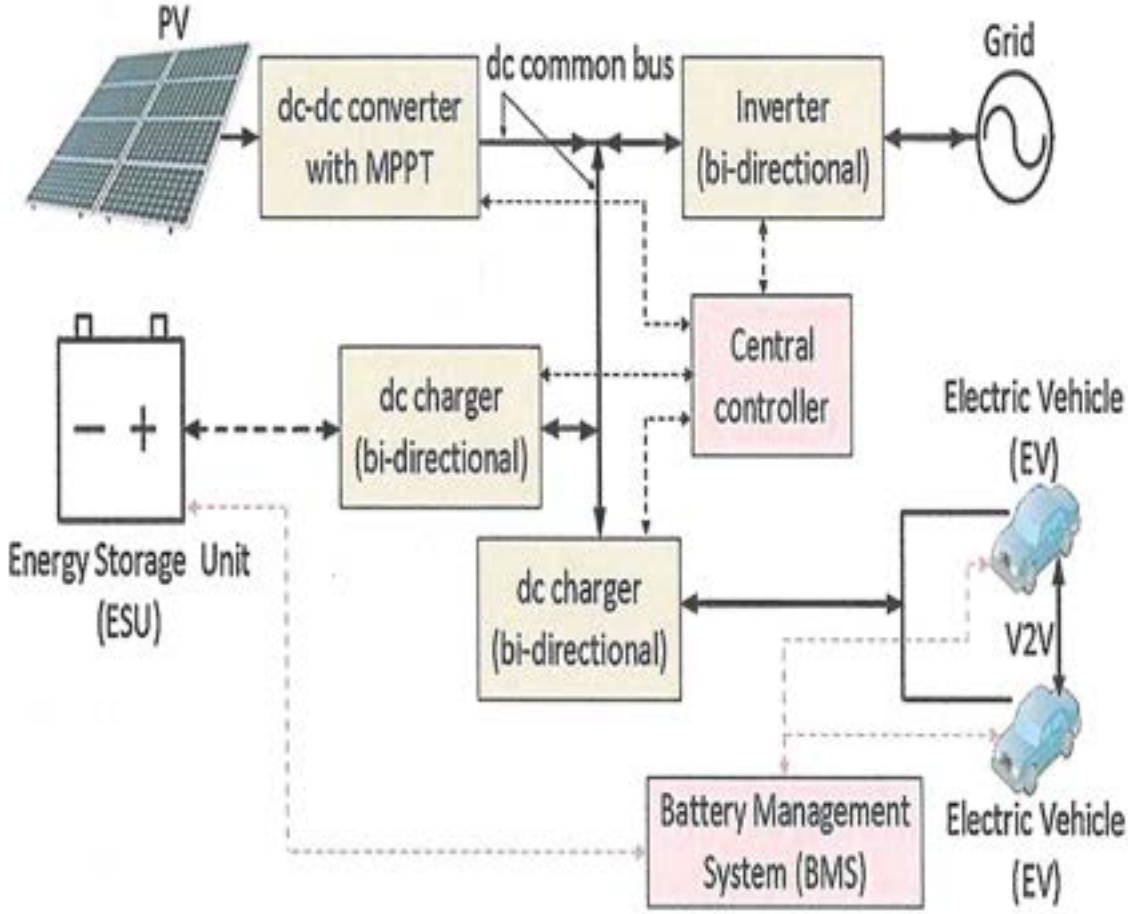
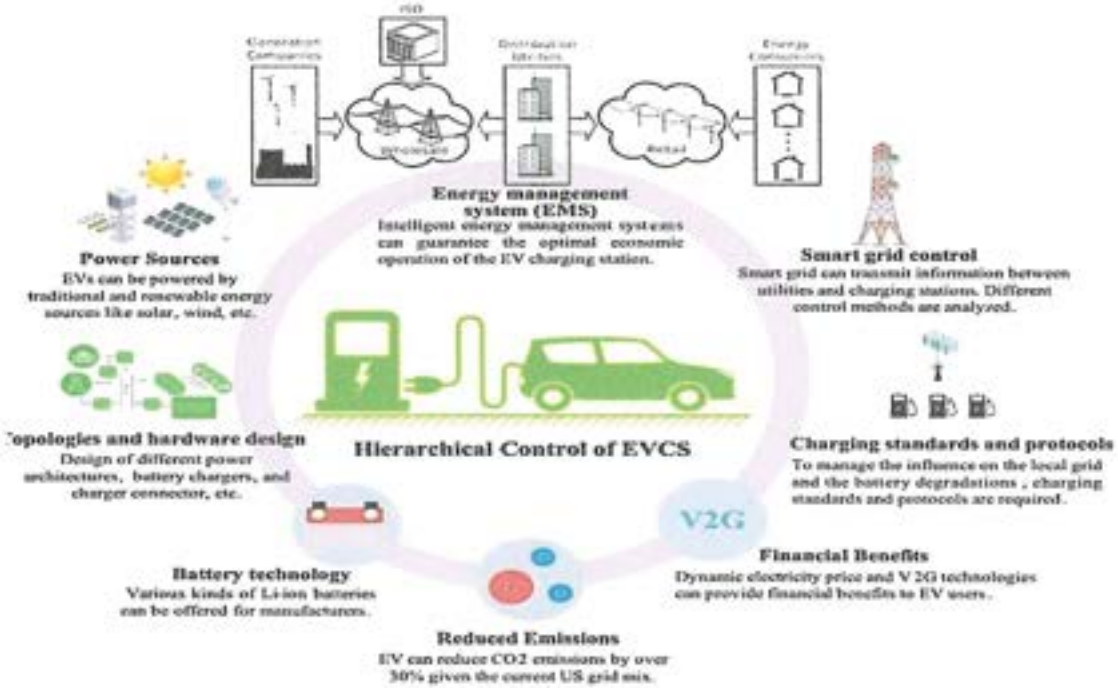


ADVANTAGES:



- Increase in number of charging station will boost the selling of EVs as their will be reduced range anxiety.
- It is always great for environment, if many Evs are being sold in country.
- This will boost direct and indirect employment in country.
- As India lack charging stations, it is good opportunity to young business aspirants to install charging station in their locality.

GOVERNMENT INITIATIVE:

Government of India to expand Public Electric Vehicle Charging Infrastructure across the nation.

Efforts by government results in 2.5 times increase in charging stations in 9 mega cities in last four months. Additional installation of 678 public EV charging stations between October 2021 to January 2022 in these 9 cities. Currently, 9 cities account for about 940 of India's 1640 public EV chargers 22,000 EV charging stations to be set up by Oil Marketing Companies across the country in prominent cities and highways.

For More Details: https://e-amrit.niti.gov.in/home

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Name and Sign of Coordinator (Faculty): Mr. Riyaj Kazi

Departmental Event Coordinator: _____

HoD: _____

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Dept. of E. & T.C. Engineering
Ajeenkya DY Patil School of Engineering

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Department of E&TC Engineering

Form No. IQAC/28
Date: 26/ 04/2023

Event Attendance

Academic Year: 2022-23 **T.E.-A** **Semester-II**

Name of Event: Educational Visit to EV Charging Station

Sr. No.	Name of the Participant	Signature
1.	Srushti Govind Rukme.	
2.	Anuja khumkar	A.A.khumkar.
3.	Atharva Ambekar	
4.	Hardik Hipparagi	
5	Ingale Omkar	
6	Subodh Dhoke	
7	mayur Bagal	
8	Waghmare Shubham	
9	Raj Ranjan	
10	Aniket V-Sonwane	
11	Ajinkya Kamble	
12	Sonil Shinde	
13	Fahed. A. Shaikh	
14	Tejas sanjay Jadhav.	
15	Purnima Dhurwey	

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16	Chaturvedi Vaishnavi B.	Vaishnavi
17	Monali Jatti	Monali.
18	Chetana Patil	Chetana
19)	Deokar Viraj	
20)	Abhishek Deshpande	Abhi
21)	Punam Kondaccele	
22)	Ankita A. Jadhav.	Ankita
23)	Vishwesh Rampure	Vishwesh
24)	Sumeet Bhopke	Sumeet
25)	Sahil Thorat	
26)	Gore Pranav	Pranav
27)	Vaishnavi Pabalkar	
28)	Prajakta Chavan	Chavan
29)	Ashish Panda	Ashish
30)	Rohit Rana	
31)	Prince Singh	
32)	Pranay Girde	
33)	Divya Salunke	Divya.
34	Aishwarya Chavan	
35	Vaishnavi Patil	Vaishnavi
36	Gargi Sarolkar	gargi
37	Rutuja Shinde	
38	Vandana Pawane	Pawane
39	Bhakti Ghate	

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40	Sneha Shinde	Sneha...
41	Shinde Nutan [Roll.No 63]	Shinde
42.	Aditi Kate. [Roll no. 34]	Kate.
43.	Mayuri Suryawanshi [Roll no. 369]	
44	Dolse Nayatai [Roll No! 318]	

Name and Sign of Coordinator:

Departmental Event Coordinator: R.L. Kavi

HoD:

HOD
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Department of E&TC Engineering

Form No. IQAC/28
Date: 26/ 04/2023

Event Attendance

Academic Year: 2022-23 **T.E.- B** **Semester-II**

Name of Event: Educational Visit to EV Charging Station

Sr. No.	Name of the Participant	Signature
1.	Hardik H. Chotalia.	
2.	Divya M. Panchmukh	
3.	Pawar Aditee	
4.	Vaibhavi S. Nimbalkar	
5.	Walzade Abhishek B.	
6.	Pratiksha Hasure	
7.	Gousmohammad Mansuri	
8.	Mhetre vinod Basappa	
9.	Ingale Vaishnavi Vijay	
10.	Bhairavanath Thakronnavar	
11.	Maniyar Asif	
12	Ajay Mondal	
13	Suhas Jadhav	
14	Sujit Gaikwad	
15	Arshad Sayyad	Sayyad.A.P.

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16	Akash Dadarao Pawal	
17	Shivsai Sunil Panchal	
18	Deep Balaji Bamsode	
19	Anant Kumar	
20	Gayatri Jasud	
21	Vaishnavi J. More	
22	Sujal V. Kamble	
23	Patil Kalyani	
24	MAYA Salokar	
43	Rohini Mokashe	
26	Pratik. G. Jadhav	
27.	Vaishnavi . D . Chature	
28.	Jadhav Abhishek Anil	
29	Kalje Omkar	
30.	Janhavi Dhanve.	
31.	Sonali Dhaygude	

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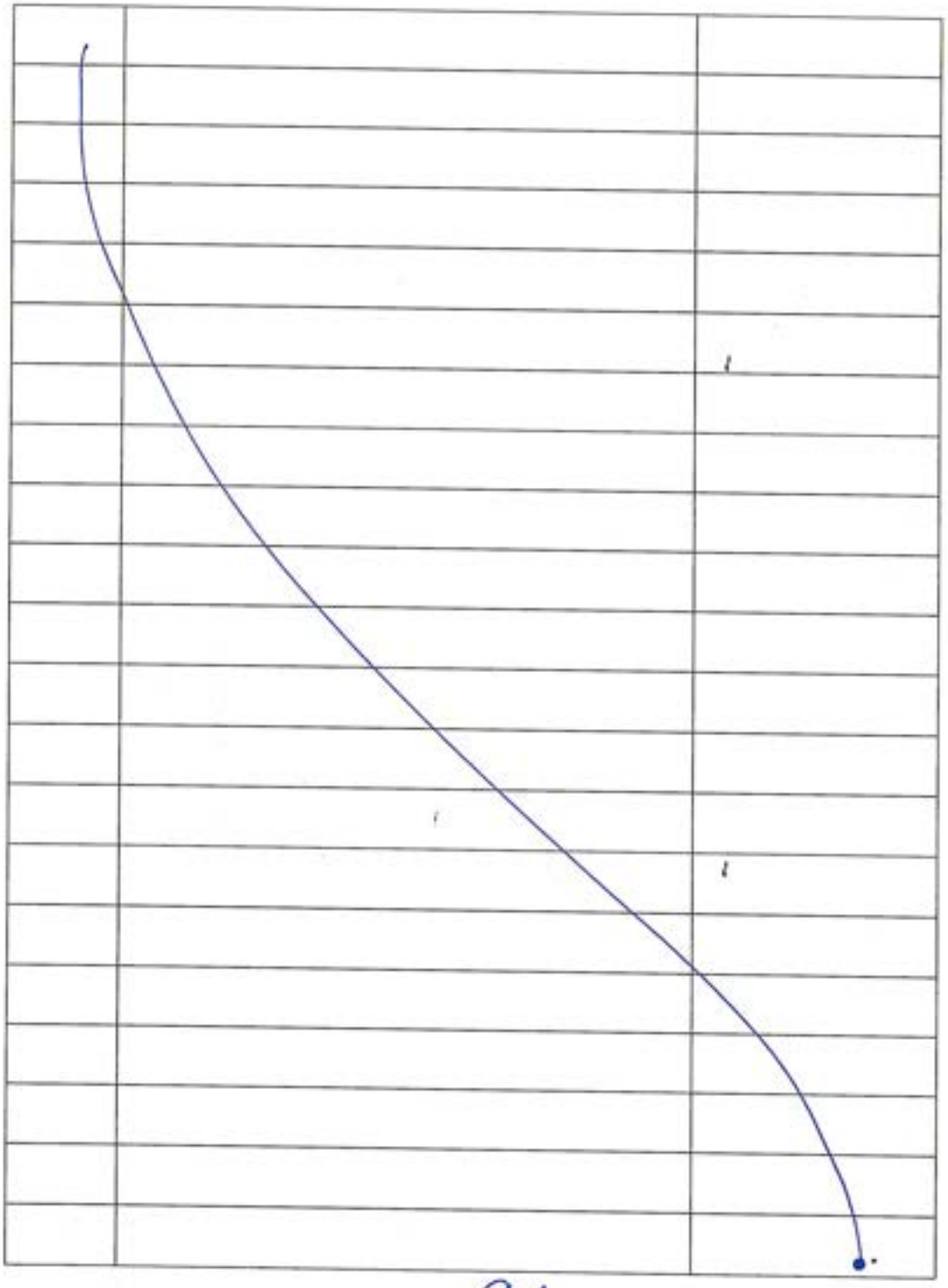

Name and Sign of Coordinator: _____

Departmental Event Coordinator: R.L Kazi

HoD: _____

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Form No. IQAC/24 (a)
Date: 26/04/2023

Event Permission

Academic Year: 2022-23 **Semester- II**

To

The Principal,

ADYPSOE, Pune

Subject: Request for permission to organize an Educational Visit to the Solar Power Plant at Dr. D Y Patil Knowledge City, as one of the activities under Best Practice-I (Competency-Based Learning)

Through: HoD (Dr. Sharan Inamdar)

Respected Sir,

Department of E&TC Engineering is planning an educational visit to Solar Power Plant at Dr. D Y Patil Knowledge City for TE(E&TC), A&B Division Students on Wednesday, 26/04/2023 at 10:15 AM. This visit is one of the best practices for the Subject "Power Devices & Circuits"

I request you permit me to organize this event.

Thanking You,

Yours Faithfully,

Name and Sign of Coordinator: R.L. Kan

Departmental Event Coordinator:

HoD:

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Principal:

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Event Notice

Academic Year: 2022-23 **Semester- II**

Name of the event: Educational Visit to Solar Power Plant

Date of the event :26/04/2023 Time: 10:00 AM

Venue :Dr D Y Patil Knowledge City- Solar Power Plant

All the students of T.E. A & B Division are hereby informed that Department of E&TC Engineering has scheduled an Educational Visit to Solar Power Plant at D Y Patil Knowledge City on 26/04/2023. This visit is a part of Best Practice-I: Competency Based Education for the subject: Power Devices & Circuits.

All Students are informed to gather in room no. 232 at 9:45 AM with uniform and ID Card.

Name and Sign of Coordinator: R.L.Kazi

Departmental Event Coordinator:

HoD:

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Date: 26/04/2023

Event Report

Academic Year: 2022-23 **Semester-II**

Name of the event: Educational Visit to Solar Power Plant

Date and Time	Wednesday, 26/04/23, 10:15 AM
Event Venue	Dr. D Y Patil Knowlegde City
Organized by	Department of E&TC
Targeted Audience	TE Students & Staff
Resource Person	Mr. Riyaj Kazi

Contents:

1. Introduction to Solar Power Plant
2. Observations on Solar power Plant
3. Details of daily power generation and utilization
4. Geotagged Photos

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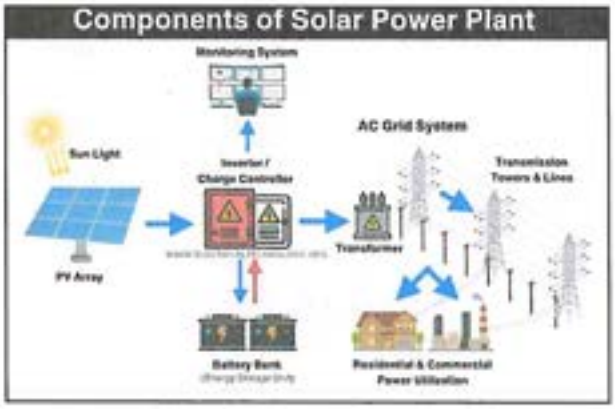
INTRODUCTION:

A solar power plant is based on the conversion of sunlight into electricity, either directly using photovoltaics (PV), or indirectly using concentrated solar power (CSP).

Solar energy is the radiation from the sun capable of producing heat, causing chemical reactions, or generating electricity. The total amount of solar energy incident on Earth is vastly in excess of the world's current and anticipated energy requirements. If suitably harnessed, this highly diffused source has the potential to satisfy all future energy needs. In the 21st century, solar energy is expected to become increasingly attractive as a renewable energy source because of its inexhaustible supply and its nonpolluting character, in stark contrast to the finite fossil fuels coal, petroleum, and natural gas. The main concern of a solar power plant is to provide complete energy independence while also lowering electricity costs.

BLOCK DIAGRAM:



PRINCIPLE:

The working principle is that we use the energy of photons to get the drift current flowing in the circuit using reversed bias p-n junction diode (p-type and n-type silicon combination). Thus, solar energy is converted to electrical energy by photovoltaic cells.

CONSTITUENTS:

1. Solar Panels

It is the heart of the solar power plant. Solar panels consists a number of solar cells. One panel consists of about 35 solar cells.

2. Solar Cells (Photovoltaic cells)

It is the energy generating unit, made up of p-type and n-type silicon semiconductor that converts the solar energy into electrical energy.

3.. D.C. to A.C. Converter (Inverter)

Solar panels produce direct current which is required to be converted into alternating current to be supplied to homes or power grid.

4. Battery

Batteries are used to produce the power bank or store the excess energy produced during day, to be supplied during night. It is optional and sometimes not preferred due to its high maintenance costs.

5. Transformer

A solar panel transformer has to convert the DC voltage coming out of the photovoltaic systems and step it up to the rated output. Sometimes it is integrated with the inverter.

6. Monitoring system

The system uses data logger and similar other applications for an effective surveillance of power production and consumption.

7. A circuit breaker

A circuit breaker is an electrical switch designed to protect an electrical circuit from damage caused by overcurrent/overload or short circuit. Its basic function is to interrupt current flow after protective relays detect a fault.

SOLAR POWER PLANT FUNCTIONING:

A batch of third year students of Electronics and Telecommunications of Dr. Ajeenkya DY Patil School of Engineering with their pedagogue Mr. Riyaj Kazi commenced an educational visit to the solar power plant of the university for an explicit evaluation of the mechanism of the solar cells and an insightful comprehension of their consequential role towards sustainable development. The trip made a headway

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with 72 students and halted at the Solar Power plant in the parking sector wherein our mentor Mr Amol Sawant began a comprehensive elucidation of the solar panels.

The illustration covered the 8 unit solar power plant in the Technical Campus that accounts for about 630 kW of power generation per day enabling the university towards a self-reliance and self-sufficiency in perpetuating the cycle of power production and consumption. The project had initiated under the Kusum Yojna Scheme of the Government of India. The output of each panel is DC voltage which is combined together and further supplied to a 60 kW inverter that converts DC into AC . The solar plant is connected in series oriented in the North - South to get maximum solar energy. The efficiency can further be enhanced by removing the dust layer on the panel surface. The same is durable enough not to be damaged easily.

The solar power plant system in the campus doesn't use a storage battery on account of a heavy expenditure on its maintenance and replacement once in every 5 - 15 years of time slot. The power is recorded and tracked online via a data logger that keeps a précised record of everyday production and consumption of power. The online monitoring system also detects any malfunctioning of the system. The institute has the UPS system, which is an uninterrupted supply of energy. Solar panels are placed at the roof of the buildings of engineering schools, hostels and parking areas. The solar water heater is also placed on the hostel's roof.

DETAILS OF DAILY POWER GENERATION AND UTILIZATION:

The campus accounts for about 630 kW of power generation per day enabling the university towards a self-reliance and self-sufficiency in terms of energy conversation. The same saves about 6-8 lakhs of electricity bill per month. The power generated doesn't only compete with the exigencies of the campus but also produces an adequate amount of supplemental power that is further supplied to MSEB.

SOLAR POWER PLANT DOCUMENTATION:

The installation of the solar power panel was a joint venture of Renew Power Private Limited and Dr. DY Patil Group of Institutions with Solitis Electrical Solutions PVT LTD as the Electrical Contractor. The Company bore the initial cost of installation and infrastructure signing an agreement for a power supply to the company for the coming 15 years.

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However the project emerges as a boon for the university in terms of self-reliance and energy sufficiency saving about 6 - 8 lakhs of electricity bill on monthly basis.

Geotagged photos

Visit to Solar Power Plant, DYPSOE

Visit to Control Room

Roofs of the buildings of Engineering Schools and Hostels

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Discussion:- Components of Solar Power Plant: Capacity, Specifications & Technology

DC to AC Conversion- Inverter (60 KW)

Data Logger

Control Panel and monitoring system

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Gist of lessons ascertained during the educational visit :

1) We evaluated the structure and mechanism of the solar panels.

2) The visit also envisaged their consequential role towards the sustainable development by switching towards renewable and replenishable sources of energy in lieu of the conventional sources.

3) We analyzed the implementation, cost, maintenance and surveillance factors profoundly and were able to spot the advantages of being self reliant in power generation by the installation of solar panels.

4) The visit also helped us understand the joint venture between the corporate sector and the university for the installation of the solar power plant.

Name and Sign of Coordinator (Faculty): Mr. Riyaj Kazi

Departmental Event Coordinator: _____

HoD: _____

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Event Attendance

Academic Year: 2022-23 **T.E.-A** **Semester-II**

Name of Event: Educational Visit to Solar Power Plant

Sr. No.	Name of the Participant	Signature
1.	Choutewar Vaishnavi Baloprasad	Vaishnavi
2.	Aishwarya Ashok Chavan	
3.	Vaishnvi Ashok Pati	Vaishnvi
4.	Gargi Sarolkar	Sarolkar
5.	Divya Yuvaraj Salunke	Divya.
6	Chetana Jaykumar Patil	
7	Pranay. Satyavan. Girde	
8	Vaishnavi Kiran Pabalkar	Vaish
9	Prajakta Pratap Chavan	Pawar
10	Mayuri Satish Suryawanshi	
11	Fahed. Akil Shaikh.	
12	Purnima Dhurwey	Purnima
13	Nagur Bagal	Bagal
14	Aditi Kate.	Akate.
15	Bhakti Chate.	

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16	Rutuja Shinde.	
17	Vandna Pawne	
18	Nutan Shinde.	
19	Tejas Jadhav	
20	Atharva Ambekar	
21	Ajinkya Kamble	
22	Sumeet Bhople	
23	Puram kondawale	
24.	Ankita Jadhav.	
25)	Gore Pranav	
26)	Thorat Sahil	
27)	Vishwesh Rampure	
28)	Soushti Rukme	
29)	Viraj Deokar	
30)	Anuja Khumkar	A.A. Khumkar
31)	Omkar Ingale	
32)	Shubham Waghmare	
33)	Monali Jathi	
34)	Ashish Panda	
35)	Rohit Rana	
36)	Prince Singh	
37)	Subodh Dhoke	
38)	Digvijay Manedeshmukh	
39	pratik Rajput	

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40-	Jagtap Shravankumar	Jagtap

Name and Sign of Coordinator: Rajkavi

Departmental Event Coordinator:

HoD:

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Department of E&TC Engineering

Form No. IQAC/28
Date: 26/ 04/2023

Event Attendance

Academic Year: 2022-23 **T.E.- B** **Semester-II**

Name of Event: Educational Visit to Solar Power Plant

Sr. No.	Name of the Participant	Signature
1.	Hardik · H · Chotalia	Hardik
2.	Shivsai . S. Panchal	
3.	Anant. Kumar	
4.	Pawar Aditee	
5.	Vaibhari Nimbalkar	Nimbalkar
6.	Divya. Panchmukh	
7.	Nikita Gangathade	
8.	Vaishnavi Savaegave	Vaishnavi
9.	Sushma Karke	Sushma.
10	Priyanka Jawale	Jawale
11	Vaishnavi J. More	Vaishnavi
12.	Sujal · V. kamble	Sujal
13.	pratik · G. sadar	SP
14	Vaishnavi O. chaturr	
15	Akash D. Pawal	

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16.	Mhetre Vinod. B	
17.	Mansoori Goosmohammad	
18.	Janhavi Dhanve	
19.	Maniyar Asif	
20	Arshad P. Sayyad	Sayyad. A.P.
21	Bhairavanath. Bhimanna. T	
22	Sonali Dhaygude	
23	Pallavi Patil	
24	Adil dafedar	
25	Suhas Jadhav	
26	Walzade Abhishek B.	
18	Gauri More	
35	Aarish Khan	
44	Ajay Mondal	
19	Hasure Pratiksha	
58	AJAY. S. Rathod	
	Swarupanand S. Desai	
43	Rohini Mokashi	
04	Pratik Babar	
01	Ritish Adepu	
03	Harshita Jagdhane	
26	Varad Jagdale	
16	Sujit Gaikwad	
31	Kadje Omkar	

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32	Sakshi Kamble	

Name and Sign of Coordinator: Riya Kari

Departmental Event Coordinator:

HoD:

HOD
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Event Report

Academic Year: 2022-23 **Semester-II**

Title of best practice: Competency-based Education & Assessment: Peer Learning on Advanced
Activity:- Participative Learning (Question bowl approach in the discussion)

Date and Time	Wednesday, 10/05/23, 10:30 AM
Event Venue	E&TC Department. Room No 232
Organized by	Department of E&TC
Targeted Audience	TE – A & B Students
Resource Person	TE Students: Ms. Chetna Patil, Mr. Hardik Chotalia, Ms. Vashnavi, Ms. Monali Jatti.

Topics:

1] Study of Power Devices

2] AC to DC Converter

3] DC to AC Converter

4] DC to DC Converters

5] Applications of Power Electronics

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In order to boost participative learning among students, one of the methods is to have a question bowl approach in the discussion.

The engagement of students to carry out this activity is essential because the students themselves learn different topics of the subject. They decide the questions to be asked along with solutions.

This activity leads to team building, group discussion, communication skills, and coordination. Participants get an opportunity to perform. This activity ensures edutainment.

In order to execute this activity; three coordinators among students were finalized as follows:

1] Ms. Chetana Patil
2] Tejas Jadhav
3] Choutewar Vaishnavi & Team

Entire class was divided into four teams:

A] Team-1: Half Circuit
B] Team-2: Short Circuit
C] Team-3: Full Circuit
D] Team-4: Open Circuit

The three team coordinators have prepared questions & answers and get it verified from faculty Mr. Riyaj Kazi.

Students prepared the question bowl & 40 Question chits.

The entire event is coordinated by the students.

The winners of this quiz are declared by Dr. Sharan Inamdar, HoD-E&TC.

Winner Team: FULL CIRCUIT (34 Marks)

Runner Up: OPEN CIRCUIT (32 Marks)

Enclosed:

1) Team Details
2) Attendance

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Geo- Tagged Photos:

Edutainment through question bowl approach in discussion & learning

Name and Sign of Coordinator (Faculty): Mr. Riyaj Kazi

Departmental Event Coordinator: _____ HoD: _____

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Department of E&TC Engineering

Class: T.E. Div: A Semester: II Date: 10/05/2023

Subject: Power Devices & Circuits

Title of Best Practice: Competency based Education & Assessment

Activity Title: Participative Learning (Question bowl approach in the discussion)

ATTENDANCE

Sr. No.	Roll No	Name of Student	Sign
1	314	Chouteaar Vaishnavi B.	
2	369	Mayuri Suryawanshi	
3	345	chetana Patil	
4	367	Aniket V. Sonwane	
5	333	Ajinkya Kamble	
6	365	Shinde Sanil	
7	337	Punam Kondawale	
8	308	Someet Bhople	
9	306	mayur Bagal	
10	340	Digvijay Mane Dehmukh	
11	362	sameer shaikh	
12	364	Rutuja Shinde	
13	347	Vandana Pawane	
14	334	Aditi Kate.	
15	318	Dolse Gayatri	
16	363	Shinde Nutan	
17	372	Thorat Sahil	
18	374	Waghmare Shubham	
19	325	Ingale omkar	
20	322	gore Pranav	
21	315	Deokar Vinaj	
22	354	Vishwesh Rampure	
23	327	Tejas Jadhav	
24	311	Bhakti Chate.	

Subject Teacher
(Mr. Riyaj Kazi)

HoD
(Dr. Sharan Inamdar)
HOD
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Department of E&TC Engineering

Class: T.E. Div: B Semester: II

Subject: Power Devices & Circuits Date: 10/05/2023

Title of Best Practice: Competency based Education and Assessment

Activity Title: Participative Learning (Question bowl approach in the discussion).

ATTENDANCE

Sr. No.	Roll No	Name of Student	Sign
1	56	Pratik Gajanan Sadar	
2	71	Vaishnavi J. More	
13	59	Tushar D. Raut	
4	37	Anant Kumar	
5	72	Vishakha Patil	
6	39	Manish Shinde	
7	51	Pallavi Pathi	
8	57	Pratiksingh Rajput	
9	14	Sonali Dhaygude	
10	3r 23	Jadhav Abhishek Anil	
11	10	Hardik H Chotaliq	
12	42	MHETRE VINOD BASAPPA	
13	05	Deep Bansode	
14	44	Ajay Mondal	
15	63	Arshad P Sayyad	
16	41	Gousmohammad Mansuri	
17	53	Akash Dadarao Pawal	
18	40	Maniyar Asif	
19	67	Bhairavnath B Thakkannavar	
20	70	Vaishnavi Tulshiram Savaegave	
21	17	Nikita Gangathade	
22	69	Vaibhavi Nimbalkar	
23	49	Divya Panchmukh	
24	54	Aditi Pawar	
25	16	Sujit Gaikwad	
26	25	Suhas Jadhav	
27	58	AJAY S Rathod	
~~28~~	~~Ritesh Ad~~		
28	01	Ritesh Adeup	
~~29~~	31	Kalje Omkar	
~~0130~~	~~01~~	~~Rithish~~	

Subject Teacher
(Mr. Riyaj Kazi)

HoD
(Dr. Sharan Inamdar)

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TEAM'S

macks – 11.

. TEAM-1

HAIF - CIRCUIT

(1) Hardik Chotalia 10(B).
2) Anant. A. Kumar 37 (B)
3) Tushar D. Raut 59 (B)
4) Pratiksingh Rajput 57 [B]
5) Deep Bansode [B].
6) Nikita Gangathade (17) B
7) Vaishnavi Sdvoegave

macks – 18

. TEAM-2

SHORT CIRCUIT

(1) Vishakha Patil 72 (B)
(2) Manish Shinde 39 (B)
3) Ajay Mondal 44 (B)
4) Arshad Sayyad 63 (B).
5) Gous Mansuri 41 (B)
6) MHETRE VINOD 42 (B)
7) Vaibhavi Nimbalkar 69 (B)
8) Divya Panchmukh 49 (B)
9) Aditee Pawar 54 (B)
10) Vandana Pawane 47 (A)
11) Rutuja Shinde 64 (A)
(12) Ajay Rathod 58 (B)
13) Sujit Gaikwad 16 (B)
14) Kochie Omkar 31 (B)

Coordinators Div-(A)

- Chetana Patil – 345
- Tejas Jadhav – 327
- Chowtewar Vaishnavi – 314

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M T W T F S S

Page No.:

Date:

YOUVA

TEAM - 3

macks - 34.

FULL - CIRCUIT

(1) sonali phaygude 14 (B)
(2) Pallavi Patil 51 (B)
(3) Vaishnavi More 71 (B)
(4) Pratik Sadot 56 (B)
(5) Akash Pawal 53 (B)
(6) Asif maniyar 40 (B)
(7) Bhairavanath. T. 67 (B)
(8) Shinde Nutan 63 (A)
(9) Kate Aditi 34 (A)
(10) Thorat Sahil 72 (A)
(11) waghmare Shubham (74 (A)
(12) Pranav Gore 22 (A)
(13) Ingale Omkar 25 (A)
(14) Viraj Deokar 15 (A)
(15) Rampure Vishwesh 54 (A)

Ashish Jagdhane (03) (B)

TEAM - 4

macks - 32.

OPEN - CIRCUIT

i) Shinde sanil (365)
ii) Ajinkya Kamble (333)
iii) Digvijay mane deshmukh (340)
iv) Aniket sonawane (307)
v) mayuri suryawanshi (369)
vi) sameer Shaikh (362)
vii) Abhishek Jadhav (23) (A)
viii) Sumit Bhorale (308)
ix) Punam Kondwale (337)
x) mayur Bagal (306)
xi) Gayatri Dolse (318)
xii Bhakti chate (11) (A)
13) Bagal Mayur 6 (A)

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Q1. Gate turn off tyristors.

Q2. 4 types of Converter.

Q3. Inverter, cycloconverter, chopper, rectifier

Q4. Its a control devices which include GTO SCR etc.

Q5. Silicon Control rectifier.

Q6. 3 terminals

Q7. Reverse recovery time.

Q8. DC and AC triggering.

Q9. GTO

Q10. false

Q11. minimum amount of current below which SCR turns off.

Q12. for equal voltage sharing in each thyristor

Q13. Series Configuration

Q14. T_2 Junction.

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Q.15 When we use an ~~AC~~ AC source and SCR gets turned off in negative half cycle without external and extra circuitry

Q16. When we use external circuitry to forcefully turn off the SCR.

Q17. false.

Q18. IGBT

Q19. Delay time

Q20. Minimum amount of current over which the SCR turns on.

a] What do you mean by inverter?
→ Inverter its converts the ~~DC~~ fixed or variable D.C. power to A.C power.

b] 3ϕ Inverter having how many modes?
→ Six modes

c] In mode one which device of SCR will be on 180° 3ϕ Inverter.
→ Q_1, Q_5, Q_6

d] ~~Which~~ no. of devices conducting in one mode of 180° 3ϕ Inverter
→ 3 devices

e] difference of 180° or 120° of 3ϕ inverter (any one)
→ ~~3ϕ~~ 180 each device conduct on 180° degree in 120° each device conducts 120°
3 devices on in 180° 2 device is conducting.

f] types of commutation
→ line or forced commutation

g] Application of Inverter
→ Induction heating
Battery vehicle drives
Computer supplies
Automation system

h] In Half Bridge Inverter How many SCR or thiristor its used
→ two thiristor / SCR are used

i] Full Bridge Inverter How many SCR will be used
→ the four SCR are used.

j] In Half Bridge Inverter No. of device Conducting Simultaneously
→ one device.

K] In Full Bridge Inverter which No. of device conducting Simultaneously
→ Two device.

l] the function of Rectifier
→ to convert the Ac to DC. power

m] define Firing Angle.
→ the firing Angle is the phase angle of the voltage at which an SCR is turned-ON.

n] No. of modes having
→ Reverse Blocking mode
Forward Blocking mode
forward Conduction mode

Ans→ o) 4 SCR and 4 diodes
Ans→ p) It uses SCR only except FD
Ans→ q) fixed ac to variable AC
Ans→ r) Ratio of time that a piece of equipment is in use to the total time that it could be in use.
Ans→ t) • Space vector mod.", Pulse width mod", control analysis of function transfer.
s] Quasi square wave with ± Vs/2.

Unit 3

s) Q What is the phase voltage of 120° mode of conduction for 3ϕ bridge invertor

→ Quasi square wave with ± $V_s/2$

Q What are the line voltages for 120° mode of conduction for 3ϕ bridge invertor.

→ Six step waveform ± V_s and ± $V_s/2$

r) Q What is device Utilizat^n factor.

→ Ratio of time that a piece of equipment is in use to the total time that it could be in use.

t) Q what are the methods of matrix converter control

→ • Space vector modulat^n
• Pulse width modulat^n
• venturi- analysis of function transfer

Q What do you mean by distortion factor

It gives the amt. of harmonic distortion that remains in a particular waveform after the harmonics of the waveform have been subjected to a second order attenuation.

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Dr. D. Y. PATIL SCHOOL OF ENGINEERING
Dr. D. Y. Patil Knowledge City, Charholi Bk., Via. Lohegaon, Pune – 412 105.
Department of E&TC Engineering

Form No. IQAC/30
Date: 04/05/2023

Event Report

Academic Year: 2022-23 **Semester-II**

Name of the event: Peer Learning on Advanced Topic:- **Electric Vehicle:-** Battery Management System, Safety and Maintenance of batteries: **Advanced Learner Activity.**

Date and Time	Monday, 19/04/23, 10:30 AM and 03/05/2023, 11:30 AM
Event Venue	E&TC Department. Room No 232
Organized by	Department of E&TC
Targeted Audience	TE – A & B Students
Resource Person	TE Students: Ms. Chetna Patil, Mr. Hardik Chotalia, Ms. Vashnavi, Ms. Monali Jatti.

Contents of Peer Learning:

1] Introduction of Battery Management System

2] Block Diagram of BMS

3] Designing a BMS

4] The functions of a BMS suitable for a hybrid electric vehicle.

5] Characteristics of Rechargeable Batteries

6] Maintenance of batteries

7] Precautionary Note

8] Geo-Tagged Photos

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INTRODUCTION:

Battery Management System is a component of a much more complex fast acting Energy Management System and must interface with other on board systems such as engine management, climate controls, communications and safety systems. To some it is simply Battery Monitoring, keeping a check on the key operational parameters during charging and discharging such as voltages and currents and the battery internal and ambient temperature. The monitoring circuits would normally provide inputs to protection devices which would generate alarms or disconnect the battery from the load or charger should any of the parameters become out of limits. For the power or plant engineer responsible for standby power who's battery is the last line of defense against a power blackout or a telecommunications network outage BMS means Battery Management Systems. Such systems encompass not only the monitoring and protection of the battery but also methods for keeping it ready to deliver full power when called upon and methods for prolonging its life. This includes everything from controlling the charging regime to planned maintenance.

BLOCK DIAGRAM:

Fig. 1: General Block Diagram of BMS

BMS Building Blocks There are three main objectives common to all Battery Management Systems:

1] Protect the cells or the battery from damage

2] Prolong the life of the battery

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3] Maintain the battery in a state in which it can fulfill the functional requirements of the application for which it was specified.

Designing a BMS:

In order to control battery performance and safety it is necessary to understand what needs to be controlled and why it needs controlling. This requires an in depth understanding of the fundamental cell chemistries, performance characteristics and battery failure modes particularly Lithium battery failures.

BMS may incorporate one or more of the following functions Cell Protection Protecting the battery from out of tolerance operating conditions is fundamental to all BMS applications. In practice the BMS must provide full cell protection to cover almost any eventuality. Operating a battery outside of its specified design limits will inevitably lead to failure of the battery. Apart from the inconvenience, the cost of replacing the battery can be prohibitive. This is particularly true for high voltage and high power automotive batteries which must operate in hostile environments and which at the same time are subject to abuse by the user. Charge control This is an essential feature of BMS. More batteries are damaged by inappropriate charging than by any other cause. Demand Management While not directly related to the operation of the battery itself, demand management refers to the application in which the battery is used. Its objective is to minimize the current drain on the battery by designing power saving techniques into the applications circuitry and thus prolong the time between battery charges. SOC Determination

Many applications require a knowledge of the State of Charge (SOC) of the battery or of the individual cells in the battery chain. This may simply be for providing the user with an indication of the capacity left in the battery, or it could be needed in a control circuit to ensure optimum control of the charging process. SOH Determination The State of Health (SOH) is a measure of a battery's capability to deliver its specified output. This is vital for assessing the readiness of emergency power equipment and is an indicator of whether maintenance actions are needed. Cell Balancing In multi-cell battery chains small differences between cells due to production tolerances or operating conditions tend to be magnified with each charge / discharge cycle. Weaker cells become overstressed during charging causing them to become even weaker, until they eventually fail causing premature failure of the battery. Cell balancing is a way of

compensating for weaker cells by equalising the charge on all the cells in the chain and thus extending battery life. History - (Log Book Function) Monitoring and storing the battery's history is another possible function of the BMS. This is needed in order to estimate the State of

Health of the battery, but also to determine whether it has been subject to abuse. Parameters such as number of cycles, maximum and minimum voltages and temperatures and maximum charging and discharging currents can be recorded for subsequent evaluation. This can be an important tool in assessing warranty claims. Authentication and Identification The BMS also allows the possibility to record information about the cell such as the manufacturer's type designation and the cell chemistry which can facilitate automatic testing and the batch or serial number and the date of manufacture which enables traceability in case of cell failures. Communications Most BMS systems incorporate some form of communications between the battery and the charger or test equipment. Some have links to other systems interfacing with the battery for monitoring its condition or its history. Communications interfaces are also needed to allow the user access to the battery for modifying the BMS control parameters or for diagnostics and test.

Automotive BMS Automotive battery management is much more demanding than the previous two examples. It has to interface with a number of other on board systems, it has to work in real time in rapidly changing charging and discharging conditions as the vehicle accelerates and brakes, and it has to work in a harsh and uncontrolled environment. This example describes a complex system as an illustration of what is possible, however not all applications will require all the functions shown here.

The functions of a BMS suitable for a hybrid electric vehicle are as follows:

1] Monitoring the conditions of individual cells which make up the battery

2] Maintaining all the cells within their operating limits

3] Protecting the cells from out of tolerance conditions

4] Providing a "Fail Safe" mechanism in case of uncontrolled conditions, loss of communications or abuse

5] Isolating the battery in cases of emergency

6] Compensating for any imbalances in cell parameters within the battery chain

7] Setting the battery operating point to allow regenerative braking charges to be absorbed without overcharging the battery.

8] Providing information on the State of Charge (SOC) of the battery. This function is often referred to as the "Fuel Gauge" or "Gas Gauge "

9] Providing information on the State of Health (SOH) of the battery. This measurement gives an indication of the condition of a used battery relative to a new battery.

10] Providing information for driver displays and alarms

11]Predicting the range possible with the remaining charge in the battery (Only EVs require this)
12]Accepting and implementing control instructions from related vehicle systems

13]Providing the optimum charging algorithm for charging the cells

14] Providing pre-charging to allow load impedance testing before switch on and two stage charging to limit inrush currents

15]Providing means of access for charging individual cells

16]Responding to changes in the vehicle operating mode

17]Recording battery usage and abuse. (The frequency, magnitude and duration of out of tolerance conditions) Known as the Log Book function

18]Emergency "Limp Home Mode" in case of cell failure.

In practical systems the BMS can thus incorporate more vehicle functions than simply managing the battery. It can determine the vehicle's desired operating mode, whether it is accelerating, braking, idling or stopped, and implement the associated electrical power management actions. Cell Protection One of the prime functions of the Battery Management System is to provide the necessary monitoring and control to protect the cells from out of tolerance ambient or operating conditions. This is of particular importance in automotive applications because of the harsh working environment. As well as individual cell protection the automotive system must be designed to respond to external fault conditions by isolating the battery as well as addressing the cause of the fault. For example cooling fans can be turned on if the battery overheats. If the overheating becomes excessive then the battery can be disconnected. Battery State of Charge (SOC) Determining the State of Charge (SOC) of the battery is the second major function of the BMS. The SOC is needed not just for providing the Fuel Gauge indication.

The BMS monitors and calculates the SOC of each individual cell in the battery to check for uniform charge in all of the cells in order to verify that individual cells do not become overstressed. The SOC indication is also used to determine the end of the charging and discharging cycles. Over-charging and over-discharging are two of the prime causes of battery failure and the BMS must maintain the cells within the desired DOD operating limits. Hybrid vehicle batteries require both high power charge capabilities for regenerative braking and high power discharge capabilities for launch assist or boost. For this reason, their batteries must be

maintained at a SOC that can discharge the required power but still have enough headroom to accept the necessary regenerative power.

Characteristics of rechargeable batteries:

• A cell is an electro-chemical device capable of supplying the energy that results from an internal chemical reaction to an external electric circuit.

• A battery is composed of one or more cells, either parallel or series connected to obtain required current/voltage capability (batteries comprised of series connected cells are by far the most common).

• ESR (Equivalent Series Resistance) is the internal resistance present in any cell that

• limits the amount of peak current it can deliver.

• The Amp-hour capacity of a battery (or cell) is its most important figure of merit: it is defined as the amount of current that a battery can deliver for 1 hour before the battery voltage reaches the end-of-life point.

• The "c" rate is a current that is numerically equal to the A-hr rating of the cell. Charge and discharge currents are typically expressed in fractions or multiples of the c rate.

• The MPV (mid-point voltage) is the nominal voltage of the cell, and is the voltage that is measured when the battery has discharged 50% of its total energy.

• The measured cell voltage at the end of its operating life is called the EODV, which stands for End of Discharge Voltage (some manufacturers refer to this as EOL or End of Life voltage).

• The gravimetric energy density of a battery is a measure of how much energy a battery contains in comparison to its weight.

• The volumetric energy density of a battery is a measure of how much energy a battery contains in comparison to its volume.

• A constant-voltage charger is a circuit that recharges a battery by sourcing only enough current to force the battery voltage to a fixed value.

• A constant-current charger is a circuit that charges a battery by sourcing a fixed current into the battery, regardless of battery voltage.

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Maintenance of batteries:

Battery service and maintenance are critical to UPS reliability. A gradual decrease in battery life can be monitored and evaluated through voltage checks, load testing or monitoring. Periodic preventive maintenance extends battery string life by preventing loose connections, removing corrosion and identifying bad batteries before they can affect the rest of the string.

What can go wrong with batteries?

Condition	Cause
Plate separation	Repeated cycling (charging and discharging), damage during handling and shipping, and overcharging
Grid corrosion	Normal aging, operating in an acidic environment and high temperatures
Internal short circuit	Heat (plates expand causing shorts), separator failure, handling and shipping, and grid corrosion
External short circuit	Human error (shorting terminals) and leaks
Sulfation of plates	Sitting discharged for an extended period, not on charge or being undercharged, such as battery shelf life being exceeded past manufacturer's guidelines
Excessive gassing	Often due to high temperatures or overcharging, electrolyte volume is decreased
Drying out	Excessive gassing, high temperatures or overcharging, resulting in too little electrolyte for battery to function and provide full backup time

Precautionary Note:

- Do not charge by higher current or higher voltage than specified. Doing so may generate gas inside the battery, resulting in swelling, fire, heat generation or bursting.
- Do not heat, disassemble, nor dispose of in fire. Doing so damages the insulation materials and may cause fire, heat generation, leakage or bursting.
- Do not solder directly to the battery. If soldering is performed directly to the battery, the battery is heated up, consequently causing leakage, explosion or fire due to overheating from internal short-circuit.
- Do not short. If the (+) and (-) come into contact with metal materials, short-circuit occurs. As a result, fire, heat generation, leakage or bursting may occur.

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• Keep batteries out of the reach of children. It is dangerous if children swallow the battery. Keep batteries which are considered swallow able out of the reach of children. When designing mechanical hardware around the battery, make sure that the battery cannot be removed by children. Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 hours of ingestion. In case of ingestion of a battery, seek medical attention immediately.

• Do not reverse placement of (+) and (-). If the (+) and (-) side of the battery is reverse inserted, it may cause a short-circuit or over discharge of the battery on some equipment and it may induce overheating, explosion or fire.

• Do not discharge by force. If the battery is discharged by direct connection to an external power supply etc., voltage of the battery will decline lower than 0 volt (electrical reversal) and will cause the battery case to expand, overheat, leak, explode or burn.

• In case of leakage or a strange smell, keep away from fire to prevent ignition of any leaked electrolyte.

• Do not weld terminals to the battery. The heat by welding may cause fire, heat generation, leakage or bursting. We weld standard terminals under strictly controlled conditions. If you need to weld terminals to the battery, please consult us in advance.

• In case of disposal, insulate between (+) and (-) of battery by an insulating material. Jumbling batteries or with other metal materials cause short-circuit. As a result, fire, heat generation, leakage or bursting may occur.

For More Details:

https://batteryuniversity.com/

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Geo- Tagged Photos:

Advanced Topic Discussion among students of different learning Level

Students peer learning activity on Electric Vehicle: BMS, Safety and Maintenance.

Name and Sign of Coordinator (Faculty): Mr. Riyaj Kazi

Departmental Event Coordinator: _____

HoD: _____

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E&TC Engineering Dept.

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H. O. D.
Dept. of E. & T.C. Engineering
Dr. D.Y Patil School of Engg., Lohegaon

Ajeenkya DY Patil School of Engineering

Department of E&TC Engineering

Class: T.E. Div: A Semester: V

Subject: Power Devices & Circuits

Title of Best Practice: Peer Learning on Advanced Topic.

Activity Title: EV- Battery management system, Safety and maintenance.

ATTENDANCE

Sr. No.	Roll No	Name of Student	Sign
1	374	Waghmare Shubham	
2	315	Deoker Viraj	
3	357	Shashti Rukme	
4	336	Anuja Khumkar	A.A.Khumkar
5	306	Mayur Bagal	
6	365	Shinde Sanil	
7	333	Ajinkya Komble	
8	330	Hamid Jalgaonkar	
9	327	Tejas Jadhav	
10	352	Purnima Dhurwey	
11	314	Chaudhari Vaishnavi	
12	324	Hardik Hipparagi	
13	349	Prince Singh	
14	350	Prabhakar Dwivedi	
15	356	Rohit Rana	
16	353	Raj Ranjan	
17	305	Ashish Panda	

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(Dr. Sharan Inamdar)

Ajeenkya DY Patil School of Engineering

Department of E&TC Engineering

Class: T.E. Div: B Semester: II

Subject: Power Devices & Circuits

Title of Best Practice: Peer Learning on Advanced Topic

Activity Title: EV - Battery management System, safety and maintenance

ATTENDANCE

Sr. No.	Roll No	Name of Student	Sign
1.	10	Hardik H. Chotalia	
2.	47	Pallavi P. Sable	
3.	14	Sonali Dhaygude.	
4.	57	Pratiksingh Rajput	
5.	19	Hasure Pratiksha	
6.	51	Pallavi Patil	
7.	31	Kalje Omkar	
8.	16	Sujit Gaikwad	
9.	13	Janhavi Dhanve	
10.	34	Sushma Karke	
11.	66	kiran Takale	
12.	29	Priyanka Jaiwale	
13.	64	Sushma Supekar	
14.	54	Aditee R. Pawar	
15.	69.	Vaibhavi Nimbalkar	
16.	49.	Divya Panchmukh	
17.	68	Kiran UPASE	
18.	8	Vaishnavi Chaitare	
19.	56	Pratik Sadar	
20.	73	Walzade Abhishek a	
21.	25	Suhas Jadhav	
22.	43	Rohini Mokashe	
23.	04	[illegible]	
23.	59	Tushar D. Raut	
24.	37	Anant Kumar	
25	48	Shivsai Panchal	
26	21	Ingale Vaishnavi	
27	12	Swarupanand Desai	

Subject Teacher
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(Dr. Sharan Inamdar)

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Best Practice-II

Bridging the Gap between Education & Employment through Industry Connect

Sr. No	Activity Title
1	Tending Area: Role of Power Electronics in EV Technology

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Event Report

Academic Year: 2022-23 **Semester-II**

Title of best practice II (2): Bridging the Gap between Education and Employment through Industry Connect

Activity:- Power Electronics in Electric Vehicle

Date and Time	Wednesday, 13/05/2023, 11:00 AM
Event Venue	E&TC Department. Room No 232
Organized by	Department of E&TC
Targeted Audience	TE – A & B Students
Resource Person	Mr.Riyaj Kazi

Topic: Role of Power Electronics in EV Technology

1] Electric Vehicle History & Advantages.

2] Components of Electric Vehicle

3] Types & Benefits of EV

4] Comparison of EVs

5] Configurations of EVs

6] Impact of EV on Grid: Negative & Positive

7] Vehicle to Grid Technology

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What are Electric Vehicles

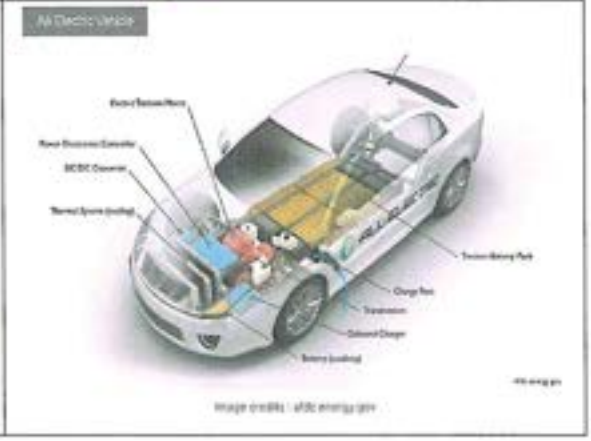
An Electric Vehicle is a vehicle that operates on an electric motor, instead of an internal combustion engine that generates power by burning a mix of fuel and gases. Electric vehicle is seen as a possible replacement for the current-generation automobile in near future to address environmental challenges.

- **Inspired by road going automobiles powered by electricity.**
- **Propelled by one electric motor or more using batteries.**
- **Electric motors give instant torque, and smooth acceleration.**
- **Plug-in electric vehicles (EVs) are fast, fun and efficient. Maintenance is simpler and cheaper.**

Lower Lifetime Cost

Lower Maintenance...

Lower Emissions



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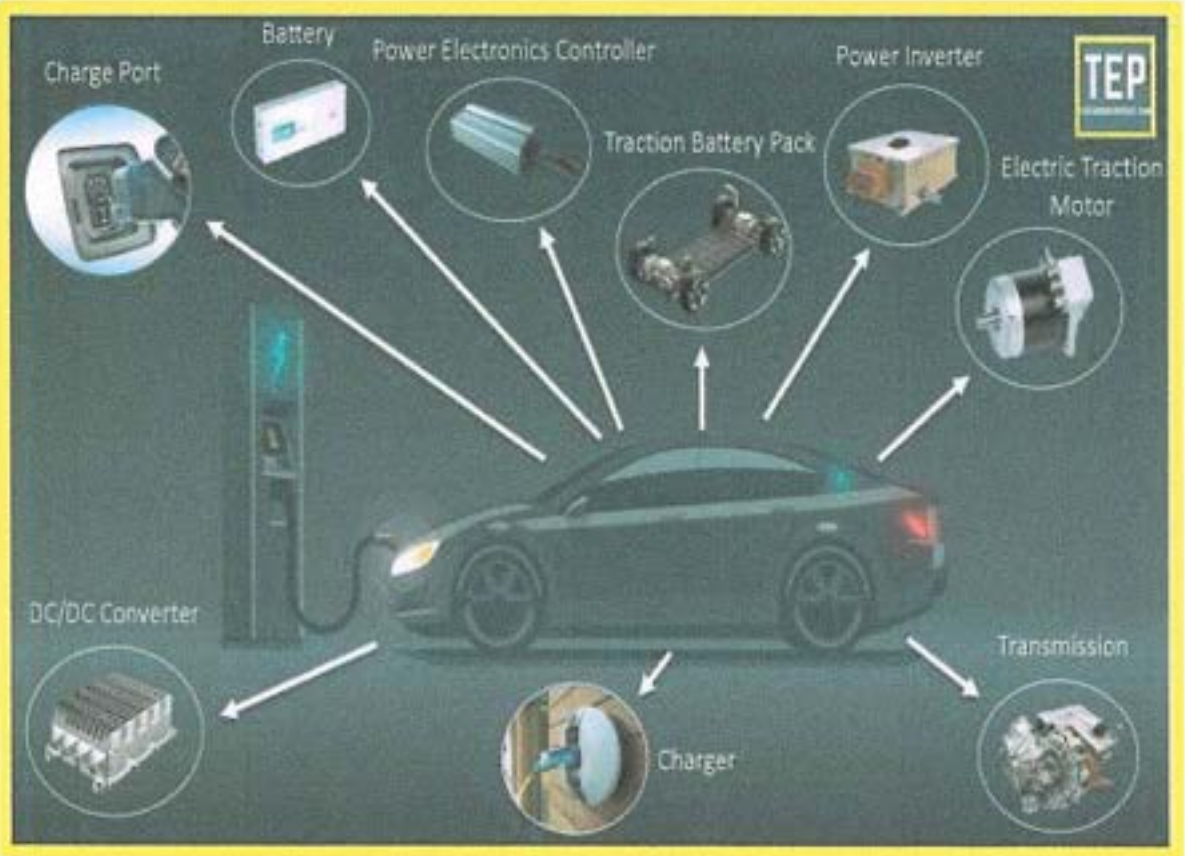
Components of Electric Vehicle

Electric vehicles consists of an electric motor that is powered by a battery pack. The main advantage of electric vehicles is that they emit zero emissions and are eco-friendly. They also do not consume any fossil fuels, hence use a sustainable form of energy for powering the car. The main components of electric vehicles are :

Traction battery pack
DC-DC Converter
Electric motor
Power inverter
Charge Port
Onboard charger
Controller
Auxiliary batteries
Thermal system (cooling)
Transmission



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Types of EVs

There are four types of electric vehicles (EVs) available:

Battery Electric Vehicle (BEV): Fully powered by electricity. These are the more efficient compared to hybrid and plug-in hybrids.

Hybrid Electric Vehicle:

Hybrid Electric Vehicle (HEV): The vehicle uses both, the internal combustion (usually petrol) engine, and the battery powered motor powertrain. The petrol engine is used both to drive and charge when the battery is drained. These vehicles are not as efficient as fully electric or plug in hybrid vehicles.

Plug-in Hybrid Electric Vehicle (PHEV): Uses both an internal combustion engine and a battery charged from an external socket (they have a plug). This means the vehicle's battery can be charged with electricity rather than the engine. PHEVs are more efficient than HEVs but less efficient than BEVs.

Fuel Cell Electric Vehicle (FCEV): Electrical energy is produced from fuel cell stacks which converts hydrogen to electricity.

Benefits of EV

1] Low Running Cost
2] Low Maintenance Cost
3] Zero Tailpipe Emission
4] Tax & Financial Benefits
5] Petrol & Diesel use is destroying our planet
6] Electric Vehicles are easy to drive & quiet
7] Convenience of Charging at home
8] No Noise Pollution

Source: https://e-amrit.niti.gov.in/benefits-of-electric-vehicles

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Comparison of Electric Vehicles

COMPARISON

GQ. 5.7.1 *Distinguish between the various types of Electric Vehicle.*

Sr. No.	Component	(Electric Vehicle)	(Hybrid Electric Vehicle)	(Plug-in Hybrid Vehicle)	(Mild Hybrid Vehicle)
1.	IC engine	Not Required	Required	Required	Required
2.	Electric Motor	Not Required	Required	Required	Required
3.	Battery Charging	It required only electric drive	The batteries get charged by the engine	The batteries can be charged from an external source (plug)	Turns off the engine and switches to motor when coasting, braking and restarting quickly.
4.	Battery Size	Large upto 20-80 kWh	Medium upto6-12 kWh	Medium upto 6-12 kWh.	Cannot be solely driven on electric motor
5.	Example	Tesla Model S	Honda Civic Hybrid	BMW i-8	Chevrolet Silverado Hybrid

Configurations of EV

Based on drive arrangements

1] EV with a Clutch
2] EV without a Clutch
3] Single Motor Drive
4] Multiple Motor Drive
5] In wheel Drive
6] In wheel wireless drive
7] Fixed Gearing Transmission
8] Variable Gearing Transmission

Based on power source configurations

1] Simple Battery Power Configuration (Battery connected to motor through a power converter)
2] Two Batteries and Power Converter: One battery is optimized for high specific energy and the other for high specific power.
3] Fuel Cell based power source
4] Hydrogen (Generated on board using liquid fuels such as methanol)
5] Battery & Super capacitor combination

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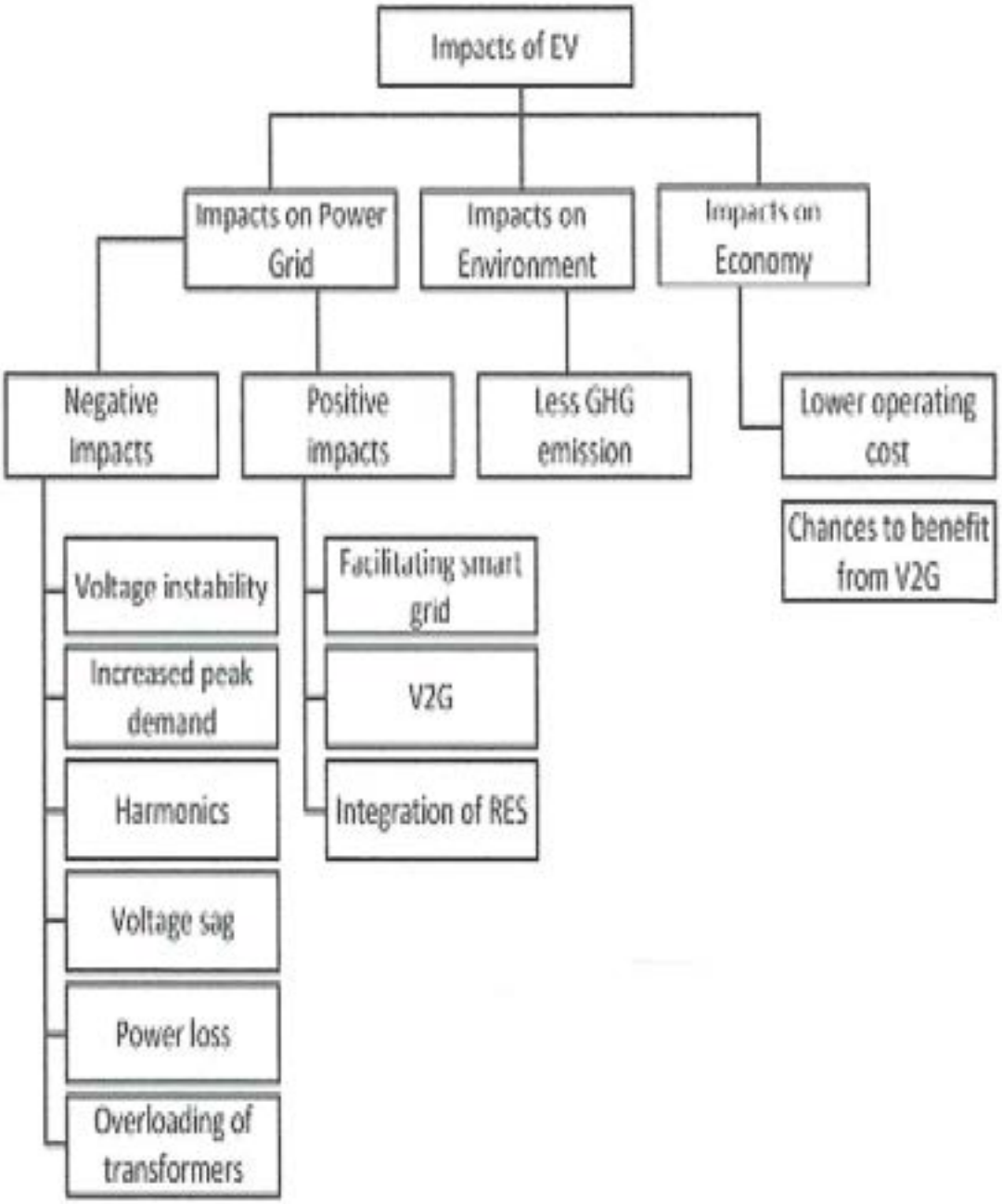
Impact of EV on Grid



Positive Impact

Smart grid: In the smart grid system, intelligent communication and decision making is incorporated with the grid architecture . In such a system, the much coveted coordinated charging is easily achievable as interaction with the grid system becomes very much convenient even from the user end. The interaction of Evsand smart grid can facilitate opportunities like V2Gand better integration of renewable energy.

V2G: V2G or vehicle to grid is a method where the EV can provide power to the grid. In this system, the vehicles act as loads when they are drawing energy, and then can become dynamic energy storages by feeding back the energy to the grid. In coordinated charging, the EV loads are applied in the valley points of the load curve, in V2G, EVs can act as power sources to provide during peak hours. V2G is realizable with the smart grid system.

Integration of renewable energy sources: Renewable energy usage becomes more promising with EVs integrated into the picture. EV owners can use RESto generate power locally to charge their EVs. Parking lot roofs have high potential for the placement of PV panels which can charge the vehicles parked underneath as well assupplying the grid in case of excess generation thus serving the increase of commercial RESdeployment.

Negative Impact

Voltage instability : EV loads have nonlinear characteristics, which are different than the general industrial or domestic loads, and draw large quantities power in a short time period. their power consumptions stay unpredictable; addition of a lot of EVsat a time therefore can lead to violation of distribution constraints. To anticipate these loads properly, appropriate modeling methods are required.

Harmonics: The EV charger characteristics, being nonlinear, gives raise high frequency components of current and voltage, known as harmonics. Harmonics distort the voltage and current waveforms, thus can reduce the power quality.

Voltage sag: A decrease in the RMS value of voltage for half a cycle or 1 min is denoted as voltage sag. It can be caused by overload or during the starting of electric machines. with an EV charger and a power converter in stated 20% EV penetration can exceed the voltage sag limit.

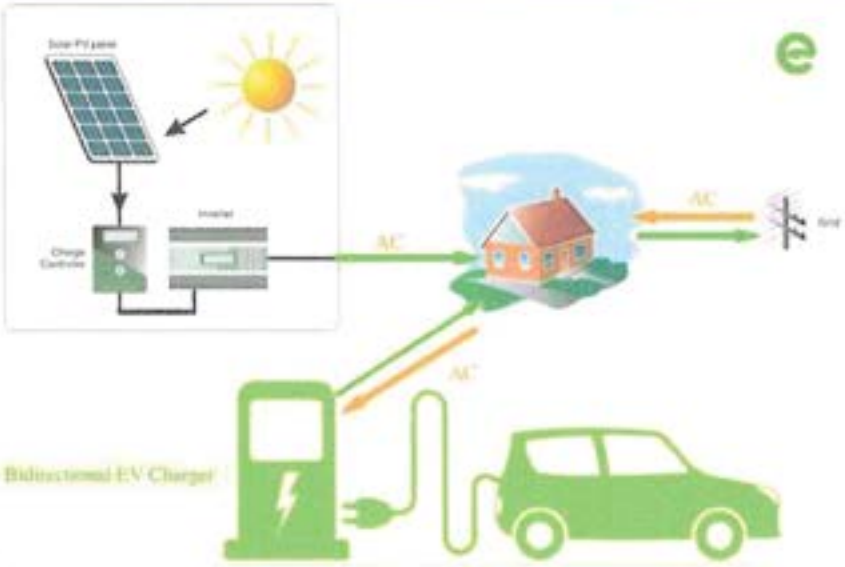
Power loss: The extra loss of power caused by EV charging can be formulated as:

PLE = PLEV – PL original

Power quality degradation: The increased amount of harmonics and imbalance in voltage will degrade the power quality in case of massive scale EV penetration to the grid .

Overloading of transformers: EV charging directly affects the distribution transformers . The extra heat generated by EV loads can lead to increased aging rate of the transformers, but it also depends on the ambient temperature.

Vehicle to Grid Technology



Vehicle to Grid Technology

- Vehicle to grid' technology, also referred to as 'V2G' enables energy stored in electric vehicles to be fed back into the national electricity network (or 'grid') to help supply energy at times of peakdemand.
- This game-changing tech is about far more than potentially making EV owners money, it also plays an important part in helping to 'balance' the national electricity network
- Eachvehicle must have following required elements forV2G

1] Precision metering on-board thevehicle

2] It would require a network of public charging stations capable of bi-directional power transfer, each station incorporating an inverter with precisely controlled voltage and frequency output to feed the energy back into the grid.

3] It would also require the support of a massive communications network to manage the distributed power flows, the billing and feed-in buy back transactions.

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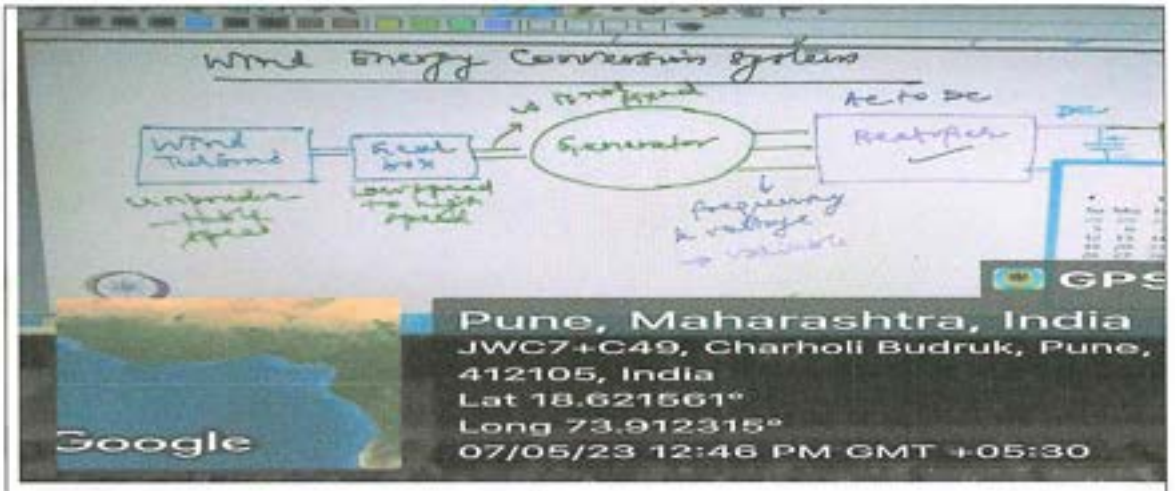

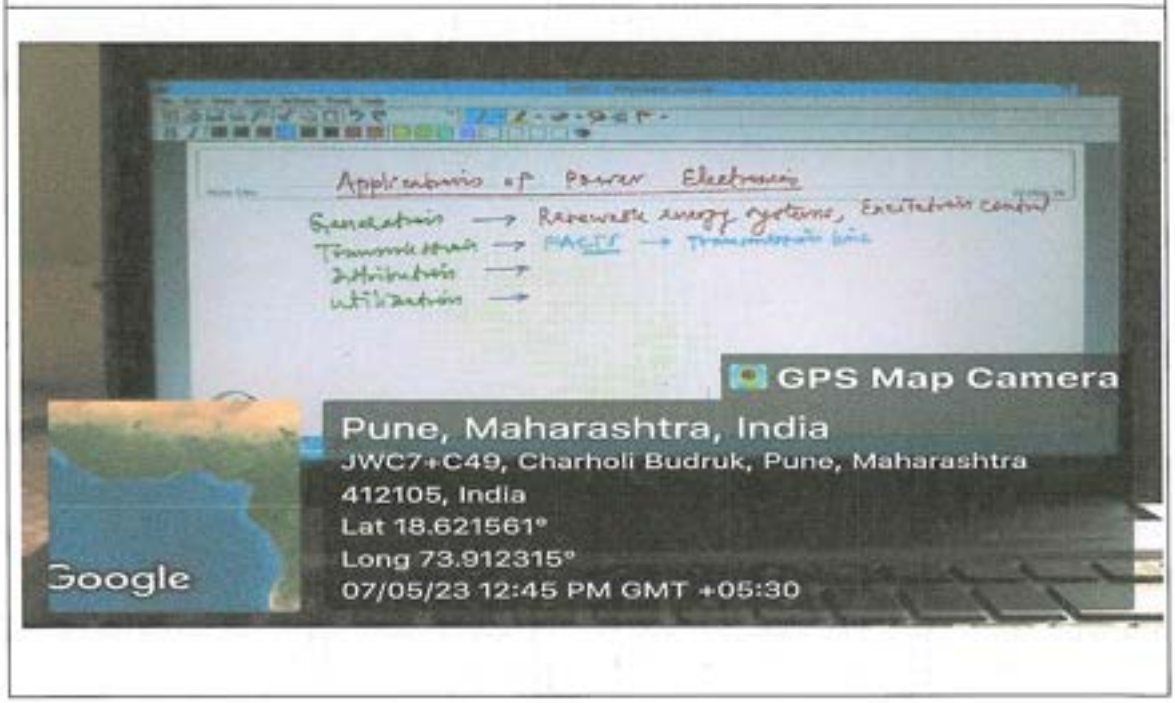

Name and Sign of Coordinator (Faculty): Mr. Riyaj Kazi

Departmental Event Coordinator: _____

HoD: _____

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Ajeenkya DY Patil School of Engineering

Department of E&TC Engineering

Class: T.E. Div: A Semester: II Date: 07/05/2023 & 13/05/2023

Subject: Power Devices & Circuits

Title of Best Practice: Bridging the Gap between Education & Employment

Activity Title: Discussion on 'Role of Power Electronics in Electric Vehicles.

ATTENDANCE

Sr. No.	Roll No	Name of Student	Sign
1.	316	Chautewar Vaishnavi B.	
2.	311	Chate Bhakti Tukaram	
3.	317	Divya Yuvaraj Salunke	
4.	366	Sneha Adasaned Shinde A	
5.	357	Sayshti Govind Rukme	
6	364	Rutuja Shinde	
7	330	Hamid Jafgaonkar	
8.	363	Shinde Nutan	
9.	362	Shaikh Sameer. Khajamiya	
10	301	Manali Nandalal Jatti	
11	334	Aditi Namdev Kate.	
12	347	Pawane Vandana Vijay	
13	306	mayur Hanumant Bagal	
14	326	Ankita A. Jadhav	
15	339	Ankita S. Mali.	
16	331	Pooja Kadam	
17	328	Jadhav Vaibhav	
18	336	Anuja Khumkar	A.A.Khumkar
19	342	Omkar Kalbhor	
20	315	Deokar Viraj	
21	354	Vignesh Pampare	
22	372	Sahil Thorat	
23	374	Waghmare Shubham	
24	361	Fakir Shaikh	
25	303	Atharva Ambekar	
26	353	Raj Ranjan	
27	351	Akshata Puri	
28	350	Priyatkarsh Dubvedi	
29	318	Dolse Gayatri	
30.	320	Shambhavi ghegade	
31	346	Vaishnavi patil	
32	321	Pranay Girde	

Subject Teacher
(Mr. Riyaj Kazi)

HoD
(Dr. Sharan Inamdar)

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Ajeenkya DY Patil School of Engineering

Department of E&TC Engineering

Date: 07/05/2023 & 13/05/2023

Class: T.E. Div: B Semester: II

Subject: Power Devices & Circuits

Title of Best Practice: Bridging the Gap between Education & Employment through Industry Connect.

Activity Title: Discussion on "Power Electronics in Electric Vehicles"

ATTENDANCE

Sr. No.	Roll No	Name of Student	Sign
1.	72	Vishakha A. Patil	Patil
2.	44	Ajay A. Mondal	A.M.
3.	05	Deep B. Bansode	D.B.
4	09	Shubham Chikane	SBC
5	25	Suhas Jadhav	Jadhav
6	65	Swami Rutuja V	Rutuja
7	57	Pratiksingh Rajput	Pratik.
8	19	Hasure Prathosh	Hasure
9	17	Nikita Gangathade	Nikita.
10	70	Vaishnavi Savaegave	Vaishnavi
11	40	Maniyar Asif	
12	67	Bhairavnath Thakkannavar	
13	41	Mansuri Gausmohammad	
14	63	Sayyad Arshad Paigambar	Sayyad A.P.
15	42	MHETRE VINOD BASAPPA	
16	53	Akash Dadarao Pawar	
17	21	Vaishnavi Vijay Ingale	
18	68	Kiran G. Upase	
19	31	Kalje omkar	
20	54	Pawar Aditee	
21	71	Vaishnavi J. More	
22	33	Sujal V. kamble	
23	46	Omkar Babu Seshadri	
24	10	Hardik Chotaliya	
25	56	Pratik Sadar	
26	14	Sonali Dhavgude	
27	49	Divya Panchmukh	
28	37	Anant Kumar	
29	28	Gayatri Jasud	
30	61	Adya Ravindra Salakar	
31	50	kalyani patil	
32	13	Dhanve Janhavi	

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Ajeenkya DY Patil School of Engineering

Department of E&TC Engineering

Class: T.E. Div: B Semester: II Date: 07/05/23 & 13/05/23

Subject: Power Devices & Circuits

Title of Best Practice: Bridging the Gap between Education & Employment

Activity Title: Discussion on Role of Power Electronics in Electric Vehicles.

ATTENDANCE

Sr. No.	Roll No	Name of Student	Sign
35	47	Pallavi Sable	
36	48	Shivsai Panchal	
37	59	Tushar D. Raut	
38	69	Vaibhavi S. Nimbalkar	
39	64	Suhrna Sapekar	
40	58	ASAY - S Rathod	
41	73	Walzade Abhishek B	
42	02	Akash Kute	
43	01	Rithish Adapu	
44	12	Swarupanand Desai	
45	16	Sujit Gaikwad	
46	22	Abhay Jadhav	
47	06	Ansh Bhale	
48P	322	Chore Pranav	
49	43	Rohini Mokashe	
50	60	Rokade Vaishnavi	
51	04	Pratik Babar	
52	08	Vaishnavi Chakire	
53	24	Mrunal Jadhav	

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