

JOINT AICTE – GTU ONLINE



FACULTY DEVELOPMENT PROGRAMME

**A Faculty Development Program on
Renewable Sources based distributed
power generation, applications and
control including Energy Storage
Devices**

**7th December, 2020 to 12th December,
2020**

Detailed report of FDP

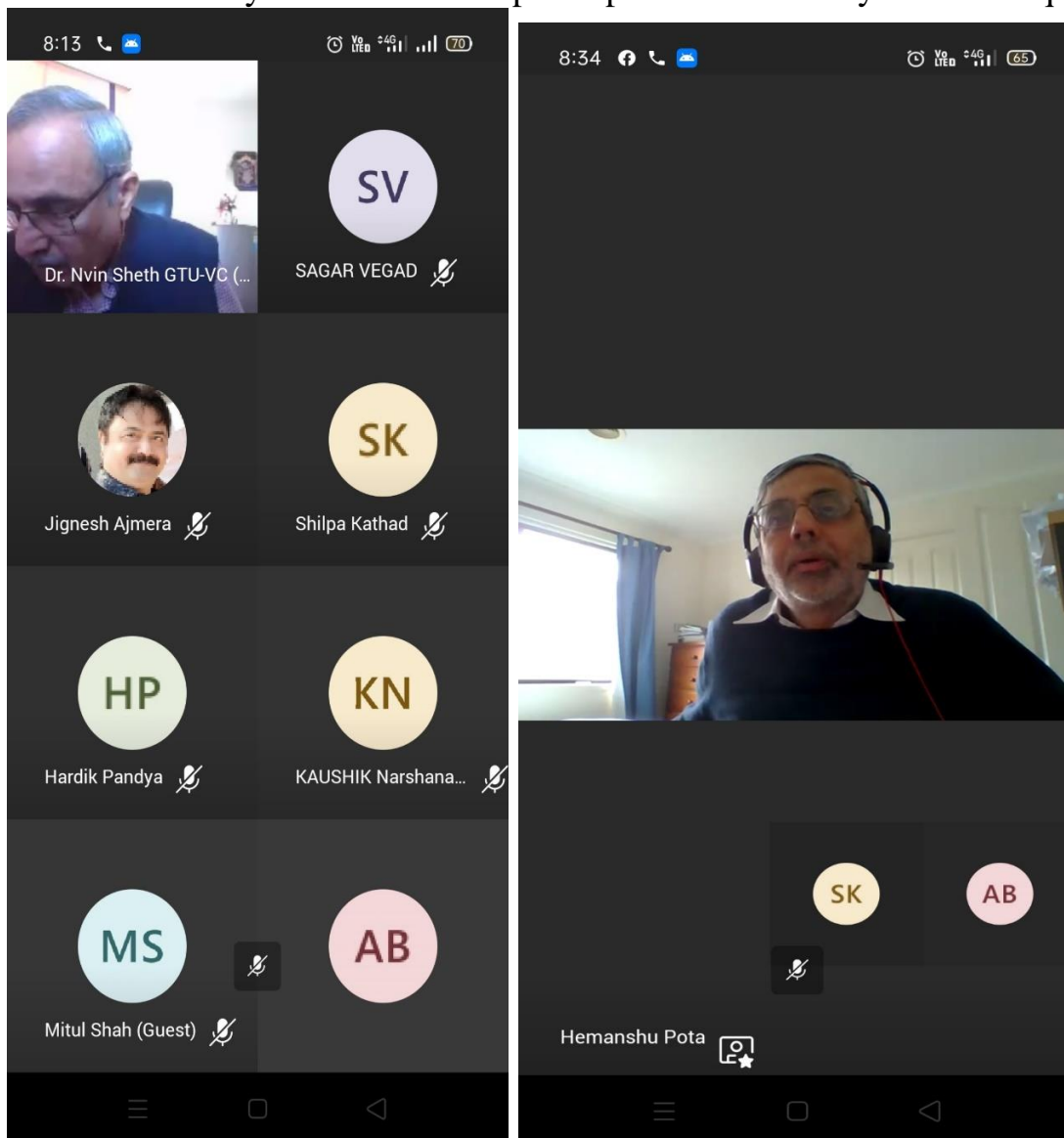
Day 1 (7th December 2020)

FDP was started with Inauguration Ceremony at 8.10am. The FDP was inaugurated by **Dr. NAVIN SHETH** Sir, Honorable Vice Chancellor of GUJARAT TECHNOLOGICAL UNIVERSITY.

As a keynote speaker **Dr. Himanshu Pota**, professor at South wales University, Canberra, Australia was invited. He delivered a fruitful session. The participants were very happy and they got very good technical exposure.

Second session on first day was conducted by **Dr. Vinod Tejwani** on improvement techniques in Micro grids based on Regenerative Fuel Cells. He is working in Government Polytechnic Jamnagar. He has discussed the new area of research which may be helpful to the participants.

Third session was on Optimal sizing of renewable DGs considering seasonal variation of load and generation by **Dr. Debapriya Das** from IIT Kharagpur. The session was very interactive and participants asked many technical questions.



Day 1 picture of inaugural function and Keynote speaker.

Day 2 (8th December 2020)

Day 2 of FDP was started with session on Battery Technologies – the future is here, the expert of the said topic was **Dr. S V Rajani**, from VVP Engineering College, Rajkot. He discussed the future aspects of Batteries and cleaner and greener production in his expert talk. It may have motivated participants to think about research in the areas of batteries and energy storage devices.

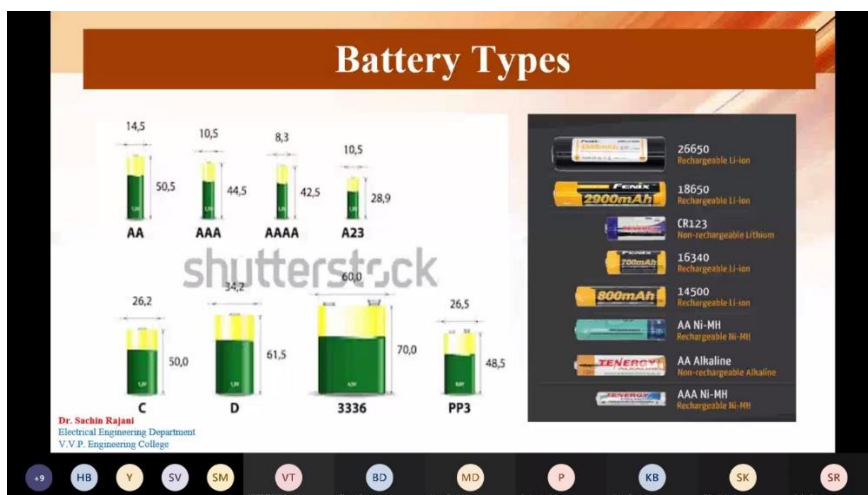
Second session was conducted by an international speaker **Dr. Shubham Sahoo** on Cybersecurity of Power Electronics based Power Systems. The expert is from Aalborg University, Denmark. Participants got quite novel area and applicability of cyber security based systems. So it was very fruitful to them.

Third session on Reliability of Modern Power Electronic based Power Systems by **Dr. Sayed Pahegami**, Aalborg University, Denmark was conducted. It was also drawing attention towards reliability and its issues.

Fourth session on Voltage and frequency control of three phase SEIG in wind generation-based distribution system was conducted by **Dr. Ashutosh Giri** from Government engineering college, Bharuch.



Day 2 photograph in which Dr. Shubham Sahoo is delivering his expert session.



Day 2 session on battery and energy storage devices by Dr. Sachin Rajani

Day 3 (9th December 2020)

Day 3 of FDP was planned with three sessions. First session was conducted by **Dr. Sabharaj Arya** from SVNIT Surat on UPQC application in Distribution System. It was very helpful to the participants.

Hands on practice session on PVSYST was arranged in second slot. The hands on session was conducted by **Dr. Sachin Rajani** from VVP Engineering College Rajkot. The participants got very good practical exposure and they have gone through various concepts of Solar rooftop and standalone PV Systems.

Third session was conducted by **Dr. Chinmay Jain** from Shakti pumps Indore on Multifunctional Grid Interfaced Solar Power Generation.

Power Quality Definitions in Different Perspective

Power quality can be defined from utility point of view as

“Reliability i.e. as the parameters of the voltage that affect the customer's supersensitive equipment”

From manufacturer's perspective,

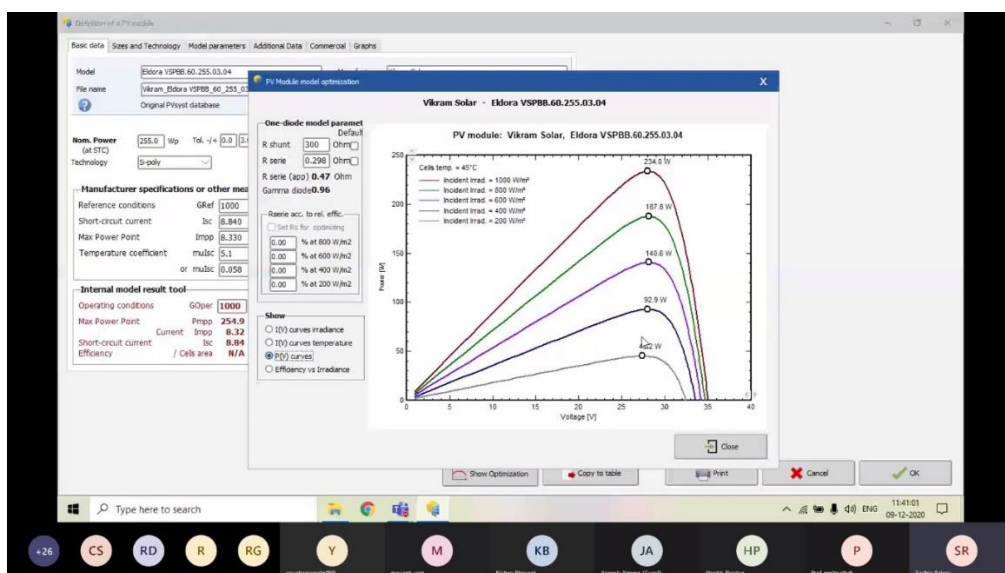
“It can be define as a power that enables the equipment to work properly”

In other words power quality can be defined as

“Any power problem manifested in voltage, current or frequency deviations that results in failure of or disoperation of customer equipment”

The slide is part of a Zoom meeting with participants: HP, KB, SA, SV, RD, P, and RG.

Dr. Sabharaj Arya has delivered an expert lecture in first session



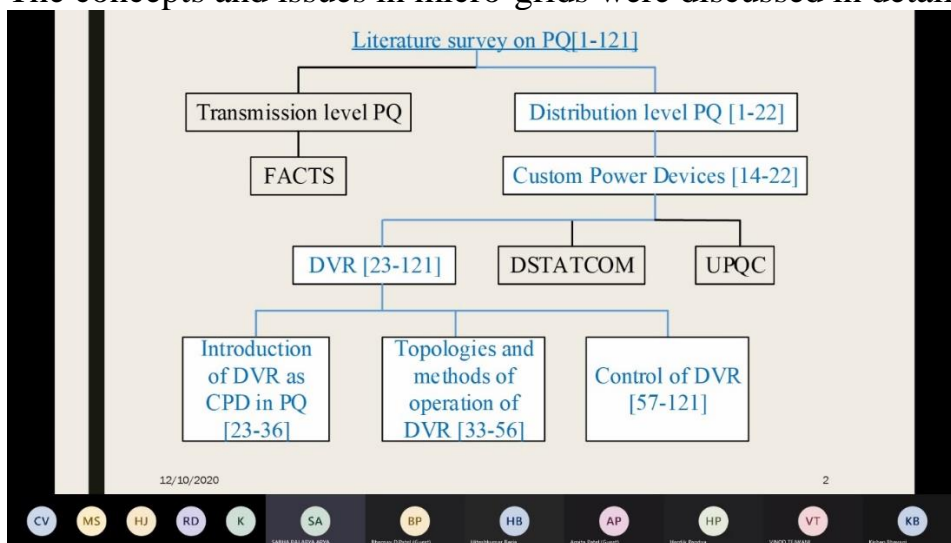
Day 3 session was conducted by Dr. Sachin Rajani

Day 4 (10th December 2020)

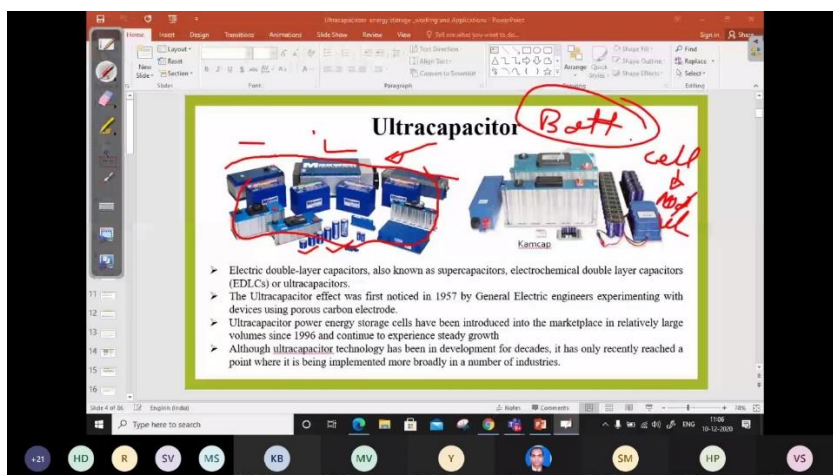
Day 4 of FDP was started with lecture of **Dr. Sabharaj Arya** from SVNIT Surat on series active filter application in distribution system. The lecture was quite important for the participants because many of them were doing research on active filters.

Second session was on Battery Storage devices, it was conducted by **Dr. Varsha Shah** from SVNIT, Surat. The contents were very helpful to the participants and it was very interactive session.

Third session of Day 4 was conducted by **Dr. Ashutosh Giri** from Government Engineering College, Bharuch. He delivered session on Introduction to power quality, micro-grids and power quality issues in DG. It was very fruitful session. The concepts and issues in micro-grids were discussed in detail.



A session by Dr. Sabharaj Arya on series active filter applications.



Second session on ultracapacitors was conducted by Dr. Varsha Shah

Day 5 (11th December 2020)

Day 5 of FDP was started with discussion on Smart Grid in rural Development Challenges and Solutions. The expert session was conducted by **Dr. B Sarvanan** from VIT Vellore. He has highlighted many issues in rural development challenges and solutions.

Second session was planned to give practice sessions of MATLAB and its applications in Grid Integration. Second session was conducted by Dr. Vinod Tejwani. The candidates got idea of development of grid systems using simulations and MATLAB tools. The participants got very good practical exposure. The department has also arranged an laboratory attendant who has solved technical queries of participants in online mode.

Third session was on Power Processor for Energy Management of Modern Applications, and it was conducted by Dr. R K Singh from IIT BHU. In the third session discussion on energy management and power processors were done in detail.

Benefits of SMART GRID

- The Grid which is smart compare to traditional grid is known as Smart Grid.
- It detects local changes in power usage and react automatically without the need of human intervention.
- It allows Two Way Communication between Grid and Consumers.
- It allows real time communication between consumer and utility.
- ✓ It reduces electricity losses (transmission, distribution etc.).
- ✓ It reduces electricity cost, meter reading cost.
- ✓ It reduces equipment failures due to automatic operation based on varying load conditions.
- ✓ It reduces electricity theft.

The slide is part of a video conference interface, with a toolbar at the bottom showing icons for participants: K, SM, HJ, RG, MV, SV, MC, MD, HB, AP, SB.

Dr. sarvanan has conducted lecture on smartgrids.

MPPT Operation of PV

The diagram illustrates the MPPT operation of a PV system. A PV panel is connected to a DC/DC converter. The PV panel outputs voltage V_{pv} and current I_{pv} . The DC/DC converter outputs power P_{pv} to a DC BUS. The DC/DC converter is controlled by MPPT calculations, which determine the duty cycle D_{pv} .

Equations shown:

$$P_{pv} = I_{pv} V_{pv} \quad (1)$$
$$P_{pv} = I_{pv} V_{DC} (1 - D_{pv}) \quad (2)$$

The slide is part of a video conference interface, with a toolbar at the bottom showing icons for participants: MV, MS, HJ, NS, RB, HP, Y, M, KB.

Hands on practice session on MATLAB by Dr. Vinod Tejwani

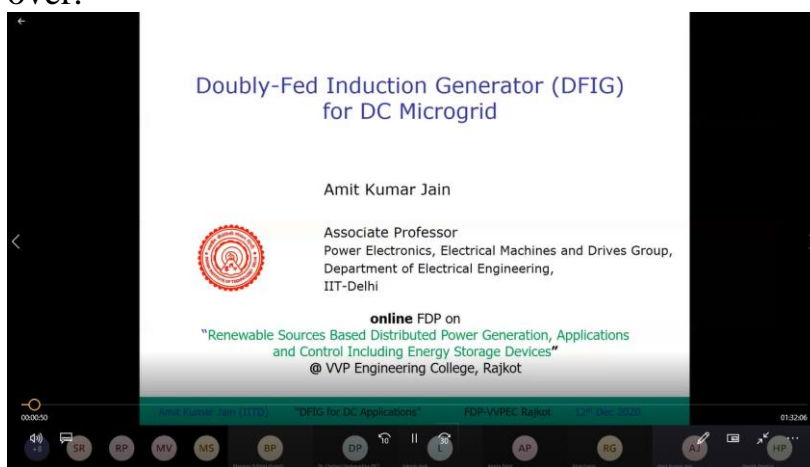
Day 6 (12th December 2020)

Day 6 of FDP was started with first session on DFIG for Micro grid by **Dr. Amit Jain** from IIT Delhi. Participants got many new areas of research and they have got very good technical exposure from this session.

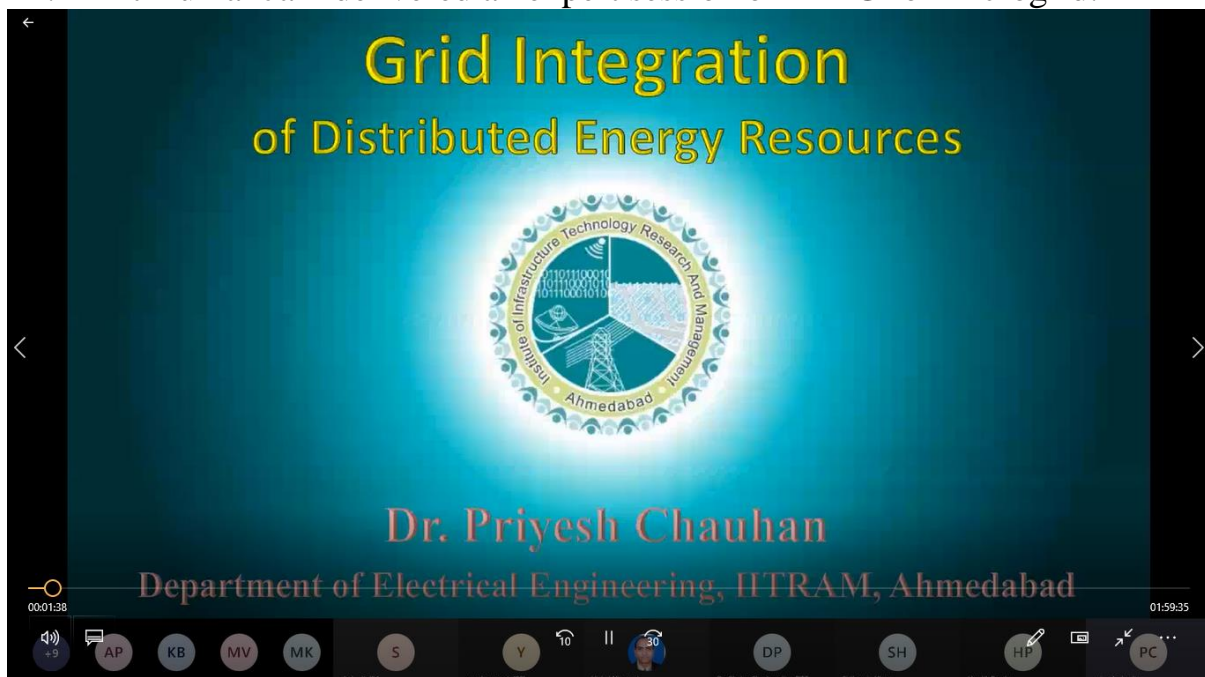
Second session was conducted by **Dr. Priyesh Chauhan** on Grid Integration of the renewable Energy Sources. Dr. Priyesh Chauhan is from IITRAM, Ahemdabad. He has delivered very efficient and fruitful expert talk.

Last session of the day was conducted by **Dr. Jayesh Deshkar**, Principal of VVP Engineering College, Rajkot on Human Values and Happiness for the teachers working in engineering disciplines.

Valedictory function of FDP was arranged after all the technical sessions got over.



Dr. Amit Kumar Jain delivered an expert session on DFIG for microgrid.



Second expert session was on grid integration by Dr. Priyesh Chauhan

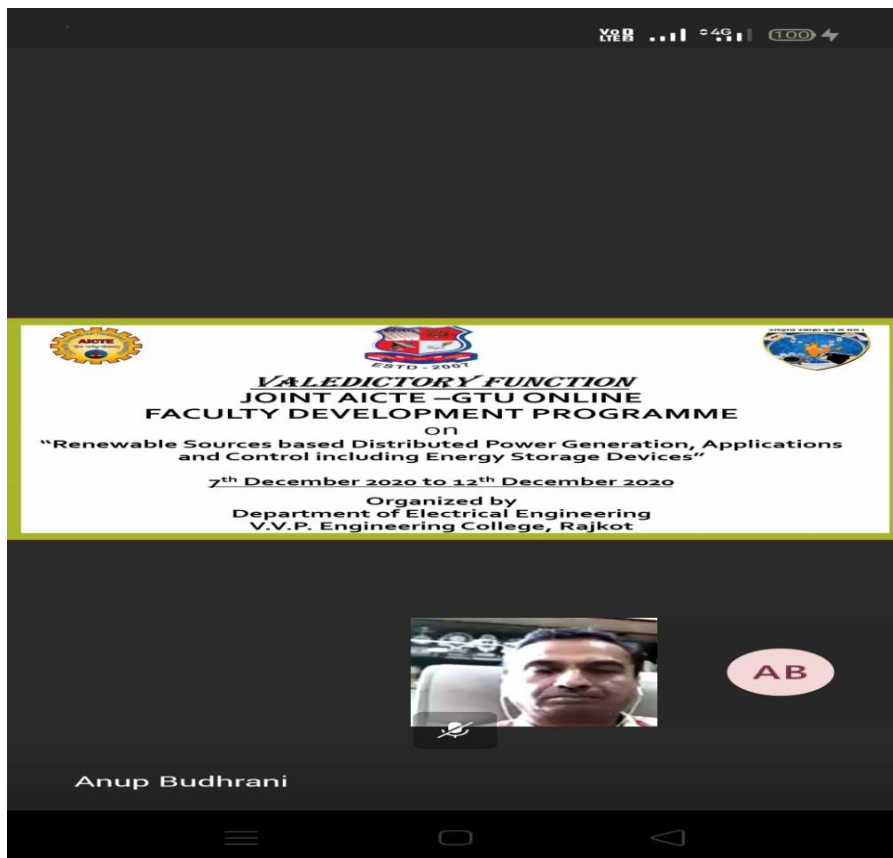
All the participants got sound technical knowledge and hands on sessions of PV SYST and MATLAB were very effective.

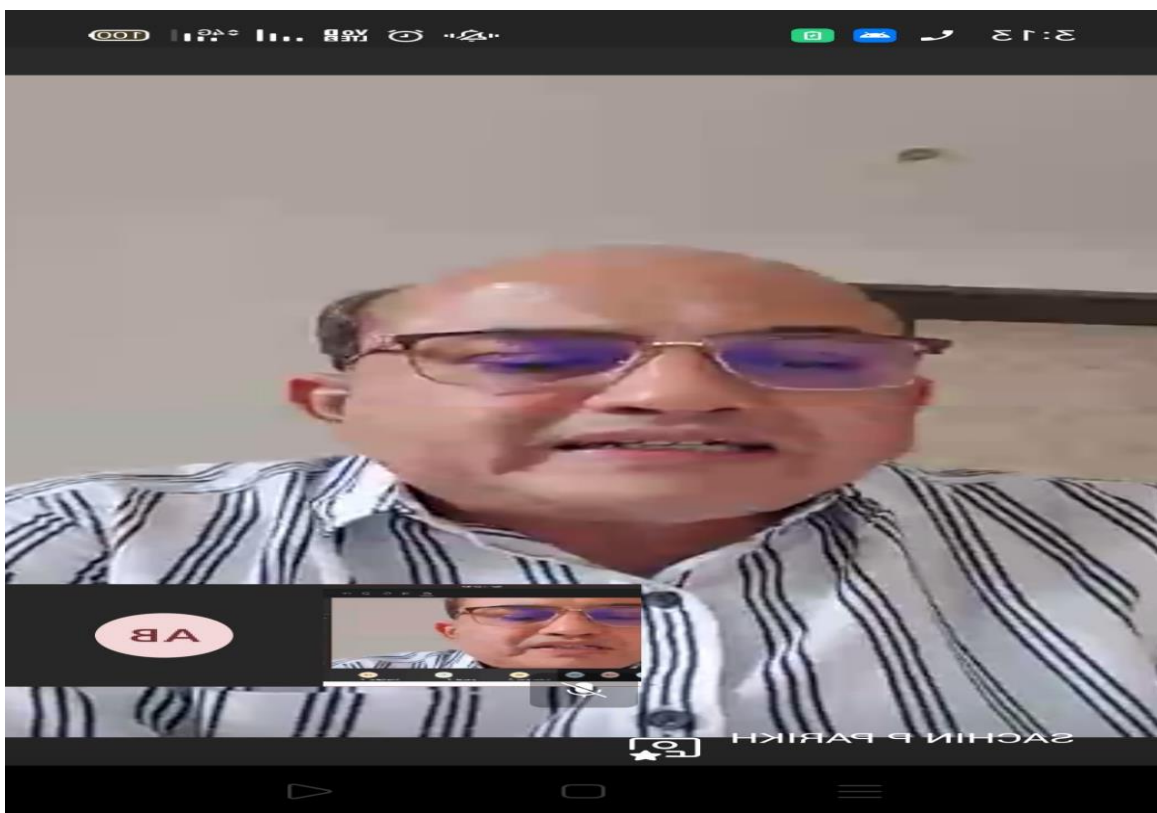
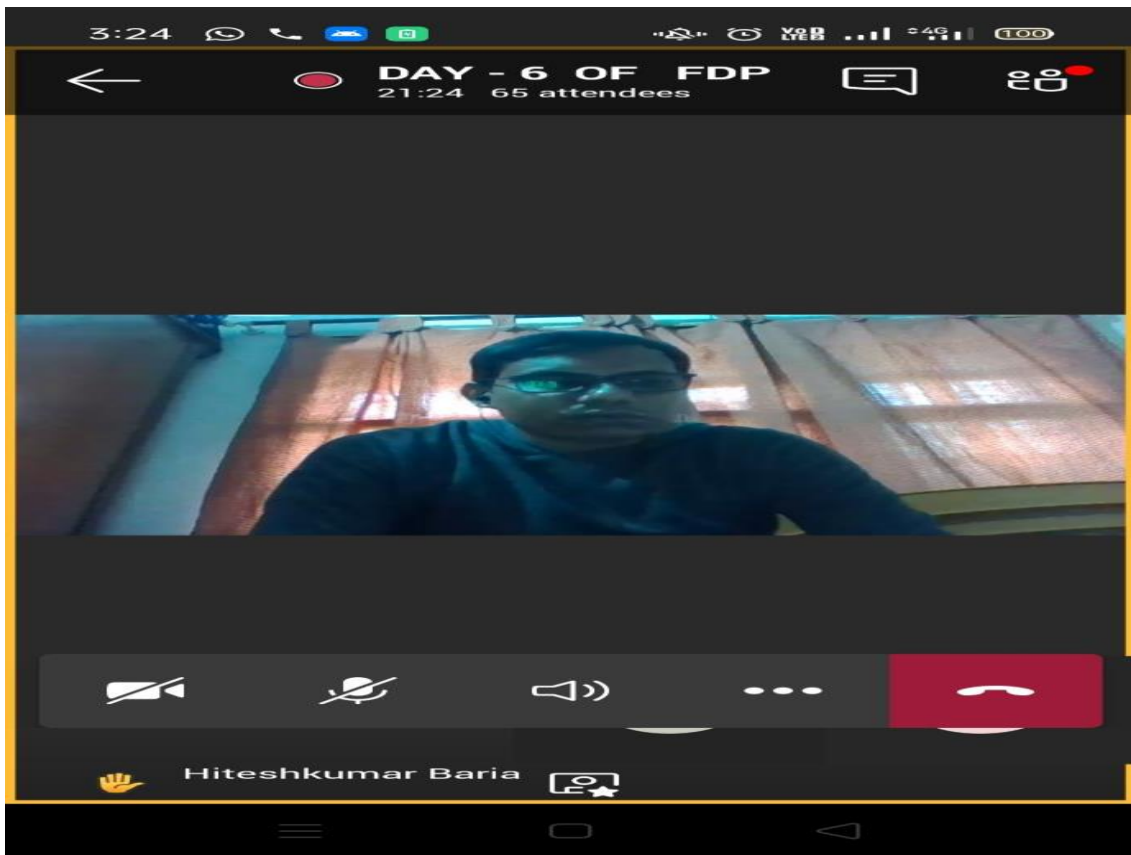
Conclusion

Two sessions were hands on sessions which help participants to get maximum benefit from the FDP.

Last day test was conducted and also the valedictory function was arranged. The chief guest of function was Dr. SACHIN PARIKH, JOINT DIRECTOR of DTE. We have also invited Dr. Shubham Sahoo, Aalborg University, Denmark for concluding remarks. He was also an expert for the said FDP.

Entire FDP was conducted on online mode using Microsoft teams platform. Feedbacks from participants were collected and we have received excellent feedbacks about experts and arrangements. We have also received verbal feedback from many participants during the valedictory function.





Glimpses of Valedictory Function

OUTCOME of FDP

Distributed Generation plays a vital role in power systems. Power quality issues arise due to overlap between two technologies. Disturbances and harmonics affect the power quality, which are mainly caused by the addition of **Distributed Generation (DG)** on the existing **power** system network. This FDP was planned to discuss these issues and mitigate them. Modern advancement in Renewable energy sources are going to be covered in this FDP which have given clear idea to Researchers about various application of distributed generation and its control techniques. There is huge scope of research and development in the areas of DG, Micro Grid, and remote Power Applications. After successful completion of faculty development program participants got new idea and practical approach towards DG issues and will get concern about control techniques to improve power quality. Hands on sessions in MATLAB and PVSYST were planned to give maximum benefit to Young Researchers, Faculty Member and Industry Delegates. The objective of the training program was to introduce the basic elements and procedures of Distributed Generation and energy management in tune with the industrial environment.

In this faculty development program 96 registrations were received from State and also from India. Out of these 96 participants 80 participants have successfully attended the FDP and also given the Test. The resource persons were from Academia and industry. All the experts were from foreign universities, IITs, NITs and well reputed institutions. Two experts from VVP engineering College have also delivered their sessions. Hands on practice session on PVSYST and MATLAB were also conducted to give maximum on research and its quality. All the sessions were arranged in proper manner and it was a very fruitful faculty development program. Feedback of participants were taken for each session and we have received genuine feedback about resource persons.

If we enlist the outcome of FDP, we can say that participants got great exposure of microgrids, Optimal sizing of Renewable DGS in Grids, Reliability and cyber security of power electronics based systems, UPQC applications, Grid interfaced solar generations, active filter applications, battery systems, energy storage devices, smart grid in rural development, DFIG in microgrids, Grid integration issues of the Renewable sources and its mitigation techniques and also the hands on sessions on MATLAB and PVSYST were effectively covered. Participants got novel ideas of research and they came to know about grid and its integration with renewable in detailed.