SARANATHAN COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

3.1.3 Number of departments having Research projects funded by government and non government agencies during the year 2020-2021

Academic Year	2020-2021
INR in Lakhs	16.60743

ACADEMIC YEAR 2020-2021

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)
Nelson Mandela Marg,VasantKunj, New Delhi-110070 Website: www.aicte-india.org

MODROB - Sanction Letter

128/IDC/MODROB/Policy-1/2019-20

Date: 20.07.2020

The Drawing and Disbursing Officer,
All India Council for Technical
Education, Nelson Mandela Marg,
Vasant Kunj, New Delhi - 110070

Sub: Release of a sum of **Rs.1100941/- (Rupees Eleven Lakh Nine Hundred FourtyOne Only)** being the 1st installment **Grant-in-Aid** under the scheme **Modernization and Removal of Obsolescence (MODROB)** for the year **2019-20** payable during the current financial year **2020-21-** reg.

Sir,

With reference to the proposal submitted by the institute, this is to convey that the sanction of the Council for payment of **Rs.1376176/- (Rupees Thirteen Lakh SeventySix Thousand One Hundred SeventySix Only)** as sanctioned Grant-in-Aid under the **Modernization and Removal of Obsolescence (MODROB)** scheme, as per details given below:

1.	Name and address of the Beneficiary Institution:	Director/ Principal/ Registrar, **SARANATHAN COLLEGE OF ENGINEERING, VENKATESWARA NAGAR EDAMALAIPATTIPUDUR POST PANJAPPUR VILLAGE SRIRANGAM TALUK**		
2.	Title of Project:	Modernization of Power Electronics Lab for Integration of Renewable Energy Sources		
3.	Name of Coordinator:	Dr. KRISHNAKUMAR CHITTIBABU		
4.	Duration of the project:	2 years		
4.	Total Grant-in-aid Sanctioned:	**Total:** Rs.1376176/-	Non-Recurring (85%): Rs.1169749/-	Recurring (15%): Rs.206426/-
5.	Amount to be released during the year 2020-21:	**1st Installment** Rs.1100941/-	Non-Recurring (85%): Rs.935799/-	Recurring (15%): Rs.165141/-
6.	Sanctioned grant-in-aid is debatable to:	**Major Head 601.18(a) Gen. (Plan Head)**		

1. The amount of the Grant shall be drawn by the Drawing and Disbursing Officer, All India Council for Technical Education on the Grant-in-Aid bill and shall be disbursed to and credited to the account of Director/Principal/ Registrar of the Institute through RTGS/PFMS.
2. This Grant-in-Aid is being released in conformity with the terms & conditions as well as norms of the scheme as already communicated, and also being communicated in this letter.

The instructions/guidelines to be followed by University/Institution

I. **Release of funds**

a. The Principal/ Director of the institute and the Coordinator of the project are hereby requested to verify the correctness of the undermentioned bank account/ RTGS details submitted by them along with the Proposal, in which the grant is being released:

No.	Bank Name	Bank Branch Name	Bank Branch Address	Account Holder Name	Account Type	Account Number	IFSC Code
AAETS6115N	CITY UNION BANK	TIRUCHIRAPALLI MAIN	KALLI AMMAN KOIL STREET, SIGC CAMPUS, TIRUCHIRAPALLI - 620002	SARANATHAN COLLEGE OF ENGINEERING	Saving Account	023001000138318	CIUB0000023

In case of any omission the same should be reported to AICTE immediately.

b. The sanction is issued in exercise of the powers delegated to the council and other terms & conditions laid down in the guidelines of the scheme.

c. 100% grant of the sanctioned amount is being released to Government/Govt. Aided institutions. Utilization Certificate (UC) and other requisite documents are to be submitted within one month of the completion of the project.

d. To self-financed/Pvt. Institutions 80% of the sanctioned amount is being released as first installment followed by 20% as reimbursement after receipt of UC and other requisite documents as specified in terms & Conditions of MODROB Scheme.

II. Maintenance of accounts

a. The Institute shall strictly follow the provisions laid down in the scheme document and sanction order No. F.No.9-128/IDC/MODROB/Policy-1/2019-20 dated 20.07.2020 issued by this office. All correspondences related to the project must contain this number along with year of sanction of the project; failing which correspondence will not be entertained.

b. Funds covered by this grant shall be kept separately and would not be mixed up with other funds, so as to know the amount of interest accrued on the grant AICTE.

c. The University/College/Institute shall maintain proper accounts of the expenditure out of the grants, which shall be utilized only on approved items of expenditure (list enclosed).

d. The Council or its nominee shall have the right to check /verify the account to satisfy that the fund has been utilized for the purpose for it was sanctioned.

e. The date of release of the grant by AICTE shall be taken as the date of commencement of the project. The Principal / Director / Registrar shall intimate about the receipt of the grant to AICTE. Any expenditure incurred prior to the issuance of the approval letter will not be allowed to be adjusted in the grant and if the Institution / University do not take the project work within one month of the receipt of the grant, the approval shall ipso fact lapse.

f. After receipt of the grant from AICTE, the Institute shall send a confirmation to AICTE within 2 months of receipt of grant that the sanctioned project has been started/is in progress.

III. Refund of grant by way of a demand draft in favour of Member Secretary, AICTE, New Delhi

a. If the college/institute does not have the Letter of Approval (LOA) or Extension of Approval issued by AICTE for the academic year 2020-21, the fund released should be immediately refunded to AICTE with interest accrued thereon.

b. If project is not started within six months of the issuance of this Offer Letter, the released amount, along with interest accrued thereon, has to be necessarily returned to AICTE.

c. In any case, if the institute is required to refund the grant or interest accrued thereon or balance amount, the amount will be refunded to AICTE.

d. It may be ensured that the project is completed within the stipulated time. If the project is not completed in time, no further extension will be granted in any case and institute has to refund the entire amount to AICTE.

No.	Bank Name	Bank Branch Name	Bank Branch Address	Account Holder Name	Account Type	Account Number	IFSC Code
AAETS6115N	CITY UNION BANK	TIRUCHIRAPALLI MAIN	KALLI AMMAN KOIL STREET, SIGC CAMPUS, TIRUCHIRAPALLI - 620002	SARANATHAN COLLEGE OF ENGINEERING	Saving Account	023001000138318	CIUB0000023

In case of any omission the same should be reported to AICTE immediately.

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c. 100% grant of the sanctioned amount is being released to Government/Govt. Aided institutions. Utilization Certificate (UC) and other requisite documents are to be submitted within one month of the completion of the project.

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b. If project is not started within six months of the issuance of this Offer Letter, the released amount, along with interest accrued thereon, has to be necessarily returned to AICTE.

c. In any case, if the institute is required to refund the grant or interest accrued thereon or balance amount, the amount will be refunded to AICTE.

d. It may be ensured that the project is completed within the stipulated time. If the project is not completed in time, no further extension will be granted in any case and institute has to refund the entire amount to AICTE.

CTE needs adequate time for depositing the Demand Draft in the bank, the same be immediately patched to avoid any lapse of the validity period.

mission of documents by college/institution after completion of Project/Subsequent years.

The following mandatory relevant documents are required to be submitted by the college/institution within one month of the completion of the project: -

a. Feedback form in the prescribed proforma.

b. The **Annual Progress Report (APR)** in the prescribed format along with the original Statement of actual Expenditure in the prescribed proforma duly signed by the Head of the institution and shall be submitted to AICTE not later than one month after completion.

c. The **Utilization Certificate (UC)** supported by Audited Statement of Expenditure to the effect that the grant has been utilized for the purpose for which it has been sanctioned shall be furnished to the AICTE immediately after completion of the project. It should contain the head-wise break up of expenditure made from the grant-in-aid provided by the Council. Audited Statement of Expenditure indicating expenditure incurred in the total duration of the project in the prescribed format and GFR-19 shall be submitted to the Council.

d. In case of self-financing/private institutions, Statement of actual Expenditure & Utilization Certificate are required to be audited & signed by a Charted Accountant (with membership no., full address & stamp). Photocopies of formats are enclosed.

e. **Program Evaluation Committee (PEC)** is required to be constituted at Institutional level. The constitution of the PEC shall be asunder:

   (i) Principal/Director/Registrar of the Institution(Chairperson)

   (ii) Coordinator of the project (Member Secretary),

   (iii) Two HODs and one subject expert(Members).

   The members of the said PEC shall not be below the rank of Associate Professor. The minutes of the meetings are to be submitted to the Council at end of the project along with other mandatory documents.

f. Project completion report project indicating the activities undertaking, number of students benefited, laboratory works photographs of students, together with their views is to be submitted.

g. Attested photocopies of supporting vouchers/bills of expenditure incurred for the completion of Project.

h. Photographs of equipment's purchased.

i. The balance amount of the grant will be reimbursed to the university/institution only on submission of the above documents. On receipt of these documents, the total amount of balance of financial assistance, admissible as per the norms, shall be worked out and grant-in-aid shall be released, as second installment, in favour of the beneficiary institution.

V. General instructions

a. The amount of interest accrued on the grant should be treated as part of the grant to be utilized for that particular project. However, the interest amount accrued along with grant disbursed should not exceed the total grant sanctioned for the project. The Institute receiving the grant should reflect the same in the audited statement of accounts/ utilization certificate and may either refund the interest amount to AICTE or AICTE shall adjust the same in the next installment of grant before its released.

b. Any unavoidable circumstantial change in the project with respect to name of Project Coordinator for the MODROB project would mandatorily require prior approval of the Council. All such requests should be addressed to AICTE, in advance, recording the specific reasons for proposed changes, failing which the offer for the grant already issued would be treated as automatically withdrawn and the financial assistance released in favour of the beneficiary institution shall be refunded immediately to the Council. Kindly mention the File No.9-1/RIFD/MOD/Policy-1/2019-20 in your future correspondence.

c. The grantee shall maintain an audited record of assets acquired wholly or substantially out of the Grant-in-Aid and a register of assets shall be maintained by the Institute in the prescribed form i.e.GFR-19.

d. The College / Institute receiving grant under MODROB is expected to put up a plaque at the main entrance of

...b/Department, which has been modernized using the grant. All the equipment procured through the ...ject should be super scribed with AICTE project file number.

...he assets acquired wholly or substantially out of grant shall not be disposed or encumbered or utilized for the purpose other than those for which the Grant was given without proper sanction of the AICTE and should at any time the institution cease to function, such assets shall revert to the AICTE.

f. The grantee Institution shall observe all financial norms and guidelines as prescribed by the AICTE/ Government of India from time to time. GOI GFR rules (@https://doe.gov.in/order-circular/general-financial-rules2017-0) should be followed during utilization of grant.

List of Equipment's approved:

Name of Equipments
Power Analyzer
Mixed Signal Oscilloscopes
FPGA Development Board
dSPACE
Data Logger/ Data Acquisition/ Control System/ IndicatorData Acquisitions
Solar PV Emulator
Digital Data Acquisitions

Yours sincerely,

3/7/20

Dr. Neeraj Saxena
Advisor - II (IDC)

Copy forwarded for information and necessary action to:

1. **Name and Address of the Coordinator,**
   Dr. KRISHNAKUMAR CHITTIBABU
   SARANATHAN COLLEGE OF ENGINEERING, VENKATESWARA NAGAR EDAMALAIPATTIPUDUR POST PANJAPPUR VILLAGE SRIRANGAM TALUK
2. **The Registrar / Director / Principal,**
   Name and Address of the Coordinator,
   Dr. KRISHNAKUMAR CHITTIBABU
   SARANATHAN COLLEGE OF ENGINEERING, VENKATESWARA NAGAR EDAMALAIPATTIPUDUR POST PANJAPPUR VILLAGE SRIRANGAM TALUK
3. **Guard File**

Dr. Neeraj Saxena
Advisor - II (IDC)

अखिल भारतीय तकनीकी शिक्षा परिषद्
(भारत सरकार का एक सांविधिक निकाय)
(मानव संसाधन विकास मंत्रालय, भारत सरकार)
नेल्सन मंडेला मार्ग, वसंत कुंज, नई दिल्ली-110070

सत्यमेव जयते

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(A Statutory Body of the Govt. of India)
(Ministry of Human Resource Development, Govt. of India)
Nelson Mandela Marg, Vasant Kunj, New Delhi-110070

Phone : 011-26131577 - 78, 80
011-29581000
Website : www.aicte-india.org

14 Sept 2020

Col. B. Venkat
Director (FDC)
E-mail: director.fdc@aicte-india.org
Mob. No. 8130255472

Sub:-For information of AICTE approved institutes which have received grants for conducting STTP's/FDP's under AQIS 2019-20.

Sir,

This is in reference to grants released by AICTE under AQIS 2019-20 for conduct of STTP's/FDPs. It is being observed that due to present circumstances of ongoing pandemic of COVID-19, most of Institutes are facing difficulties in organizing and conducting STTP's. This office has received a number of requests from various institute to allow on line method of conducting STTP/FDP to complete their commitments.

In this regard, it is to inform that all such institutes, which have already received grants for conducting STTP's/FDPs through prevailing contact mode, are **allowed to conduct STTP's through online mode subject to following conditions:**

(i) The Institute will be allowed to adjust the grants received for STTP at following rates:-

a.	Honorarium for Coordinator	Rs. 5000.00
b.	Honorarium to experts	Rs. 75000.00
c.	Provision for payment to lab attendant engaged during lab practices	Rs. 3000.00
d.	miscellaneous charge	Rs. 10000.00
	Total for each STTP's	**Rs 93000.00**

(ii) The Institute will conduct more than one STTP's in multiples of Rs. 93000.00 within the total grant received by it and shall return the balance unspent amount to AICTE.

e.g.

if an Institute has received grant for STTP	=Rs 3,00,000.00
Cost of three STTP	3x93000= Rs. 279000.00
Balance	**= Rs. 21,000.00**

The institute will return the balance unspent amount of Rs.21,000.00 alongwith interest earned on such amounts to AICTE while submitting UC for adjustment of accounts for keeping its eligibility for receiving grants in next AQIS.

(iii) The institute will conduct all three STTP's as explained above on the same topic which has been approved by AICTE while releasing the grants.

(iv) Firm dates for each program will be intimated to AICTE beforehand.

On similar lines FDP (02 week program) to be conducted online has the following approval totaling to Rs. 1,86,000.00.

a.	Honorarium for Coordinator	Rs. 5000.00
b.	Honorarium to experts	Rs. 1,68,000.00
c.	Provision for payment to lab attendant engaged during lab practices	Rs. 3000.00
d.	miscellaneous charge	Rs. 10000.00
	Total for each FDPs	**Rs 1,86,000.00**

The conducting of FDP's (two weeks program) shall be subjected to the similar conditions (i) to (iv) given above for conduct STTP courses, except rates of Honorarium to experts.

You are requested to acknowledge receipt of above guidelines and convey your consent if your institute is ready for conducting the STTP through online format on conditions explained above.

It is once again reiterated that online conduct of FDP & STTP will be on explicit permission of AICTE.

This provision is valid only till 31 Dec 2020.

14 Sept

Yours sincerely,

Director (FDC)

ABOUT THE COLLEGE

Saranathan College of Engineering was founded by "Vidya Seva Ratnam", "Guru Seva Mani" Auditor Sri. K. Santhanam in the year 1998. It was so named in respectful memory of his Guru, the then Principal of National College, Prof. Saranathan. Saranathan College is a self-financing college approved by AICTE and affiliated to Anna University, Chennai. Civil, CSE, ECE, EEE, ICE, IT and Mechanical Engineering departments are permanently affiliated to Anna University, Chennai. All the eligible 6 UG branches are accredited by NBA, New Delhi. In the recently concluded NAAC Peer Team Inspection visit the College was accredited with an A+ grade.

ABOUT THE DEPARTMENT

Department of EEE was started in the year 1998. It is equipped with modern facilities besides conventional infrastructure. The department has well qualified experienced faculty, supporting staff and it is recognized by Anna University as a Research Centre. The department has received grants, from central as well as state government organizations like MNRE, DRDO, CSIR, AICTE and TNSCST, for carrying out research work and organizing National Conferences / Workshops / Seminars. The sheer hard work and enthusiasm of the faculty members and students of the department have helped in this department being considered as one of the best in the campus. There are about 19 faculty members in the department. Among them six are Ph.D. holders while ten are pursuing their Ph.D. The department has been extending consultancy services to various industries with a special focus on Energy Auditing and Power Quality. As a continuous learning program, it also offers to Industries and Academia value added training program in Protection and Switchgear.

PATRON
Shri. S. Ravindran
Secretary

CHAIRPERSON
Dr. D. Valavan
Principal

COORDINATOR
Dr. C. Krishnakumar
Professor & Head,
Department of Electrical and Electronics Engineering.

Programme Evaluation Committee
Dr. G. Jayaprakash
Professor & Head,
Department of Mechanical Engineering.

Dr. S.M.Girirajkumar
Professor & Head,
Department of
Instrumentation & Control Engineering.

Dr. D.Kalyankumar
Professor,
Department of
Electrical and Electronics Engineering.

Organizing Committee
Dr.K.Rajkumar
Associate Professor, EEE
Mr.P.Ram Prakash
Assistant Professor, EEE
Mr.R.Sridhar
Assistant Professor, EEE
Email: saraeeedept@gmail.com

All India Council for Technical Education
AICTE

AICTE
sponsored

Two weeks online
Faculty Development Programme (FDP)
on

Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering

03.05.2021 - 15.05.2021

Saranathan College of Engineering Tiruchirappalli

Accredited with Grade A+ NAAC

Organized by
Department of
Electrical and Electronics Engineering
(Accredited by NBA)
SARANATHAN COLLEGE OF ENGINEERING
(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)
(Accredited by NAAC with A+ Grade)
Venkateswara Nagar, Panjappur, Tiruchirappalli - 620 012
www.saranathan.ac.in

ABOUT THE PROGRAM

This program provides theoretical and practical knowledge on the Cyber Physical Systems and Contemporary Research areas of Electrical and Electronics Engineering for the faculty members and Researchers. It also aims to provide research scope on recent trends in the field of Power System Protection, Cyber Security, Power Electronics, Control Systems, Artificial Intelligence, Evolutionary Algorithm, etc.

SCOPE OF THE PROGRAM

The program covers the following important aspects of Recent Trends in Power System and Cyber Security

*IoT applications in Power System Protection / Smart Grid / Microgrid

*Industrial Control Systems (ICS) Security

*Cyber autonomy and automation

*Artificial Intelligence (AI) in Electrical Engineering

*Modern Trends in Power System Protection and High Voltage Engineering

*Protection Schemes in Microgrids and Smartgrids

*Synchrophasors / Modern Fault Detection Systems in Power Systems

*Evolutionary Algorithm and AI applications in Power System Protection

*Challenges and Opportunities of Cyber Security in Electrical Engineering

REGISTRATION:

The duly filled registration form with institution ID card (scanned copy) must be submitted on or before 27.04.2021.

Registration Link:

https://forms.gle/yDzZMinZY7ejCPgXA

There is **NO REGISTRATION FEE** for eligible participants of AICTE approved Institutions.

CONDUCT OF TEST AND ISSUANCE OF CERTIFICATES:

All the participants have to appear for a test at the end of the programme. As per AICTE norms of FDP, **E-certificates** will be issued to the participants.

IMPORTANT DATES

Last date for receipt of application : 27.04.2021

Intimation to selected participants : 29.04.2021

ONLINE PLATFORM - Google Meet

Session Timings

FN - 10.00 AM to 1.00 PM

AN - 02.00 PM to 05.00 PM

Contact Details

+91 94433 92629 / +91 90433 84406

Online Platform Support

+91 94876 76423

www.saranathan.ac.in

RESOURCE PERSONS

Dr.Bhaveshkumar Bhalja
Professor, EEE, IIT Roorkee

Dr.M.Jayabharata Reddy
Professor, EEE, NIT Trichy

Dr.Sydulu Maheswarapu
Professor, EEE, NIT Warangal

Dr.D.M. Vinod Kumar
Professor, EEE, NIT Warangal

Dr.Muralidharan
Professor, EEE, Mepco Schlenk Enginnering College, Sivakasi

Dr.S. Vasantharathna
Professor, EEE, CIT Coimbatore

Dr.S. Selvaperumal
Professor, EEE, Syed Ammal Engineering College, Ramanathapuram

Dr.Shriram Vasudevan
Dean, K.Ramamakrisnan College of Technology, Trichy

Dr.Albert Alexander
Associate Professor, EEE, Kongu Engineering College, Erode

Dr.Anamika Yadav
Associate Professor, EEE, NIT Raipur

Dr.Chandrasekar Yammani
Associate Professor, EEE, NIT Warangal

Dr.M.Chetan Singai
Associate Professor, RUAS, Bengaluru

Dr.Premalata Jana
Associate Professor, EEE, IIT Roorkee

Dr.N.V. Srikanth
Associate Professor, EEE, NIT Warangal

Dr.M.V. Indhragandhi
Associate Professor, EEE, VIT Vellore

Dr.G.R.Kanagachidambaresan
Associate Professor, CSE, Vel Tech. University, Chennai

Dr.Arpan Chattopadhyay
Assistant Professor, EEE, IIT Delhi

Dr.B.Chitti Babu
Assistnt Professor, IIITD&M Kancheepuram

Dr.R. Gowtham
Assistant Professor, (SG) EEE, Amrita University, Coimbatore

Dr.Kanasottu Anil Naik
Assistant Professor, EEE, NIT Warangal

Dr.Manas Kumar Jena
Assistant Professor, EEE, IIT Palakkad

Mr.Shyam Sundar Ramaswami
Lead Security Threat Researcher, CISCO Umbrella, India

Mr. Rajeev raj
Senior Manager, Customer Success, ColorTokens, Bengaluru

Mr.S. Selvakumar
Head - Engineering & Design, Power Projects

SARANATHAN COLLEGE OF ENGINEERING
TIRUCHIRAPALLI - 12

Dr. D. VALAVAN B.E.,M.Tech.,Ph.D.
PRINCIPAL

Ref : SCE / AQIS – FDP / 2019- 2020 / Dated 09th July 2021

To
Col.B. Venkat
Director (FDC)
All India Council for Technical Education
Nelson Mandela Marg, Vasant Kunj
New Delhi – 110 070

Sir,

Sub : AICTE – EEE- FDP – converted into online mode – refund of balance amount – NEFT – sent – Reg.

Ref : 1. Sanction letter No.34-67/113/FDC/FDP/P-1/2019-20 dated 30.07.2020.
2. Sanction letter-online mode for FDP dated 14.09.2020.

Vide letter cited under reference (1), an amount of Rs.4,34,000/- (Rupees four lakhs and thirty four thousand only) towards organizing a Faculty Development Programme under the Scheme AQIS 2019-20 had been sanctioned to our institution on 30.07.2020. The amount was credited to our account on 10.09.2020. We had planned to conduct the Programme from 07th December 2020 to 19th December 2020. The Pre-programme work such as fixing of keynote speakers, printing of Brochure, Certificates, website design etc., was done in the month of August 2020 itself. An amount of Rs. 12,000/- has been spent by us towards the above said process. Due to Covid-19, further work on the proposed FDP got held up and we are unable to go further.

Contd....2

VENKATESWARA NAGAR, EDAMALAIPATTI PUDUR (P.O.) PANJAPPUR VILLAGE, SRIRANGAM TALUK, TIRUCHIRAPALLI - 620 012.
Ph : 8489915204 Telefax - 0431 - 2473684, e-mail : principal@saranathan.ac.in

SARANATHAN COLLEGE OF ENGINEERING
TIRUCHIRAPALLI - 12

Dr. D. VALAVAN B.E.,M.Tech.,Ph.D.
PRINCIPAL

Vide letter cited under reference (2), the AICTE has given us an option to conduct the FDP in an online mode. The amount sanctioned for the conduct of E-conference being Rs.1,86,000/- (Rupees one lakh and eighty six thousand only),the above referred sanction letter also instructed us to refund the balance amount of Rs.2,48,000/- (Rupees two lakhs and forty eight thousand only).

The utilization certificate and other necessary documents confirming the successful conduct of the faculty development programme are enclosed for your kind perusal.

As instructed we have sent the balance amount of Rs.2,48,000/- (Rupees two lakhs and forty eight thousand only) to the State Bank of India account no. 55113199952 of Member Secretary, AICTE, New Delhi through RTGS mode on 01.07.2021 (Reference number of online transaction is CIUBH21183034229).

The receipt of the same may please be acknowledged.

Thanking you,

Yours faithfully,

PRINCIPAL
Saranathan College of Engineering
TRICHY - 12.

Encl.: as above.

VENKATESWARA NAGAR, EDAMALAIPATTI PUDUR (P.O.) PANJAPPUR VILLAGE, SRIRANGAM TALUK, TIRUCHIRAPALLI - 620 012.
Ph : 8489915204 Telefax - 0431 - 2473684, e-mail : principal@saranathan.ac.in

SCE/EEE/FDP/03

05.07.2021

To

Col.B.Venkat,

Director (FDC),

All India Council for Technical Education,

Nelson Mandela Marg., Vasant Kunj,

New Delhi – 110 070.

Sir,

Sub: Submission of Documents for FDP - reg.

Ref: No.34-67/113/FDC/FDP/P-1/2019-20. As per AICTE guidelines issued on 14.09.2020 06.04.2021 and 15.04.2021

We hereby submit the following documents of two weeks online FDP titled, "Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering", organised by department of Electrical and Electronics Engineering from 3rd May 2021 to 15th May 2021. As per AICTE guidelines, the following documents are attached herewith for your perusal.

(i) Original statement of actual expenditure and Utilization certificate

(ii) Proceeding and completion report - softcopy

(iii) List of candidates who have successfully completed the program on the basis of the test conducted by Program Monitoring Committee (PMC) - softcopy

(iv) Report submitted by Program Monitoring Committee (PMC) - softcopy

(v) Feedback of the Participants - softcopy

With Regards,

Dr.D.Valavan

PRINCIPAL
Saranathan College of Engineering
TRICHY - 12.

Annexure – I

FACULTY DEVELOPMENT PROGRAMME

FEED BACK FORM

AICTE File No. & Date of Offer Letter : **34-67/113/FDC/FDP/P-1/2019-20 dated 30.07.2020 and guidelines from AICTE dated 14.09.2020, 06.04.2021 and 15.04.2021**

Name of the Coordinator : **DR.C.KRISHNAKUMAR**

Name and Address of the Institution : **Saranathan College of Engineering**
Venkateswara Nagar,
Edamalaipattipudur Post,
Panjappur Village,
Tiruchirapalli – 620 012,
Tamil Nadu.

Title of the Programme : **Two week online Faculty Development Programme on Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering**

Dates : **03.05.2021 – 15.05.2021 (Two Weeks)**

Total no. of participants proposed and actually attended:
: Proposed 60 Attended 70

Number and Date of the offer Letter :

Letter Number	Date	Grant Received
F.No. 34-67/113/FDC/FDP/P-1/2019-20	**30.07.2020**	**Rs.4,34,000 /-**
Guidelines from AICTE	**14.09.2020, 06.04.2021 and 15.04.2021**	

Total Amount Sanctioned : **Rs.4,34,000.00**

Total Expenditure incurred in conducting the seminar : **Nil**

Grant Received from various agencies other Than AICTE for this Faculty Development Programme : **Nil**

Details of the internal revenue if any generated by the Institution / Department on account of this Programme : **Nil**

Briefly mention about the technological / academic / or any other benefit generated by conducting this programme with respect to a) the institution, b) the faculty, c) students, d) industry / society : **Enclosed in Annexure A**

The soft copy of the proceedings of the programme must be furnished to the council : **Enclosed in Annexure B**

Name & Signature of the Coordinator with Seal	**Name & Signature of the Head of the Institution with Seal**
Dr.C.KRISHNAKUMAR M.Tech.,Ph.D., *Supervisor No: 2430097* *Professor and Head* *Department of EEE* *Saranathan College of Engineering* *Panjappur, Trichy-620 012.*	Dr. D. Valavan, M.Tech.,Ph.D., Principal Saranathan College of Engineering Trichy - 12.

Annexure-II

Faculty Development Programme

UTILIZATION CERTIFICATE

AICTE File No. : AICTE FDP sanction order with Ref. No. 34-67/113/FDC/FDP/P-1/ 2019-20 dated 30.07.2020, Guidelines from AICTE dated 14.09.2020, 06.04.2021 and 15.04.2021

Name of the Coordinator : Dr.C.Krishnakumar

Title of the Programme : AICTE Sponsored Two week Faculty Development Programme on Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering

Date of the Programme : 03.05.2021–15.05.2021

S.No	AICTE Sanction order/ LetterNo.& Date	Amount (Rs.)	
1	AICTE FDP sanction order with Ref. No. 34-67 / 113 /FDC/FDP/P-1/2019-20 dated 30.07.2020, Guidelines from AICTE dated 14.09.2020, 06.04.2021 and 15.04.2021	Rs.4,34,000/-	Certified that out of **Rs.4,34,000/-**of Grant-in-Aid sanctioned by the AICTE during the financial year 2019-2020 in favour of the Principal under this Institution Letter No. **F.No. 34-67/113/FDC/FDP/P-1/2019-20** dated **30.07.2020, Guidelines from AICTE dated 14.09.2020, 06.04.2021 and 15.04.2021** Given in the margin a sum of **Rs.1,86,000/-** has been utilized for the purpose of **Faculty Development Programme (FDP)** for which it was sanctioned and that the balance of **Rs.2,48,000** remaining unutilized at the end of the year has been surrendered to the All India Council for Technical Education.
2.	GrantReceived	Rs.4,34,000/-	
3.	Balance to be reimbursed to AICTE	Rs.2,48,000/-	

Certified that I have satisfied myself that the conditions on which the grant-in-aid was sanctioned Have been duly fulfilled and that I have exercised the following checks to see that the money was actually utilized for the purpose for which it was sanctioned.

Kinds of checks exercised:-

1. Remuneration to Speakers
2. Designing and Printing Expenses
3. Miscellaneous Charges

Name & Signature of the Coordinator with Seal

Dr.C.KRISHNAKUMAR M.Tech.,Ph.D.,
Supervisor No: 2430097
Professor and Head
Department of EEE
Saranathan College of Engineering
Panjappur, Trichy - 620 012.

Name & Signature of the Head of the Institute with Seal

PRINCIPAL
Saranathan College of Engineering
TRICHY - 12.

Signature of Chartered Accountant :
Name of Chartered Accountant :
Membership No. :
Full Address with Seal :

For M.RAJU & Co.,
CHARTERED ACCOUNTANTS
(A.KUMAR)
M.No: 026517
PROPRIETOR

For M.RAJU & Co., CHARTERED ACCOUNTANTS
TRICHY
FRN:003481S

FACULTY DEVELOPMENT PROGRAMME
STATEMENT OF EXPENDTITURE

AICTE File No. : AICTE FDP sanction order with Ref. No. 34-67/113/FDC/FDP/ P-1/ 2019-20 dated 30.07.2020, Guidelines from AICTE dated 14.09.2020, 06.04.2021 and 15.04.2021

Name of the Coordinator : Dr.C.Krishnakumar

Title of the Programme : AICTE Sponsored Two week Faculty Development Programme on Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering

Date of the Programme : 03.05.2021–15.05.2021

Sanction No. & Date	Grant Sanctioned	Details of Expenditure Incurred Item wise	No. of Participants	Duration of the Programme (with dates)
AICTE FDP sanction order with Ref. No. 34-67 / 113 / FDC/ FDP / P-1/2019-20 dated 30.07.2020, Guidelines from AICTE dated 14.09.2020, 06.04.2021 and 15.04.2021	**Rs.4,34,000**	Remuneration to Speakers – **Rs. 1,76,000** Designing and Printing Expenses – **Rs. 3,500** Miscellaneous Expenses – **Rs. 6,500**	**70**	**Two Weeks 03.05.2021 – 15.05.2021**
	Total Expenditure		**Rs. 1,86,000**	
	Grant Received		**Rs. 4,34,000**	
	Balance to be reimbursed		**Rs. 2,48,000**	

Name & Signature of the Coordinator with Seal
Dr.C.KRISHNAKUMAR M.Tech.,Ph.D.,
Supervisor No: 2430097
Professor and Head
Department of EEE
Saranathan College of Engineering
... 620 012.

Name & Signature of the Head of the Institute with Seal
PRINCIPAL
Saranathan College of Engineering
TRICHY - 12.

Signature of Chartered Accountant :
Name of Chartered Accountant :
Membership No. :
Full Address with Seal :

For M.RAJU & Co.,
CHARTERED ACCOUNTANTS
(A.KUMAR)
M.No: 026517
PROPRIETOR

For M.RAJU & Co., CHARTERED ACCOUNTANTS
TRICHY
FRN:003481S

SARANATHAN COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

(Accredited by NAAC with A+ Grade)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

(Accredited by NBA)

AICTE Sponsored Two Week Online Faculty Development Programme on Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering

03.05.2021 – 15.05.2021

Statement of Accounts

Sl.No	Description	Amount (Rs.)	Grand Total (Rs.)
1.	**Remuneration to Speakers**		
	Honorarium to Course Coordinator	5,000	1,76,000
	Honorarium to Resource Persons	1,68,000	
	Provision for payment to Lab attendant engaged during Lab practices	3,000	
2.	**Designing and Printing Expenses**		
	Designing of Brochure, Proceedings and Certificate	3,000	3,500
	Printing of Program Evaluation Committee Report	500	
3.	**Miscellaneous Expenses**		
	Google Meet Upgrade version for Education	2,100	6,500
	Data pack and Recharge values	2,500	
	Auditor Fee	1,000	
	Stationary and other expenses	900	
		Total Amount	**1,86,000**

Name & Signature of the Coordinator with Seal

Dr.C.KRISHNAKUMAR M.Tech.,Ph.D.,
Supervisor No: 2430097
Professor and Head
Department of EEE
Saranathan College of Engineering
Panjappur, Trichy-620 012.

Name & Signature of the Head of the Institute with Seal

PRINCIPAL
Saranathan College of Engineering
TRICHY - 12.

SARANATHAN COLLEGE OF ENGINEERING
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

AICTE Sponsored Two week Faculty Development Programme on Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering

Submitted to the Principal:

Sub: Formation of Program Monitoring Committee (PMC) for FDP – reg.
Ref: Ref.No. 34-67/113/ FDC/FDP/P-1/2019-20 dated 30.07.2020

The AICTE sanctioned **Two week Faculty Development Programme on "Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering"** organised by the department of Electrical and Electronics Engineering. We have planned to conduct the training programme from **03.05.2021** to **15.05.2021** as per AICTE guidelines. As per instructions given in the sanction letter, the **Programme Monitoring Committee (PMC)** is constituted on **05.04.2021** and the details are given below:

Sl.No	Name of the Staff Member	Designation & Department	Position	Signature
1	Dr.D.Valavan	Principal	Chairperson	
2	Dr.C.Krishnakumar	Professor & Head / EEE	Member Secretary	
3	Dr.G.Jayaprakash	Professor & Head / Mechanical Engineering	Member	
4	Dr.S.M.Girirajkumar	Professor & Head / Instrumentation & Control Engineering	Member	
4	Dr.D.Kalyanakumar	Professor, EEE	Subject Expert	

Thanking You,

Yours faithfully,

Dr.C.Krishnakumar
(Coordinator)

Dr.C.KRISHNAKUMAR, M.Tech.,Ph.D.,
Supervisor No: 2430097
Professor and Head
Department of EEE
Saranathan College of Engineering
Panjappur, Trichy-620 012.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Two week Faculty Development Programme on

Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering

Minutes of Meeting

The **Programme Monitoring Committee (PMC)** meeting is convened on **05.04.2021** at 10.00 AM in Seminar Hall, Department of Electrical and Electronics Engineering. The following points are discussed and proposed in the meeting.

- Roles of Programme Monitoring Committee (PMC)
- Conducting the programme in online mode as per AICTE guidelines.
- Duration of the programme
- Resource Persons for the entire duration of the programme
- Honorarium for the Resource Persons
- Selection procedure for the outside participants
- Video conferencing tool for online mode.
- Conduct of End Test and issue of certificate to the participants
- Proposed Budget of FDP

Dr.D.Valavan
Dr. D. Valavan, M.Tech.,Ph.D.,
(Chairperson)
Principal
Saranathan College of Engineering
Trichy - 12.

Dr.C.Krishnakumar
Dr.C.KRISHNAKUMAR M.Tech.,Ph.D.,
Supervisor No: 2430097
(Member Secretary)
Professor and Head
Department of EEE
Saranathan College of Engineering
Panjappur, Trichy 620 012.

Dr.G.Jayaprakash
(Member)
Head of the Department
Mechanical Engineering
Saranathan College of Engineering
Tiruchirappalli - 620 012.

Dr.S.M.Girirajkumar
(Member)
Dr.S.M.GIRIRAJKUMAR
PROFESSOR & HEAD
DEPARTMENT OF INSTRUMENTATION & CONTROL ENGINEERING
SARANATHAN COLLEGE OF ENGINEERING
TIRUCHIRAPALLI

Dr.D.Kalyanakumar
(Subject Expert)

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
(Accredited by NBA)

AICTE Sponsored Two Week Online Faculty Development Programme on
Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering

29/04/2021

SCHEDULE OF TRAINING PROGRAMME

Day/ Session	SESSION-I (09.45 A.M -11.15 P.M) / SESSION-II (11.30 A.M – 1.00 P.M)		SESSION-III (2.00 PM – 03.30 PM) / SESSION-IV (3.45 PM – 5.15 PM)
03.05.21 MON	**Dr. M. Jaya Bharata Reddy** Professor/EEE, NIT Trichy **Novel Design & Control Strategies and Innovation Technical Practices in Modern Switch Gear**	L	**Dr.Indhragandhi.V** Asso. Professor/School of Electrical Engineering, VIT, Vellore **Security Challenges in Smart Grid and Smart Metering System.**
04.05.21 TUE	**Dr. Arpan Chattopadhyay** AP/EEE, IITD **Security of cyber-physical systems**	U N	**Mr. Rajeev Raj** Senior Manager, Customer Success, ColorTokens, Bengaluru **Cyber World : The Invisible Network**
05.05.21 WED	**Mr.Shyam Sundar Ramaswami** Lead Security Threat Researcher, CISCO Umbrella, India **Cyber autonomy and automation**	C H B R	**Dr.Vinod Kumar D M** Professor/EEE, NIT Warangal **AI applications in Electrical Engineering**
06.05.21 THU	**Dr. Manas Kumar Jena** AP/EEE, IIT Palakkad **Synchrophasors**	E A K	**Dr. Chetan Singai** ASP, RUAS, Bengaluru **National Education Policy - 2020**
07.05.21 FRI	**Dr.K.V. Shriram** Dean, KRCT, Trichy **Artificial Intelligence (AI) in Electrical Engineering**		**Dr. Bhavesh Kumar R.Bhalja** Professor/EE, IIT Roorkee **Challenges and Opportunities of Cyber Security in Electrical Engineering**
08.05.21 SAT	**Dr. G. R. Kanagachidambaresan** ASP/CSE, Vel Tech University,Chennai. **IoT for Sustainable Smart City Development**		**Dr.Kanasottu Anil Naik** AP/EEE, NIT Warangal **AI applications in Electrical Engineering**

Coordinator

Dr.C.KRISHNAKUMAR M.Tech.,Ph.D.,
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AICTE Sponsored Two Week Online Faculty Development Programme on
Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering

29/04/2021

SCHEDULE OF TRAINING PROGRAMME

Day/ Session	SESSION-I (09.45 A.M -11.15 P.M)	SESSION-II (11.30 A.M – 1.00 P.M)		SESSION-III (2.00 PM – 03.30 PM)	SESSION-IV (3.45 PM – 5.15 PM)
10.05.21 MON	**Dr. Sydulu Maheswarapu** Professor/EEE, NIT Warangal **AI applications in Electrical Engineering**		L	**Dr.S.Vasantharathna** Professor/EEE, CIT Coimbatore **Data Analytics in Smart Grid**	
11.05.21 TUE	**Dr.S. Albert Alexander** ASP/EEE, Kongu Engineering College, Erode. **Fault Detection and Diagnostic Tools for Smart Grid Environment**		U N C	**Dr.A. Nazar Ali** Asso. Professor/EEE, Rajalakshmi Engineering College, Chennai **Opportunities and Challenges of Integrating Solar Energy in Smart Grid System**	
12.05.21 WED	**Dr. Anamika Yadav** Asso. Professor/EE, NIT, Raipur **Protection Schemes in Microgrids and Smartgrids**		H B R	**Dr.S.Muralidharan** Senior Professor / EEE, Mepso Schlenk EC, Sivakasi A **Smart cyber physical system for Electric Vehicles**	
13.05.21 THU	**Dr. S. Selvaperumal** Professor/EEE, SAEC, Ramanathapuram. **Cyber Physical System Security In Power Electronics Applications**		E A K	**Dr. Chandrasekhar Yammani** AP/EEE, NIT Warangal **Electric Vehicle Fast Charging Stations and its impacts on modern microgrids**	
14.05.21 FRI	**Dr.N.V. Srikanth** Asso. Professor/EEE, NIT Warangal **AI applications in Electrical Power Systems**			**Mr.S.Selvakumar** Head – Engineering & Design, Power Projects **Protection in Microgrids**	
15.05.21 SAT	**Dr. Premalata Jena** Asso. Professor/ EE, IIT Roorkee **Protection Schemes in Microgrids and Smart Grid**			**Dr.Gowtham R** AP/CSE, Amrita Vishwa Vidyapeetham, Coimbatore **Cyber Autonomy and Automation**	

Coordinator

Dr.C.KRISHNAKUMAR M.Tech.,Ph.D.,
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Professor and Head
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AICTE Sponsored Two week Online Faculty Development Programme on Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering

03.05.2021-15.05.2021

Resource Person Contact Details

Sl.No	Resource Person Name	Designation	Name of the Institution	Phone Number
1.	Dr. M. Jaya Bharata Reddy	Professor	National Institute of Technology, Tiruchirapalli	+91 94431 71746
2.	Dr.Indhragandhi.V	Associate Professor	Vellore Institute of Technology, Vellore	+91 77088 18873
3.	Dr. Arpan Chattopadhyay	Assistant Professor	Indian Institute of Technology, Delhi	+91 82501 82680
4.	Mr.Rajeev Raj	Senior Manager	ColorTokens, Bengaluru	+91 99000 02328
5.	Mr.Shyam Sundar Ramaswami	Lead Researcher,	CISCO Umbrella, India	+91 99167 62601
6.	Dr. Vinod Kumar. D. M	Professor	National Institute of Technology, Warangal	+91 98852 94521
7.	Dr. Manas Kumar Jena	Assistant Professor	Indian Institute of Technology, Palakkad	+91 99110 58543
8.	Dr. Chetan Singai ASP	Associate Professor	Ramaiah University of Applied Sciences, Bengaluru	+91 94835 07705
9.	Dr.K.V.Shriram	Dean	K.Ramakrishnan College of Technology, Tiruchirappalli	+91 89399 18562
10.	Dr. Bhavesh Kumar R.Bhalja	Professor	Indian Institute of Technology, Roorkee	+91 96394 71375
11.	Dr.G. R. Kanagachidambaresan	Associate Professor	Vel Tech University,Chennai.	+91 99941 20988
12.	Dr.Kanasottu Anil Naik	Assistant Professor	National Institute of Technology, Warangal	+918630384437, +919690314482
13.	Dr.Sydulu Maheswarapu	Professor	National Institute of Technology, Warangal	+918702459675, +919440579995
14.	Dr.S.Vasantharathna	Professor	Coimbatore Institute of Technology, Coimbatore	+91 70944 64003
15.	Dr.S.Albert Alexander	Associate Professor	Kongu Engineering College, Erode.	+91 98659 31597
16.	Dr.A.Nazar Ali	Associate Professor	Rajalakshmi Engineering College, Chennai	+91 87785 71455
17.	Dr.Anamika Yadav	Associate Professor	National Institute of Technology, Raipur	+91 94258 52654
18.	Dr.S.Muralidharan	Senior Professor	Mepso Schlenk Engineering College, Sivakasi	+91 94434 44436
19.	Dr. S. Selvaperumal	Professor	Syed Ammal Engineering College, Ramanthapuram	+91 99407 90400

20.	Dr.Chandrasekhar Yammani	Assistant Professor	National Institute of Technology, Warangal	+91 83329 69290
21.	Dr.N.V.Srikanth	Associate Professor	National Institute of Technology, Warangal	+91 92478 81601
22.	Mr.S.Selvakumar	Head – Engineering & Design,	Power Projects, Bengaluru	+91 94861 70489
23.	Dr. Premalata Jena	Associate Professor	Indian Institute of Technology, Roorkee	+91 81261 58674
24.	Dr.Gowtham R	Assistant Professor	Amrita Vishwa Vidyapeetham, Coimbatore	+91 98420 32323

Dr.C.KRISHNAKUMAR M.Tech.,Ph.D.
Supervisor No: 2430097
Professor and Head
Department of EEE
Saranathan College of Engineering
Panjappur, Trichy-620 012.

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AICTE Sponsored Two weeks Online Faculty Development Programme on
Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering

03.05.2021 - 15.05.2021

Sl.No	Name of the Participant	Designation	Name of the Institution	Email
			EXTERNAL PARTICIPANTS	
1	SANJEEV GUPTA	Associate Professor	Government College of engineering and technology jammu	sanjeevgupta2208@gmail.com
2	SATHIYA GIRIJA H	Assistant Professor	Dr.Mahalingam College of Engineering and Technology	sathya11.sece@gmail.com
3	S SATISH KUMAR	ASSISTANT PROFESSOR	AMET DEEMED TO BE UNIVERSITY	satishkumarjec@gmail.com
4	MANOHARA. H.C.	Asst. Prof	P.E.S College of Engg	manoharahcpesce@gmail.com
5	UMA MAHESWARI T	Assistant Professor	RVS College of Engineering	tvumama@gmail.com
6	V. SARAVANAN	Professor	Arunai Engineering College	vsaranaec@yahoo.co.in
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8	Ganesh K	Assistant Professor	Nadar Saraswathi College of Engineering and Technology	ganesh4kandy@gmail.com
9	Sudhir P Dhanure	Assistant Professor	Sinhgad Institutes SKNCOE, Pune	ind.sudhir@gmail.com
10	D.MERCY	Assistant Professor and Head	St.Joseph's College of Engineering and Technology, Thanjavur	mercyprabhu06@gmail.com
11	HARISH VENKATRAM SARIPELLA	Assistant Vice President	Deutsche Bank Group	venkatramharish@gmail.com
12	KARPAGAM	Assistant Professor (SS)	Dr.Mahalingam College of Engineering and Technology	karpagam_84@drmcet.ac.in
13	Mahesh Kumar K M	Assistant Professor	PES COLLEGE OF ENGINEERING	maheshkm01@gmail.com
14	Mukesh Devidas Patil	Assistant Professor	SITS Narhe	ace.mukeshpatil@gmail.com
15	TUSHAR KISAN ZOMBADE	Assistant Professor	RMDSSOE, Warje, Pune	tzombade2330@gmail.com
16	S KAVITHA	Assistant professor	MCET	kaviece33@gmail.com
17	MINAKHI BEHERA	Assistant Professor	College of Engineering and Technology	mbeheraee@cet.edu.in
18	GIRIJAPATI SHARMA	LECTURER	GLA UNIVERITY, MATHURA UP INDIA	girijapati.sharma@gla.ac.in
19	LATHA R	Assistant Professor	St.Joseph's College of Engineering and Technology Thanjavur	rlatha.me@gmail.com
20	C.THIRUMRAI SELVI	Professor	SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY	thirumaraiselvi@skcet.ac.in
21	A VENKATESH	ASSISTANT PROFESSOR	Dr.MAHALINGAM COLLEGE OF ENGINEERING AND TECHNOLOGY	venkatesh25@drmcet.ac.in
22	G.KARTHIKEYAN	Assistant Professor	Dr.Mahalingam College Engineering and Technology	karthik12eca33@gmail.com
23	K Durgalakshmi	Assistant Professor	Dr Mahalingam College of Engineering and Technology	durgakarthigeyan@gmail.com
24	A. SIVAPRAKASH	Assistant Professor(Senior Grade)	Mepco Schlenk Engineering College	sivahp@mepcoeng.ac.in
25	DHARMENDRA GANAGE	Assistant Professor	Sinhgad College of Engineering, Pune	dgganage@gmail.com
26	KUBDE ROHAN RAVINDRA	Assistant Professor	Sinhgad Institute of Technology and Science Pune	rkubde@gmail.com
27	RONITA PAWN	ASSISTANT PROFESSOR	PILLAI HOC COLLEGE OF ENGINEERING AND TECHNOLOGY	ronita@mes.ac.in

Sl.No	Name of the Participant	Designation	Name of the Institution	Email
28	SUCHITA WAGH	Assistant Professor	Sinhgad Institute of Technology & Science, Pune	suchitawagh@gmail.com
29	Kavitha Kumari.K.S	Assistant Professor	Aarupadai Veedu Institute of Technology	kavithakseee@gmail.com
30	Subramanya Reddy	Professor	CMR University	reddysubramanya151@gmail.com
31	SUJATA MILINDKUMAR MALI	Assistant Professor	Sinhgad Institute of Technology and Science	smmali2009@gmail.com
32	B VIJAYA KUMAR	ASSISTANT PROFESSOR	S. K. U COLLEGE OF ENGINEERING AND TECHNOLOGY, S. K UNIVERSITY, ANANTAPURAMU	vijay.begari@gmail.com
33	ARULKUMAR P	Associate Professor	V.S.B. Engineering College	arulkumarme@gmail.com
34	SRIANANDA GANESH T	ASSISTANT PROFESSOR	ST. JOSEPH'S COLLEGE OF ENGINEERING	srianandceg19@gmail.com
35	T DHANAKODI	LECTURER (SG)	VALIVALAM DESIKAR POLYTECHNIC COLLEGE, NAGAPATTINAM	dhanakodi.thangavelu@gmail.com
36	Pankaj Kumar Sharma	Professor	Rajshree Institute of Management and Technolgy,Bareilly	pankaj354518@gmail.com
37	SATHIS KUMAR M	ASSISTANT PROFESSOR	CK COLLLEGE OF ENGINEERING AND TECHNOLOGY	murugudevi@gmail.com
38	A.VENGADESAN	Assistant Professor	St. Joseph's College of Engineering and Technology,Thanjavur	avmithrankavin@gmail.com
39	T.V.NARMADHA	Professor	ST.JOSEPH'S COLLEGE OF ENGINEERING	nar_velu@yahoo.co.in
40	MINAKSHEE PATIL	Assistant Professor	Sinhagad Academy of Engineering, Pune	minaksheepatil.me@gmail.com
41	NARAYAN P BHOSALE	Assistant Professor	IGNTU (A Central University)	narayanbhosale@gmail.com
42	P.Venkata Prasad	Professor	Chaitanya Bharathi Institute of Technology	pvprasad_eee@cbit.ac.in
43	VEERESH H	LECTURER	S. E. S. Polytechnic (Government Aided-363)	veeresh.hv@gmail.com
44	V GOPU	ASSISTANT PROFESSOR	SRI RAMAKRISHNA ENGINEERING COLLEGE, COIMBATORE	gopu.venugopal@srec.ac.in
45	J.PANDIA RAJAN	Assistant Professor (Senior Grade)	Mepco Schlenk Engineering College, Sivakasi	pandiarajan@mepcoeng.ac.in
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Professor and Head
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Saranathan College of Engineering
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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This is to certify that **<<Salutation>><<Name of the Participant>>** *of* **<<Name of the Institution>>** *has participated and successfully completed the* **AICTE Sponsored Two weeks online Faculty Development Programme (FDP)** *on* **Electrical Paradigm Shift to Cyber Physical Systems and Contemporary Research in Electrical and Electronics Engineering** *from* **03.05.2021** *to* **15.05.2021** *conducted by* **Department of Electrical and Electronics Engineering, Saranathan college of Engineering,** Tiruchirapalli, Tamil Nadu, India.

Dr.C.Krishnakumar	**Dr.D.Valavan**
HoD / EEE, Coordinator	**Principal**

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DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING

A I C T E
sponsored

online Short Term Training Programme (STTP)
on

Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switchgear

15.07.2020 - 21.07.2020 (Phase I)

KEYNOTE SPEAKERS

Dr. R. Sarathi
Professor, IIT Madras

Dr.B.K.Panigrahi
Professor, IIT Delhi

Dr. Kalyan Chatterjee
ASP & Head, IIT (ISM) Dhanbad

Dr.M. Jaya Bharata Reddy
Professor, NIT Trichy

Dr. M.Venkata Kirthiga
Asso. Professor, NIT Trichy

Dr.R.Gnanadass
Professor, PEC

Dr.V.Saravanan
Professor, TCE, Madurai

Dr.D.Kalyana Kumar
Professor, SCE, Trichy

Dr. S. Venkatesh
Asso. Professor, VIT, Vellore

Dr.K. Selvajyothi
AP, IIITD&M, Kancheepuram

Dr.B.Chitti Babu
AP, IIITD&M, Kancheepuram

Mr.S.Selva Kumar
Head-E&D, Power Projects

Dr.C.Krishnakumar	Dr.D.Valavan	Shri.S.Ravindran
HoD / EEE, Coordinator	Principal	Secretary

Register at: https://forms.gle/wGAA6fV5N6oYyW5E8
www.saranathan.ac.in

1. No Registration Fee
2. E-Certificate will be provided to all the Active Participants

A I C T E

Sponsored

One week online Short Term Training Programme (STTP)
On

Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switchgear (Phase I)

15.07.2020 to 21.07.2020

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SARANATHAN COLLEGE OF ENGINEERING
Venkateswara Nagar, Panjappur,
Tiruchirappalli – 600 012

Brochure

SARANATHAN
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(Approved by AICTE and Affiliated to Anna University, Chennai)
DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING
AICTE
sponsored
online Short Term Training Programme (STTP)
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
(Accredited by NBA)

AICTE Sponsored Six day Online Short Term Training Programme on Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switchgear (Phase I)

15.07.2020 to 21.07.2020

SCHEDULE OF TRAINING PROGRAMME

Day/ Session	FORENOON SESSION (10.00 A.M -12.00 P.M)		AFTERNOON SESSION (2.00 P.M -4.00 P.M)
15.07.20 WED	**Inauguration (9.30 AM)** **Dr.R.Sarathi** Professor, IIT Madras **High Voltage Engineering**	**L U N C H B R E A K**	**Mr.S.Selvakumar** Head – Engineering & Design, Power Projects **Power System Protection in off-grid / on-grid Renewable Energy Systems**
16.07.20 THU	**Dr.B.K.Panigrahi** Professor, IIT Delhi **AI applications on Power Systems**		**Dr. K Selvajyothi** **AP/EEE, IIITD&M, Kancheepuram** **Frequency Locked Loops for Single Phase Grid Synchronization**
17.07.20 FRI	**Dr.Jaya Bharata Reddy,** Professor, NIT Trichy **Synchrophasor applications in Smart Grid**		**Dr. B. Chitti Babu** AP/EEE, IIITD&M, Kancheepuram **Control of Self-Excited Induction Generator (SEIG) with improved power Quality in the off-grid system**
18.07.20 SAT	**Dr. Kalyan Chatterjee,** HOD & Associate Professor, IIT(ISM), Dhanbad **Fault ride-through capability of WECS**		**Dr. R. Gnanadass** Professor, PEC, Pondicherry **Protection Schemes in Smart Grid**
20.07.20 MON	**Dr.S.Venkatesh** Associate Professor, VIT Vellore **Trends and Challenges in High Voltage Circuit Breaker Testing, Quality Assessment and Condition Monitoring**		**Dr.V.Saravanan**, Professor, TCE, Madurai **Selection and Ratings of Protective Devices for Domestic & Commercial Electrical Installation**
21.07.20 TUE	**Dr. M.Venkata Kirthiga** ASP, NIT Trichy **Islanding Detection Schemes in Micro-grids**		**Dr.D.Kalyana Kumar** Professor, SCE **TECHNICAL REQUIREMENTS -** *from Protection Perspectives* **for Power System Reliability**

SARANATHAN COLLEGE OF ENGINEERING

Venkateswara Nagar, Panjappur, Tiruchirappalli – 12

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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Cordially invites you

for the Inaugural function of the

AICTE Sponsored

One Week online Short Term Training Programme (STTP)

on

Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switchgear (Phase I)

Chief Guest

Dr.R.Sarathi

Professor, EEE

IIT Madras, Chennai

July 15, 2020

09:30 am

Google Meet Link: https://meet.google.com/jes-msgp-wzq

Dr.C.Krishnakumar
Coordinator, Prof & Head /EEE

Dr.D.Valavan
Principal

Shri. S. Ravindran
Secretary

15.07.2020

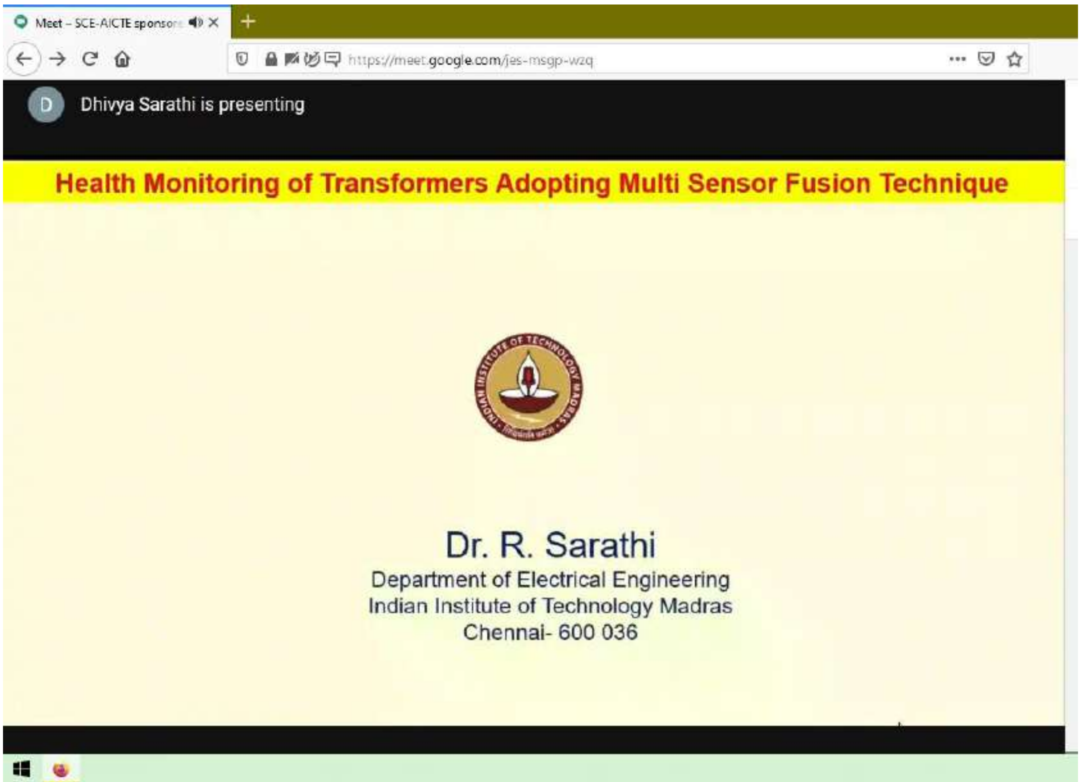
Wednesday

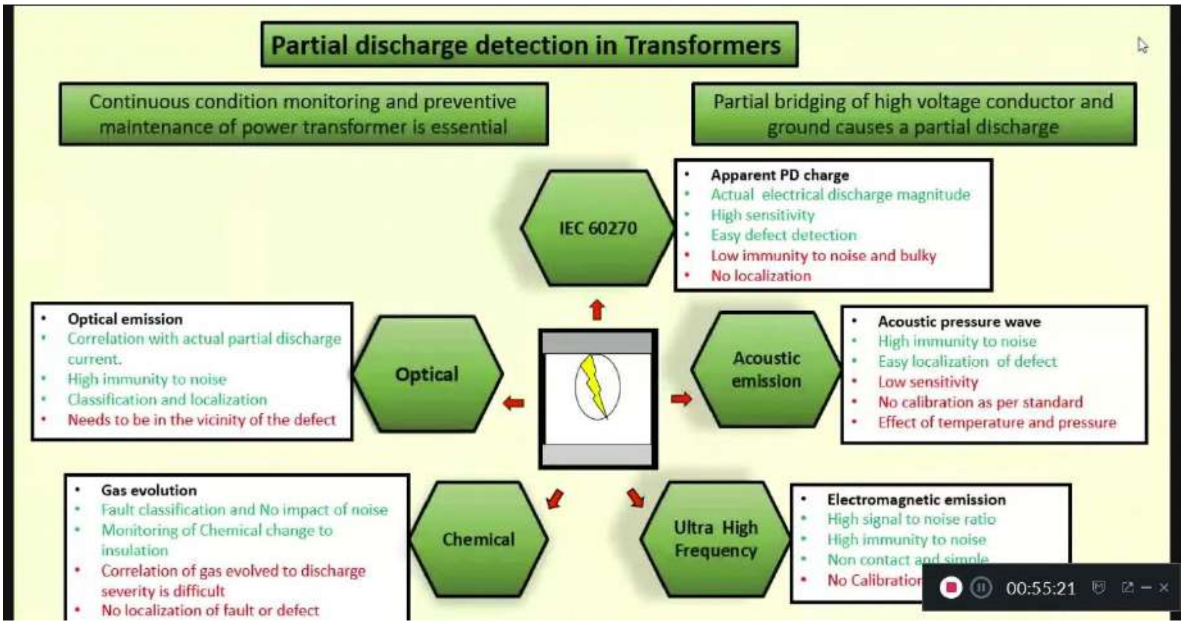
15.07.2020
Wednesday
FN Session
10.00 AM to 12.00 PM

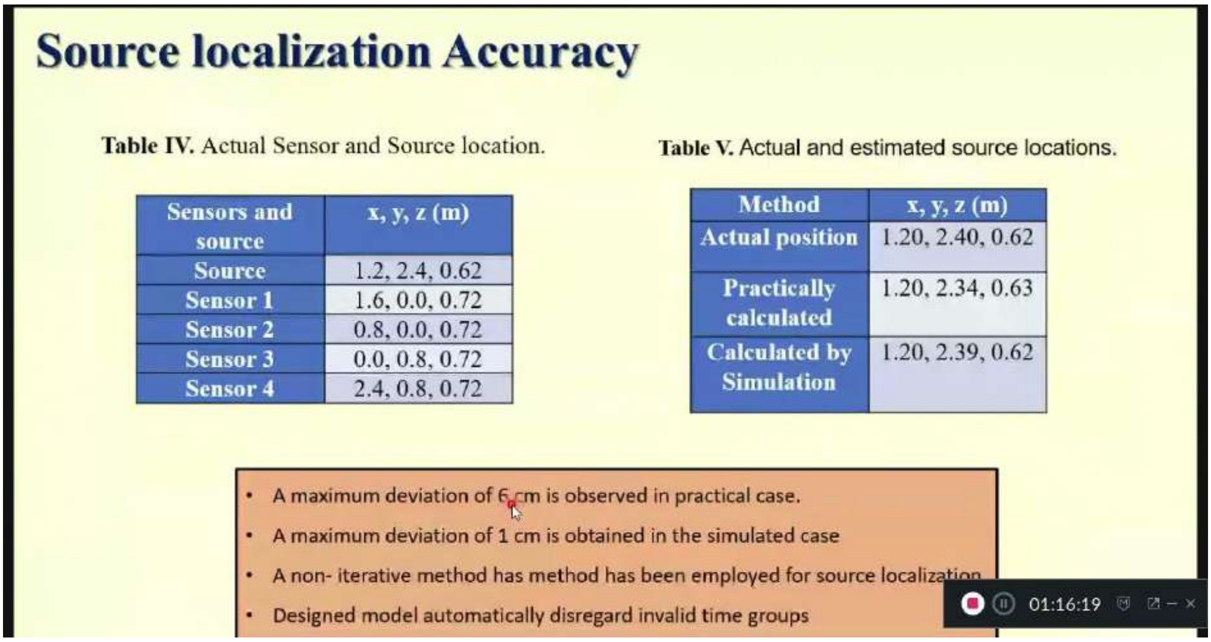
Dr.R.Sarathi
Professor, Department of Electrical and Electronics Engineering
Indian Institute of Technology Madras
Chennai
Topic: Health Monitoring of Transformers adopting Multi Sensor Fusion Technique

INAUGURAL CEREMONY

The one week AICTE Sponsored Online Short Term Training Programme on Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switch Gear (Phase - I) started on 15th July with an inauguration ceremony. Coordinator of the STTP, Dr. C.Krishnakumar, Professor & Head, Department of Electrical and Electronics Engineering welcomed all the participants in his welcome address. Dr. D.Valavan, Principal of Saranathan College of Engineering, added a special value to the STTP by delivering felicitation address. The Inauguration ceremony ended with vote of thanks given by Dr.K.Rajkumar, Assistant Professor, EEE, SCE.




Partial discharge detection in Transformers
Continuous condition monitoring and preventive maintenance of power transformer is essential
Partial bridging of high voltage conductor and ground causes a partial discharge
IEC 60270
Apparent PD charge
Actual electrical discharge magnitude
High sensitivity
Easy defect detection
Low immunity to noise and bulky
No localization
Optical
Optical emission
Correlation with actual partial discharge current.
High immunity to noise
Classification and localization
Needs to be in the vicinity of the defect
Acoustic emission
Acoustic pressure wave
High immunity to noise
Easy localization of defect
Low sensitivity
No calibration as per standard
Effect of temperature and pressure
Chemical
Gas evolution
Fault classification and No impact of noise
Monitoring of Chemical change to insulation
Correlation of gas evolved to discharge severity is difficult
No localization of fault or defect
Ultra High Frequency
Electromagnetic emission
High signal to noise ratio
High immunity to noise
No Calibration
00:55:21


Source localization Accuracy
Table IV. Actual Sensor and Source location.

Sensors and source	x, y, z (m)
Source	1.2, 2.4, 0.62
Sensor 1	1.6, 0.0, 0.72
Sensor 2	0.8, 0.0, 0.72
Sensor 3	0.0, 0.8, 0.72
Sensor 4	2.4, 0.8, 0.72

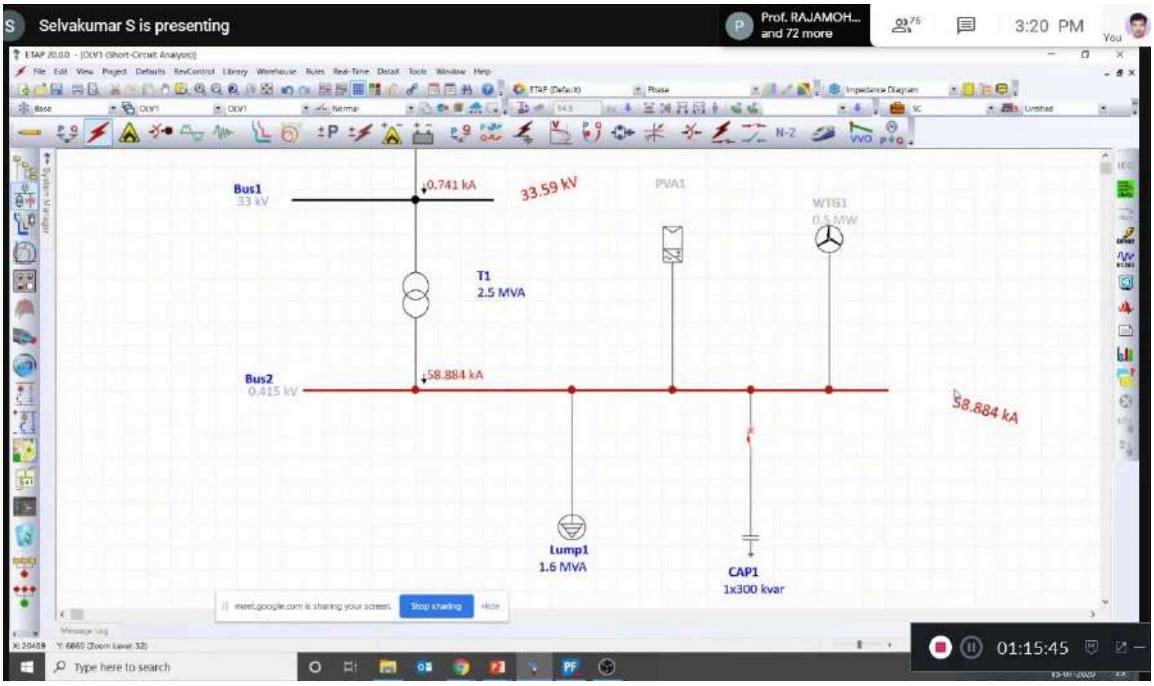
Table V. Actual and estimated source locations.

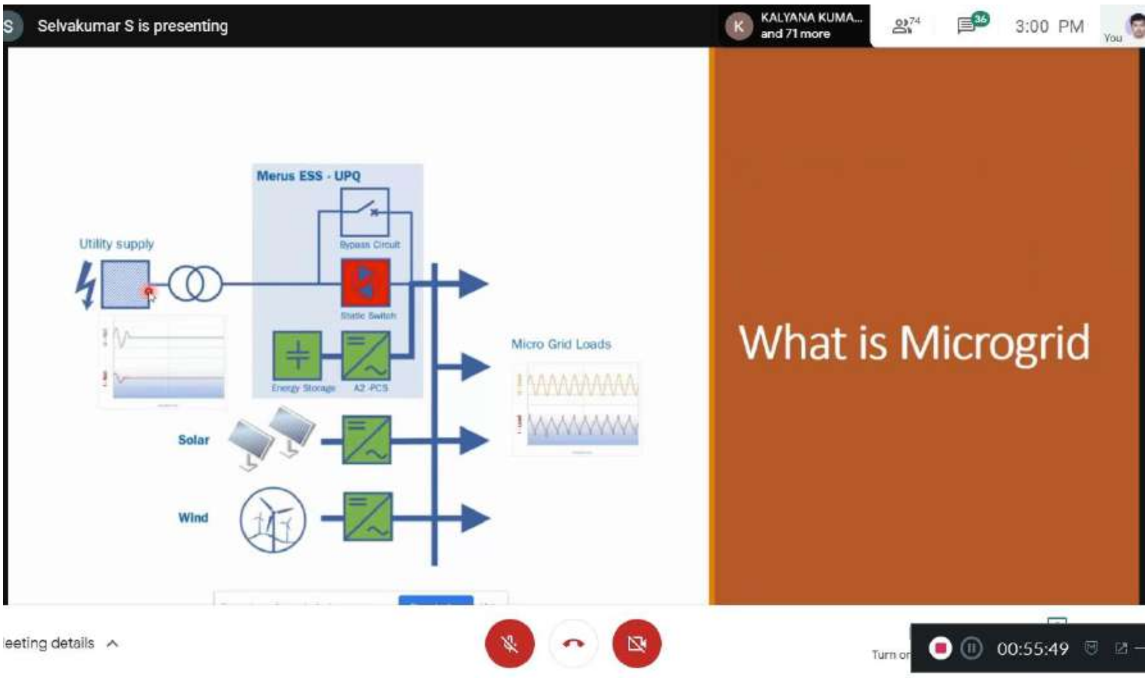
Method	x, y, z (m)
Actual position	1.20, 2.40, 0.62
Practically calculated	1.20, 2.34, 0.63
Calculated by Simulation	1.20, 2.39, 0.62

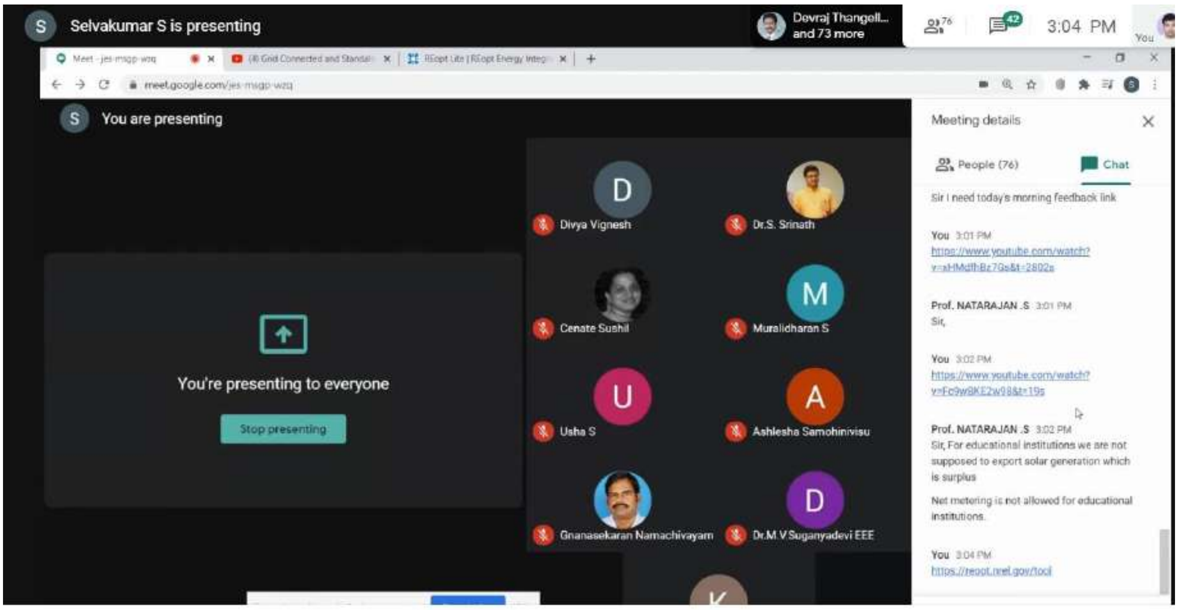
A maximum deviation of 6 cm is observed in practical case.
A maximum deviation of 1 cm is obtained in the simulated case
A non- iterative method has method has been employed for source localization
Designed model automatically disregard invalid time groups
01:16:19

Mr.S.Selvakumar
Head – Engineering & Design
Power Projects
Bengaluru
Topic: Power System Protection in off-grid / on-grid Renewable Energy Systems

15.07.2020
Wednesday
AN Session
02.00 PM to 04.00 PM




Selvakumar S is presenting
KALYANA KUMA...
and 71 more
3:00 PM
Merus ESS - UPQ
Utility supply
Bypass Circuit
Static Switch
Energy Storage
A2-PCS
Micro Grid Loads
Solar
Wind
What is Microgrid
00:55:49

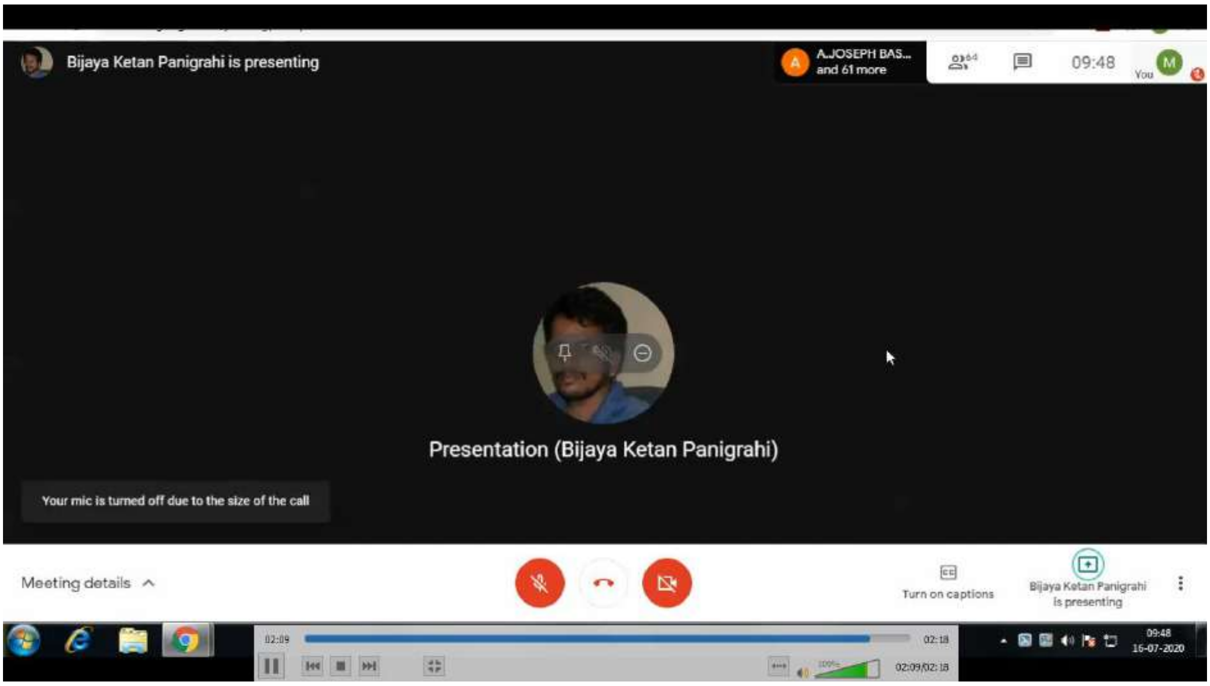

Selvakumar S is presenting
Devraj Thangell...
and 73 more
3:04 PM
You are presenting
You're presenting to everyone
Stop presenting
Divya Vignesh
Dr.S. Srinath
Cenate Sushil
Muralidharan S
Usha S
Ashlesha Samohinivisu
Gnanasekaran Namachivayam
Dr.M.V.Suganyadevi EEE
Meeting details
People (76)
Chat
Sir I need today's morning feedback link
Prof. NATARAJAN .S
Sir,
Sir, For educational institutions we are not supposed to export solar generation which is surplus
Net metering is not allowed for educational institutions

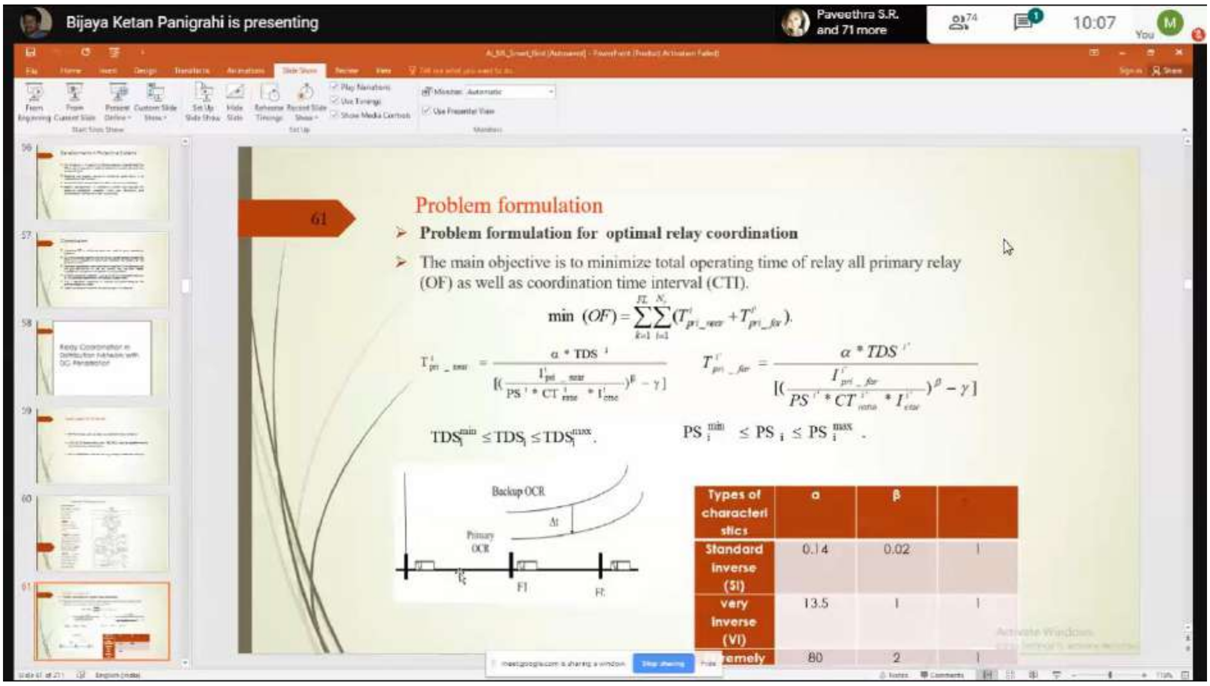
16.07.2020

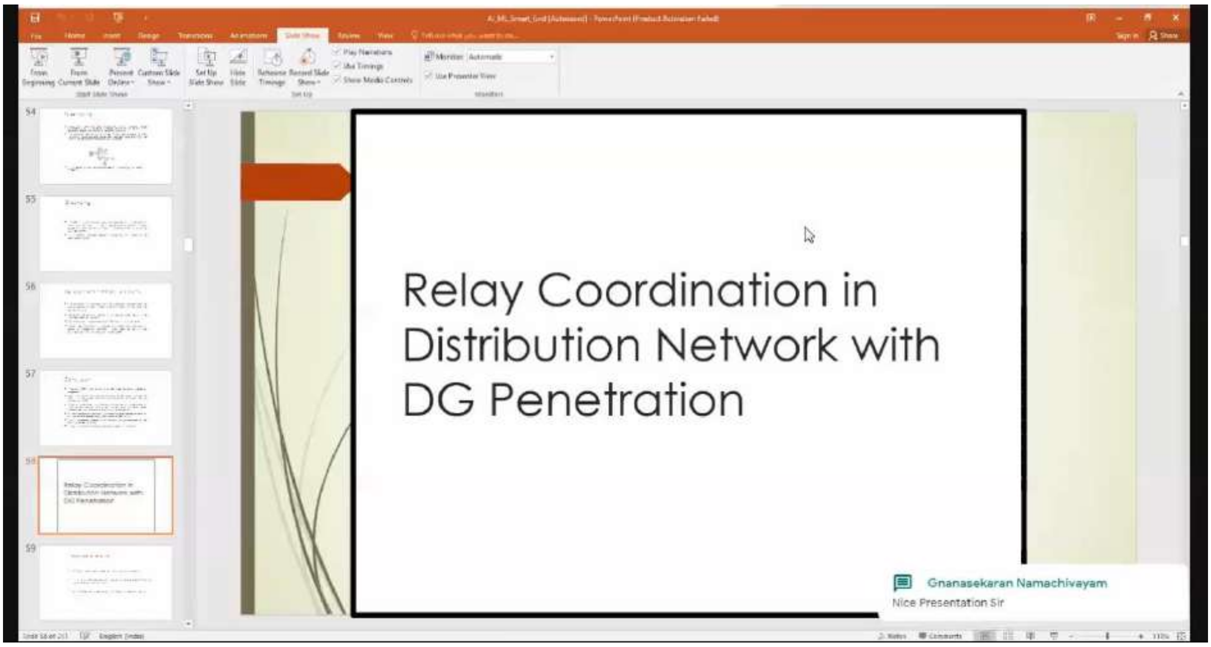
Thursday

Dr.B.K.Panigrahi
Professor, Department of Electrical and Electronics Engineering
Indian Institute of Technology Delhi
New Delhi
Topic: AI applications on Power Systems

16.07.2020
Thursday
FN Session
10.00 AM to 12.00 PM

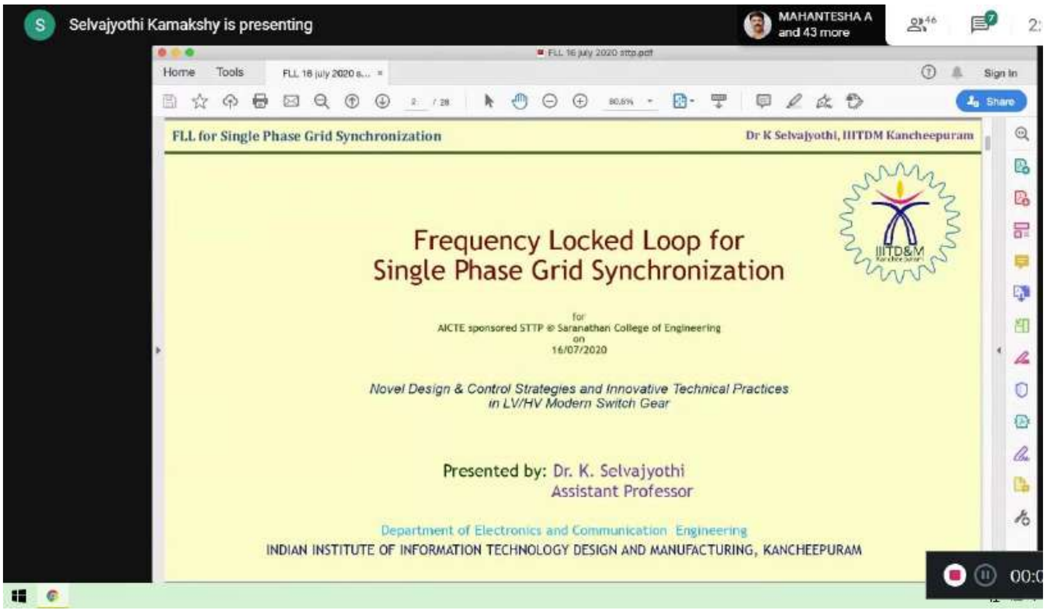


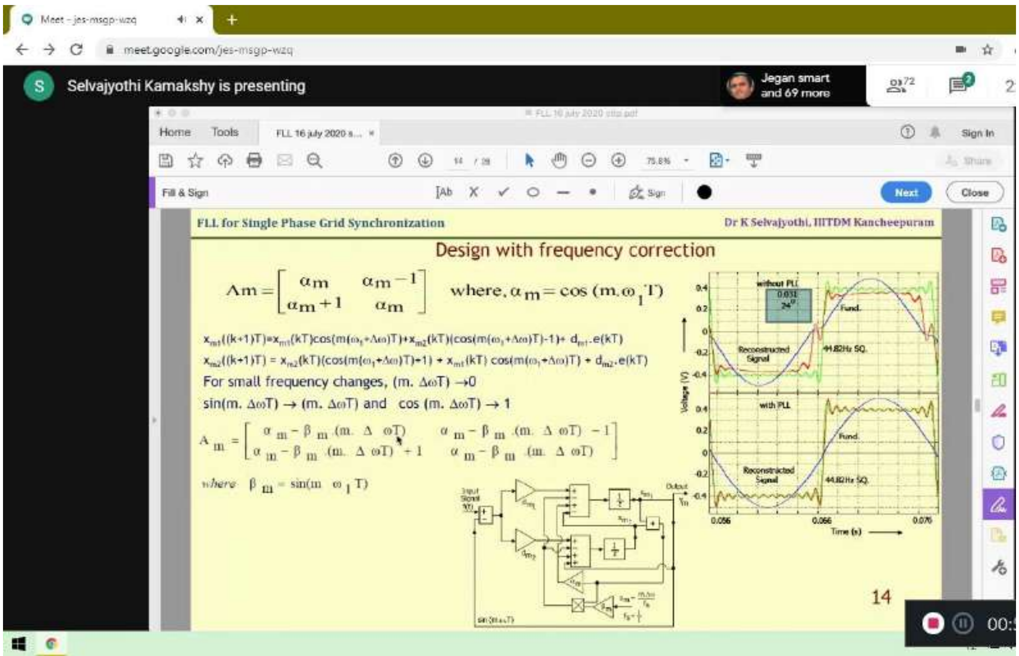

Bijaya Ketan Panigrahi is presenting
Paveethra S.R. and 71 more
10:07
You
61
Problem formulation
Problem formulation for optimal relay coordination
The main objective is to minimize total operating time of relay all primary relay (OF) as well as coordination time interval (CTI).
$\min\ (OF) = \sum_{k=1}^{FL} \sum_{i=1}^{N_r} (T^{i}_{pri\_near} + T^{i}_{pri\_far})$
$TDS_i^{min} \le TDS_i \le TDS_i^{max}$
$PS_i^{min} \le PS_i \le PS_i^{max}$
Backup OCR
Primary OCR
Δt
F1
F2
Types of characteristics
α
β
Standard Inverse (SI)
0.14
0.02
1
Very Inverse (VI)
13.5
1
1
80
2
1

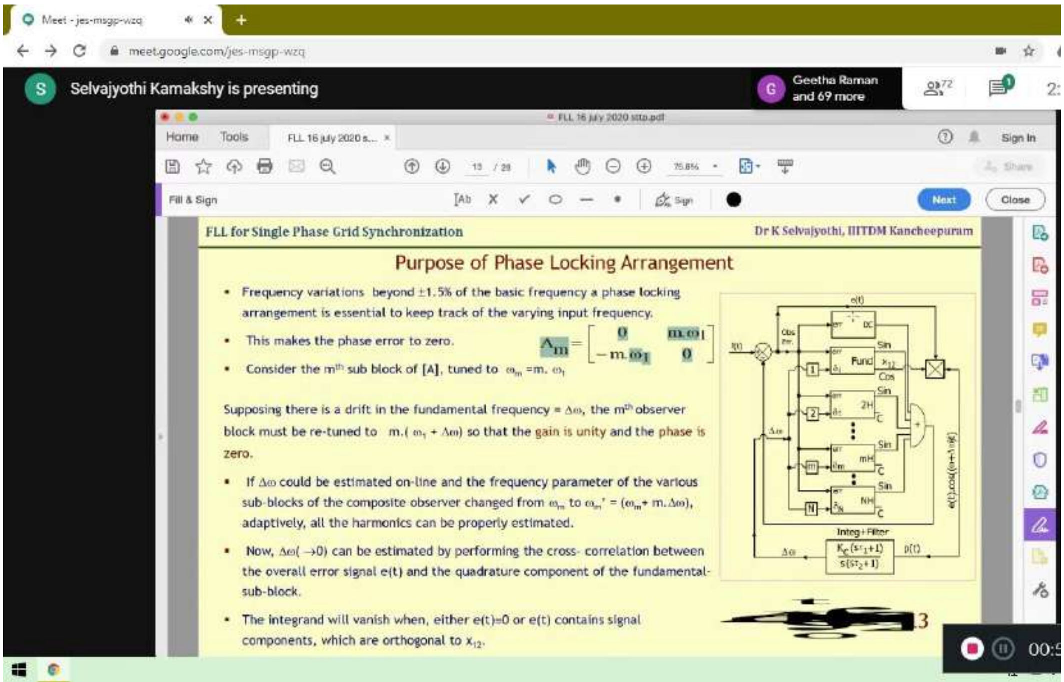

Relay Coordination in Distribution Network with DG Penetration
Gnanasekaran Namachivayam
Nice Presentation Sir

Dr.K.Selvajyothi
Assistant Professor, Department of EEE
Indian Institute of Information Technology, Design & Manufacturing
Kancheepuram, Tamil Nadu
Topic: Frequency Locked Loops for Single Phase Grid Synchronization

16.07.2020
Thursday
AN Session
02.00 PM to 04.00 PM






Meet - jes-msgp-wzq
meet.google.com/jes-msgp-wzq
Selvajyothi Kamakshy is presenting
Geetha Raman
and 69 more
FLL 16 july 2020 sttp.pdf
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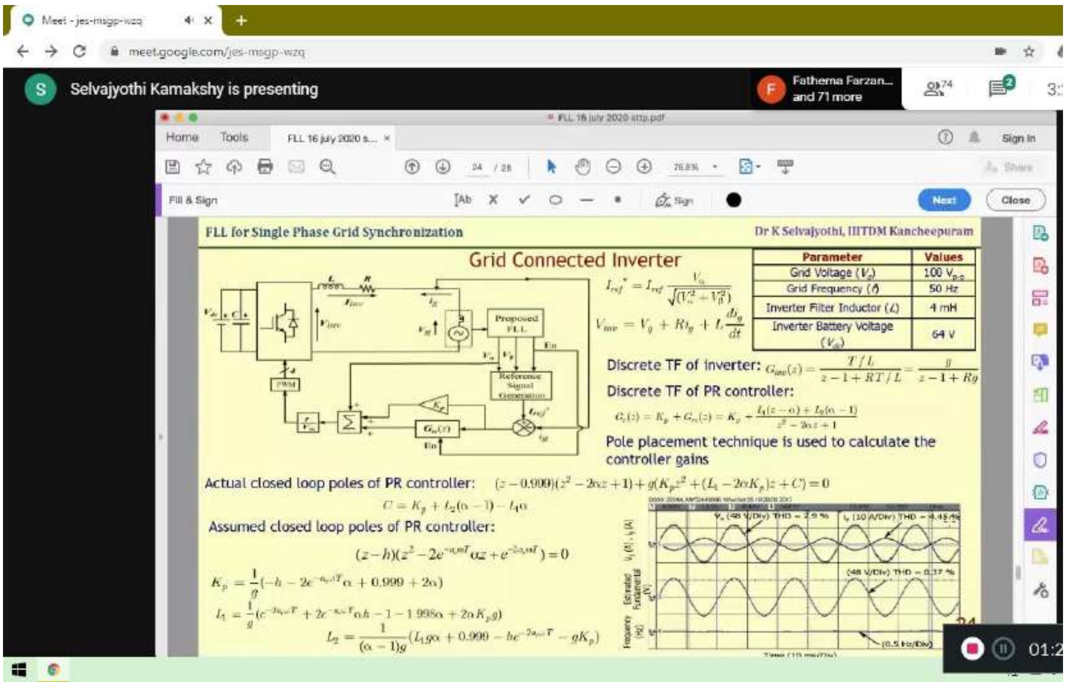
FLL for Single Phase Grid Synchronization
Dr K Selvajyothi, IIITDM Kancheepuram
Purpose of Phase Locking Arrangement
Frequency variations beyond ±1.5% of the basic frequency a phase locking arrangement is essential to keep track of the varying input frequency.
This makes the phase error to zero.
Consider the mth sub block of [A], tuned to ωm = m. ω1
Supposing there is a drift in the fundamental frequency = Δω, the mth observer block must be re-tuned to m.(ω1 + Δω) so that the gain is unity and the phase is zero.
If Δω could be estimated on-line and the frequency parameter of the various sub-blocks of the composite observer changed from ωm to ωm' = (ωm+ m.Δω), adaptively, all the harmonics can be properly estimated.
Now, Δω(→0) can be estimated by performing the cross- correlation between the overall error signal e(t) and the quadrature component of the fundamental sub-block.
The integrand will vanish when, either e(t)=0 or e(t) contains signal components, which are orthogonal to x12.
Integ+Filter
13


Meet - jes-msgp-wzq
meet.google.com/jes-msgp-wzq
Selvajyothi Kamakshy is presenting
Fathema Farzan...
and 71 more
FLL 16 july 2020 sttp.pdf
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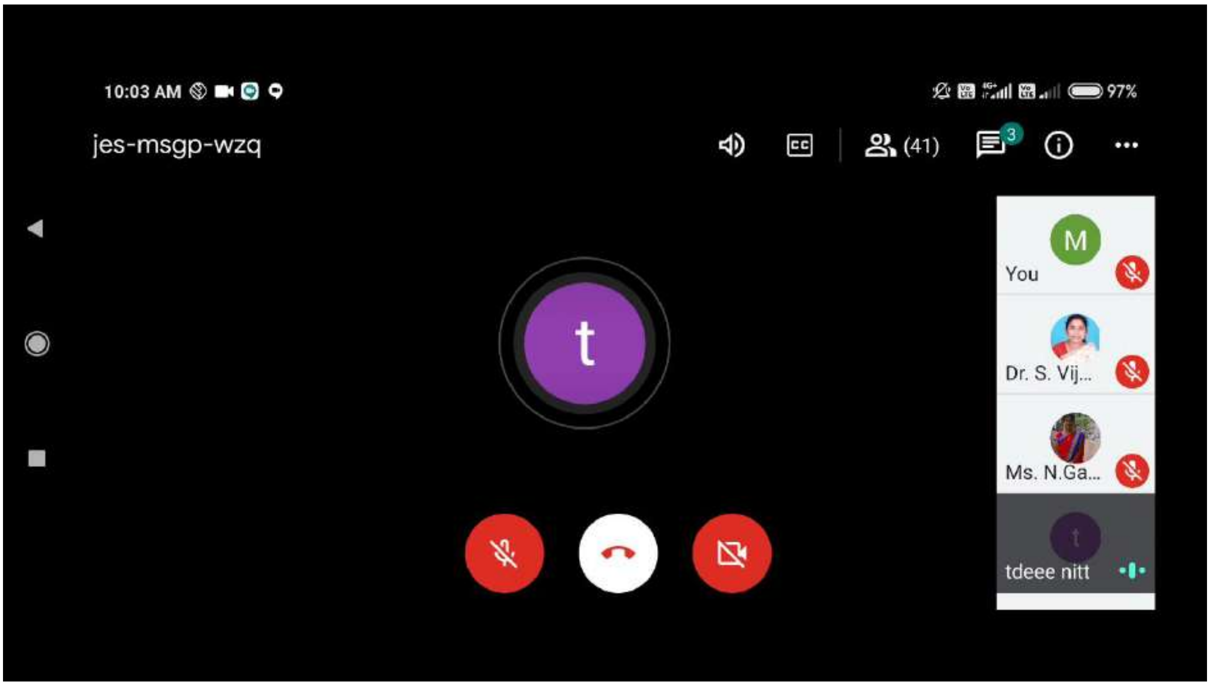
Tools
Sign In
Fill & Sign
Next
Close
FLL for Single Phase Grid Synchronization
Dr K Selvajyothi, IIITDM Kancheepuram
Grid Connected Inverter
Parameter | Values
Grid Voltage | 100 V
Grid Frequency | 50 Hz
Inverter Filter Inductor (L) | 4 mH
Inverter Battery Voltage | 64 V
Proposed FLL
Discrete TF of inverter:
Discrete TF of PR controller:
Pole placement technique is used to calculate the controller gains
Actual closed loop poles of PR controller:
Assumed closed loop poles of PR controller:
24

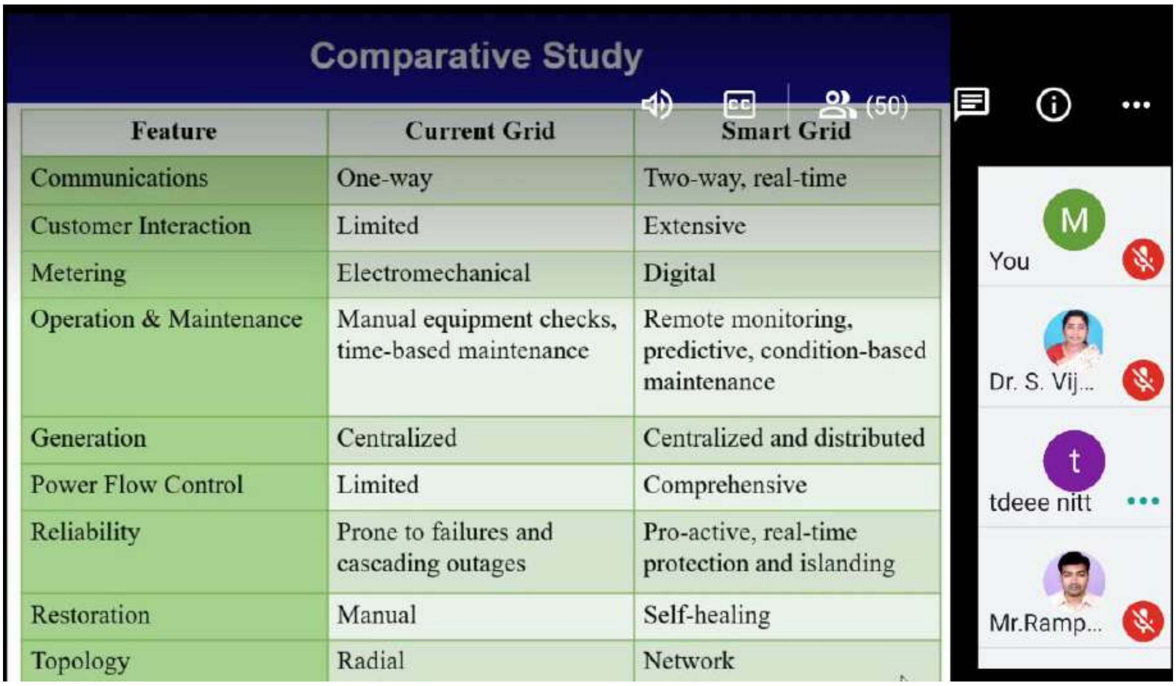
17.07.2020

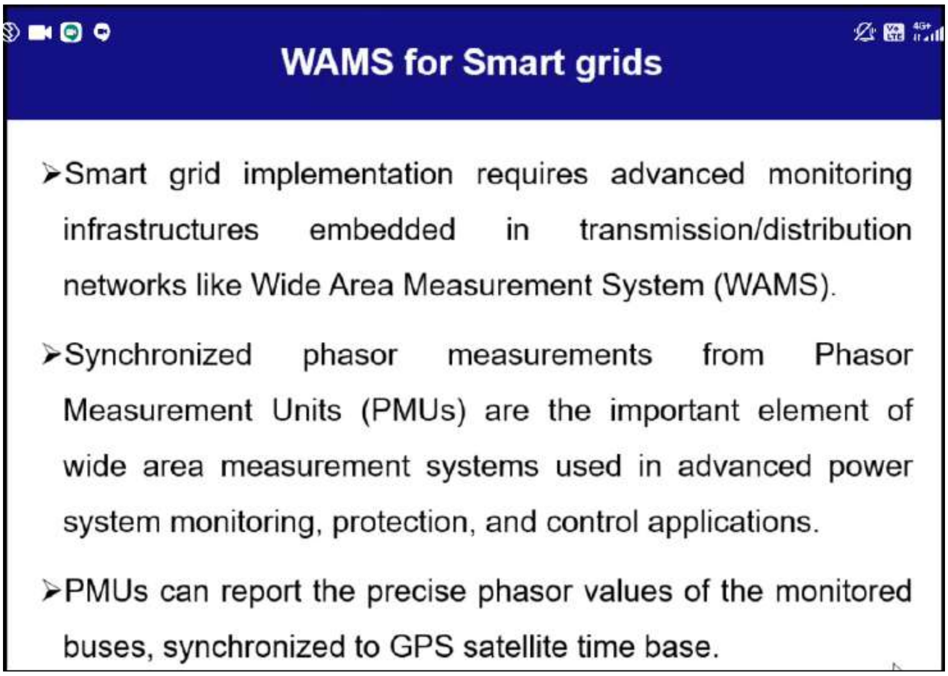
Friday

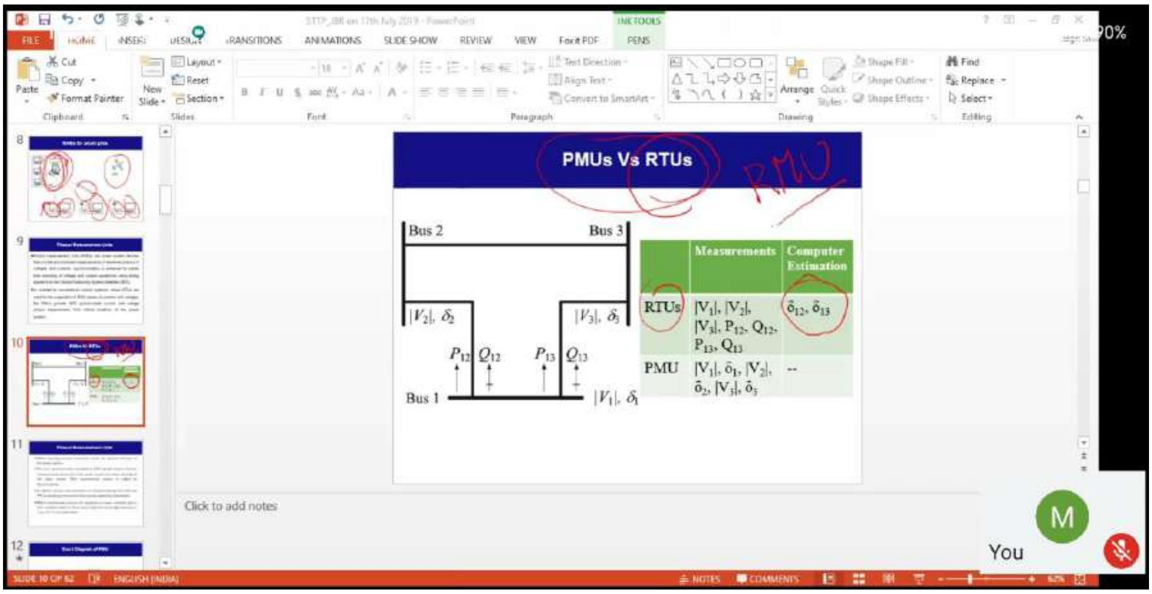
Dr.Jaya Bharata Reddy
Professor, Department of Electrical and Electronics Engineering
National Institute of Technology Trichy
Tiruchirapalli, Tamil Nadu.
Topic: Synchrophasor applications in Smart Grid

17.07.2020
Friday
FN Session
10.00 AM to 12.00 PM





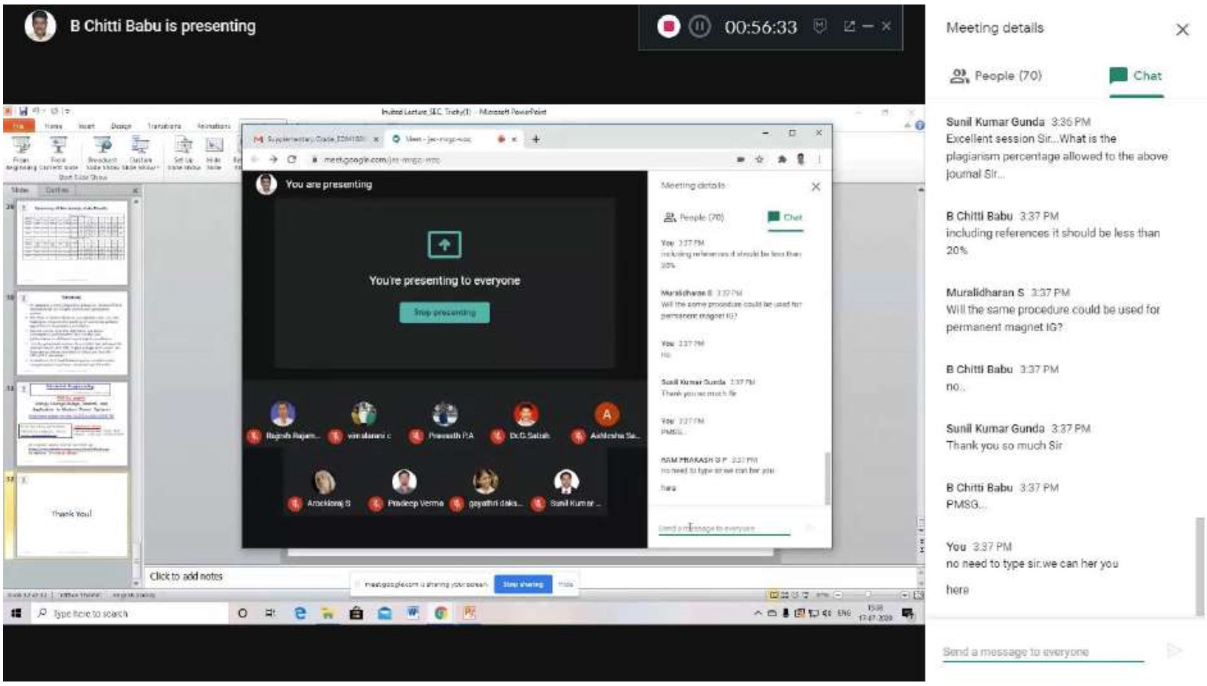

WAMS for Smart grids
➢Smart grid implementation requires advanced monitoring infrastructures embedded in transmission/distribution networks like Wide Area Measurement System (WAMS).
➢Synchronized phasor measurements from Phasor Measurement Units (PMUs) are the important element of wide area measurement systems used in advanced power system monitoring, protection, and control applications.
➢PMUs can report the precise phasor values of the monitored buses, synchronized to GPS satellite time base.

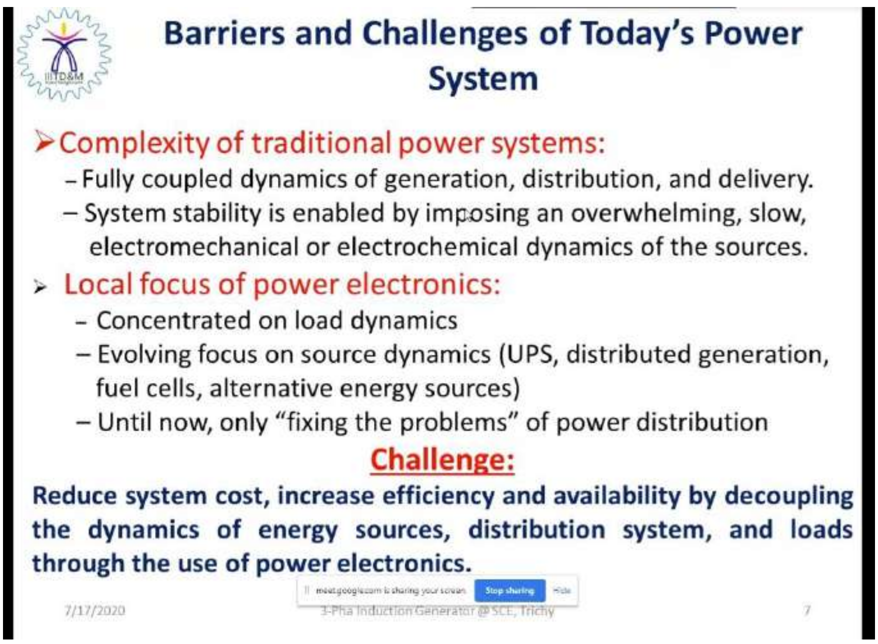

PMUs Vs RTUs
Bus 2
Bus 3
Bus 1
$|V_2|, \delta_2$
$|V_3|, \delta_3$
$|V_1|, \delta_1$
P_{12} Q_{12}
P_{13} Q_{13}
Measurements
Computer Estimation
RTUs
$|V_1|, |V_2|, |V_3|, P_{12}, Q_{12}, P_{13}, Q_{13}$
$\hat{\delta}_{12}, \hat{\delta}_{13}$
PMU
$|V_1|, \bar{\delta}_1, |V_2|, \bar{\delta}_2, |V_3|, \bar{\delta}_3$
--
Click to add notes
You

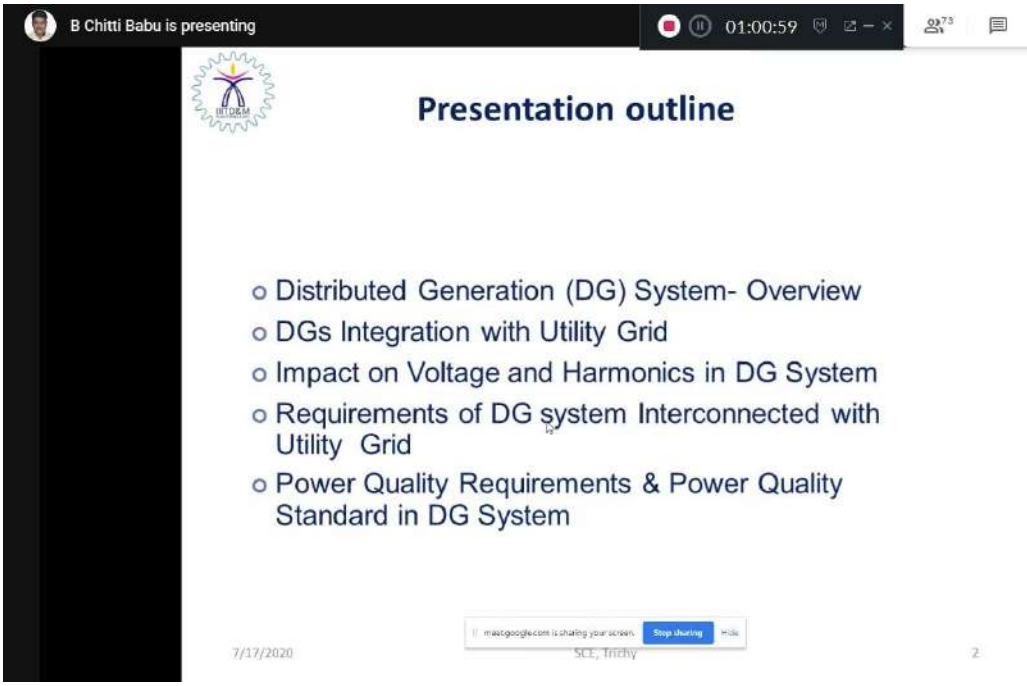
Dr.B.Chittibabu
Assistant Professor, Department of EEE
Indian Institute of Information Technology, Design & Manufacturing
Kancheepuram, Tamil Nadu

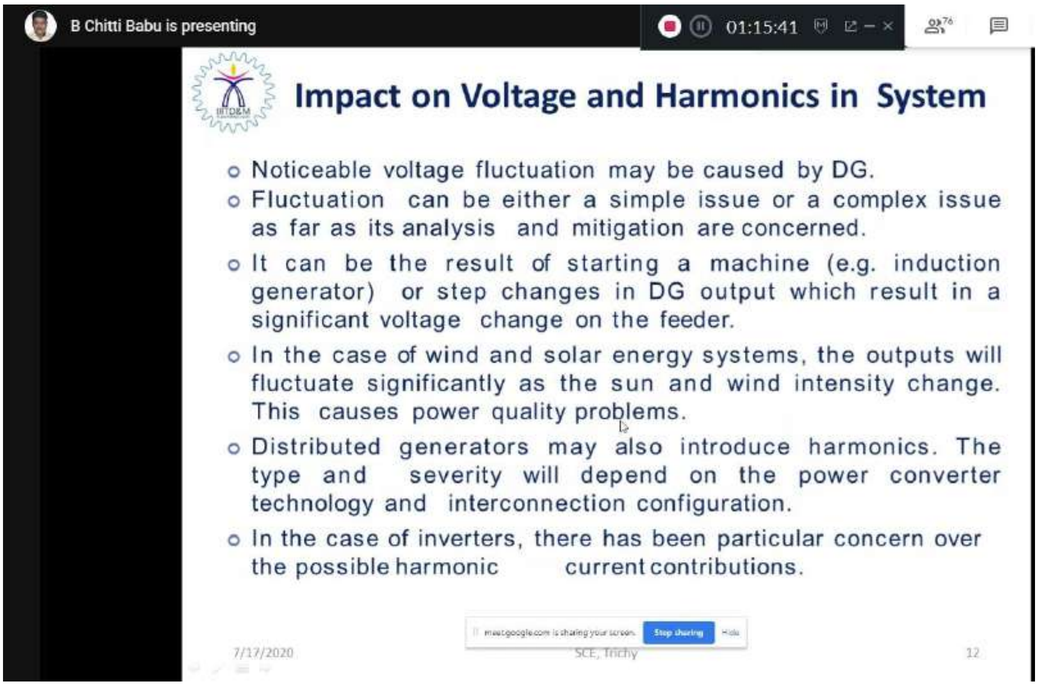
17.07.2020
Friday
AN Session
02.00 PM to 04.00 PM

Topic: Control of Self-Excited Induction Generator (SEIG) with improved the power Quality in the off-grid system






B Chitti Babu is presenting
01:00:59
Presentation outline
Distributed Generation (DG) System- Overview
DGs Integration with Utility Grid
Impact on Voltage and Harmonics in DG System
Requirements of DG system Interconnected with Utility Grid
Power Quality Requirements & Power Quality Standard in DG System
7/17/2020
SCE, Trichy
2

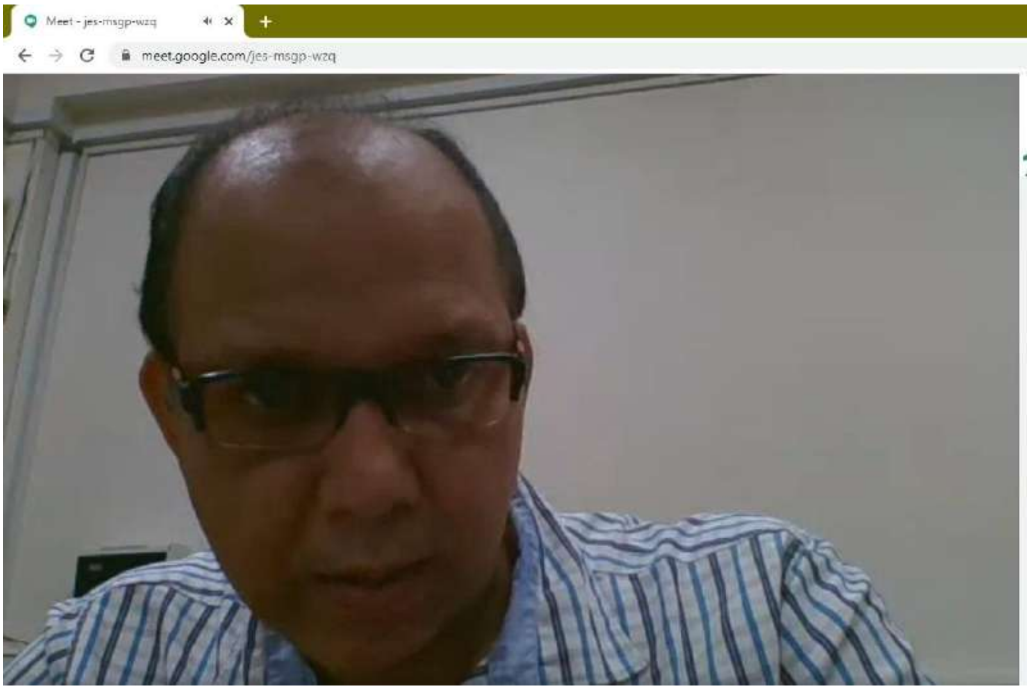

B Chitti Babu is presenting
01:15:41
Impact on Voltage and Harmonics in System
Noticeable voltage fluctuation may be caused by DG.
Fluctuation can be either a simple issue or a complex issue as far as its analysis and mitigation are concerned.
It can be the result of starting a machine (e.g. induction generator) or step changes in DG output which result in a significant voltage change on the feeder.
In the case of wind and solar energy systems, the outputs will fluctuate significantly as the sun and wind intensity change. This causes power quality problems.
Distributed generators may also introduce harmonics. The type and severity will depend on the power converter technology and interconnection configuration.
In the case of inverters, there has been particular concern over the possible harmonic current contributions.
7/17/2020
SCE, Trichy
12

18.07.2020

Saturday

Dr. Kalyan Chatterjee
HOD & Associate Professor, Department of EEE
Indian Institute of Technology Dhanbad
Dhanbad.
Topic: Fault ride-through capability of WECS

18.07.2020
Saturday
FN Session
10.00 AM to 12.00 PM



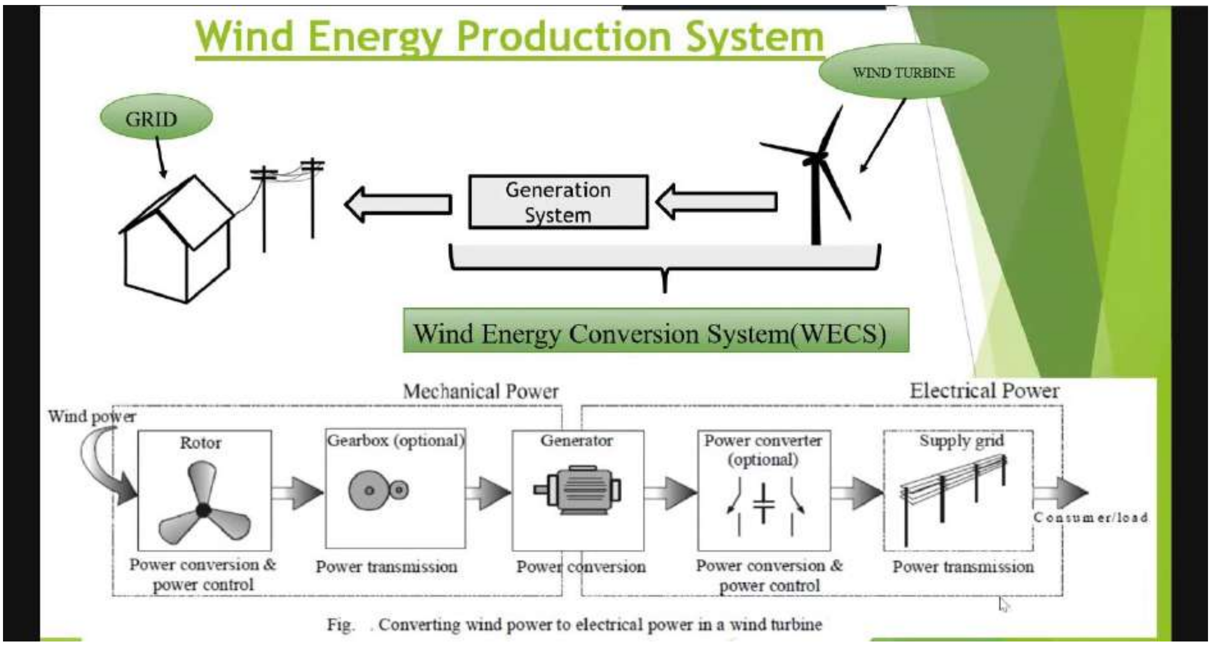
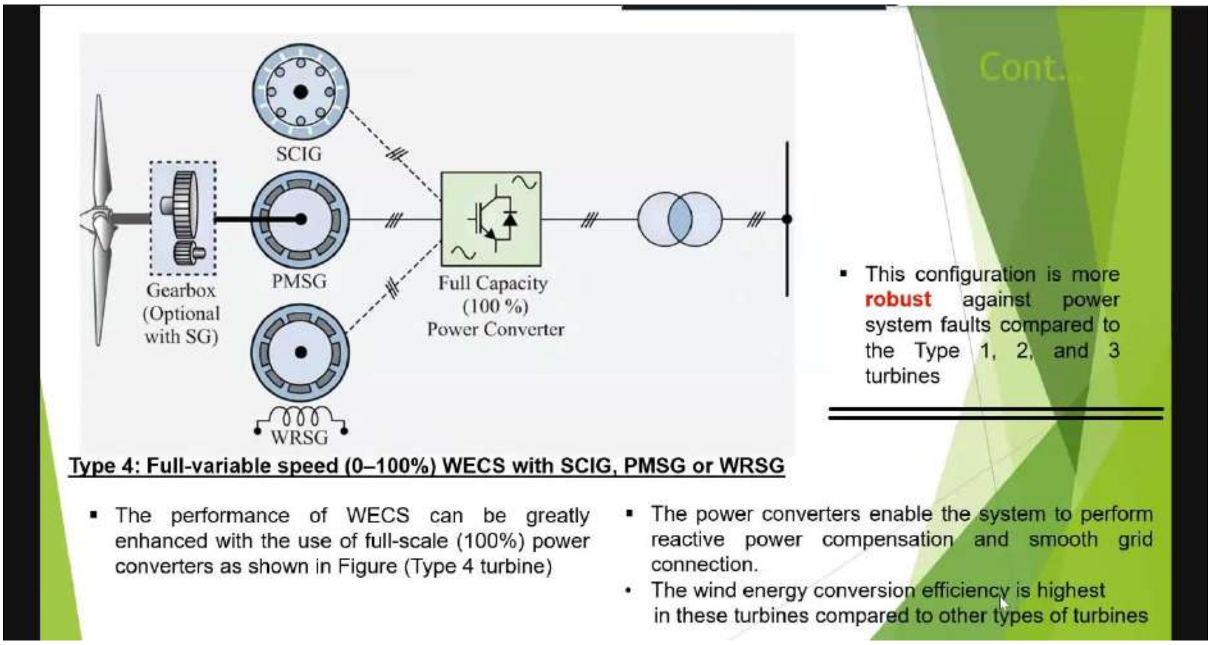
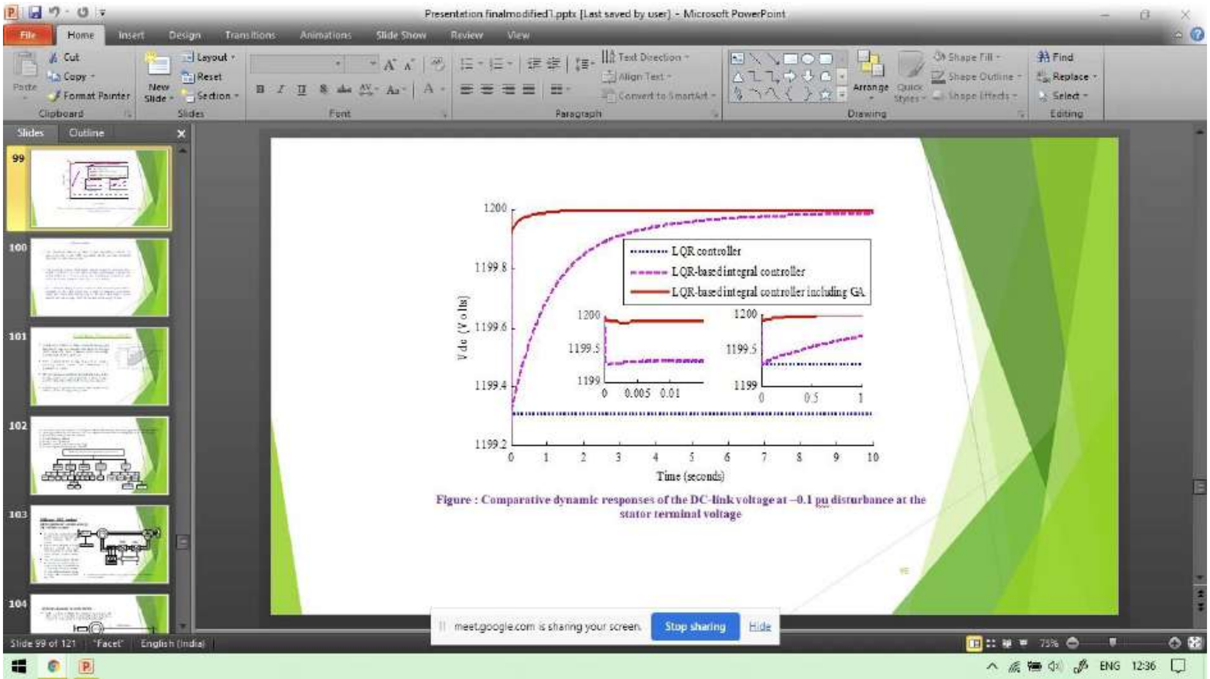


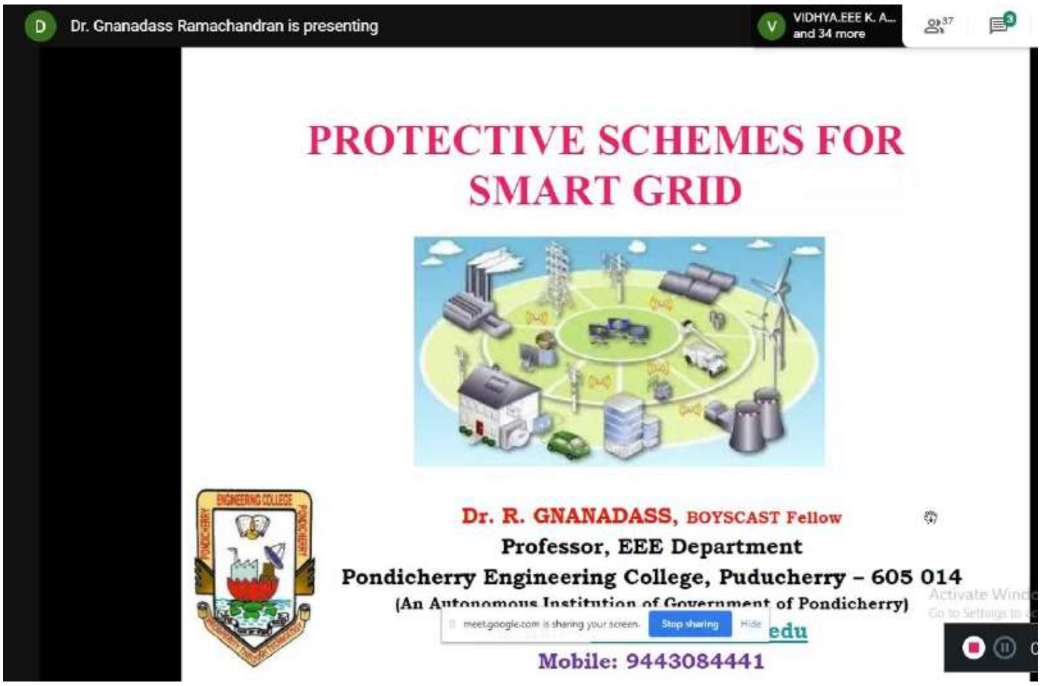
Fig. . Converting wind power to electrical power in a wind turbine

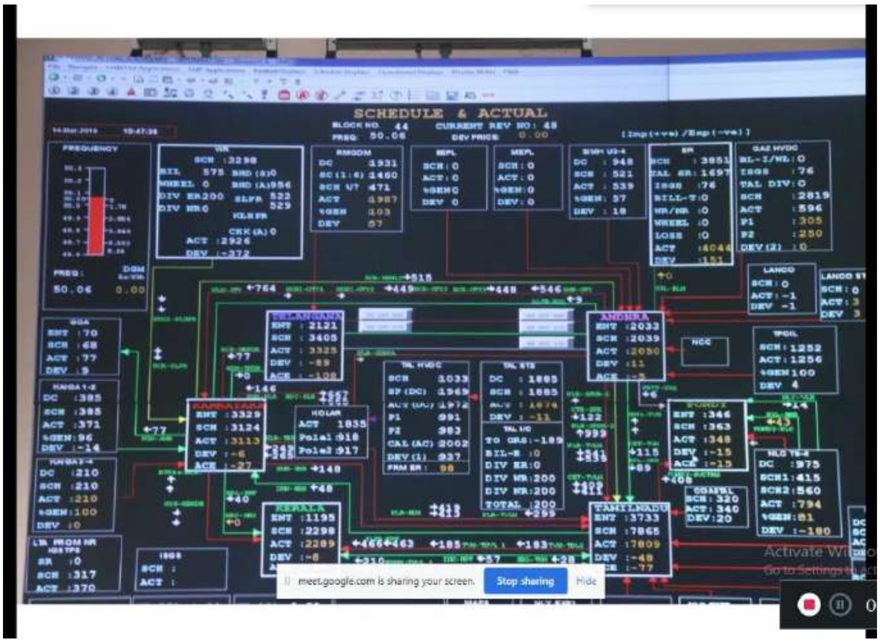

Cont...
SCIG
PMSG
WRSG
Gearbox (Optional with SG)
Full Capacity (100 %) Power Converter
Type 4: Full-variable speed (0–100%) WECS with SCIG, PMSG or WRSG
This configuration is more robust against power system faults compared to the Type 1, 2, and 3 turbines
The performance of WECS can be greatly enhanced with the use of full-scale (100%) power converters as shown in Figure (Type 4 turbine)
The power converters enable the system to perform reactive power compensation and smooth grid connection.
The wind energy conversion efficiency is highest in these turbines compared to other types of turbines


Presentation finalmodified1.pptx [Last saved by user] - Microsoft PowerPoint
Vdc (Volts)
Time (seconds)
LQR controller
LQR-based integral controller
LQR-based integral controller including GA
Figure : Comparative dynamic responses of the DC-link voltage at –0.1 pu disturbance at the stator terminal voltage
meet.google.com is sharing your screen.
Stop sharing
Hide
Slide 99 of 121
"Facet"
English (India)

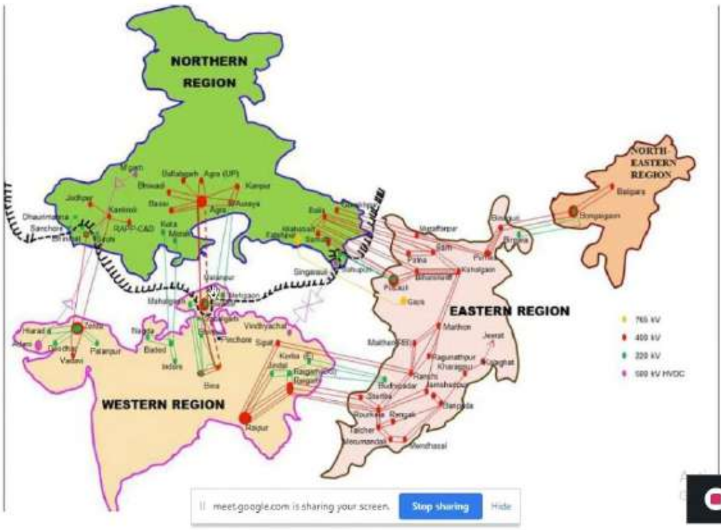
Dr. R. Gnanadass
Professor, Department of Electrical and Electronics Engineering
Pondicherry Engineering College
Pondicherry.
Topic: Protection Schemes in Smart Grid

18.07.2020
Saturday
AN Session
02.00 PM to 04.00 PM





Angular Separation on 30th July 2012



Ref: Report of the Enquiry Committee on Grid Disturbance, 16th August 2012

AI based PS Research Problems

- Transformer Loading Prediction
- Transmission Line Overloading Prediction
- Battery failure Prediction
- Power Quality Prediction
- Power System Fault Prediction
- Maximum Demand Prediction
- ABT Predi

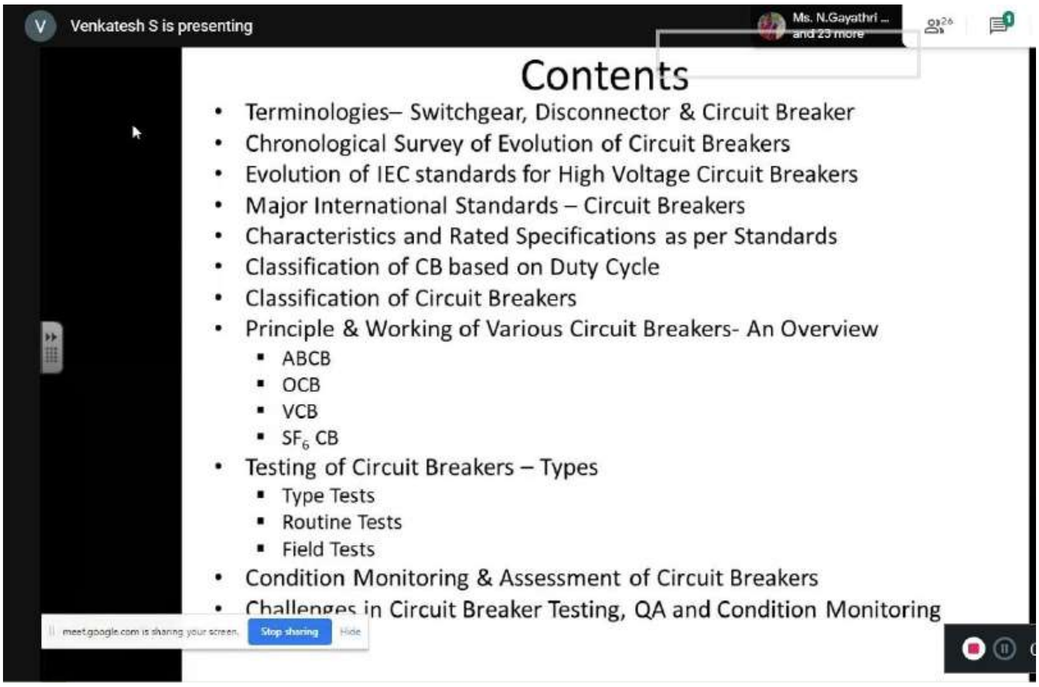
20.07.2020

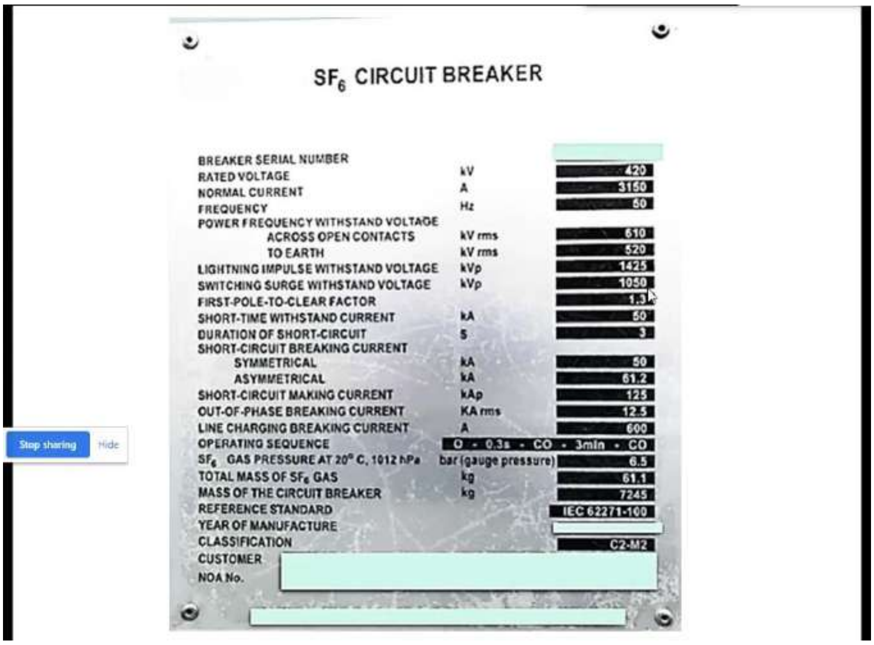
Monday

Dr.S.Venkatesh
Associate Professor, Department of EEE
Vellore Institute of Technology
Vellore.

20.07.2020
Monday
FN Session
10.00 AM to 12.00 PM

Topic: Trends and Challenges in High Voltage Circuit Breaker Testing, Quality Assessment and Condition Monitoring





Classification of CB based on Duty Cycle

- **Mechanical Operation- Class M1 and M2**
  - **Class M1** - Relatively small switching transmission lines (type tested for 2000 operations)
  - **Class M2** - Frequent switching of reactors, capacitor banks, industrial applications (type tested for 10000 operations)
- **Electrical Endurance- Class E1 and E2**
  - **Class E1:**
  - No requirement for electrical endurance for circuit-breakers at voltages ≥ 52 kV
  - Generally, Class E1 CB are adequate
  - **Class E2:**
  - Proposes a test procedure for electrical endurance tests for rated voltages ≥ 72.5 kV
  - Special applications (e.g. frequent fault occurrence, pumping stations, capacitor banks, etc.)
- **Capacitive Current Switching Operations- Class C1 and C2**
  - **Class C1** - Medium voltage circuit-breakers and circuit-breakers applied for infrequent switching of transmission lines and cables.
  - **Class C2** - Capacitor bank circuit-breakers and those used on frequently switched transmission lines and cables

References

[1] C. H. Flurscheim, "Power Circuit Breaker Theory and Design", IEE Power Engineering Series 1, Peter Peregrinus Ltd., 2nd Edition, 1985

[2] Ruben D Garzon, "High Voltage Circuit Breakers- Design and Application", Marcel Dekker, New York, 2nd Edition, 2002

[3] IEC 62271- High-voltage switchgear and controlgear - Part 1: Common specifications for alternating current switchgear and controlgear

[4] IEC/TR 62271-306 - High-voltage switchgear and controlgear, Part 306: Guide to IEC 62271-100, IEC 62271-1 and other IEC standards related to alternating current circuit-breakers

[5] IEEE Std C37.010- IEEE Application Guide for AC High Voltage Circuit Breakers > 1000 Vac Rated on a Symmetrical Current Basis

[6] IS/IEC 60947-2 - Low-Voltage Switchgear and Controlgear, Part 2: Circuit Breakers [ETD 7: Low Voltage Switchgear and Control-gear

[7] IEC 60427 - Synthetic Testing of High-Voltage Alternating Current Circuit-Breakers

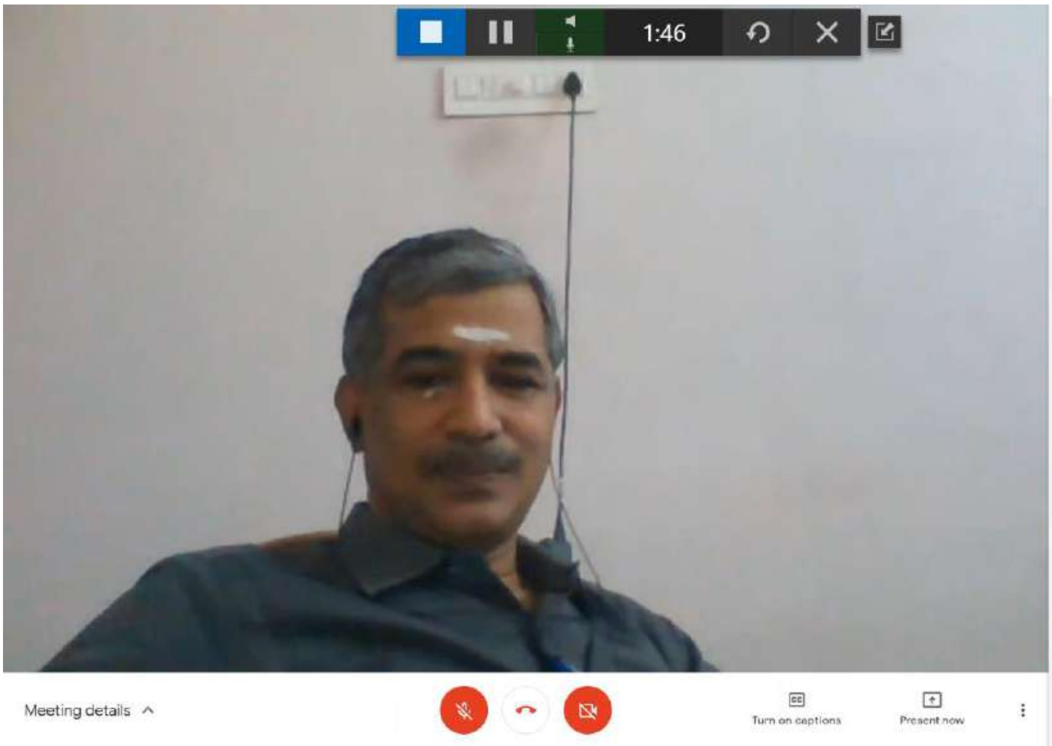
[8] IEC/TR 62271-300 -High-voltage switchgear and controlgear – Part 300: Seismic qualification of alternating current circuit-breakers

[9] IEEE C37.20.2-2015 - IEEE Standard for Metal-Clad Switchgear

[10] IEEE C37.04-2018 - IEEE Standard for Ratings and Requirements for AC High-Voltage Circuit Breakers with Rated Maximum Voltage Above 1 kV

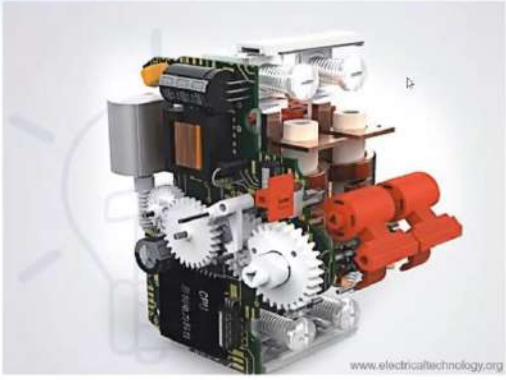
Dr.V.Saravanan
Professor, Department of Electrical and Electronics Engineering
Thiagarajar College of Engineering
Madurai.
Topic: Selection and Ratings of Protective Devices for Domestic & Commercial Electrical Installation

20.07.2020
Monday
AN Session
02.00 PM to 04.00 PM



WiFi Circuit Breaker

- WiFi circuit breakers are same like normal and ordinary CBs with
  - An antenna for WiFi signals
  - a special mechanical switch mechanism for automatic ON/OFF operation



Selection of Protective Devices

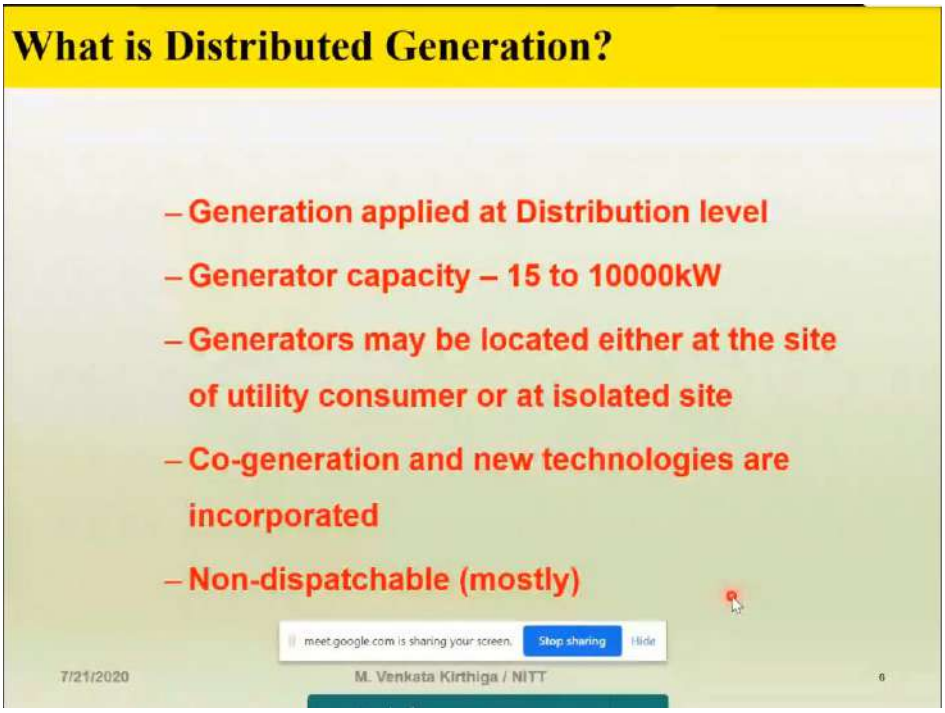
Purpose	Device	Protection
11KV Incomer	Vacuum CB	OL,SC & Earth Fault
MV Main DB	Air Blast CB	OL,SC & Earth Fault
125A to 630A	MCCB	OL,SC & Earth Fault
1A to 125A	MCB	OL & SC
Up to 20A	Fuse	OL & SC
Domestic/Public Bldg.	ELCB	OL,SC & Earth Fault
Voltage Sensitive Devices	SPD / LA	Surge Protection

21.07.2020

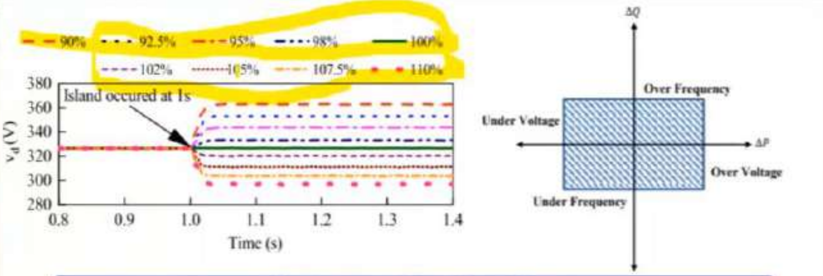
Tuesday

Dr. M.Venkata Kirthiga
Associate Professor, Department of EEE
National Institute of Technology Trichy
Tiruchirapalli.
Topic: Islanding Detection Schemes in Micro-grids

21.07.2020
Tuesday
FN Session
10.00 AM to 12.00 PM



NON-DETECTION ZONE



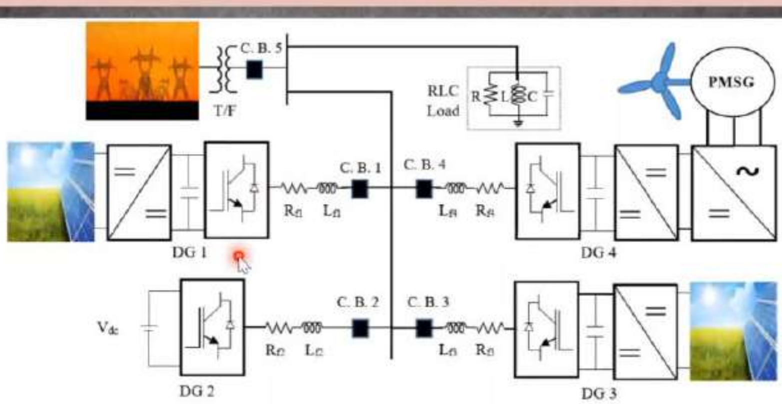
Greater power mismatch condition

- Power generation > Power demand and Power generation < Power demand

Lesser power mismatch condition

- Power generation ≅ Power demand
- Power generation == Power demand (**Perfectly matched power condition or zero power mismatch condition**)

TEST SYSTEM



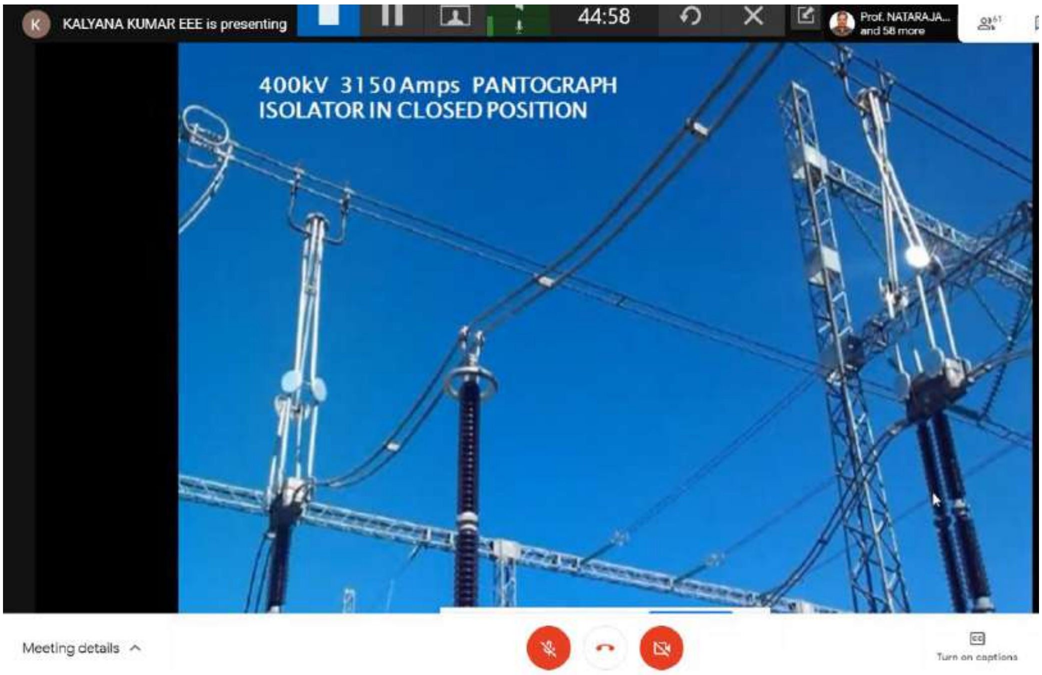
Each DG is incorporated with the proposed methodology

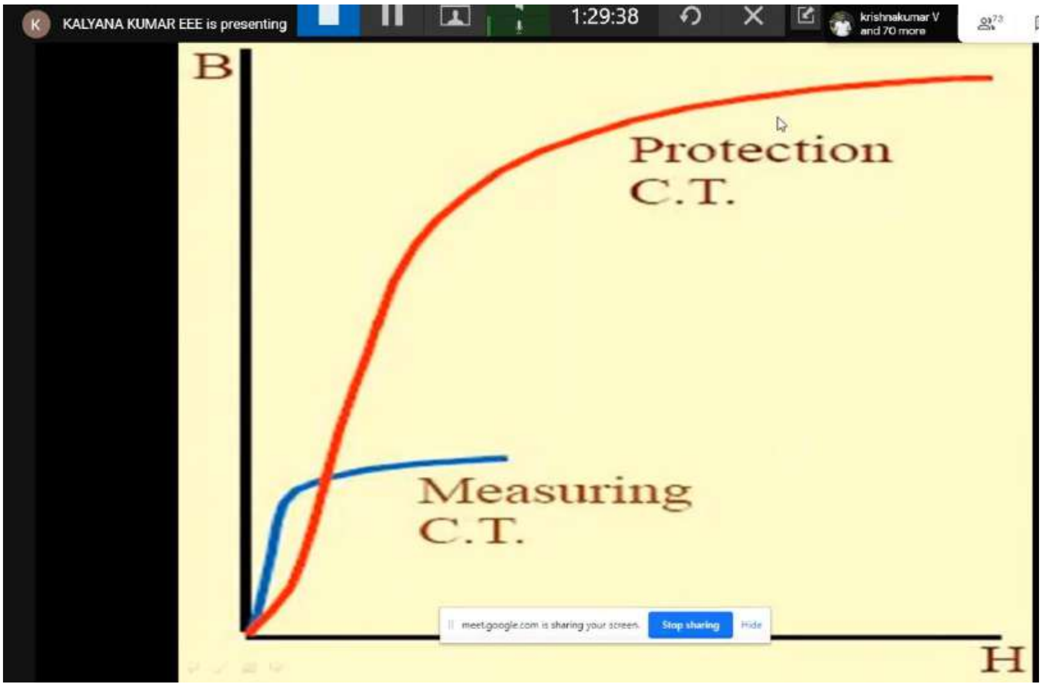
DG	Power Rating (kW)	DG	Power Rating (kW)
1	100	3	300
2	200	4	400

Dr.D.Kalyanakumar
Professor, Department of Electrical and Electronics Engineering
Thiagarajar College of Engineering
Madurai.

21.07.2020
Tuesday
AN Session
02.00 PM to 04.00 PM

Topic: TECHNICAL REQUIREMENTS - *from Protection Perspectives* for Power System Reliability





VALEDICTORY SESSION

The six days AICTE Sponsored Online Short Term Training Programme on Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switch Gear (Phase - I) ended with a valedictory session. Mr.P.Ram Prakash, Assistant Professor, Department of Electrical and Electronics Engineering thanked all the participants and resource person with his valedictory speech.

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Venkateswara Nagar, Panjappur, Tiruchirapalli - 620012

DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING

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sponsored

online Short Term Training Programme (STTP)

on

Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switchgear

23.07.2020 - 29.07.2020 (Phase II)

KEYNOTE SPEAKERS

Dr.H D Mathur
Asso. Professor, BITS Pilani

Dr.Manas Kumar Jena
AP, IIT Palakkad

Dr. S.Kumaravel
Asso. Professor, NIT Calicut

Dr. Shelas Sathyan
AP, NIT Trichy

Dr. Manoranjan Sahoo
AP, NIT Trichy

Dr.V.Saravanan
Professor, TCE Madurai

Dr.C.K.Babulal
Professor, TCE Madurai

Dr.C.Sharmeela
AP, AU Chennai

Dr.K. Vijayakumar
AP, IIITD&M Kancheepuram

Dr.P.Maruthupandi
AP, GCT Coimbatore

Mr.A.Annamalai
Manager, BHEL Trichy

Mr.P.Gnanagirija
Expert, DNV GL Chennai

Dr.C.Krishnakumar	Dr.D.Valavan	Shri.S.Ravindran
HoD / EEE, Coordinator	Principal	Secretary

Register at: https://forms.gle/7eMBQDEWCnyigFLy8
www.saranathan.ac.in

1. No Registration Fee
2. E-Certificate will be provided to all the Active Participants

AICTE

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One week online Short Term Training Programme (STTP)
On

Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switchgear (Phase II)

23.07.2020 to 29.07.2020

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Brochure


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DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING
AICTE
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online Short Term Training Programme (STTP)
on
Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switchgear
23.07.2020 - 29.07.2020 (Phase II)
KEYNOTE SPEAKERS
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Dr.Manas Kumar Jena
AP, IIT Palakkad
Dr. S.Kumaravel
Asso. Professor, NIT Calicut
Dr. Shelas Sathyan
AP, NIT Trichy
Dr. Manoranjan Sahoo
AP, NIT Trichy
Dr.V.Saravanan
Professor, TCE Madurai
Dr.C.K.Babulal
Professor, TCE Madurai
Dr.C.Sharmeela
Asso.Professor, AU Chennai
Dr.K. Vijayakumar
AP, IIITD&M Kancheepuram
Dr.P.Maruthupandi
AP, GCT Coimbatore
Mr.A.Annamalai
Manager, BHEL Trichy
Mr.P.Gnanagirija
Expert, DNV GL Chennai
Dr.C.Krishnakumar
HoD / EEE, Coordinator
Dr.D.Valavan
Principal
Shri.S.Ravindran
Secretary
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AICTE Sponsored Six day Online Short-Term Training Programme on Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switchgear (Phase II)

SCHEDULE OF TRAINING PROGRAMME

Day/ Session	FORENOON SESSION (10.00 A.M -12.00 P.M)		AFTERNOON SESSION (2.00 P.M -4.00 P.M)
23.07.20 THU	**Inauguration** **Dr. Hitesh Dutt Mathur** Associate Professor, BITS Pilani **Protection Challenges and Strategies in Smart Grid Scenario**	**L U N C H B R E A K**	**Mr. A. Annamalai** Manager, BHEL Trichy **HVDC System: Direct solutions for Long distance Bulk Power Transmission**
24.07.20 FRI	**Dr.Manas Kumar Jena** Assistant Professor, IIT Palakkad **Synchrophasor Technology in Smart Grid**		**Dr. K. Vijayakumar** AP, IIIT&D, Kancheepuram, **Power conversion strategies in wind energy conversion system**
25.07.20 SAT	**Dr.Manoranjan Sahoo** Assistant Professor, NIT Trichy **Multi-phase induction motor drive for high power Electric vehicle**		**Dr.C.K.Babulal** Professor, TCE Madurai **Fuzzy Logic based Power Quality Evaluation**
27.07.20 MON	**Dr.ShelasSathyan** Assistant Professor,NIT,Trichy **Design of power electronic Converters-Gate Drivers and Magnetic components**		**Mr.P.Gnanagirija** Electrical Expert, DNV GL, Chennai **Basic Design Parameters of Power System Protection**
28.07.20 TUE	**Dr.V.Saravanan**, Professor, TCE, Madurai **Selection and Ratings of Protective Devices for Domestic & Commercial Electrical Installation**		**Dr.C.Sharmeela** Associate Professor, AU Chennai **Protection Requirements for Solar Photovoltaic Systems**
29.07.20 WED	**Dr.S.Kumaravel** Associate Professor, NIT Calicut **Power Electronic Applications in High Voltage Engineering**		**Dr.P.Maruthupandi** Assistant Professor, GCT Coimbatore **Control and Protection Schemes in Grid connected PV systems**

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Venkateswara Nagar, Panjappur, Tiruchirappalli – 12

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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Cordially invites you

for the Inaugural function of the

AICTE Sponsored

Six days online Short TermTraining Programme (STTP)

on

Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switchgear (Phase II)

July23, 2020
09:30 am

Chief Guest

DR. HITESH DUTT MATHUR
Associate Professor, BITS Pilani

Dr.C.Krishnakumar	**Dr.D.Valavan**	**Shri. S. Ravindran**
Coordinator,Prof & Head /EEE	**Principal**	**Secretary**

INAUGURAL CEREMONY

The six days AICTE Sponsored Online Short-Term Training Programme on Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switchgear (Phase - II) started on 223rd July with an inauguration ceremony. Coordinator of the STTP, Dr. C. Krishnakumar, Professor & Head, Department of Electrical and Electronics Engineering welcomed all the participants with his welcome address. Dr. D. Valavan, Principal of Saranathan College of Engineering, added a special value to the STTP by delivering felicitation address. The Inauguration ceremony ended with vote of thanks given by Dr.K.Rajkumar, Assistant Professor, EEE, SCE.

DAY-1

23.07.2020

Thursday

FN Session

10.00 AM to 12.00 PM

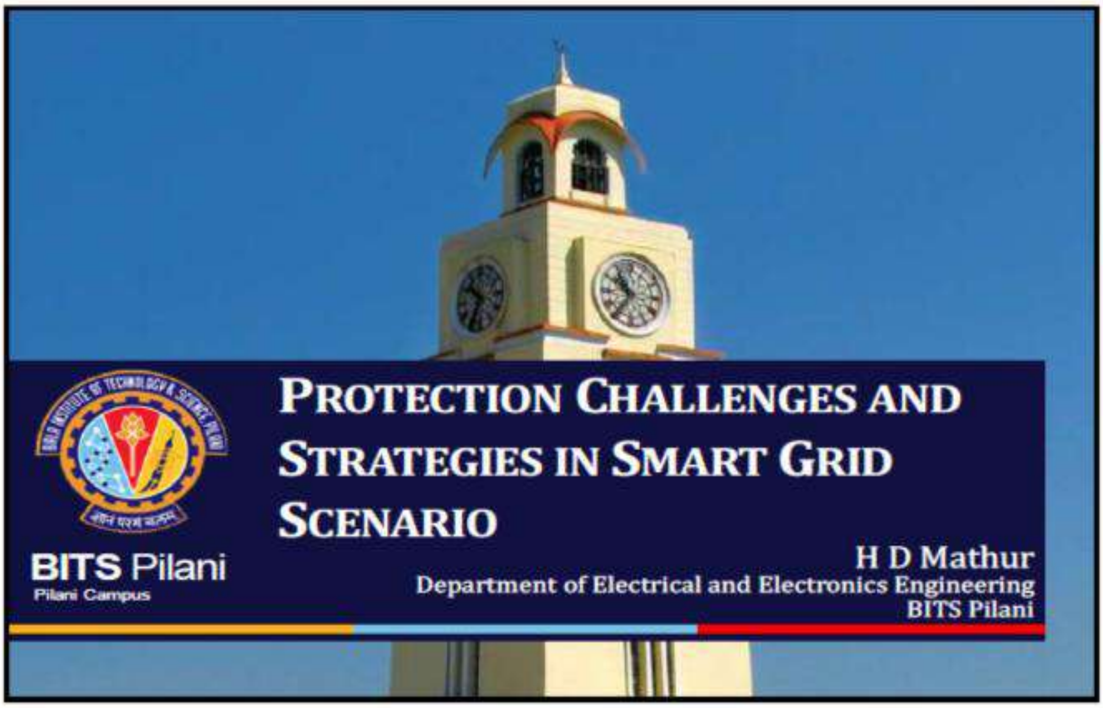
Resource Person

Dr.HiteshDutt Mathur

Associate Professor,

BITS Pilani.

Topic: Protection Challenges and Strategies in Smart Grid Scenario



Protection Challenges and Strategies in Smart Grid Scenario

H D Mathur
Department of Electrical and Electronics Engineering
BITS Pilani

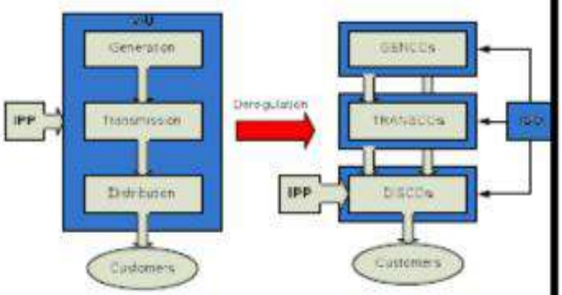
BITS Pilani
Pilani Campus

Deregulation in Power System

innovate achieve lead

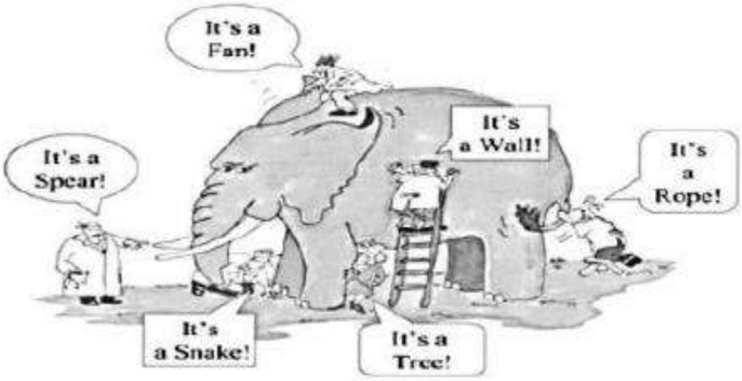
⇒ Some of the significant benefits of power industry deregulation include:
- Generation and distribution of electric power is **made free from monopoly structure**
- **Reduction of electricity price** due to competitive environment
- **Development of innovative technologies** in different sectors of power industry

The Electricity Act, 2003 *is an Act of the Parliament of India enacted to transform the power sector in India.*



SMART GRID DEFINITION

What is smart grid?



…depends on the way we look at it!

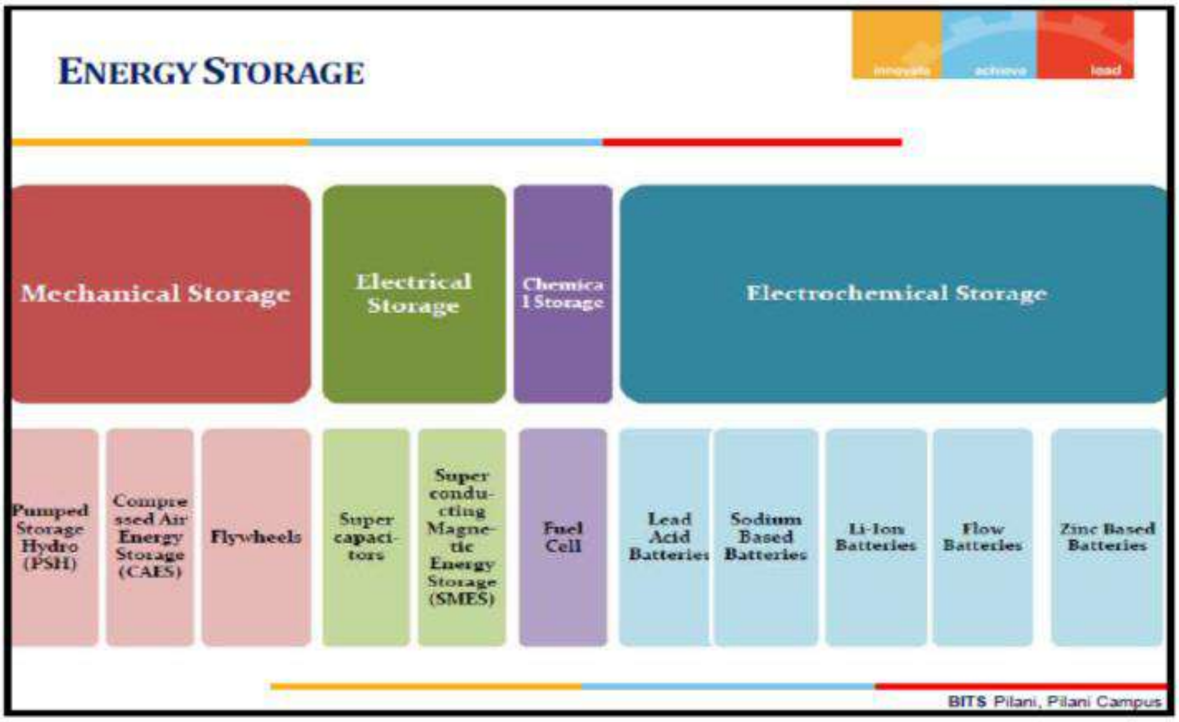
SMART GRID DEFINITION

Definition by National Institute of Standards and Technology (NIST), USA:

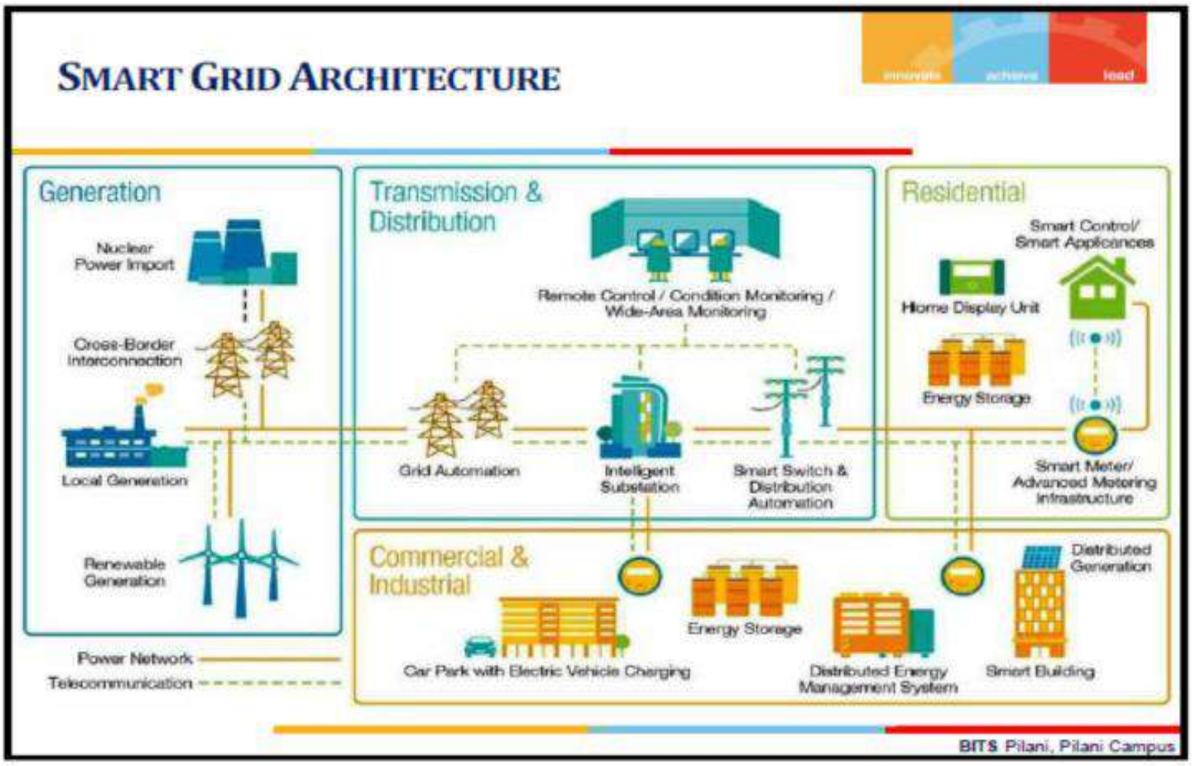
A modernized grid that enables bidirectional flows of energy and uses two-way communication and control capabilities that will lead to an array of new functionalities and applications.

IEEE:

- ❑ *Smart grid is a large 'System of Systems', where each functional domain consists of three layers: (i) the power and energy layer, (ii) the communication layer, and (iii) the IT/computer layer.*
- ❑ Layers (ii) and (iii) above are the enabling infrastructure that makes the existing power and energy infrastructure 'smarter'.



ENERGY STORAGE
innovate achieve lead
Mechanical Storage
Electrical Storage
Chemica l Storage
Electrochemical Storage
Pumped Storage Hydro (PSH)
Compressed Air Energy Storage (CAES)
Flywheels
Super capaci-tors
Super conducting Magnetic Energy Storage (SMES)
Fuel Cell
Lead Acid Batteries
Sodium Based Batteries
Li-Ion Batteries
Flow Batteries
Zinc Based Batteries
BITS Pilani, Pilani Campus



SMART GRID ARCHITECTURE
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Generation
Nuclear Power Import
Cross-Border Interconnection
Local Generation
Renewable Generation
Transmission & Distribution
Remote Control / Condition Monitoring / Wide-Area Monitoring
Grid Automation
Intelligent Substation
Smart Switch & Distribution Automation
Residential
Smart Control/ Smart Appliances
Home Display Unit
Energy Storage
Smart Meter/ Advanced Metering Infrastructure
Commercial & Industrial
Car Park with Electric Vehicle Charging
Energy Storage
Distributed Energy Management System
Distributed Generation
Smart Building
Power Network
Telecommunication
BITS Pilani, Pilani Campus

SMART GRID: FEW MAJOR CHALLENGES

- Reliable and Fast Communication, Big Data, Cyber Security.
- WAMS integration with EMS, SCADA/DMS implementation in the existing networks.
- Suitable Converter Topology and Controls for RES Integration.
- Optimal Siting, Sizing and Controls of Energy Storage Systems.
- Dealing with Intermittent Generation- Flexible Generation (High ramp rate), CHP and Thermal storage.
- Adaptive Protection in Active Distribution Network, Microgrid protection (DC more challenging)
- Regulatory Changes.
- Customers' Acceptance to RES Deployment and Demand Side Participation- Social survey

MICROGRID STRUCTURE

NATIONAL ENERGY STORAGE MISSION

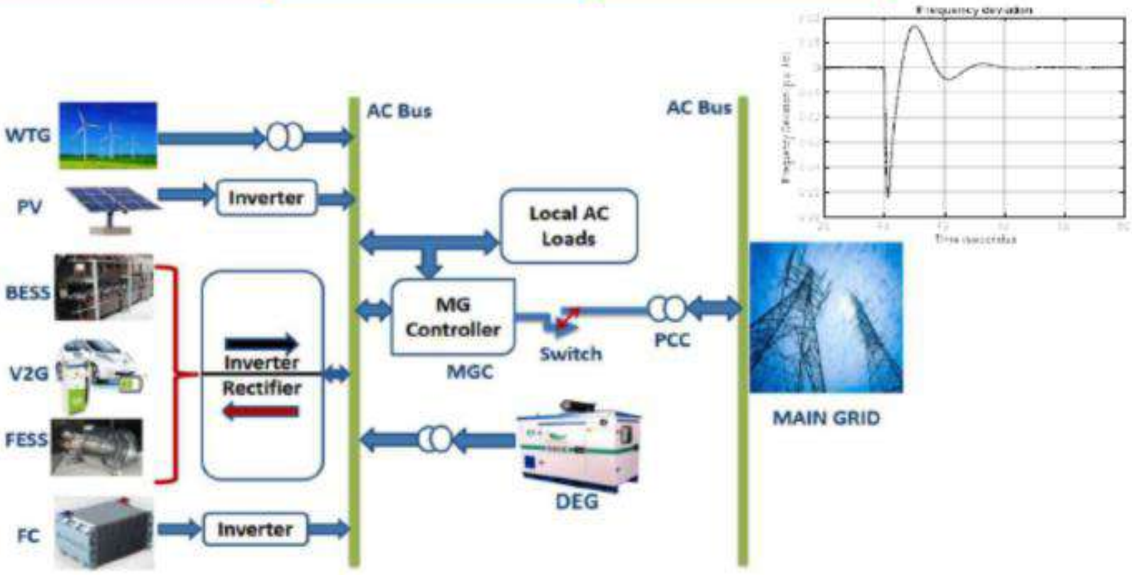
Government of India
Ministry of New and Renewable Energy

1. Integrating renewable energy with distribution and transmission grids.

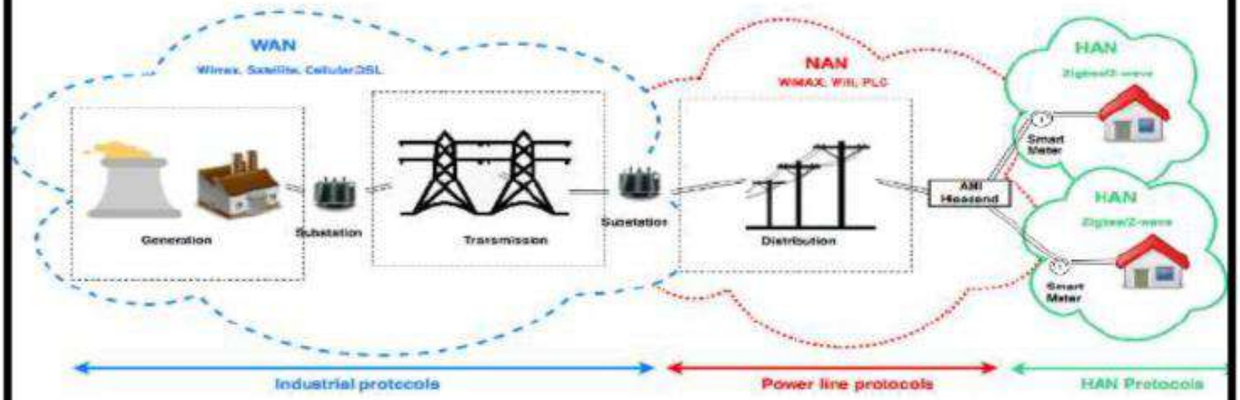
2. Setting Rural micro grids with diversified loads or stand-alone systems.

3. Developing Storage component of electric mobility plans.

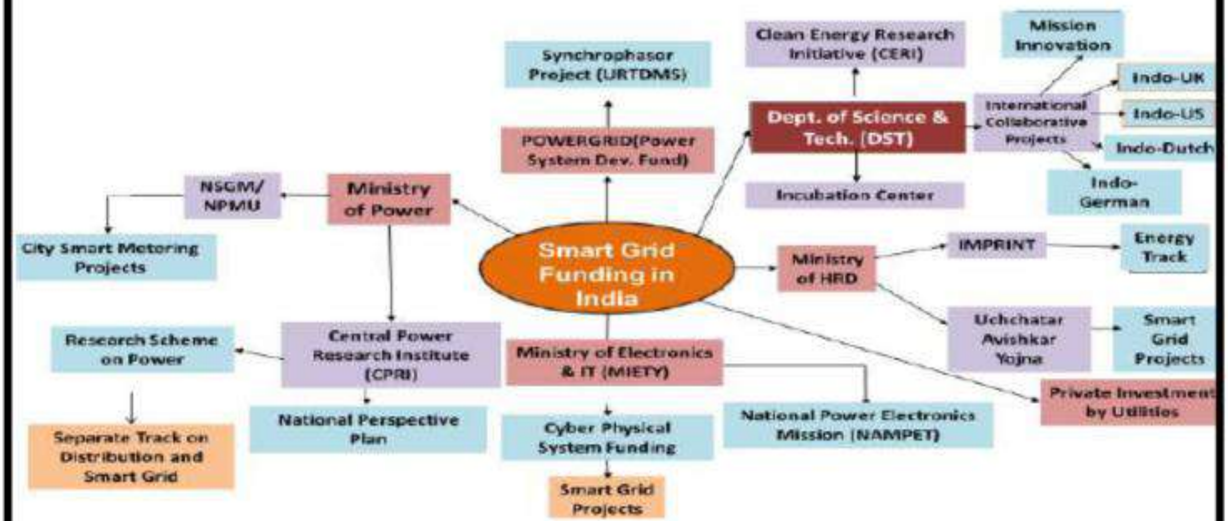
EFFECT OF INTEGRATING EVS INTO THE GRID



CYBER SECURITY



SMART GRID FUNDING IN INDIA



DAY-1

23.07.2020

Thursday

AN Session

02.00 PM to 04.00 PM

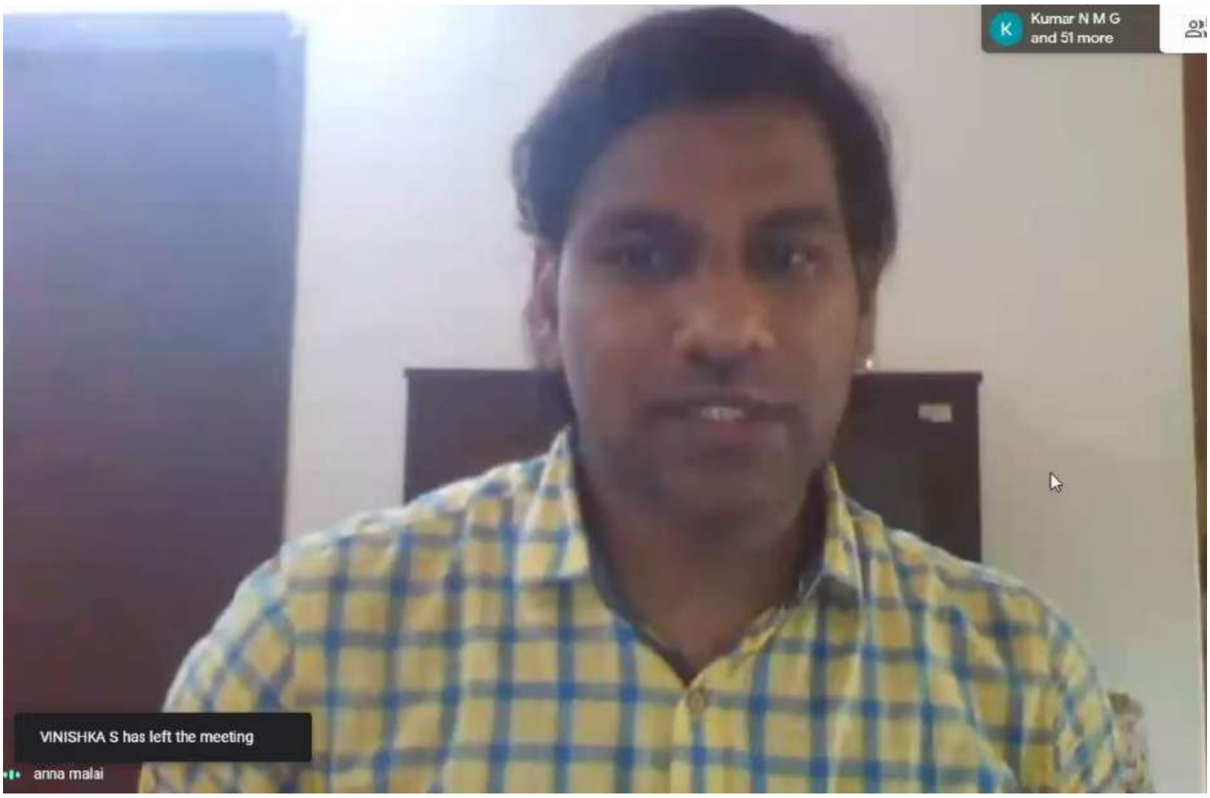
Resource Person

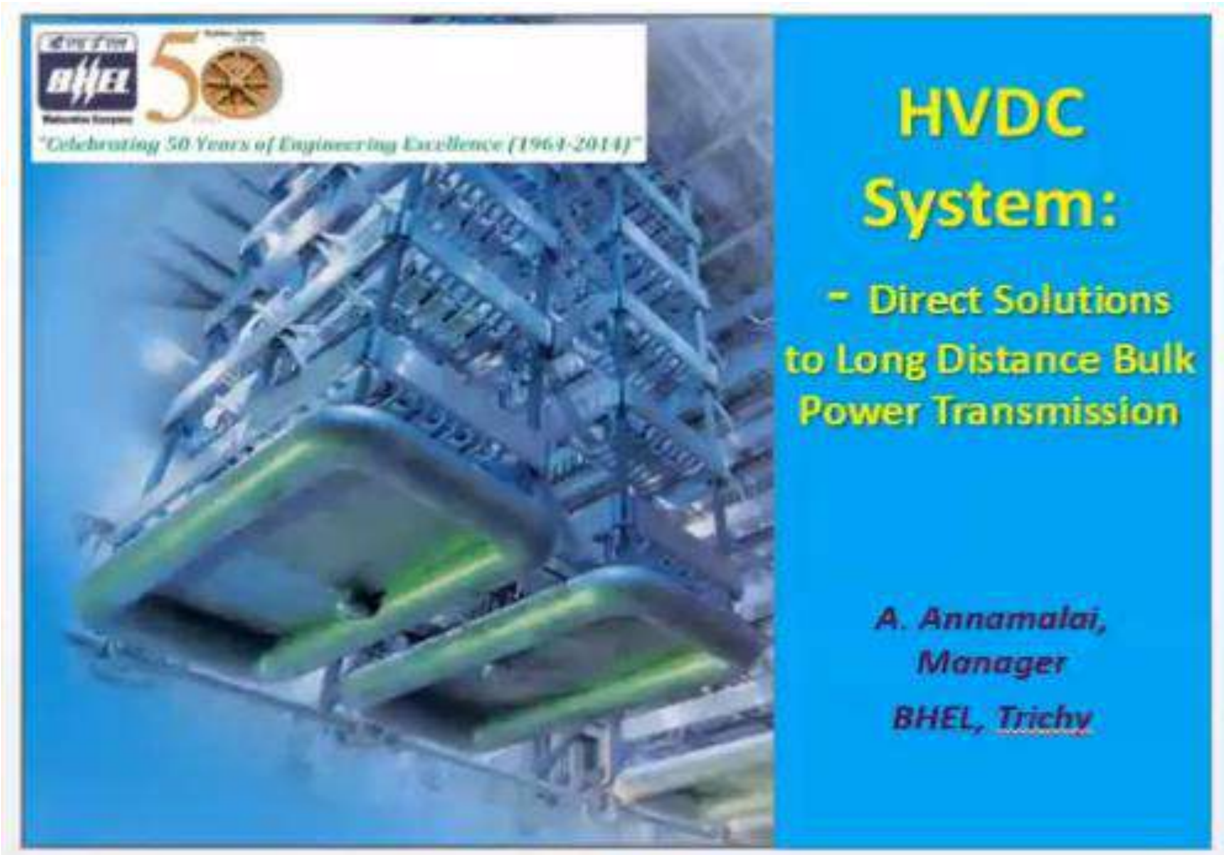
Mr. A. Annamalai

Manager, BHEL

Trichy, TamilNadu

Topic: HVDC System: Direct solutions for Long distance Bulk Power Transmission


Kumar N M G
and 51 more
VINISHKA S has left the meeting
anna malai


"Celebrating 50 Years of Engineering Excellence (1964-2014)"
HVDC
System:
- Direct Solutions
to Long Distance Bulk
Power Transmission
A. Annamalai,
Manager
BHEL, Trichy

High Voltage Direct Current

- The HVDC technology is used to transmit **bulk power** over **long distances** by overhead transmission lines or submarine cables.
- **HVDC** is the only solution to interconnect separate power systems **(Asynchronous connection).**
- Today a well-proven technology

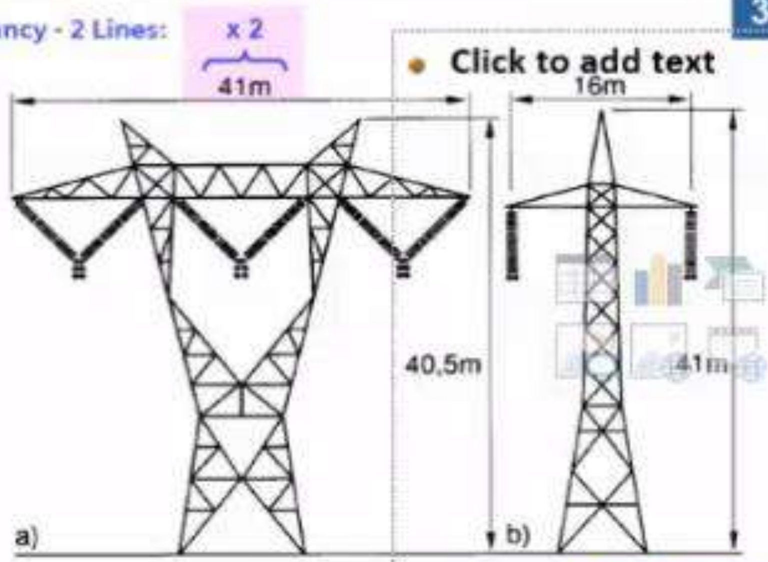
HVDC- Economic Aspects

Comparison of Towers for 500 kV AC Line a) and 500 kV DC Line b), at same Transmission Capacity

3,000 MW

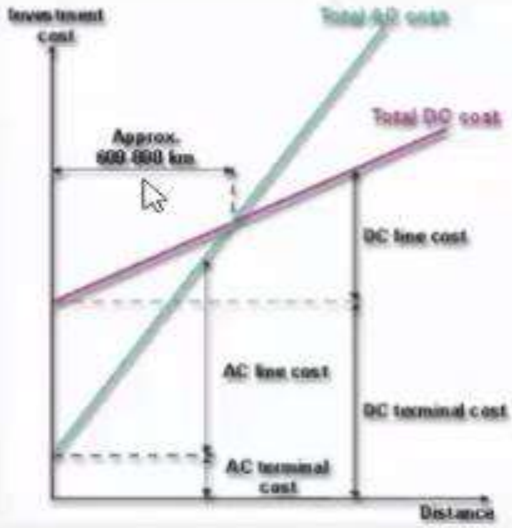
For Redundancy - 2 Lines:

- Click to add text



For equivalent transmission capacity, a DC line has **lower construction costs** than an AC line.

HVDC- Technical Aspects



AC

- 3 Cables
- 0 Converters

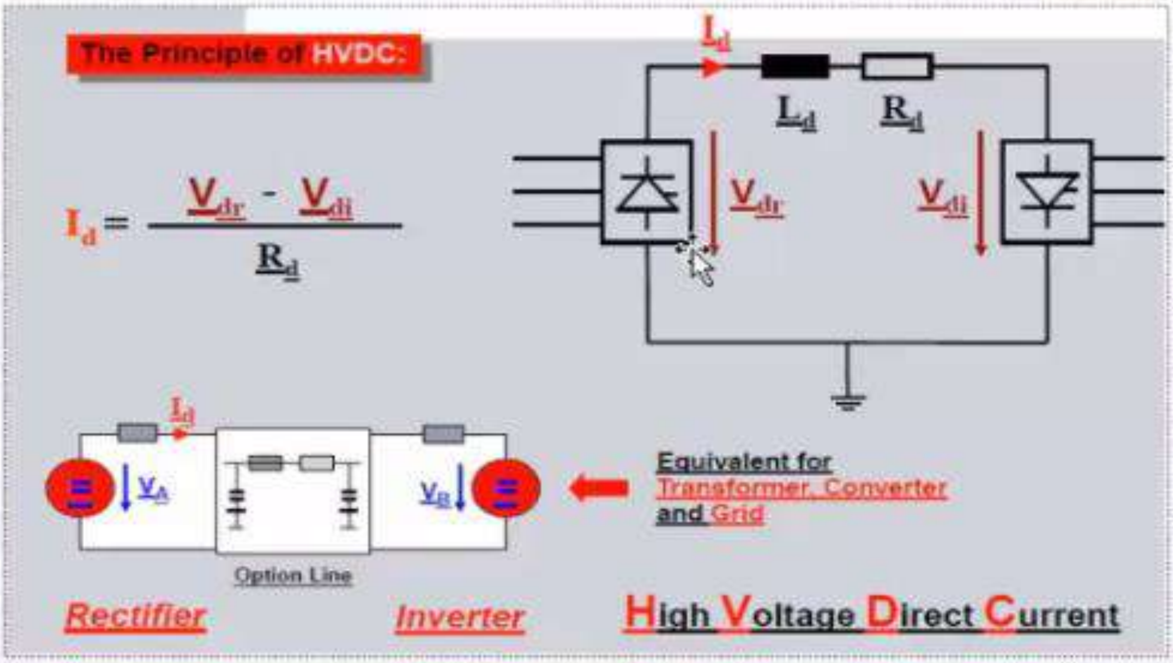
DC

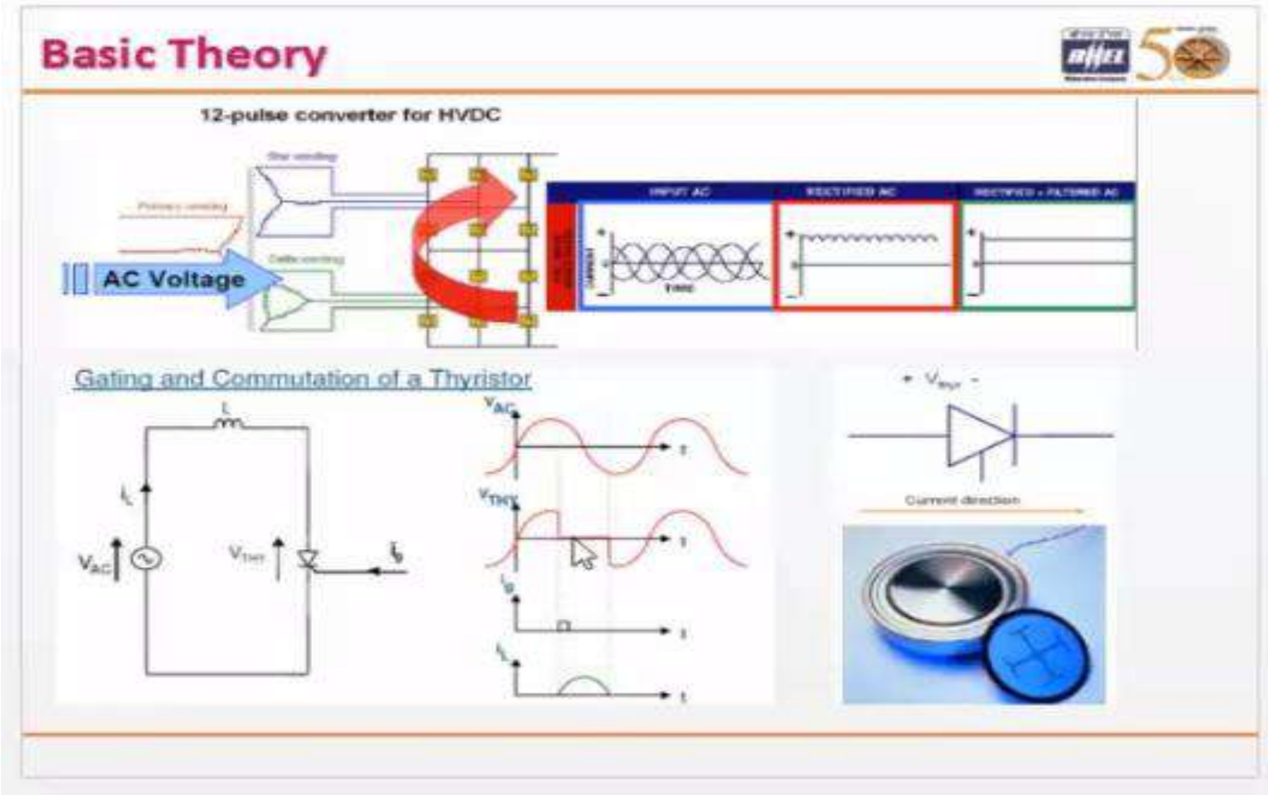
- 2 Cables
- 2 Converters

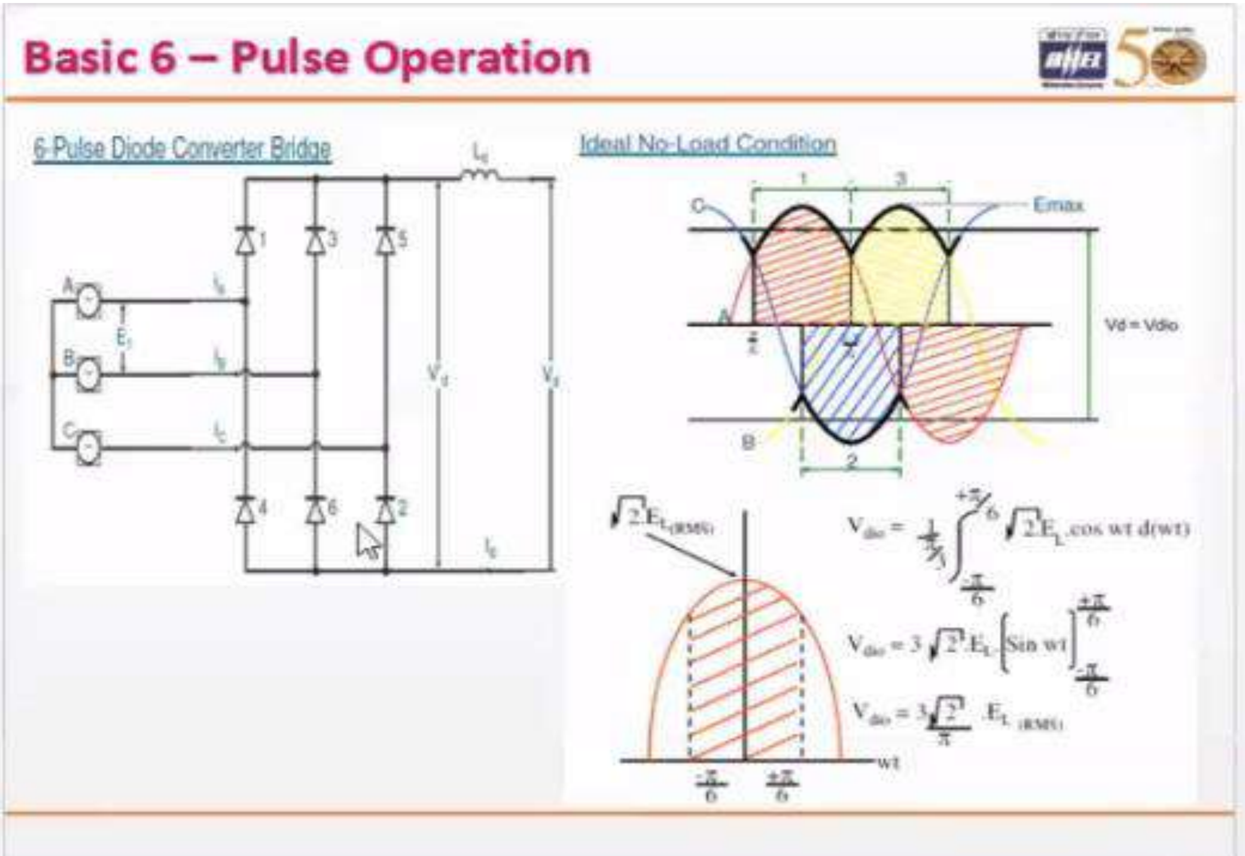
Cables – Crossover 50-60 Km

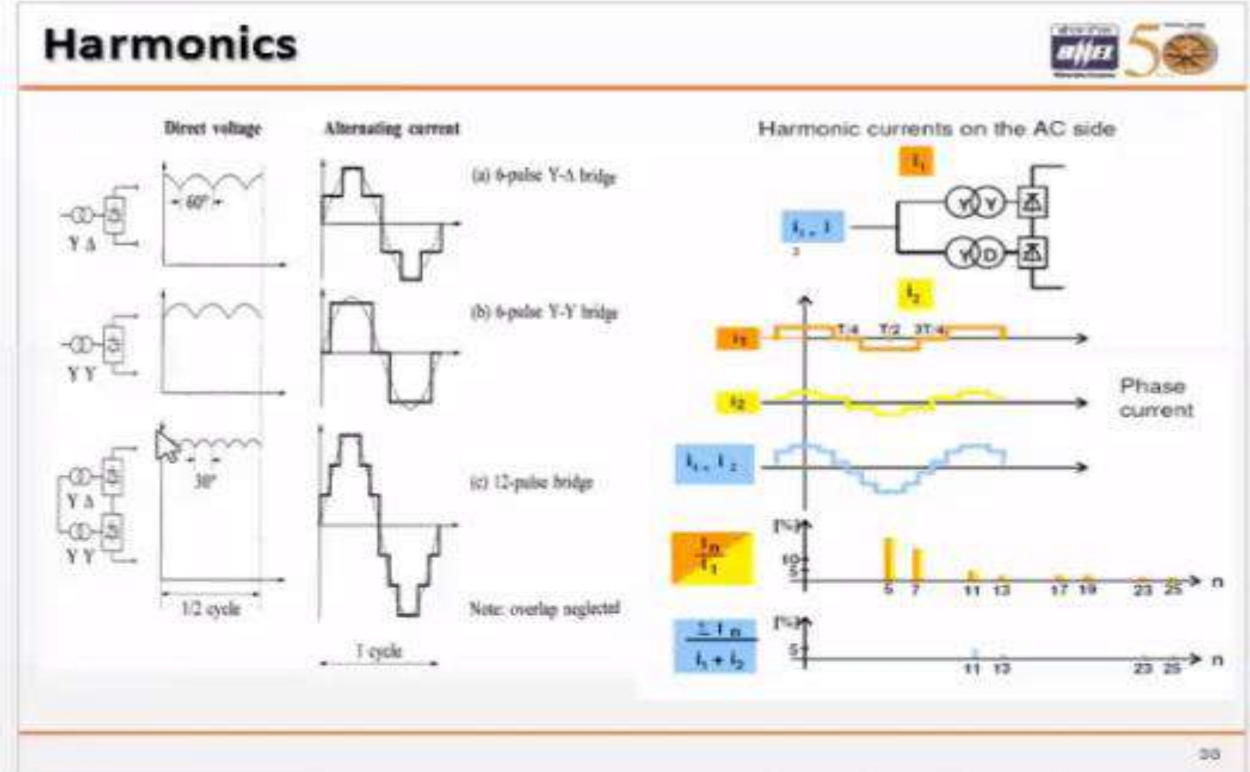
OH Lines – Crossover 600-700 Km

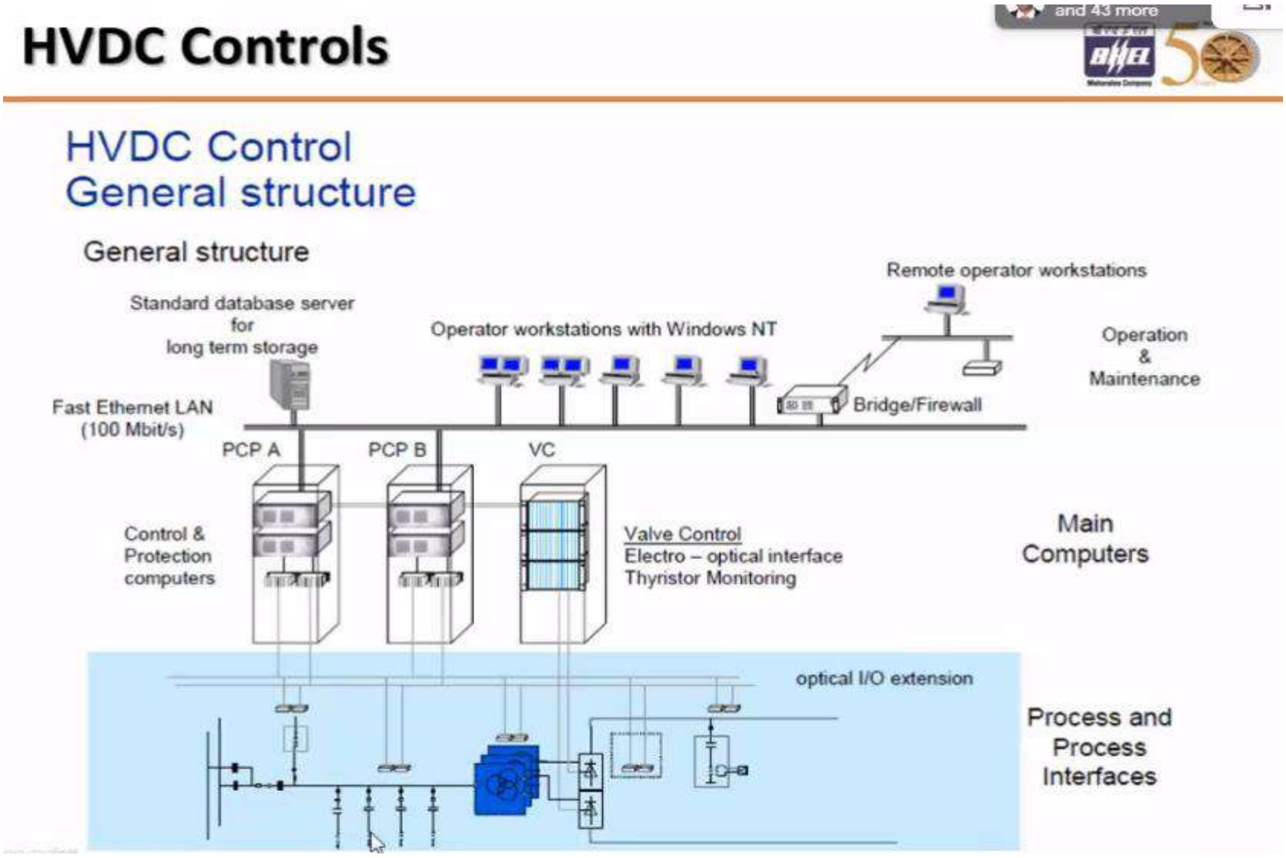
HVDC – Working Principle



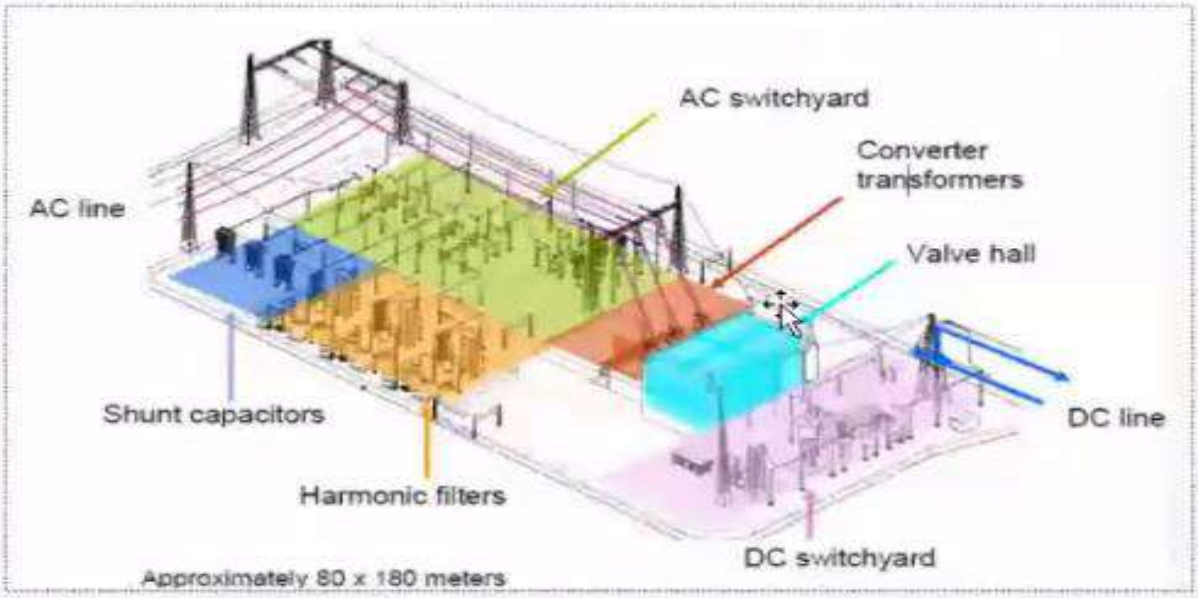

Basic Theory
12-pulse converter for HVDC
AC Voltage
Gating and Commutation of a Thyristor
Current direction


Basic 6 – Pulse Operation
6-Pulse Diode Converter Bridge
Ideal No-Load Condition
Emax
Vd = Vdio


Harmonics
Direct voltage
Alternating current
(a) 6-pulse Y-Δ bridge
(b) 6-pulse Y-Y bridge
(c) 12-pulse bridge
Note: overlap neglected
1/2 cycle
1 cycle
60°
30°
Harmonic currents on the AC side
Phase current
33

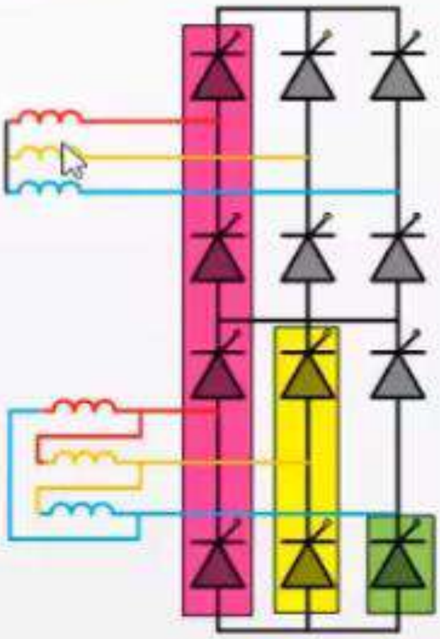

HVDC Controls
HVDC Control
General structure
General structure
Remote operator workstations
Standard database server
for
long term storage
Operator workstations with Windows NT
Operation
&
Maintenance
Fast Ethernet LAN
(100 Mbit/s)
Bridge/Firewall
PCP A
PCP B
VC
Control &
Protection
computers
Valve Control
Electro – optical interface
Thyristor Monitoring
Main
Computers
optical I/O extension
Process and
Process
Interfaces

HVDC – Station Layout



55

HVDC – Valves Terminology



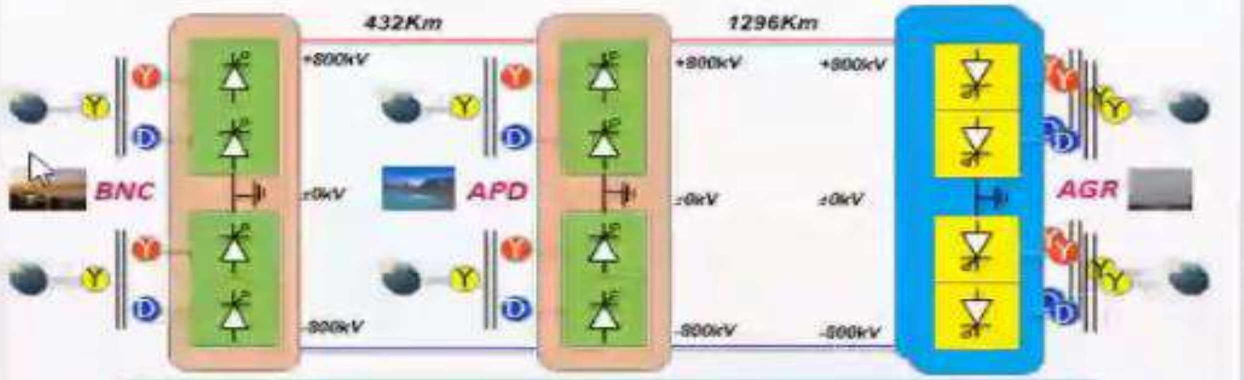
Twelve Pulse Converter circuit consists of :

Single Valve	**: 12 No's**
Double Valve	**: 6 No's**
Quadri Valve	**: 3 No's**

Single Valve
Twin/Double Valve
Quadri/Quadruple Valve

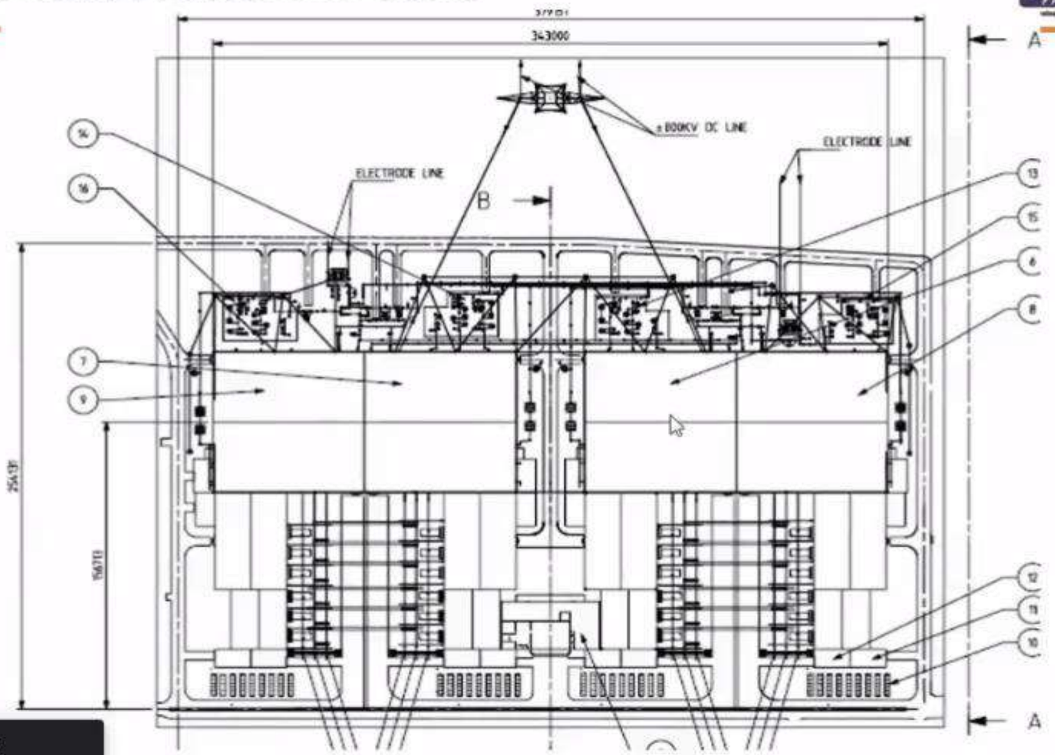
56

NEA800 – World's first Multi-terminal UHVDC Transmission Link (INDIA)



DESCRIPTION	RECTIFIER -1 (BNC)	RECTIFIER-2 (APD)	INVERTER – 1&2 (AGR)
No of Poles	2	2	4
Power(MW)	3000	3000	6000
Reason	Long distance, bulk power, Connecting remote generation		

DC HALL and DC Yard



Chandrapur – Padghe HVDC Transmission

Description	Data
Joint Venture	ABB, Sweden
Commissioning Year	1999
Power Rating	1500 MW
AC Voltage Rating	400kV
DC Voltage Rating	± 500kV
Length of OH line	752 Km
Main reason	Long distance, Better stability and environmental concerns

NEA800 – World's first Multi-terminal UHVDC Transmission Link (INDIA)

Description	Data
Joint Venture	ABB, Sweden
Customer	POWERGRID
Commissioning year:	2017
Power rating:	6 000 MW (Multi-terminal)
No. of poles:	Converter: 4 Line: 2
AC voltage:	400 kV (all stations)
DC voltage:	±800 kV
Length of overhead DC line:	1 765 km
Main reason for choosing HVDC:	Long distance, bulk power

DAY-2

24.07.2020

Friday

FN Session

10.00 AM to 12.00 PM

Resource Person

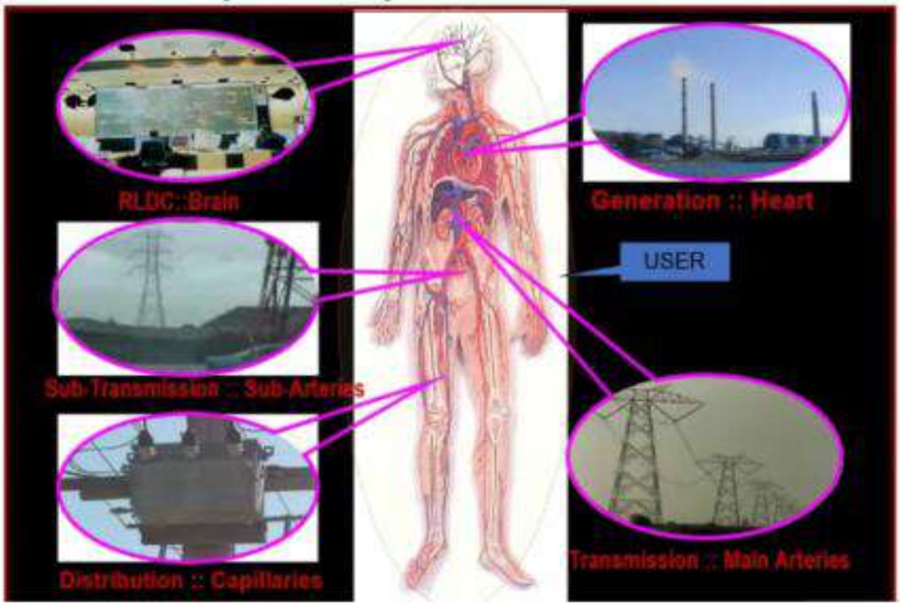
Dr.Manas Kumar Jena

Assistant Professor

IIT Palakkad, Kerala

Topic: Synchrophasor Technology in Smart Grid

Analogy: Human Body-Power System



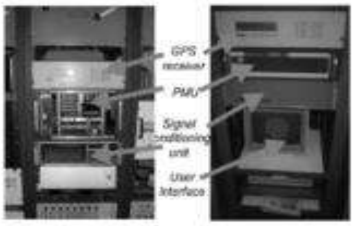
Diagnosis: Everything is fine?

The Heart...

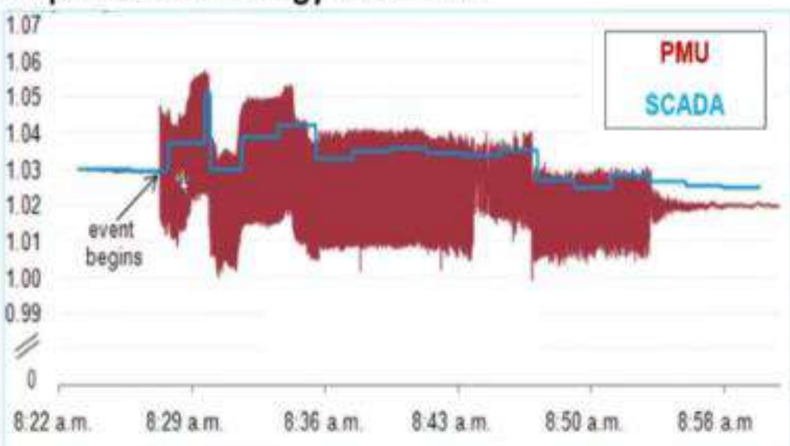
	Human Body	Power System
	Blood Pressure	Voltage
	Heart Beat	Frequency
The Pulse	72 Beats/Minutes	50 Cycles/Seconds
Cause	Stress/Anxiety	Load-Gen.-Mismatch
Risk	Heart Beat Deviation	Frequency Deviation

From Phasor to Synchrophasor

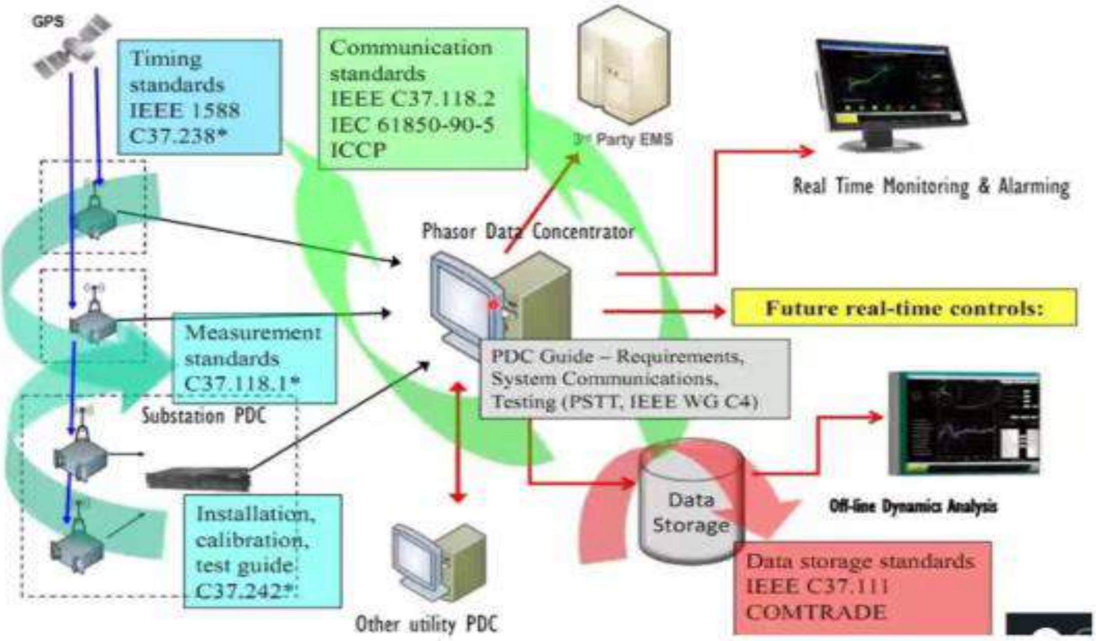
- Concept of phasor: 1893, in a paper by **Charles Proteus Steinmetz.**
- Invention of phasor measurement unit (PMU) in **1988 by Prof. A.G Phadke and Prof. James S. Throp at Virginia Tech.**
- First commercially available PMU was manufactured by Macrodyne (model 1690) in the early 1990s.
- As of July 2014- **1300** PMUs deployed in **US**
- As of July 2012- **2000** PMUs deployed in **China**
- Proect India- More than 1000 PMUs**URTDSM.**
- ONS Brazil- More than **1000PMUs**

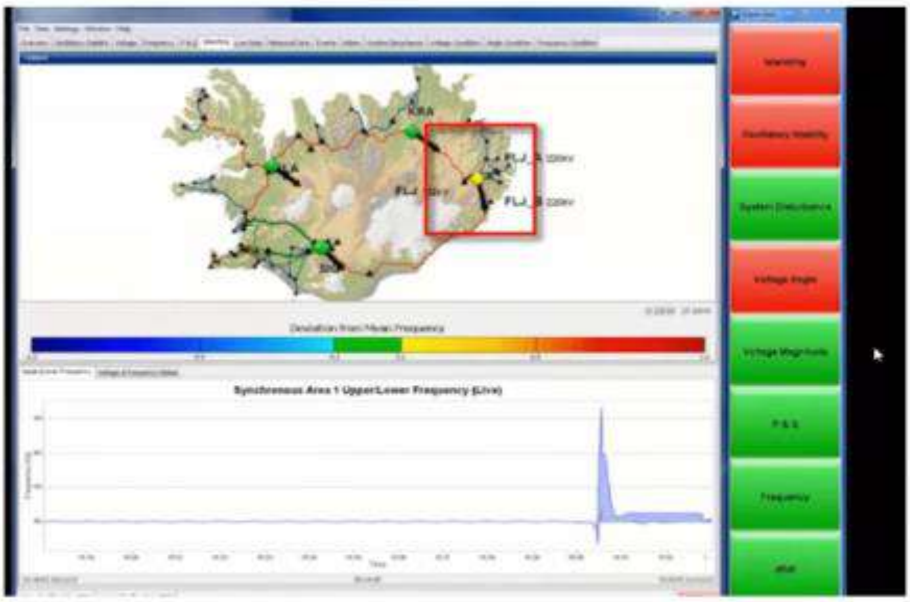


Synchrophasor Technology vs SCADA

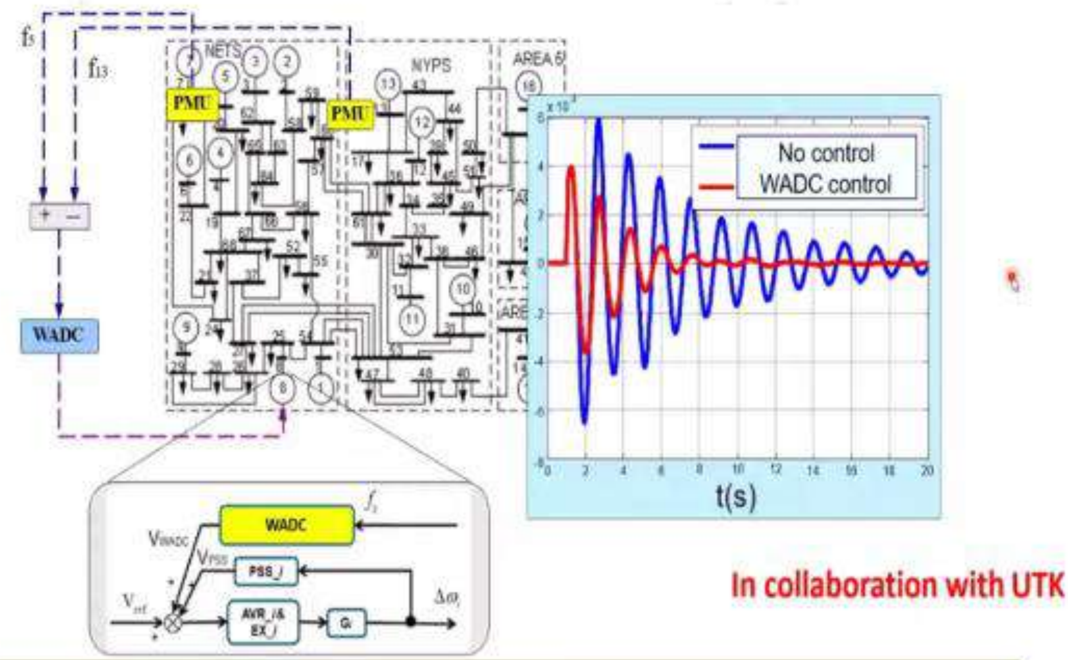


- Synchrophasor data comprises current and voltage phasors, frequency and rate of change of frequency (ROCOF), whereas SCADA data is analog measurements of RMS voltages and currents, and real and reactive power.
- Synchrophasor data have high resolution, typically reported at 10 to 60 records per second, compared to 2 to 4 seconds per record in the case of SCADA data.
- Synchrophasor data have time synchronization and are time stamped using precise, standard specified times.

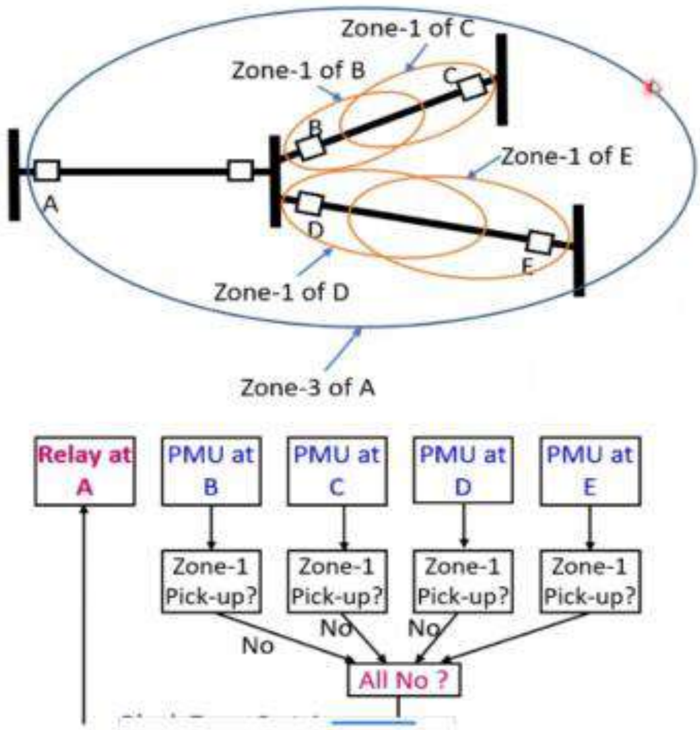




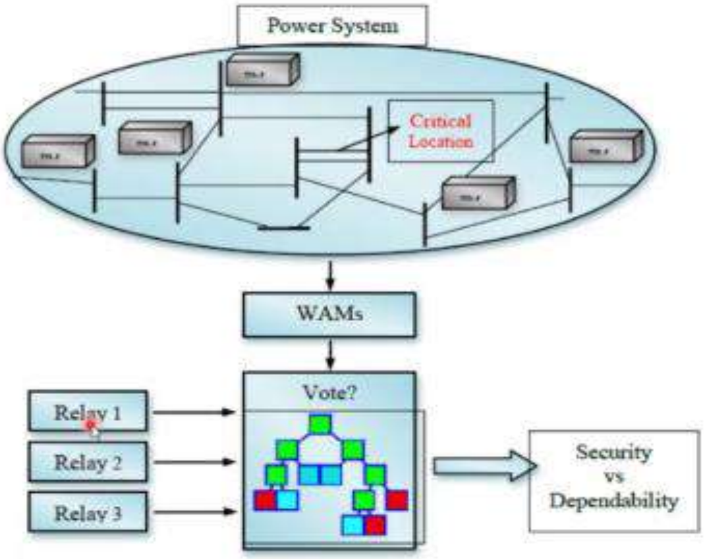
Ref: https://www.gegridsolutions.com/software_solutions/catalog/phasorpoint.htm



• Improved Damping of Target Inter-area/Local Oscillations Mode



Adaptive Dependability-Security



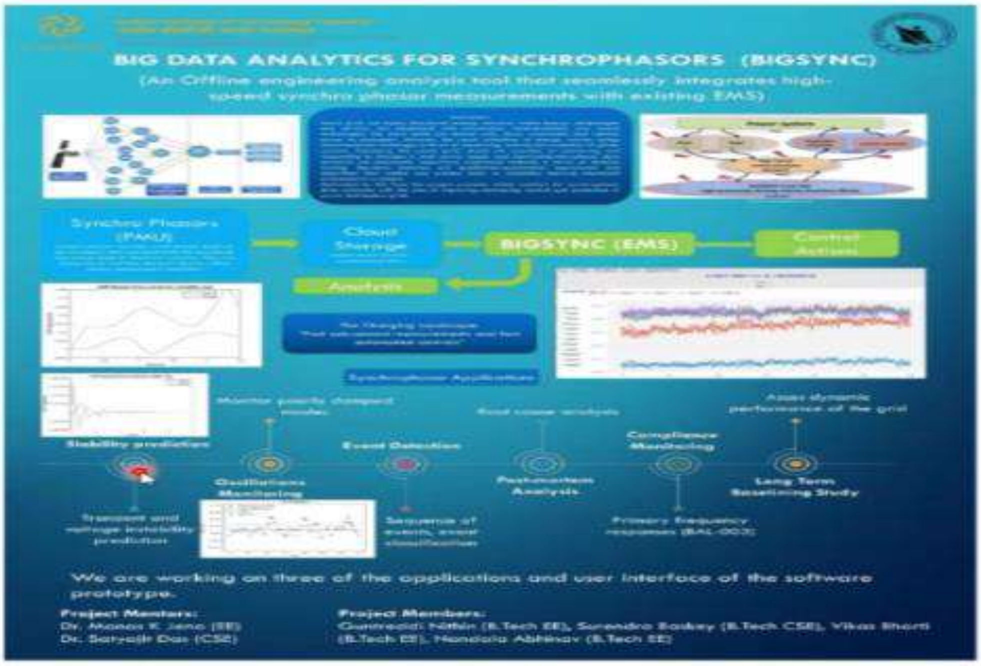
Research and Development Survey Results

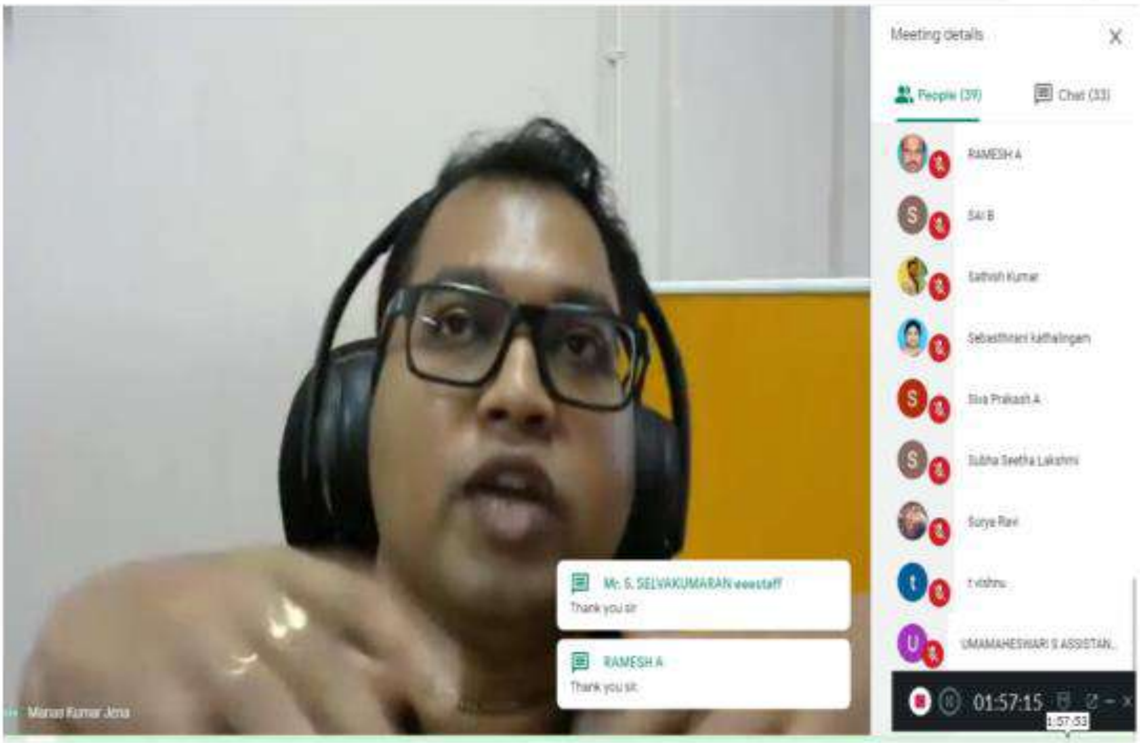
Examples of existing research being performed today include:

- Wide area protection
- Adaptive auto-reclosing
- Transmission line impedance evaluation
- Microgrid
- RAS
- Setting-less protection
- Signal security
- Time synchronization vulnerability

Respondents report that they are planning research on:

- Protection system communication protocols
- Safety net schemes
- Backup protection schemes
- Adaptive microgrid and distribution system protection


BIG DATA ANALYTICS FOR SYNCHROPHASORS (BIGSYNC)
(An Offline engineering analysis tool that seamlessly integrates high-speed synchro phasor measurements with existing EMS)
Synchro Phasors (PMU)
Cloud Storage
BIGSYNC (EMS)
Control Actions
Analysis
Stability prediction
Event Detection
Compliance Monitoring
Oscillations Monitoring
Postmortem Analysis
Long Term Baselining Study
Root cause analysis
Assess dynamic performance of the grid
We are working on three of the applications and user interface of the software prototype.
Project Mentors:
Project Members:


Meeting details
People (39)
Chat (33)
RAMESH A
SAI B
Sathish Kumar
Siva Prakash A
Surya Ravi
t vishnu
UMAMAHESWARI S ASSISTAN...
Mr. S. SELVAKUMARAN eeestaff
Thank you sir
RAMESH A
Thank you sir
01:57:15
Manas Kumar Jena

DAY-2

24.07.2020

Friday

AN Session

02.00 PM to 04.00 PM

Resource Person

Dr. K. Vijayakumar

AP, IIIT&D

Kancheepuram, TamilNadu

Topic: Power Conversion Strategies in Wind Energy Conversion system

Power Electronic Controller for Wind Energy Conversion System

Dr. Vijayakumar Krishnasamy | M.Tech., Ph.D., PDF (NTU-Singapore) |

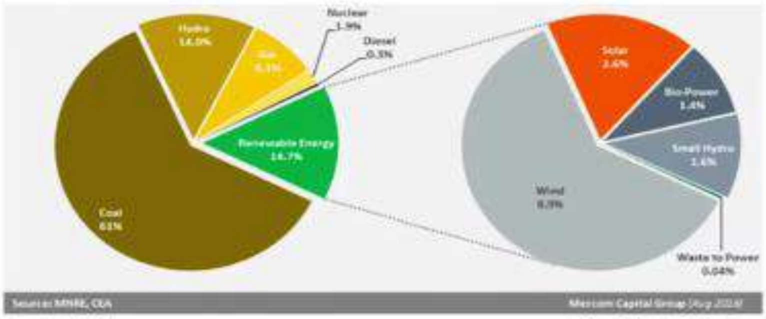
Assistant Professor, Department of Electrical Engineering |

Indian Institute of Information Technology Design and Manufacturing |

Mobile: (91) 9549659069 | Email: krishna4vijay@gmail.com |

Inkedin: https://in.linkedin.com/in/dr-vijayakumar-krishnasamy-06106838 |

Renewable Energy - Introduction



- ➢ Wind power is clean and free source of energy for power production
- ➢ Reduce dependence on fossil fuels including imported oils
- ➢ Reduce emission of greenhouse gas and other pollutant
- ➢ One major concern is the noise – can be improved
- ➢ Intermittency and variability of the wind

General Information on WECS in India

➤ Tariff : 4-6 Rs./unit

➤Pay back period : 5.5 to 8 years

➤Cost : 4.5 to 5 Crore/MW

➤Companies : suzlon, Vestas, Regen, etc..,

➤Avg. Height : 60 – 90 meters

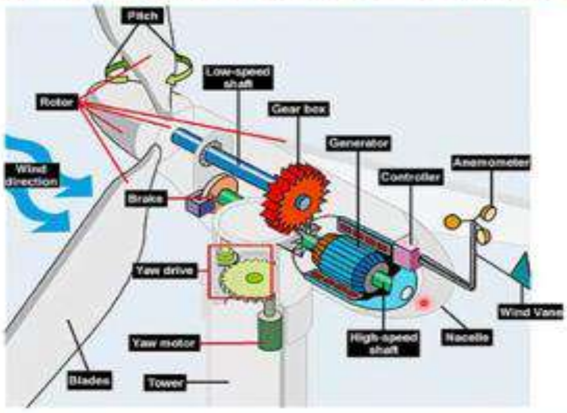
➤Tallest Hybrid Wind turbine: Suzlon Energy S97 - 120m is the tallest hybrid wind turbine in Kutch, Gujarat, India

➤ Capacity : 100 kW, 200 kW, 700 kW, 1 MW…,

➤The Vestas V164 has a largest rated capacity of 8.0 MW

22:21

Components of a horizontal-axis wind turbine



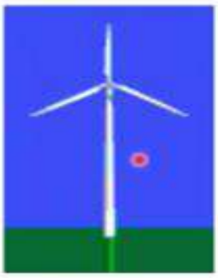
The ROTOR component : Its approx 20% of the wind turbine cost, includes the blade for converting wind energy to low speed rotational energy.

The GENERATOR component : Its approx 34% of the wind turbine cost, includes electrical generator ,the control electronics and a gearbox.

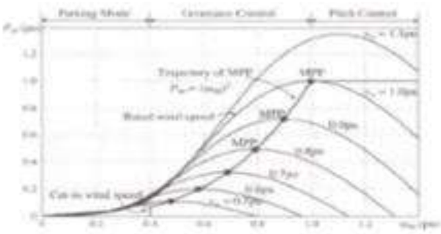
The STRUCTURAL component : Its approx 15% of the wind turbine cost, includes the tower and yaw mechanism.

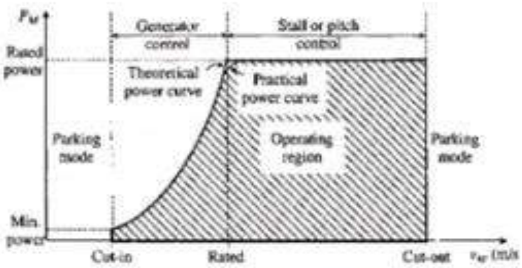
Wind Turbines: Number of Blades

- Most common design is the three-bladed turbine. The most important reason is the stability of the turbine. A rotor with an odd number of rotor blades (and at least three blades) can be considered to be similar to a disc when calculating the dynamic properties of the machine.
- A rotor with an even number of blades will give stability problems for a machine with a stiff structure. The reason is that at the very moment when the uppermost blade bends backwards, because it gets the maximum power from the wind, the lowermost blade passes into the wind shade in front of the tower.



Turbine Mechanical Power versus Wind Speed Curve





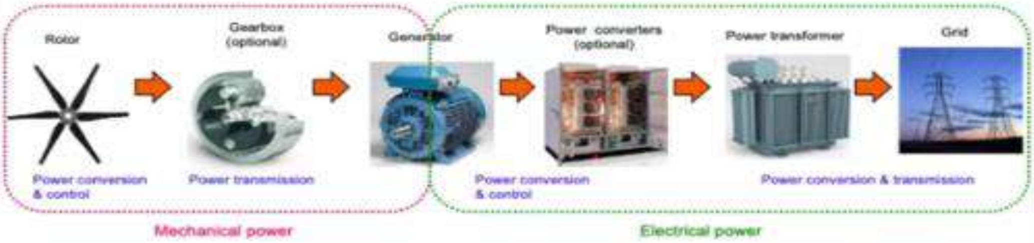
- The wind turbine starts to capture power at the cut in wind speed. The power captured by the blades is a cubic function of wind speed until the wind speed reaches its rated value. To deliver captured power to the grid at different wind speeds, the wind generator should be properly controlled with variable speed operation.
- As the wind speed increases beyond the rated speed, aerodynamic power control of blades is required to keep the power at the rated value.

Wind energy conversion system(WECS)

Grid Connected System

Stand-alone System (or Isolated system)

Main components of WECS



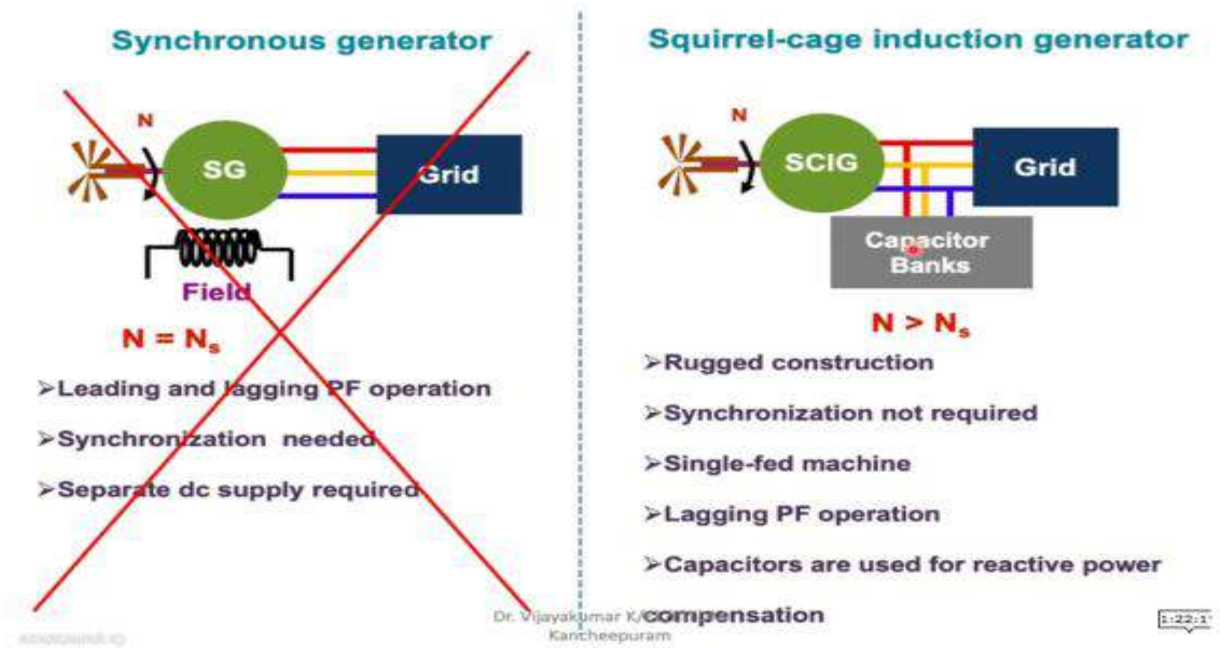
Wind turbine concept

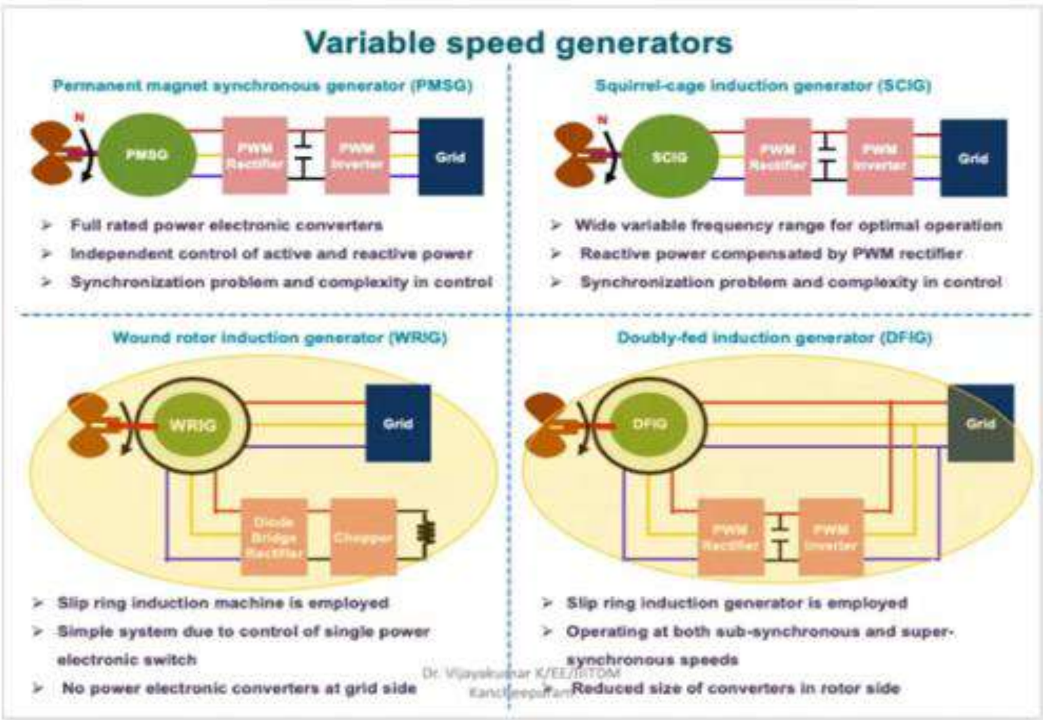
Fixed speed wind turbine

- Operates at constant speed
- Multiple -stage gear box (three-stage)
- High mechanical stress during gusty wind
- Limits the energy output of the turbine
- SCIGs are employed

Variable speed wind turbine

- Operates at variable speed
- Single or two-stage gear box
- Possible to incorporate the MPPT
- Increase the energy output of the turbine
- PMSG, DFIG and WRIG are employed


Synchronous generator
N
SG
Grid
Field
N = Ns
➢Leading and lagging PF operation
➢Synchronization needed
➢Separate dc supply required
Squirrel-cage induction generator
N
SCIG
Grid
Capacitor Banks
N > Ns
➢Rugged construction
➢Synchronization not required
➢Single-fed machine
➢Lagging PF operation
➢Capacitors are used for reactive power compensation
Dr. Vijayakumar K/
Kancheepuram


Variable speed generators
Permanent magnet synchronous generator (PMSG)
PMSG
PWM Rectifier
PWM Inverter
Grid
➢ Full rated power electronic converters
➢ Independent control of active and reactive power
➢ Synchronization problem and complexity in control
Squirrel-cage induction generator (SCIG)
SCIG
PWM Rectifier
PWM Inverter
Grid
➢ Wide variable frequency range for optimal operation
➢ Reactive power compensated by PWM rectifier
➢ Synchronization problem and complexity in control
Wound rotor induction generator (WRIG)
WRIG
Grid
Diode Bridge Rectifier
Chopper
➢ Slip ring induction machine is employed
➢ Simple system due to control of single power electronic switch
➢ No power electronic converters at grid side
Doubly-fed induction generator (DFIG)
DFIG
Grid
PWM Rectifier
PWM Inverter
➢ Slip ring induction generator is employed
➢ Operating at both sub-synchronous and super-synchronous speeds
➢ Reduced size of converters in rotor side

DAY-3

25.07.2020

Saturday

FN Session

10.00 AM to 12.00 PM

Resource Person

Dr.Manoranjan Sahoo

Assistant Professor, NIT Trichy

Tamil Nadu

Topic:Multi-phase induction motor drive for high power Electric vehicle

Need of Eco-Friendly System

Need of Eco-friendly Systems

- Global warming due to the emissions of hydro carbons
- Fast enervation of fossil fuels
- High fuel price

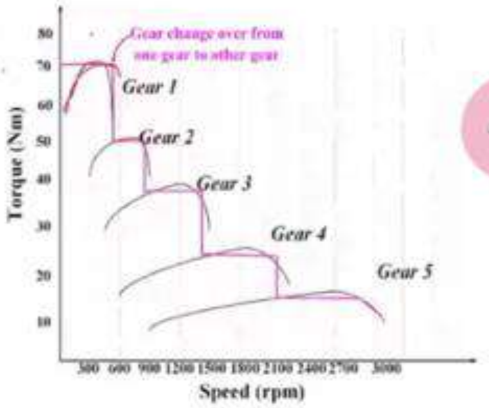
Key Challenges in EV Application

- The torque and speed should be comparable to todays IC Engine Driven vehicle
- How long with single charge
- Time required to charge the Battery
- Braking

Required Drive Characteristics for Electric Traction Applications

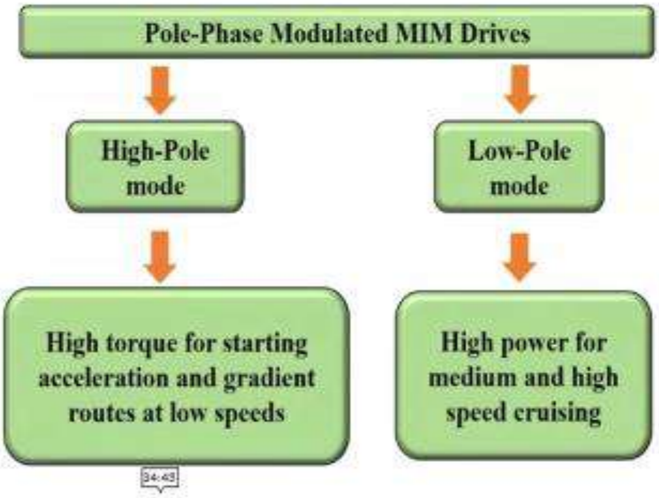
- Enhanced torque-speed range with high efficiency
- High power handling capability
- High torque for starting and hill climbing and high power for high-speed cruising
- High reliability and robustness
- Acceptable cost
- Low acoustic noise and low torque ripple
- Volume of the machine

Typical IC Engine with Gear BoX



Introduction to Pole-Phase Modulation

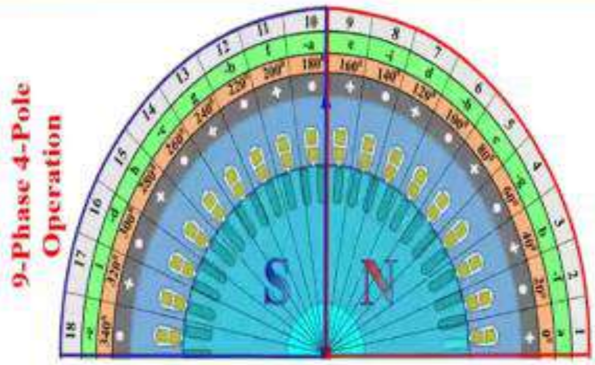
- Pole-Phase Modulation (PPM) is an effective way for getting different speed ratios by varying the number of poles and phases in a constant ratio, without changing the stator winding connections.



$\because T \alpha \frac{P}{2}$

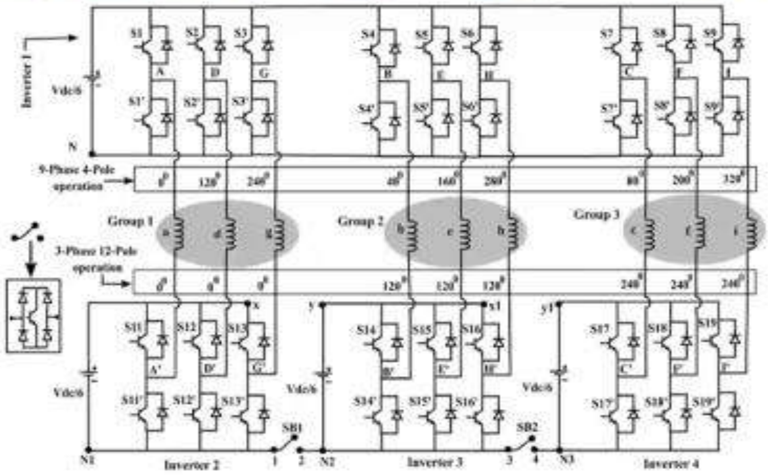
Power= $T \times \omega_s$

MLI Configurations for 9-phase PPMIM drive With Four DC Sources

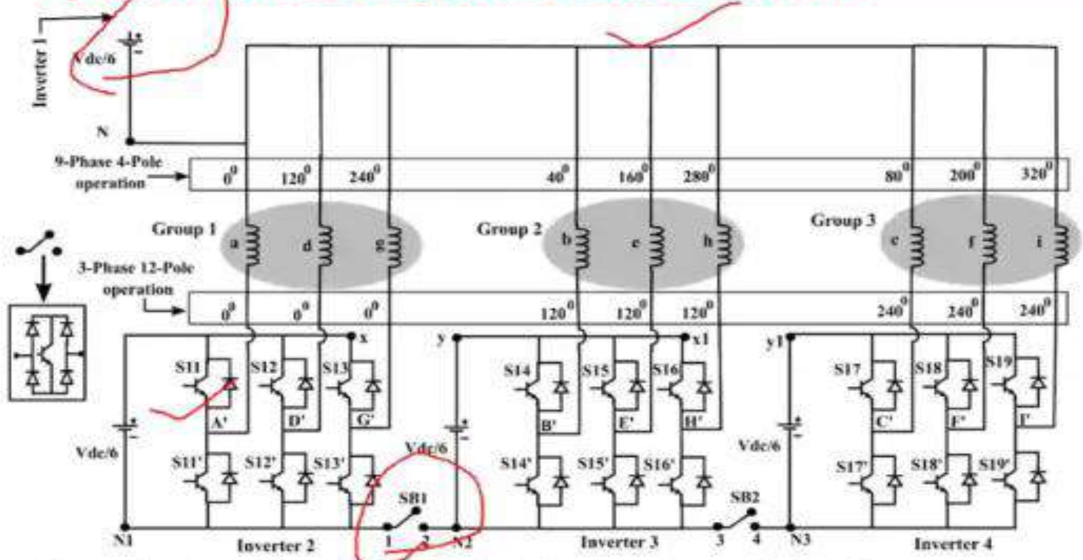


MLI Configurations for 9-phase PPMIM drive With Four DC Sources

Dual inverter Based fault tolerant 3-level inverter configuration with symmetrical sources



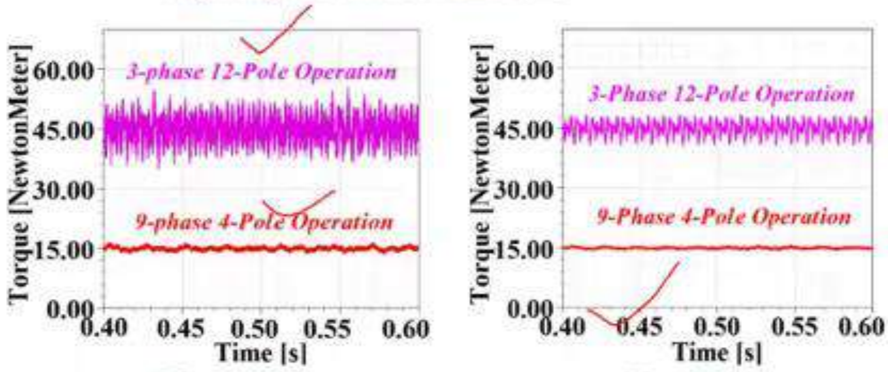
Operation of the MLI configuration under fault condition



Open circuit (or Short circuit) switch faults or Source fault of Inverter 1

MLI Configurations for 9-phase PPMIM drive With Four DC Sources

Torque response of the PPMMIM drive



2-Level Voltage

- ❖ In high-pole mode torque ripple percentage is 38.5%
- ❖ In low-pole mode torque ripple percentage is 16%

3-Level Voltage

- ❖ In high-pole mode torque ripple percentage is 16.5%
- ❖ In low-pole mode torque ripple percentage is 7.3%

Summary

- ❖ The MLI configurations are based on dual inverter principle with four dc sources in a ratio of 1:1
- ❖ These configurations are able to generate 3 level and 4 level voltages
- ❖ The isolated dc sources eliminate the zero-sequence voltages in the phase windings.
- ❖ Requires less magnitude of dc link voltage
    - ❖ reduced ratings of the switches as compared to conventional NPC and flying capacitor MLIs.
- ❖ The performance in terms of torque ripple and harmonics in the phase voltage has improved by using of carrier phase-shifted SVPWM.
- ❖ The DC link voltage utilization (DLVU) is improved by 15.4%
- ❖ Under fault condition the MLI configurations operates as a 9-phase two-level inverter
- ❖ The multilevel configuration fed MIM drive maintains the rated load torque requirement in both fault and normal conditions

DAY-3

25.07.2020

Saturday

AN Session

02.00 PM to 04.00 PM

Resource Person

Dr.C.K.Babulal

Professor, Thygarajar College of Engineering

Madurai, TamilNadu

Topic: Fuzzy Logic Based Power Quality Evaluation

Fuzzy Logic based Power Quality Evaluation

Saranathan College of Engineering
Thiruchirappalli, July 25, 2020

DR.C.K.BABULAL
PROFESSOR,
DEPARTMENT OF EEE,
THIAGARAJAR COLLEGE OF ENGINEERING,
MADURAI – 625 015.
ckbeee@tce.edu

Inventors

- Lotfi Zadeh
  - Citations: 2,44,038
  - h-index: 113
- Mamdani
- Sugeno

What is Fuzzy Logic?

- Fuzzy logic is a **convenient** way to map an input space to an output space.
- Fuzzy logic is a logical system, which is an extension of two-valued logic.
- Deals with real world vagueness
- Which relates objects of un-sharp boundaries in which membership is a matter of degree.

Why Use Fuzzy Logic?

- Fuzzy logic is conceptually easy to understand
- The mathematical concepts behind fuzzy reasoning are very simple.
- Fuzzy logic is flexible.
- Fuzzy logic is tolerant of imprecise data.

Classical sets-Review

- A classical set is a collection of objects of any kind

- Set
- Element
- Membership
- Universe of discourse

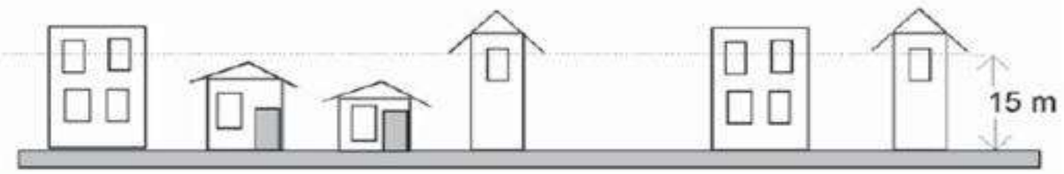
DEFINITION OF THE CRISP SET

1. List method: List the members of the set

UNIVERSE	SET
1, 2, 3, 4, 5, 6, . . . , 1000, . . .	3, 4, 5, 6

2. Rule method: Take only the members which satisfy the rule

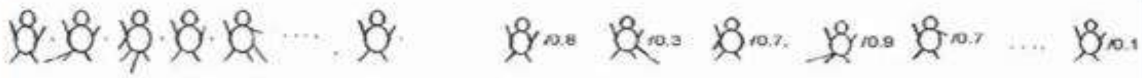
Rule: Take only the houses higher than 15 m



DEFINITION OF THE FUZZY SET

1. List method: List the members of the set

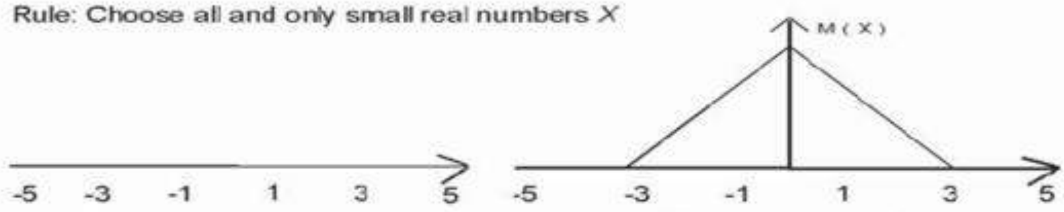
UNIVERSE	FUZZY SET
1, 2, 3, 4, 5, 6, . . . , 1000, . . .	1/0.1, 2/0.2, 3/0.9, 4/0.95, 5/0.9, 6/0.85, 7/0.5, . . .



2. Rule method: Take only the members which satisfy to the rule

Rule: Take only the high houses

Rule: Choose all and only small real numbers *X*



Membership function

Properties of crisp set operations

Table 2.1 Properties of crisp set operations

Involution	$(\bar{A})' = A$
Commutativity	$A \cup B = B \cup A$ $A \cap B = B \cap A$
Associativity	$(A \cap B) \cap C = A \cap (B \cap C)$ $(A \cup B) \cup C = A \cup (B \cup C)$
Distributivity	$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
Idempotence	$A \cup A = A$ $A \cap A = A$
Absorption	$A \cap (A \cup B) = A$ $A \cup (A \cap B) = A$

Absorption of complement	$A \cup (\bar{A} \cap B) = A \cup B$ $A \cap (\bar{A} \cup B) = A \cap B$
Absorption by U and $\varnothing$	$A \cup U = U$ $A \cap \varnothing = \varnothing$
Identity	$A \cup \varnothing = A$ $A \cap U = A$
Law of contradiction	$A \cap \bar{A} = \varnothing$
Law of excluded middle	$A \cup \bar{A} = U$
De Morgan's laws	$\overline{A \cap B} = \bar{A} \cup \bar{B}$ $\overline{A \cup B} = \bar{A} \cap \bar{B}$

Operations on fuzzy logic

AND

OR

NOT

Properties of Fuzzy Logic

Property	Name
$A \cup B = B \cup A$	*Commutative*
$A \cap B = B \cap A$	*Commutative*
$(A \cup B) \cup C = A \cup (B \cup C)$	*Associative*
$(A \cap B) \cap C = A \cap (B \cap C)$	*Associative*
$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$	*Distributive*
$A \cup (B \cap C) = (A \cup B) \cup (A \cup C)$	*Distributive*
$\overline{A \cap B} = \overline{A} \cup \overline{B}$	*DeMorgan*
$\overline{A \cup B} = \overline{A} \cap \overline{B}$	*DeMorgan*
$(A \cap B) \cup A = A$	*Absorption*
$(A \cup B) \cap A = A$	*Absorption*
$A \cup A = A$	*Idempotency*
$A \cap A = A$	*Idempotency*
$A \cup \overline{A} \neq 1$	*Exclusion* **not** satisfied
$A \cap \overline{A} \neq 0$	*Exclusion* **not** satisfied

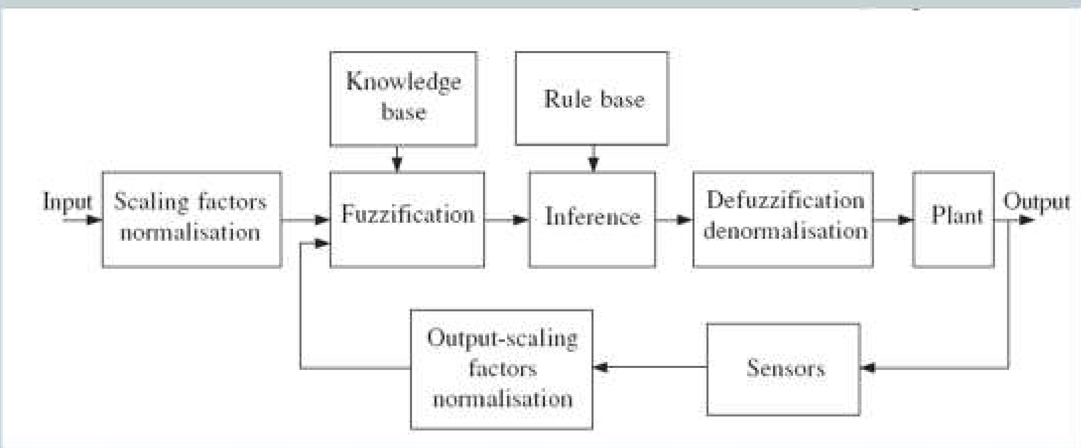
Table 1: Properties of the primitive operations

Fuzzy logic controller

- **Types:**

1. **Mamdani Fuzzy Controller**
2. **Takagi-Sugeno Controller**

Block Diagram of FLC



Modules

- Fuzzification module
- Knowledge base
- Rule base
- Inference engine
- Defuzzification module

Sugeno Model

- Output is constant or linear
- Example XOR function

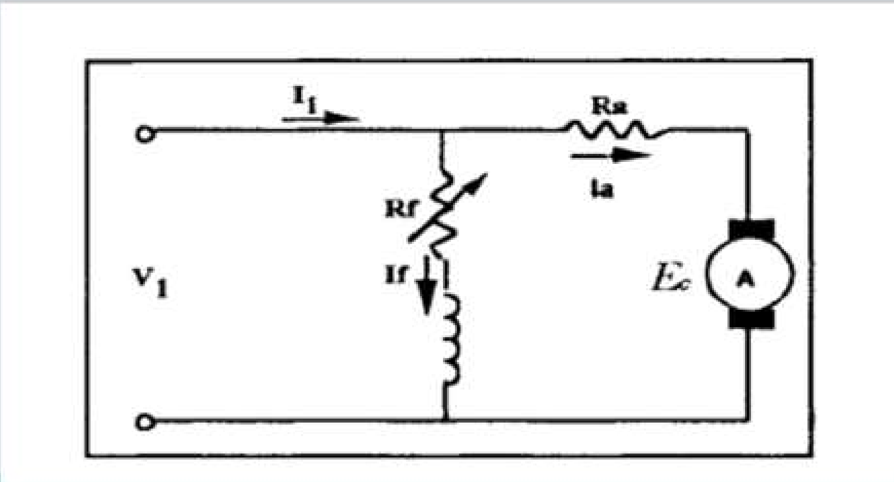
- Input
  - X (Near 0 / Near 1) – [0 1]
  - Y (Near 0 / Near 1) – [0 1]

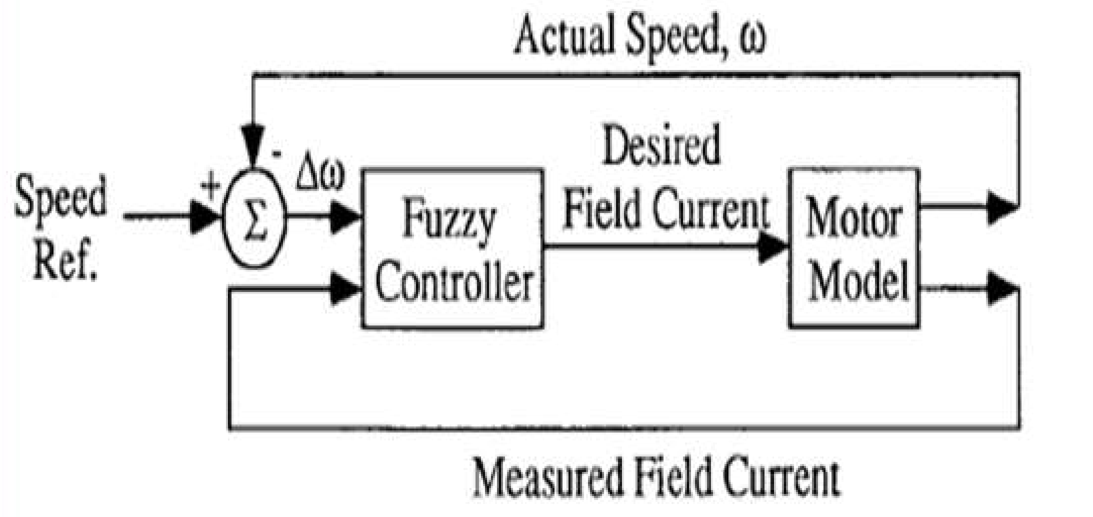
- Output
  - Class [0 1 1 0]

X	Y	Class
0	0	0
0	1	1
1	0	1
1	1	0

Fuzzy-Logic-Based Speed Control of Shunt DC Motor

- **Armature voltage control**
- **Field current control**





Fuzzy logic based Power Quality Evaluation

- Power Quality
- Reliability was the concern for the consumers many years.
- Now they want reliable as well as quality power.
- Industries like:
- Hospitals (Life support, operation theatre, data base)
- Processing plants (Semiconductor, rayon and fabric, food industries)
- They want uninterruptable and clean power supply.

Causes of PQ problem

- There are varieties of PQ problems like Transient, sag, swell, Interruptions, long duration voltage variation, Waveform distortion – Harmonics etc.,
- Waveform distortion? – Non-Sinusoidal
- Increased use of -
- **Power electronic devices,**
- **Adjustable speed drives, and other nonlinear loads**, cause the voltage and current waveforms to become non-sinusoidal and highly distorted.

Conclusion

- A fuzzy logic based representative quality power factor is explained using
- Displacement power factor
- Transmission efficiency power factor and
- Oscillation power factor.
- Cost-effective analysis for applying the **power factor correction devices** and **power quality mitigation techniques.**
- **Billing purposes**

DAY-4

27.07.2020

Monday

FN Session

10.00 AM to 12.00 PM

Resource Person

Dr. Shelas Sathyan

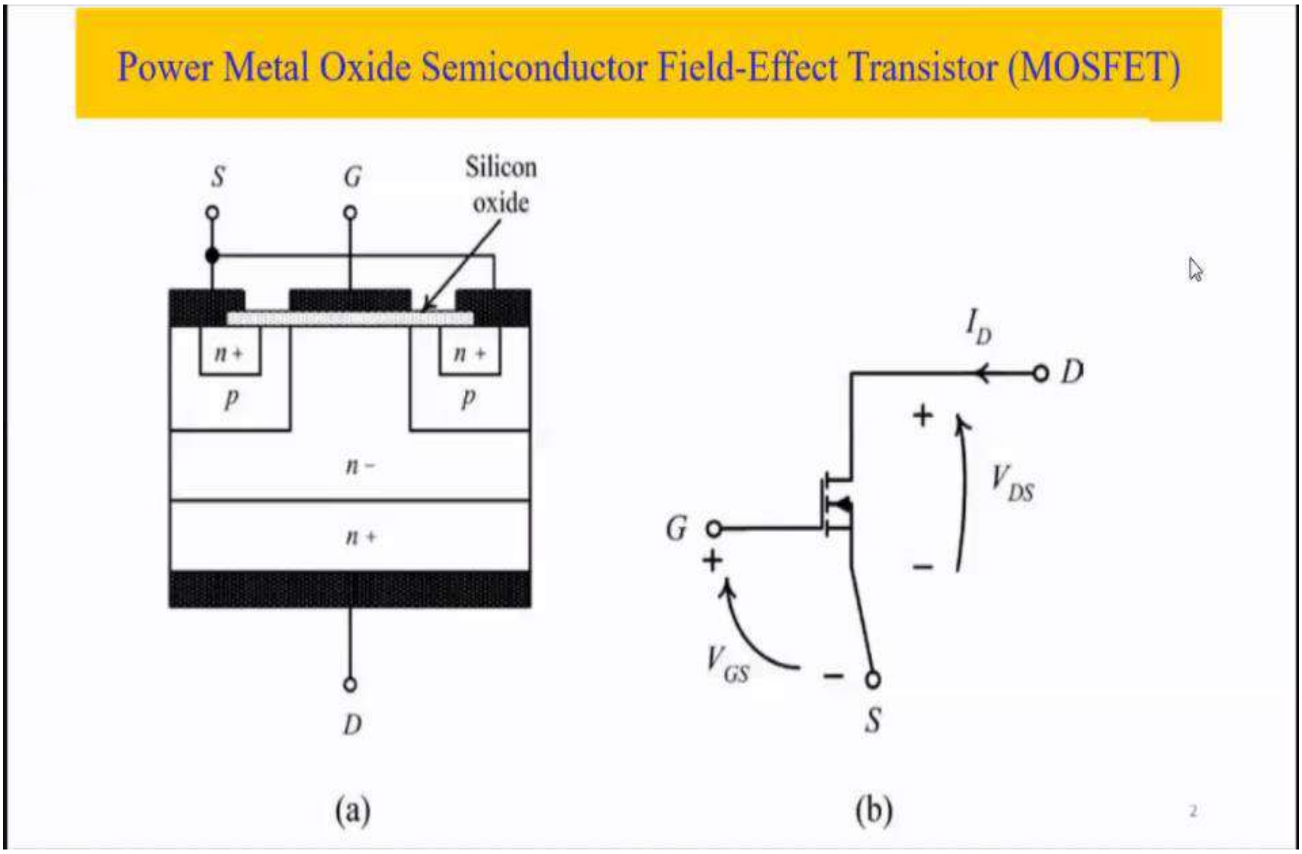
Assistant Professor, NIT

Trichy, Tamil Nadu

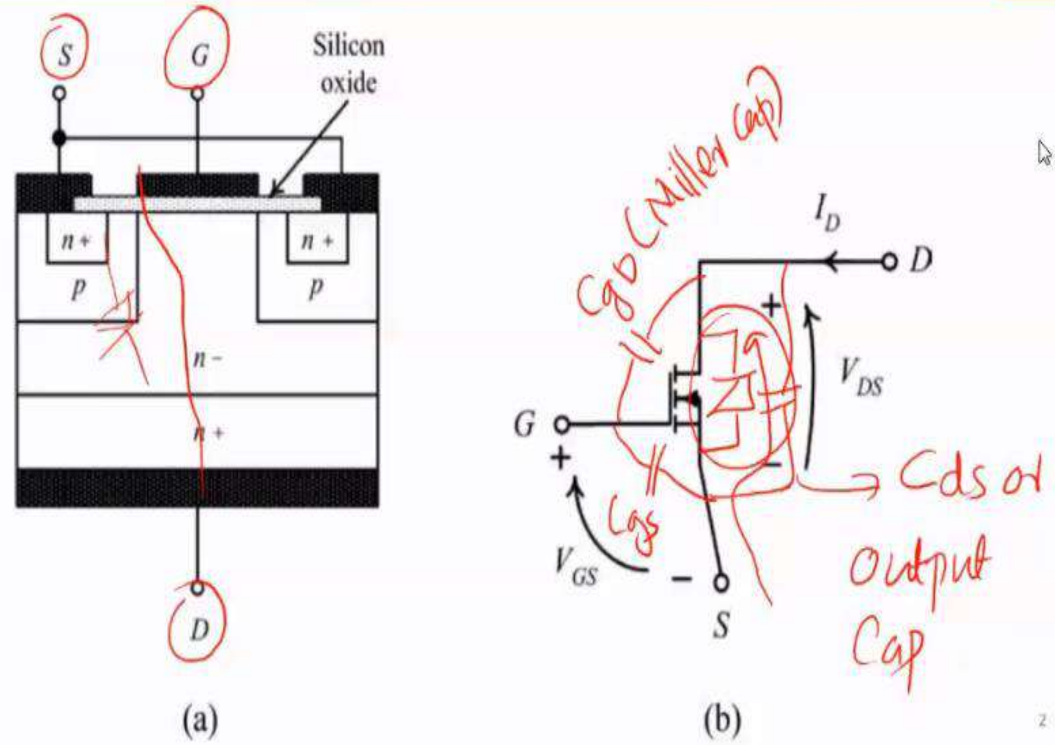
Topic: Design of Power Electronic Converters-Gate Drivers and Magnetic

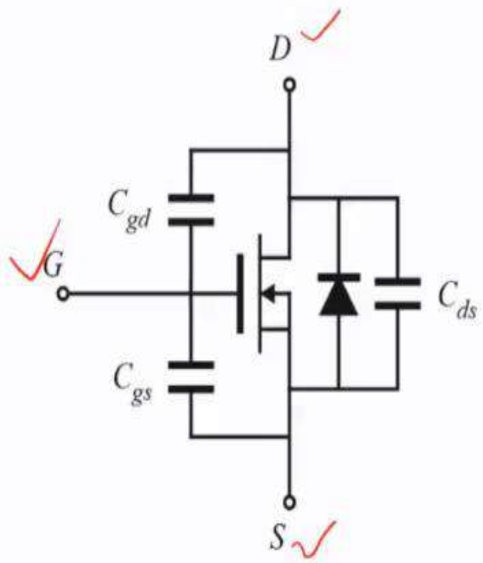
Components


Design of Power Converters- Gate Drives, Magnetic Components
By
Shelas Sathyan, PhD.
Assistant Professor
Department of Electrical& Electronics Engineering
National Institute of Technology Tiruchirappalli
1


Power Metal Oxide Semiconductor Field-Effect Transistor (MOSFET)
S
G
Silicon oxide
n +
n +
p
p
n −
n +
D
(a)
I_D
D
G
+
V_{DS}
−
+
V_{GS}
−
S
(b)
2

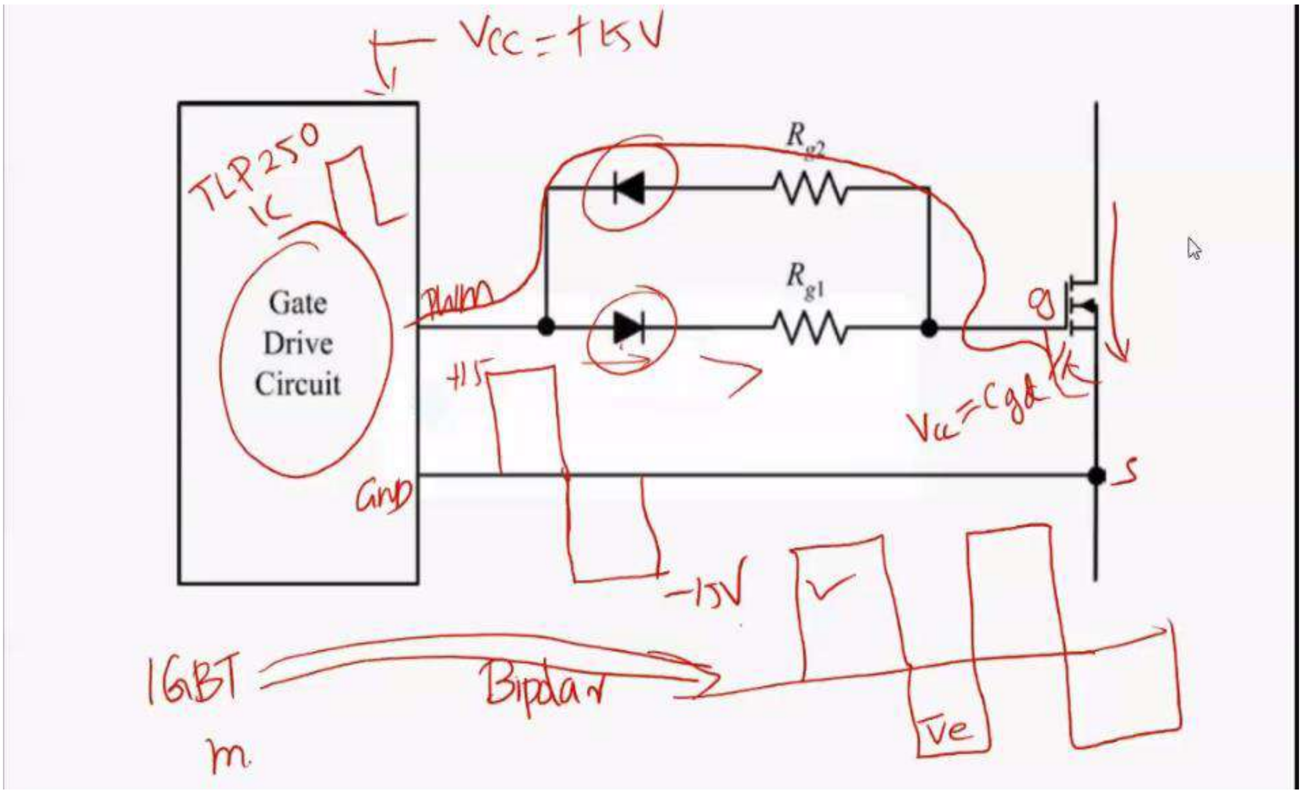
Power Metal Oxide Semiconductor Field-Effect Transistor (MOSFET)



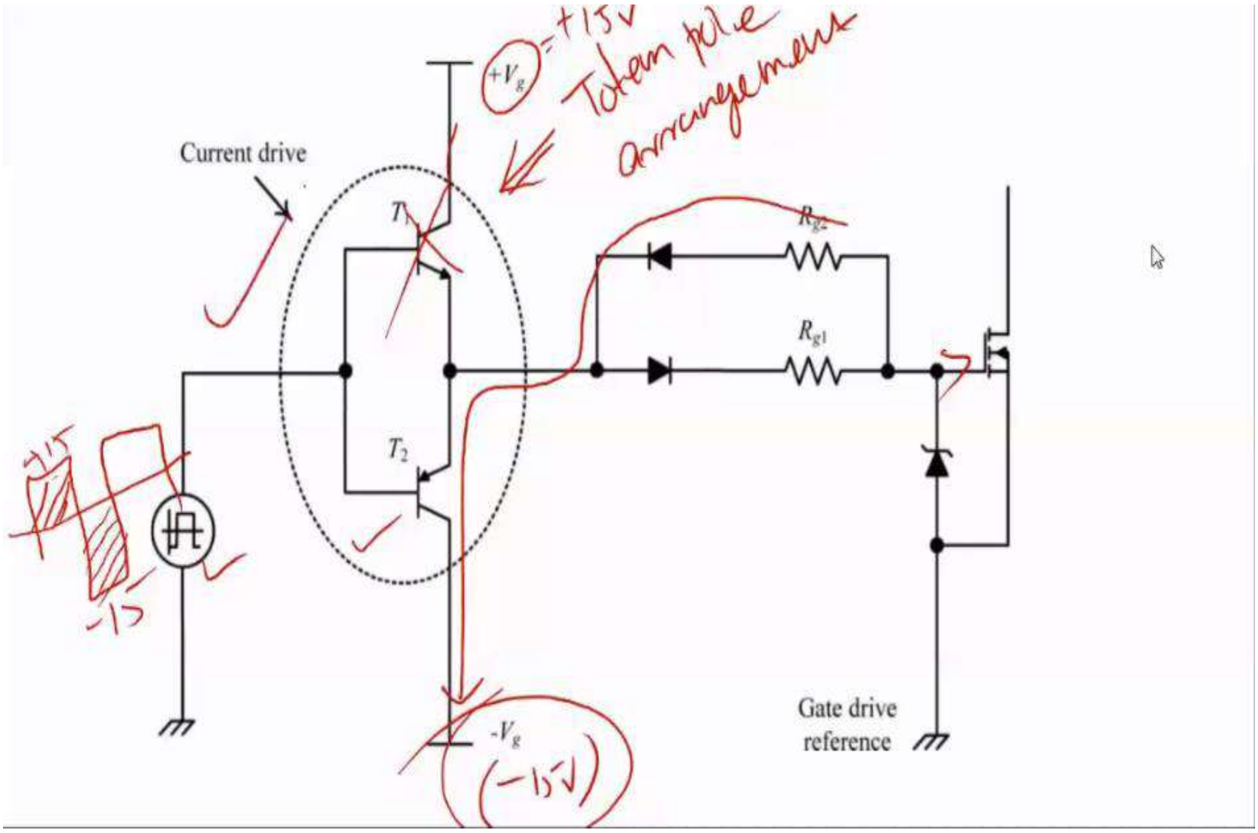


- C_{gs} : large, essentially constant
- C_{gd} : small, highly nonlinear
- C_{ds} : intermediate in value, highly nonlinear
- switching times determined by rate at which gate driver charges/discharges C_{gs} and C_{gd}

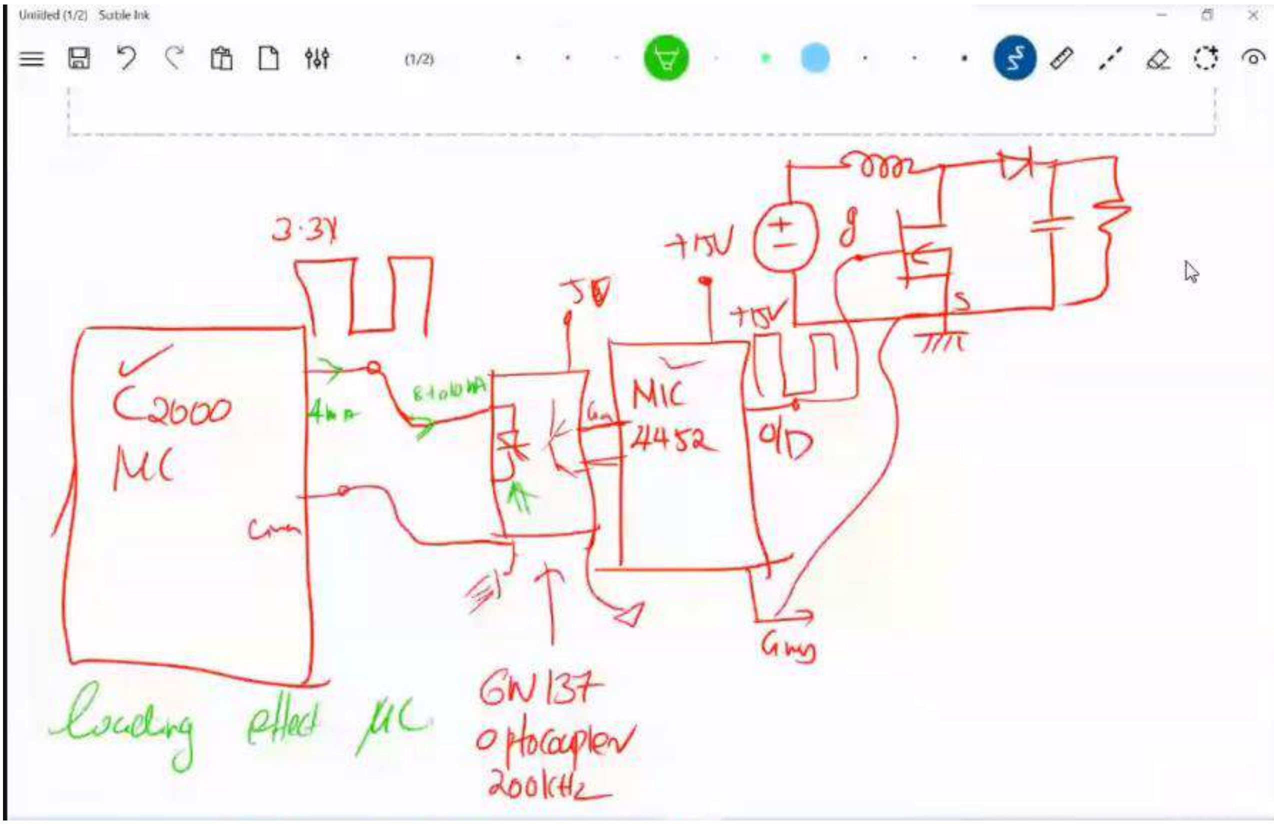
$$C_{ds}(v_{ds}) = \frac{C_0}{\sqrt{1 + \frac{v_{ds}}{V_0}}} \qquad C_{ds}(v_{ds}) \approx C_0 \sqrt{\frac{V_0}{v_{ds}}} = \frac{C_0'}{\sqrt{v_{ds}}}$$



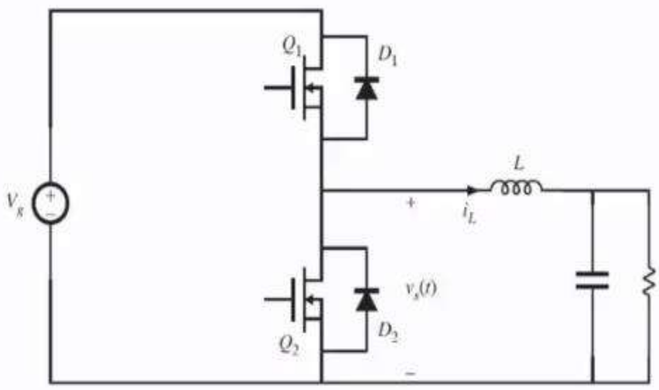
Vcc = +15V
TLP250 IC
Gate Drive Circuit
PWM
Gnd
+15
-15V
R_{g2}
R_{g1}
g
s
Vcc = Cgd
IGBT
Bipolar
-ve



$+V_g$ = +15V
Totem pole arrangement
Current drive
T_1
T_2
R_{g2}
R_{g1}
+15
-15
$-V_g$
(-15V)
Gate drive reference



Synchronous buck converter



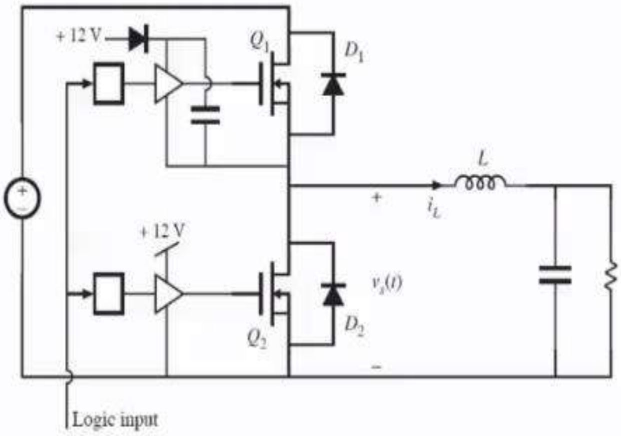
Main switch Q_1
Synchronous rectifier Q_2

Gate driver circuitry:

- Source of Q_2 is connected to ground
- Source of Q_1 is connected to switch node

Half-bridge gate driver

Bootstrap gate Driver



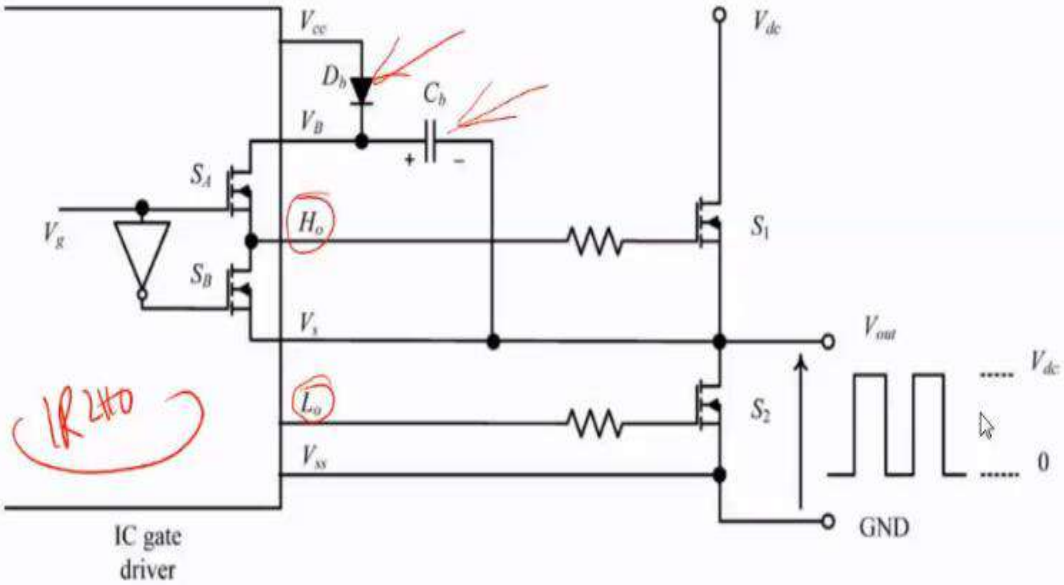
Half-bridge gate driver:

- Gate of Q_2 is driven by low-side driver
- Gate of Q_1 is driven by high-side driver
- High-side driver is powered by bootstrap power supply circuit
- High voltage integrated circuit

Logic input:

- Commands ON/OFF state of MOSFETs
- When Q_1 is on, Q_2 must be off, and vice-versa
- High-side control signal must be level-shifted
- Non-overlapping control: insert dead times

BOOTSTRAP

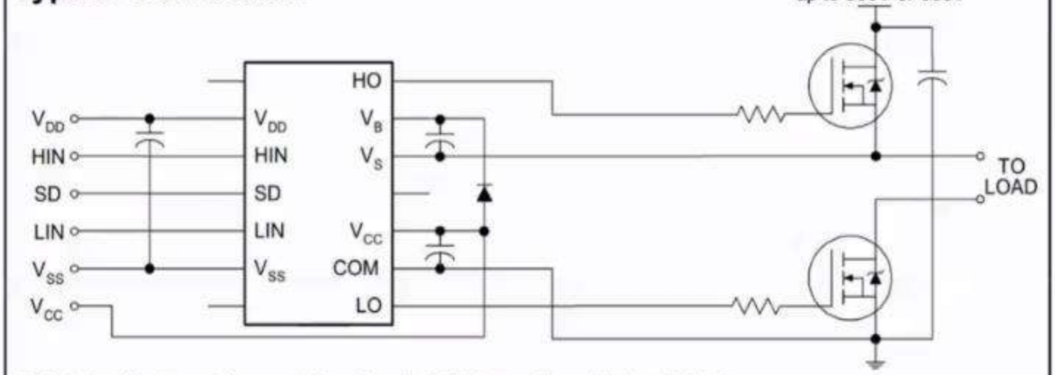


Packages

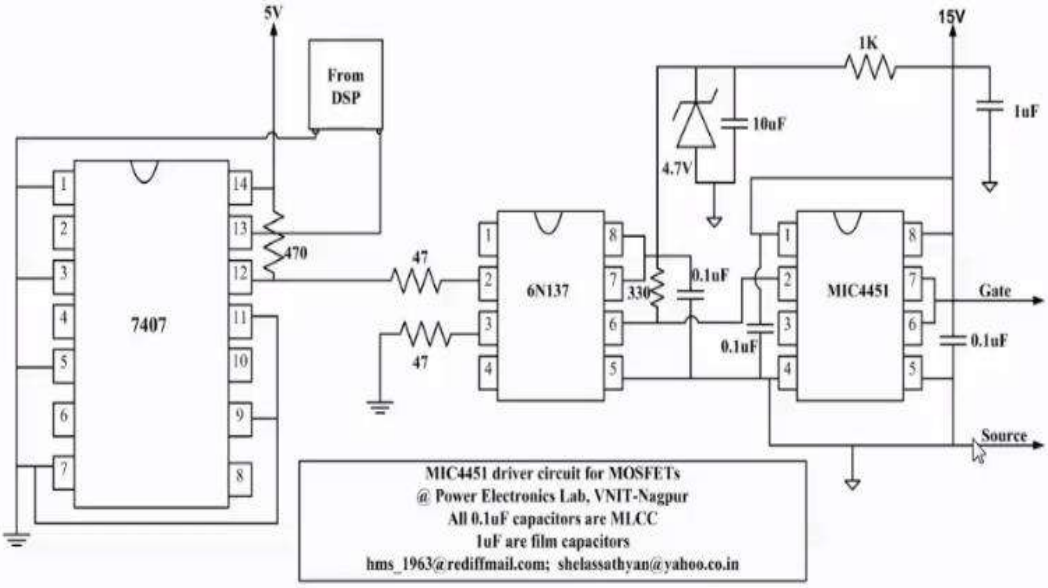
Lead Definitions

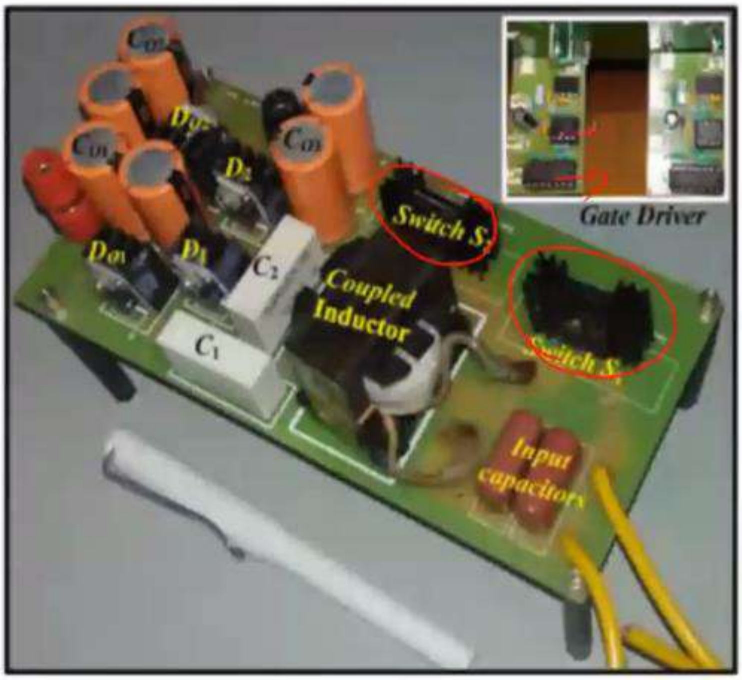
Symbol	Description
V_{DD}	Logic supply
HIN	Logic input for high side gate driver output (HO), in phase
SD	Logic input for shutdown
LIN	Logic input for low side gate driver output (LO), in phase
V_{SS}	Logic ground
V_B	High side floating supply
HO	High side gate drive output
V_S	High side floating supply return
V_{CC}	Low side supply
LO	Low side gate drive output
COM	Low side return

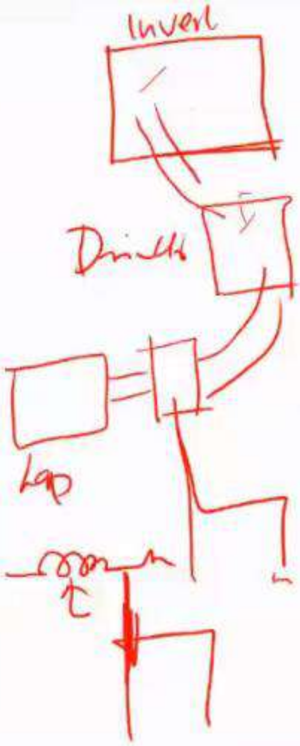
Typical Connection



(Refer to Lead Assignments for correct pin configuration). This/These diagram(s) show electrical connections only. Please refer to our Application Notes and DesignTips for proper circuit board layout.







Magnetic Materials for Power Electronics

Dr. SHELAS SATHYAN
Assistant Professor
Electrical & Electronics Engineering Department
NIT Tiruchirappalli

Ferromagnetic materials

Hard magnetic

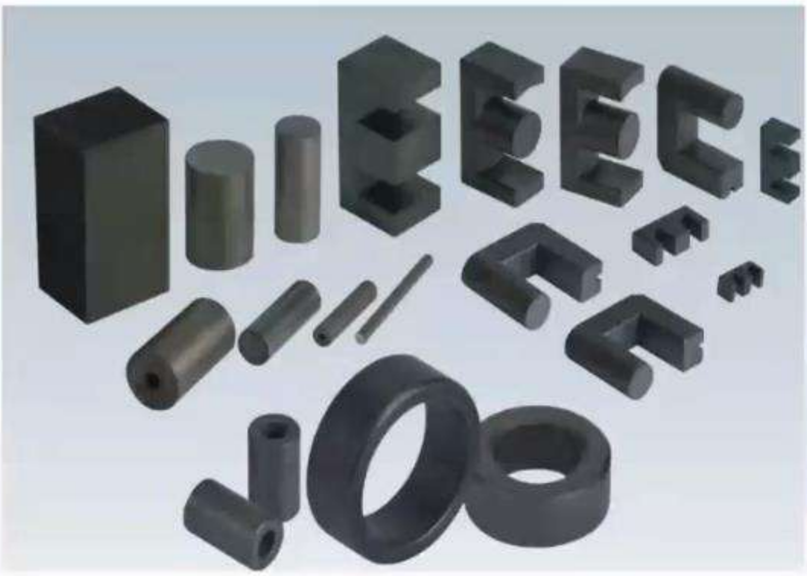
- Wide hysteresis loop
- Coercive force (H_c) is higher
- Difficult to magnetize and demagnetize
- Used for permanent magnets in brushless and synchronous motors
- Examples: Iron (Fe), Cobalt (Co), Nickel (Ni), Gadolinium (Gd) etc.

Soft magnetic

- Narrow hysteresis loop
- Low coercive force (H_c)
- Easy to magnetize and demagnetize
- Used in power electronics
- Examples: Ferrites, Steel (SiFe), amorphous alloys, Powder iron, Nano crystalline materials, Fe-Ni and Fe-Co alloys

5

Ferrite Cores



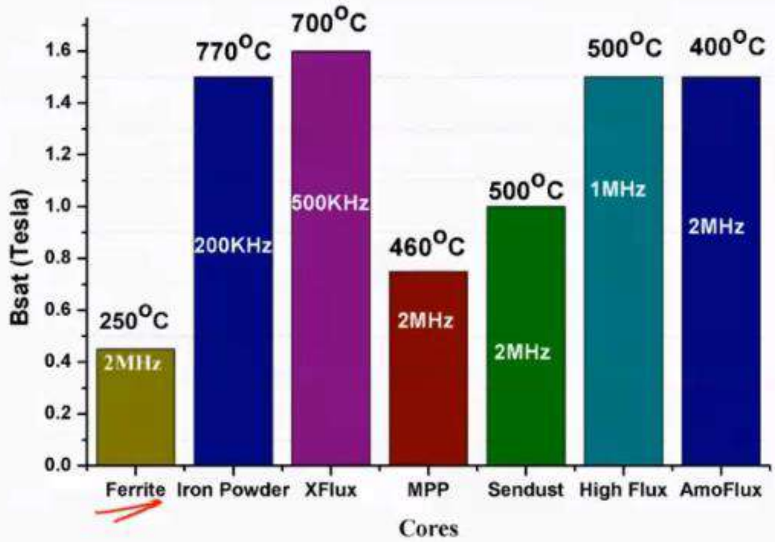
6

Powder Core

meeting

11

Comparison of Bsat , Max.operating frequency and Curi temperature of ferrite and powder core



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Performance comparison of Ferrite and Powder cores

Material	Core Loss	DC Bias	Relative Cost	Saturation Flux Density (Tesla)	Curie Tempe-rature	Operating frequency	Tempe-rature stability
AmoFlux	Low	Better	Medium	1.5	400° C	2 MHz	Betetr
High Flux	Moderate	Best	Medium	1.5	500° C	1 MHz	Better
Sendust	Low	Good	Low	1.0	500° C	2 MHz	Good
MPP	Very Low	Better	High	0.75	460° C	2 MHz	Best
XFlux	High	Best	Low	1.6	700° C	500 kHz	Good
Iron Powder	Highest	Good	Lowest	1.2 - 1.5	770° C	200 kHz	Poor
Ferrite	Lowest	Poor	Lowest	0.45	100 - 250° C	2MHz	Poor

Nano crystalline Cores

- Made up crystals with a typical size of 7–20 nm that are iron (Fe) based . In addition there are traces of Si, B, Cu, molybdenum (Mo) and niobium (Nb)
- They combine the high saturation magnetic flux density of silicon steels with the low loss of ferrites at high frequencies.
- saturation flux density is about 1.2T- 1.5 T.
- The nanocrystalline cores are used up to 150 kHz.
- High relative permeability μ_r.
- applications in current transformers, pulse transformers and common-mode EMI filters

DAY-4

27.07.2020

Monday

AN Session

02.00 PM to 04.00 PM

Resource Person

Mr.P.Gangagirija

Electrical Expert

DNV GL, Chennai

Topic: Basic Design Parameters of Power System Production


Dr. S. Vijayalaks...
and 23 more
13:52
You
Gnanagirija


Start the slide show from the
Basic Design Parameters
P Gnanagirija
27-7-2020
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Basic Design Parameters

What is a Switchboard ?

A combination of

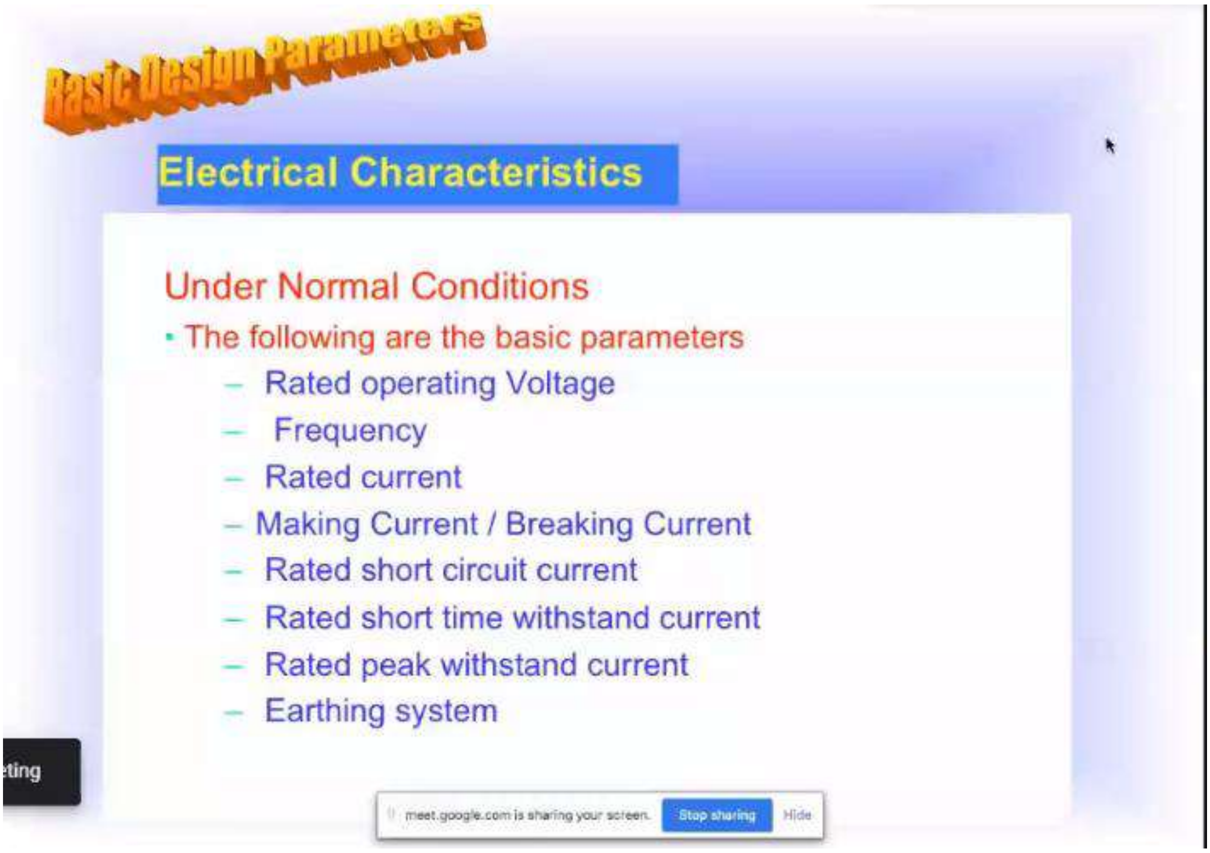
- one or more switching device (s) together with
  - associated control, measuring, signaling, protection etc.

- ➢ completely assembled, under the responsibility of the manufacturer with
  - ➢ all the internal - Electrical and Mechanical connections and
  - ➢ structural parts complying to applicable Standards.

Basic Design Parameters

Standards

- Standards are **PRE ESTABLISHED RULES** and **REGULATIONS** which tell us about the basic norms to be followed in the assembly of the switchboards.
- Without considering the standards the assembly can be simply a potential bomb.
- Those Days we have different standards like
  - BS
  - French Standards
  - German Standards
  - American Standards
  - Japanese Standards
- Nowadays more or less all the countries follow IEC
  - Manufacturer's Standards etc


Basic Design Parameters
Electrical Characteristics
Under Normal Conditions
• The following are the basic parameters
– Rated operating Voltage
– Frequency
– Rated current
– Making Current / Breaking Current
– Rated short circuit current
– Rated short time withstand current
– Rated peak withstand current
– Earthing system
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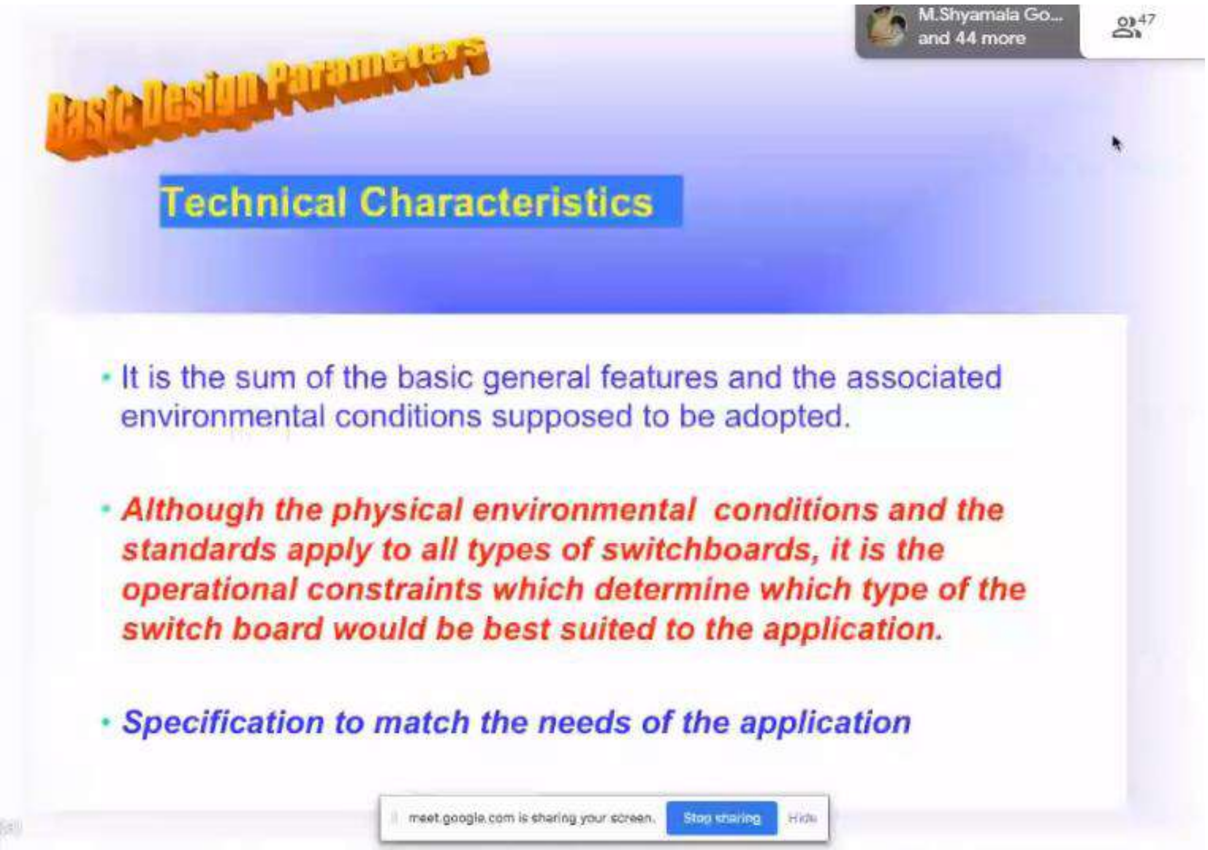
M.Shyamala Go...
and 44 more
47
Basic Design Parameters
Technical Characteristics
• It is the sum of the basic general features and the associated environmental conditions supposed to be adopted.
• Although the physical environmental conditions and the standards apply to all types of switchboards, it is the operational constraints which determine which type of the switch board would be best suited to the application.
• Specification to match the needs of the application
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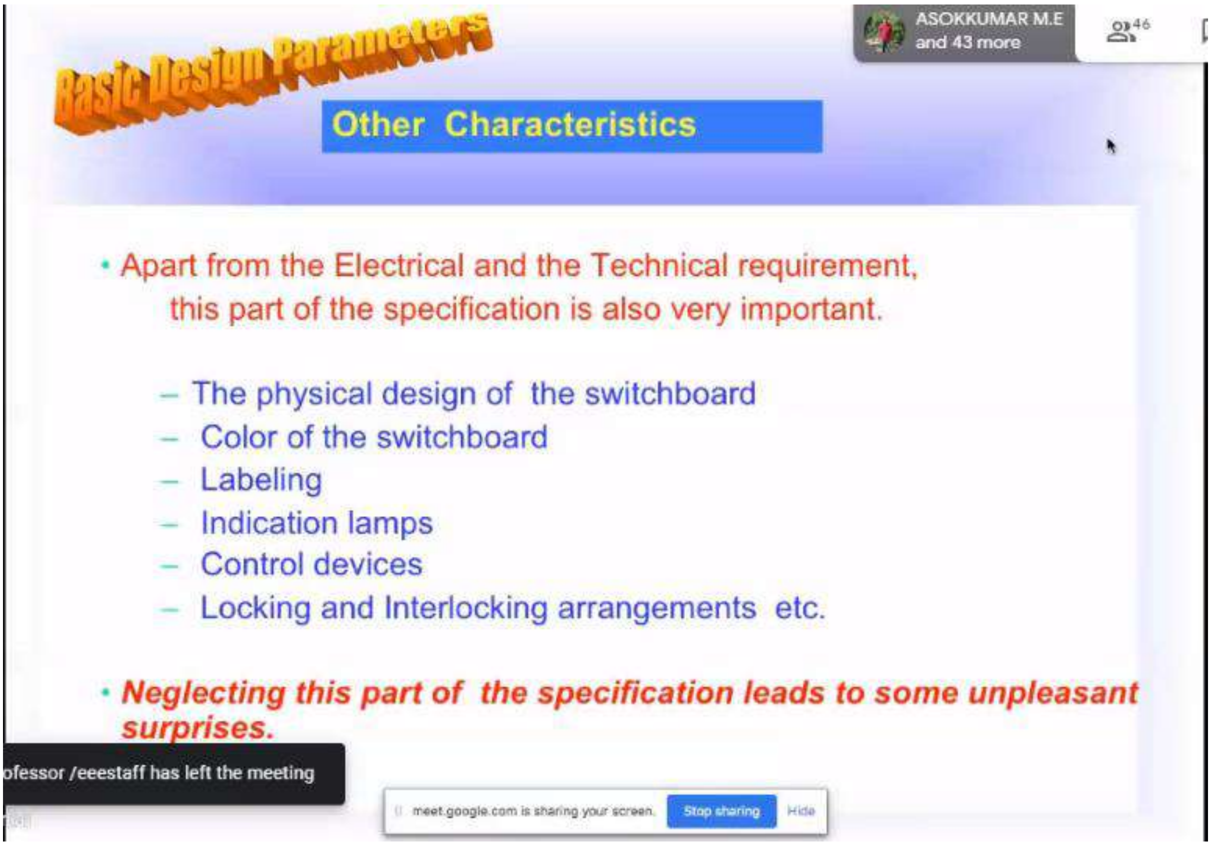
ASOKKUMAR M.E
and 43 more
46
Basic Design Parameters
Other Characteristics
• Apart from the Electrical and the Technical requirement, this part of the specification is also very important.
– The physical design of the switchboard
– Color of the switchboard
– Labeling
– Indication lamps
– Control devices
– Locking and Interlocking arrangements etc.
• Neglecting this part of the specification leads to some unpleasant surprises.
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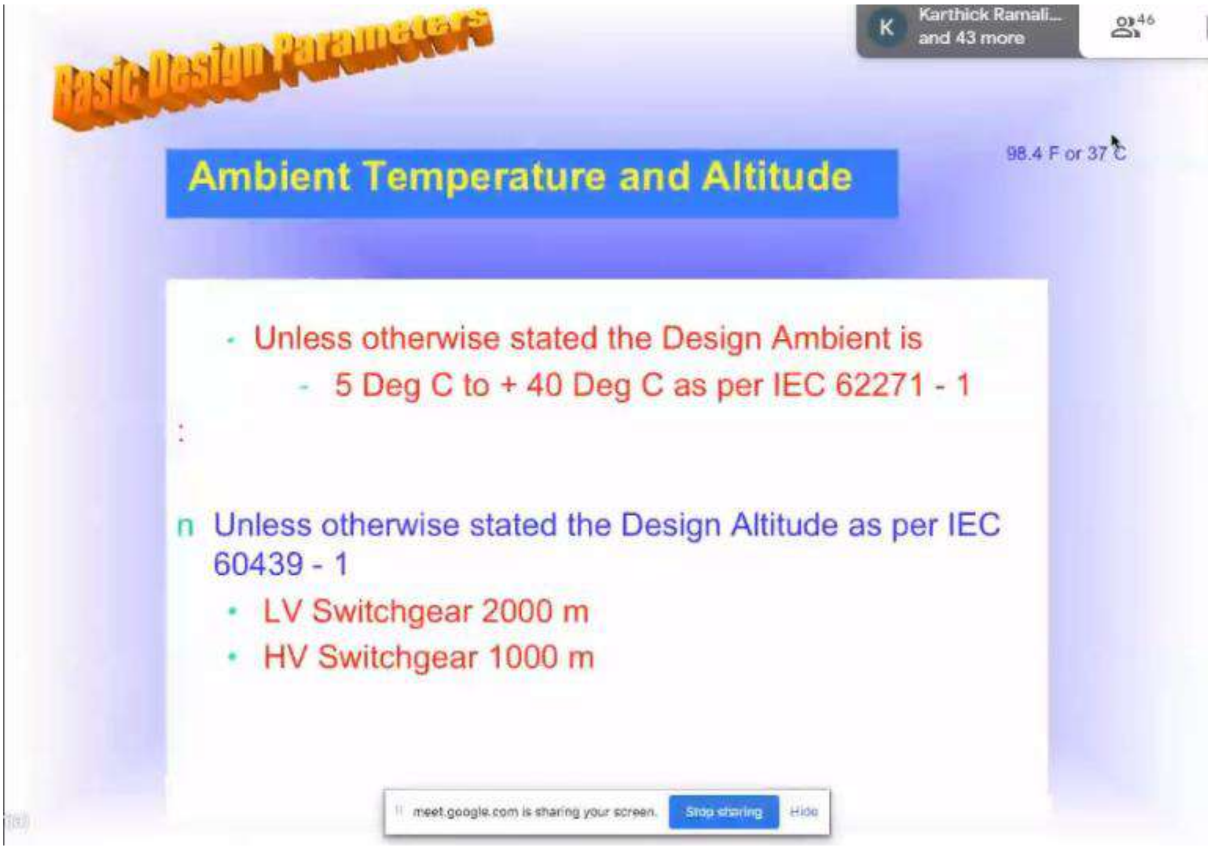
Karthick Ramali...
and 43 more
46
Basic Design Parameters
Ambient Temperature and Altitude
98.4 F or 37 C
• Unless otherwise stated the Design Ambient is
- 5 Deg C to + 40 Deg C as per IEC 62271 - 1
n Unless otherwise stated the Design Altitude as per IEC 60439 - 1
• LV Switchgear 2000 m
• HV Switchgear 1000 m
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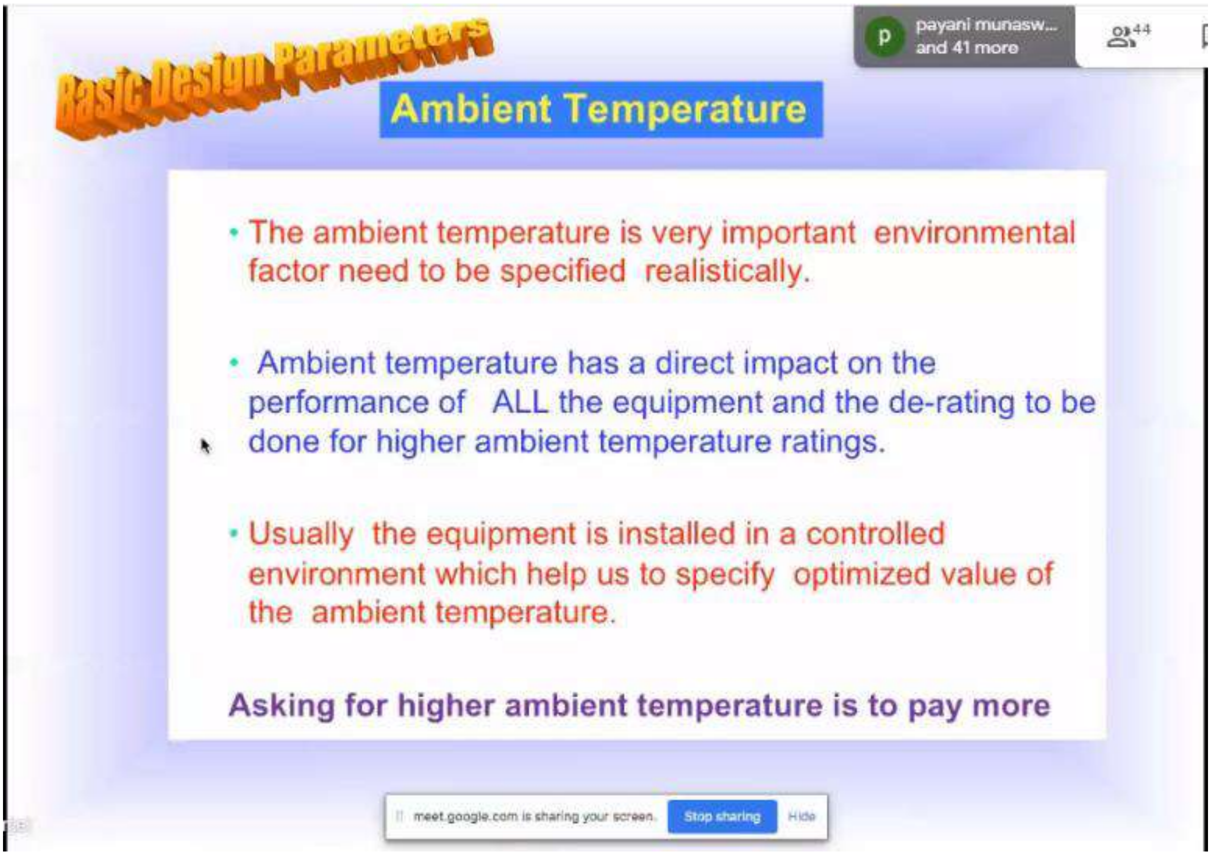
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and 41 more
44
Basic Design Parameters
Ambient Temperature
• The ambient temperature is very important environmental factor need to be specified realistically.
• Ambient temperature has a direct impact on the performance of ALL the equipment and the de-rating to be done for higher ambient temperature ratings.
• Usually the equipment is installed in a controlled environment which help us to specify optimized value of the ambient temperature.
Asking for higher ambient temperature is to pay more
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Arvin Tony
and 42 more
45
Basic Design Parameters
Forms of separations
• As per IEC 60439-1 we have the following forms of segregation
– Form 1
– Form 2a & 2b
– Form 3a & 3b
– Form 4a & 4b
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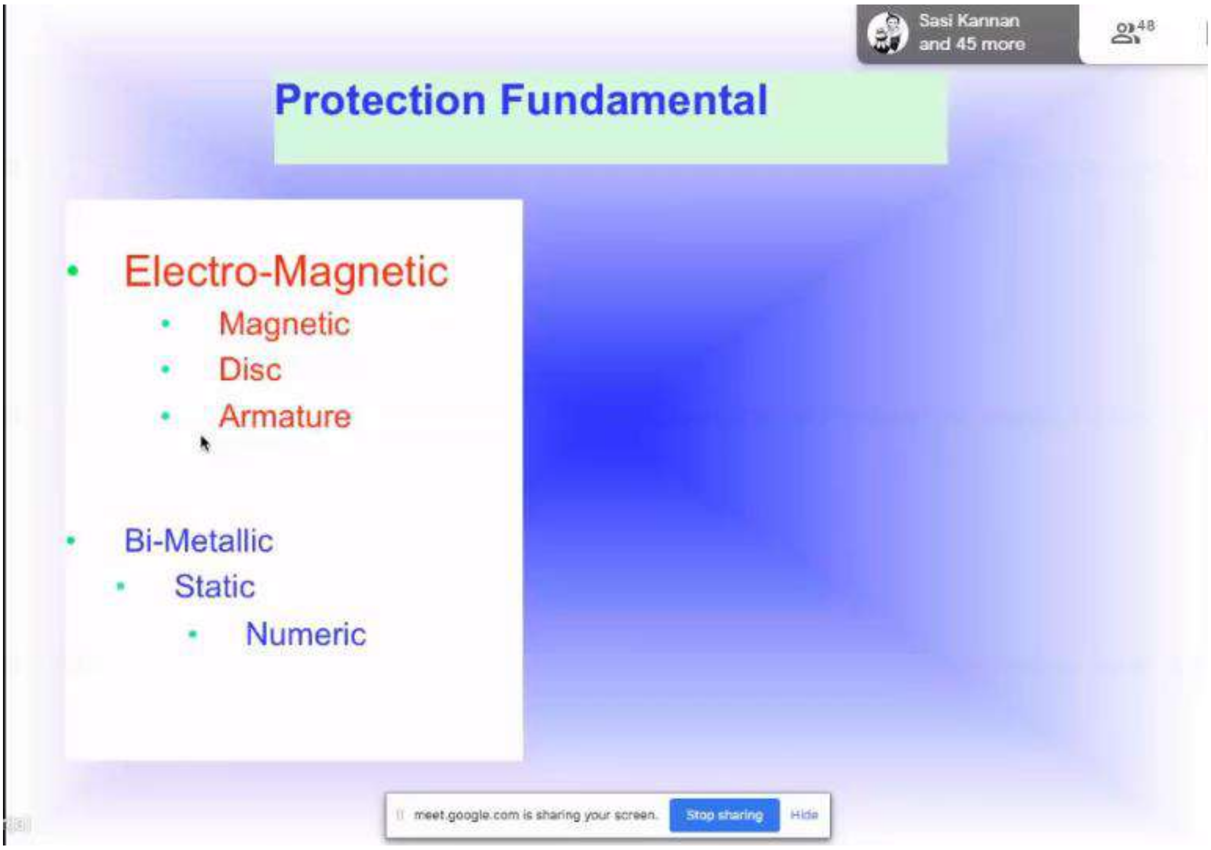
Sasi Kannan
and 45 more
48
Protection Fundamental
Electro-Magnetic
Magnetic
Disc
Armature
Bi-Metallic
Static
Numeric
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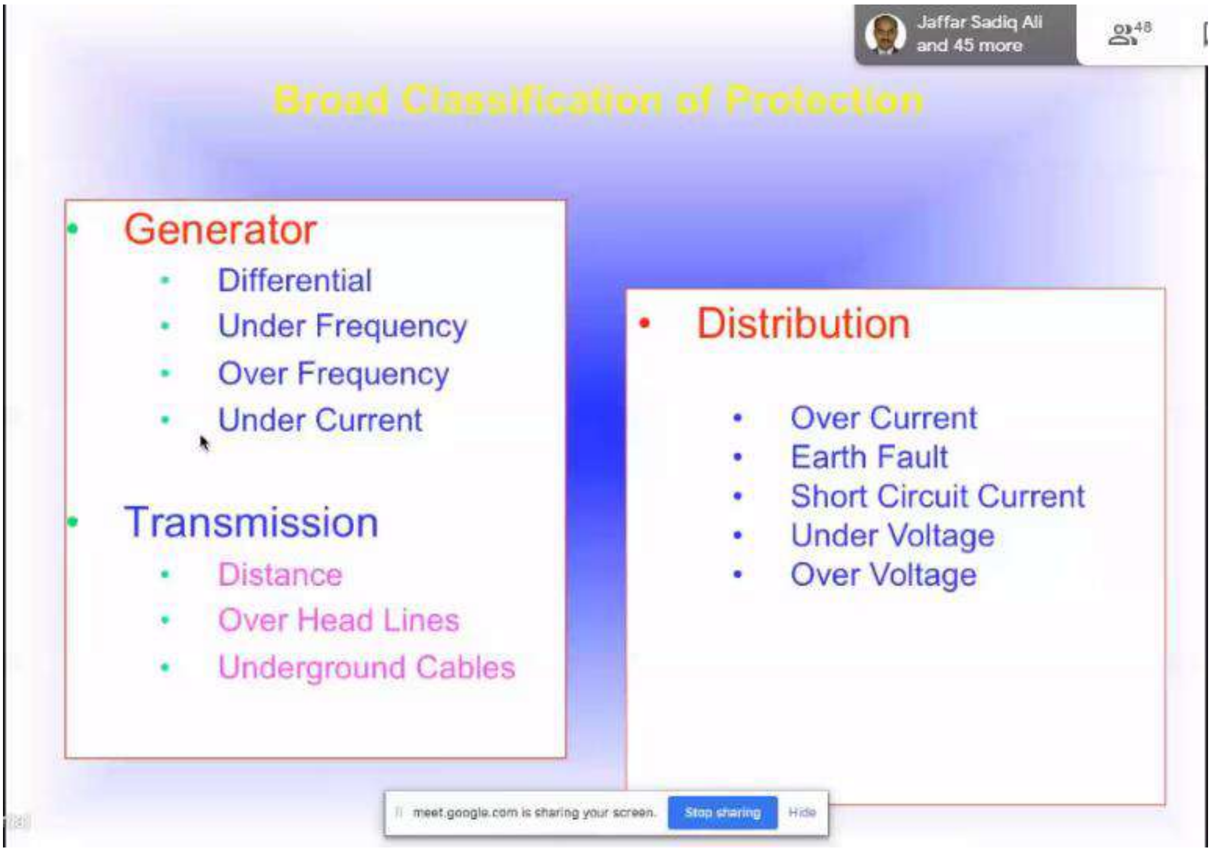
Jaffar Sadiq Ali
and 45 more
48
Broad Classification of Protection
Generator
Differential
Under Frequency
Over Frequency
Under Current
Transmission
Distance
Over Head Lines
Underground Cables
Distribution
Over Current
Earth Fault
Short Circuit Current
Under Voltage
Over Voltage
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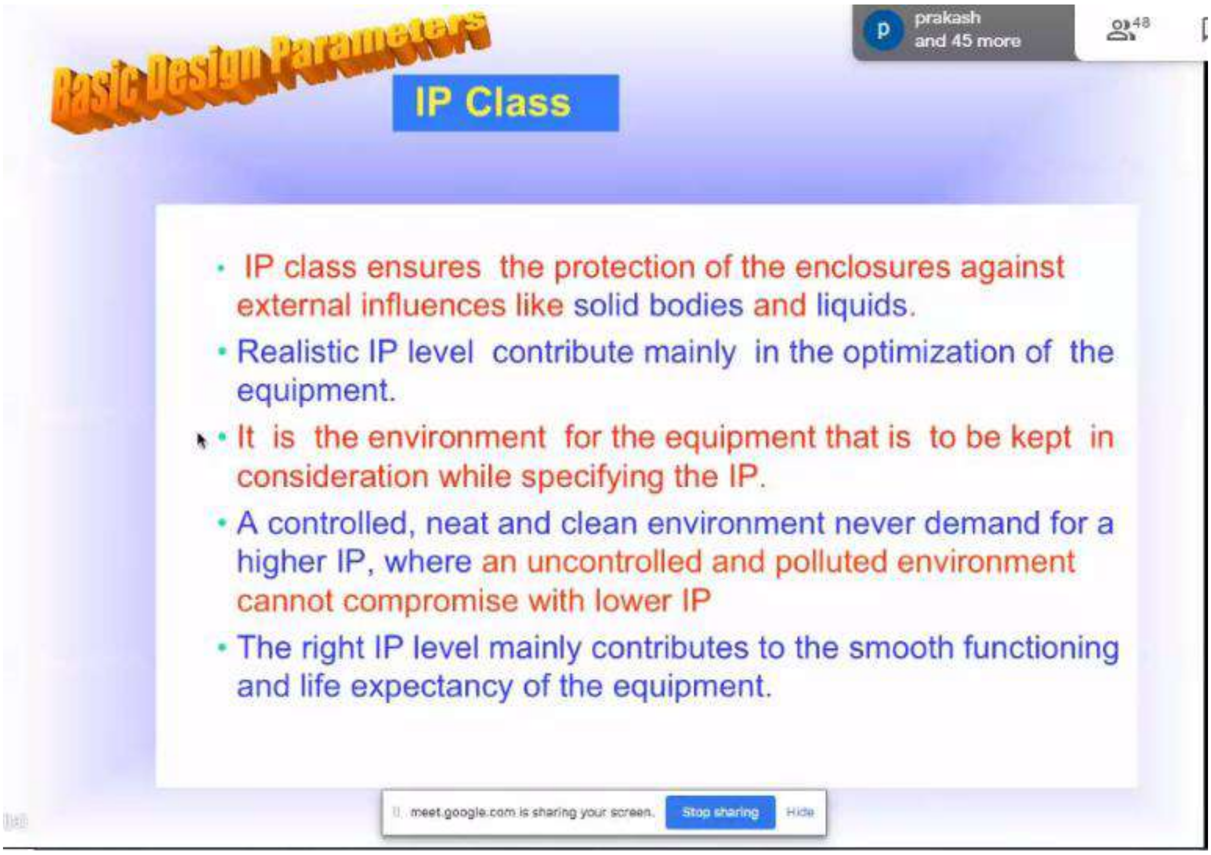
prakash
and 45 more
48
Basic Design Parameters
IP Class
• IP class ensures the protection of the enclosures against external influences like solid bodies and liquids.
• Realistic IP level contribute mainly in the optimization of the equipment.
• It is the environment for the equipment that is to be kept in consideration while specifying the IP.
• A controlled, neat and clean environment never demand for a higher IP, where an uncontrolled and polluted environment cannot compromise with lower IP
• The right IP level mainly contributes to the smooth functioning and life expectancy of the equipment.
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Jagadeesh Babu
and 45 more
48
Basic Design Parameters
IP Levels 1st Digit Protection Against Solid Bodies
• No protection
• Protection against solid bodies greater than 50mm.
• Protection against solid bodies greater than 12mm.
• Against bodies greater than 2.5mm
• Against bodies greater than 1mm.
• Protection against dust
• Total protection against dust.
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Basic Design Parameters

I P Levels 2nd Digit - Protection against Liquid

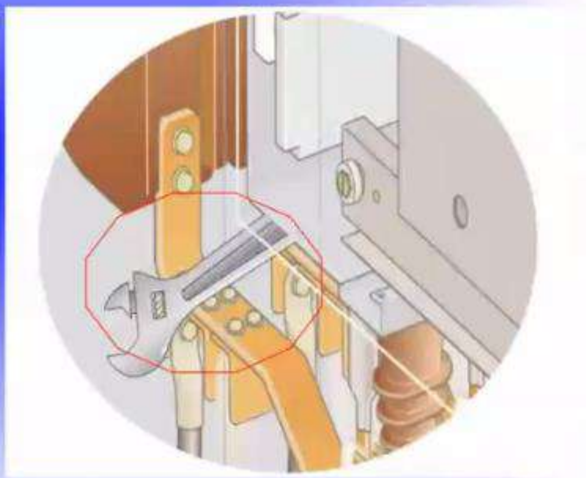
- No protection
- Protection against vertical drops
- Protection against drops of water falling upto 15 deg. from vertical
- Protection against drops of water falling upto 60 deg. from vertical
- Protection against water projected from all direction
- Protection against hosing with water projected from all direction
- Protection against swamping (flooding) with water
- Protection against Immersion

Basic Design Parameters

Internal Arc

Origine

- Tools forgotten after maintenance
- Very corrosive atmosphere
- Forced (defeating) inter-locks
- Faulty component



DAY-5

28.07.2020

Tuesday

FN Session

10.00 AM to 12.00 PM

Resource Person

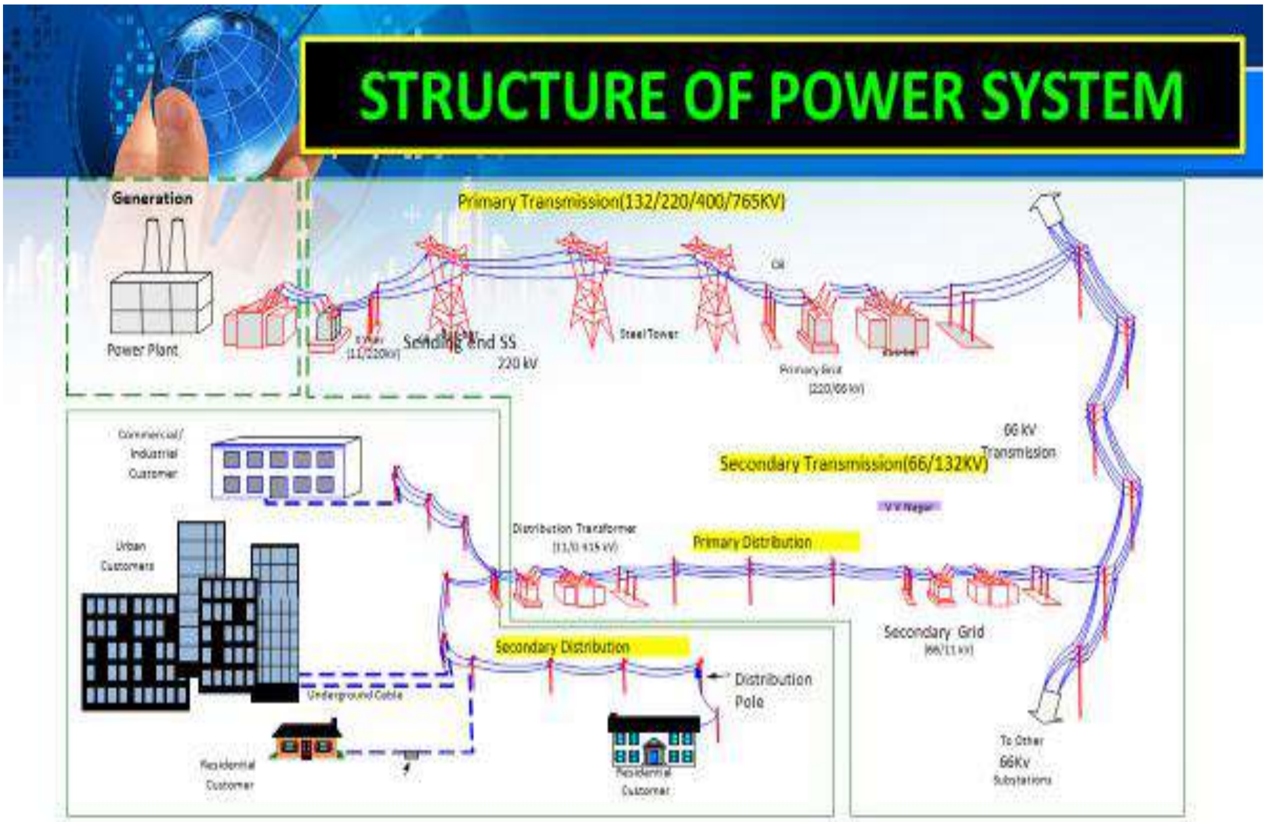
Dr.V.Saravanan

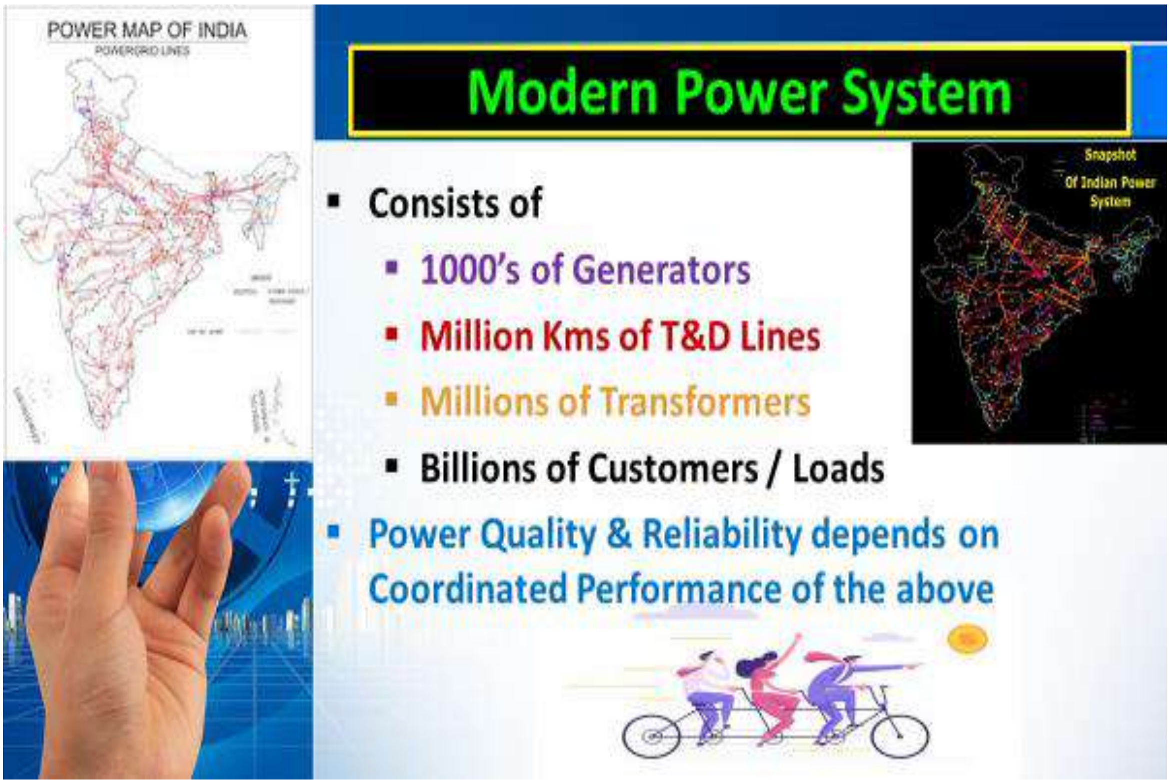
Professor, Thygarajar College of Engineering

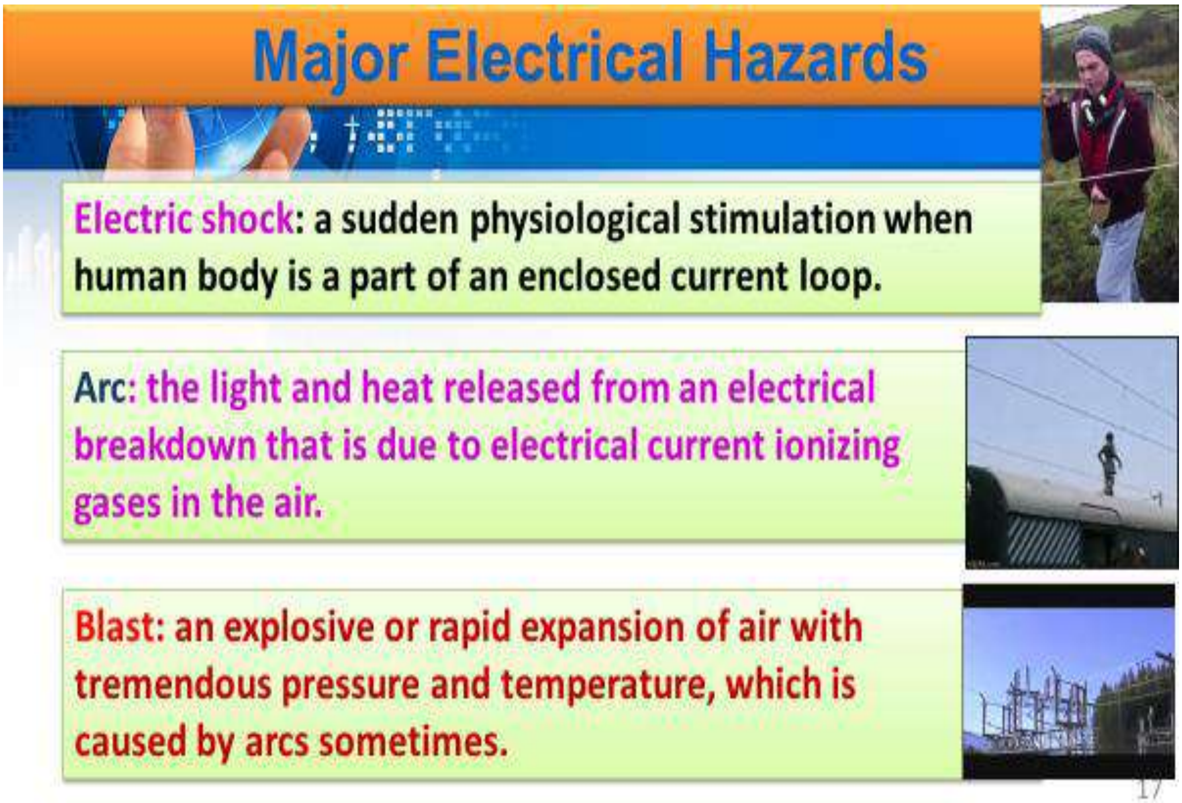
Madurai, TamilNadu

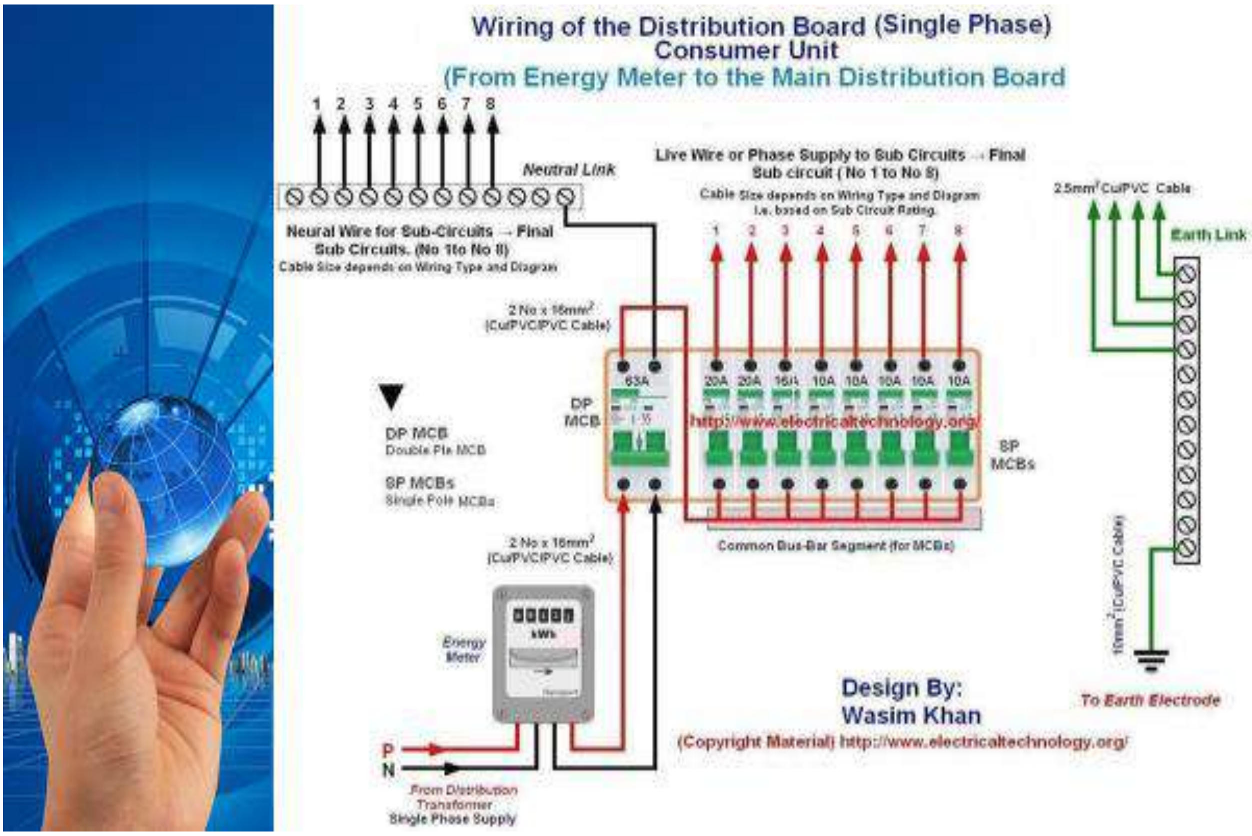
Topic: Selection and Ratings of Protective Devices for Domestic & Commercial Electrical Installation


Selection and Ratings of Protective Devices for
Domestic & Commercial Electrical Installation
Dr.V.Saravanan,
Professor / Energy Consultant - EEE Dept.
Thiagarajar College of Engineering, Madurai
www.electricaltechnology.org
1P
2P
3P
4P

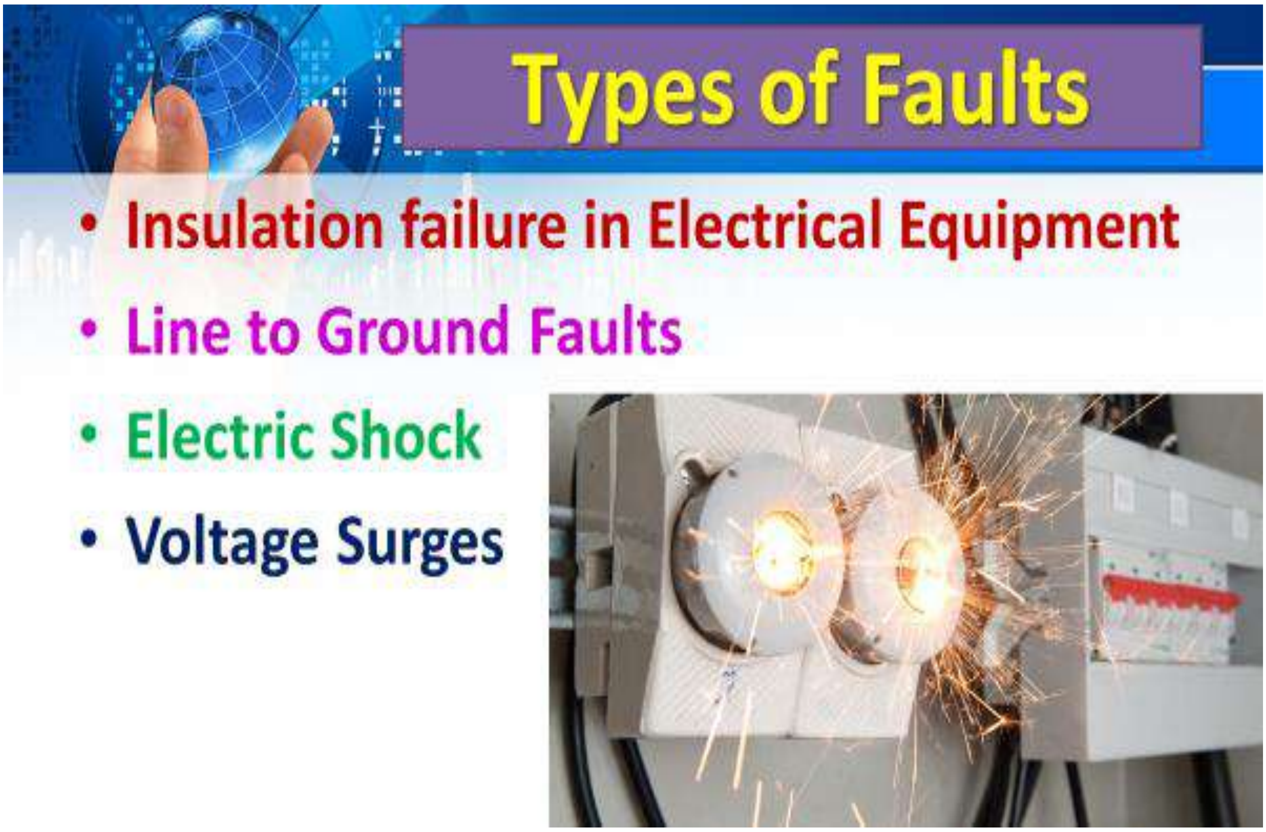

STRUCTURE OF POWER SYSTEM
Generation
Power Plant
Primary Transmission(132/220/400/765KV)
Sending End SS
220 kV
Steel Tower
Secondary Transmission(66/132KV)
66 kV
Transmission
Primary Distribution
Distribution Transformer
Secondary Grid
Secondary Distribution
Distribution
Pole
Commercial/
Industrial
Customer
Urban
Customers
Underground Cable
Residential
Customer
Residential
Customer
To Other
66Kv
Substations


POWER MAP OF INDIA
POWERGRID LINES
Modern Power System
Snapshot
Of Indian Power
System
Consists of
1000's of Generators
Million Kms of T&D Lines
Millions of Transformers
Billions of Customers / Loads
Power Quality & Reliability depends on Coordinated Performance of the above

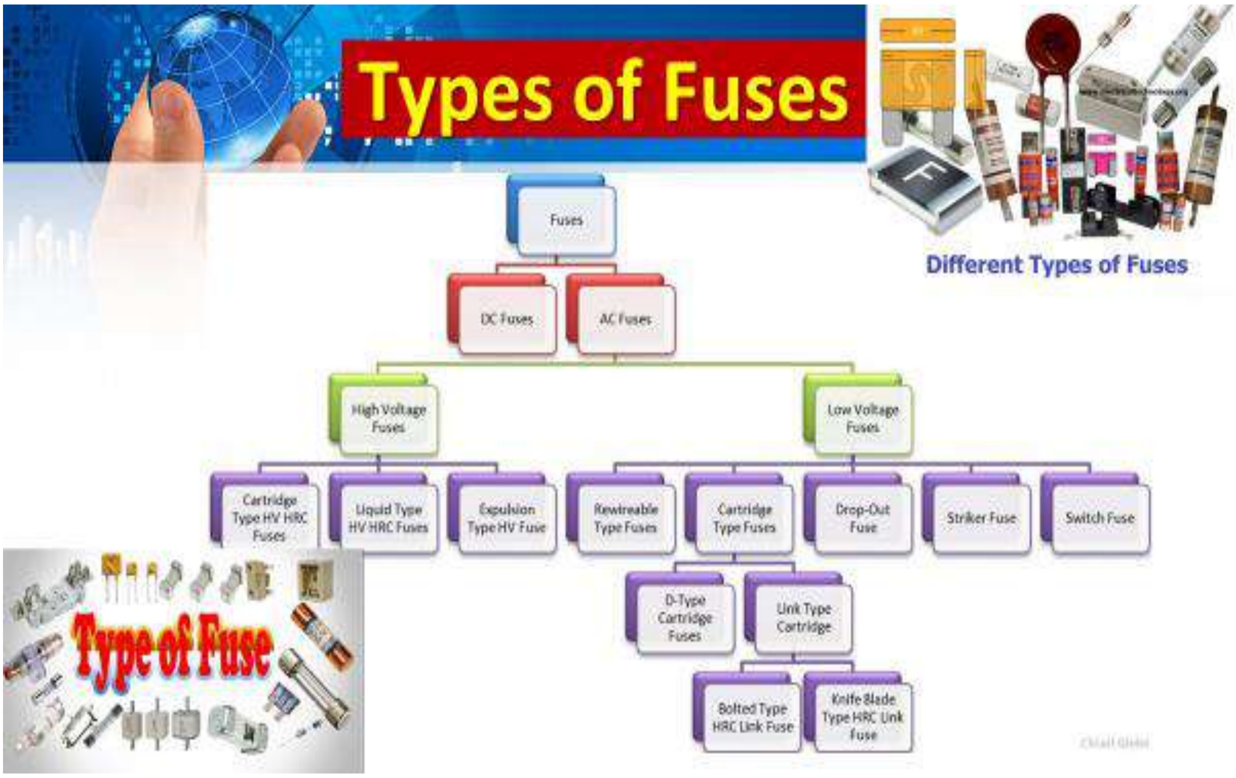

Major Electrical Hazards
Electric shock: a sudden physiological stimulation when human body is a part of an enclosed current loop.
Arc: the light and heat released from an electrical breakdown that is due to electrical current ionizing gases in the air.
Blast: an explosive or rapid expansion of air with tremendous pressure and temperature, which is caused by arcs sometimes.
17


Wiring of the Distribution Board (Single Phase)
Consumer Unit
(From Energy Meter to the Main Distribution Board
1 2 3 4 5 6 7 8
Neutral Link
Neural Wire for Sub-Circuits → Final
Sub Circuits. (No 1to No 8)
Cable Size depends on Wiring Type and Diagram
Live Wire or Phase Supply to Sub Circuits → Final
Sub circuit (No 1 to No 8)
2.5mm² Cu/PVC Cable
Earth Link
2 No x 16mm²
(Cu/PVC/PVC Cable)
63A
20A 20A 16A 10A 10A 10A 10A 10A
DP
MCB
http://www.electricaltechnology.org/
SP
MCBs
DP MCB
Double Ple MCB
SP MCBs
Single Pole MCBs
2 No x 16mm²
(Cu/PVC/PVC Cable)
Common Bus-Bar Segment (for MCBs)
kWh
Energy
Meter
Design By:
Wasim Khan
To Earth Electrode
(Copyright Material) http://www.electricaltechnology.org/
P
N
From Distribution
Transformer
Single Phase Supply


Need for Protective Devices
• Human Safety
• To avoid Electric Fire / Fire initiated by Electric Faults
• Equipment Protection
▪ LED Lights, BLDC Fan, Inverter based A/C / Refrigerator / Washing Machine, LED TV
• Demand Control


Types of Faults
• Insulation failure in Electrical Equipment
• Line to Ground Faults
• Electric Shock
• Voltage Surges


Types of Protective Devices
• Fuses
• Earthing
• MCB's
• ELCB
• Surge Protective Devices



Advantages of Fuse

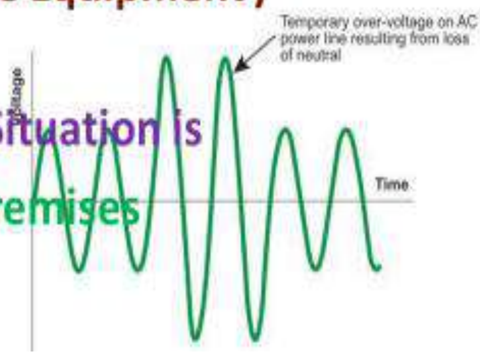
- Speed of operation is very high
- Maintenance cost is practically zero
- They are capable of clearing high as well as low faults current
- They provide reliable operation

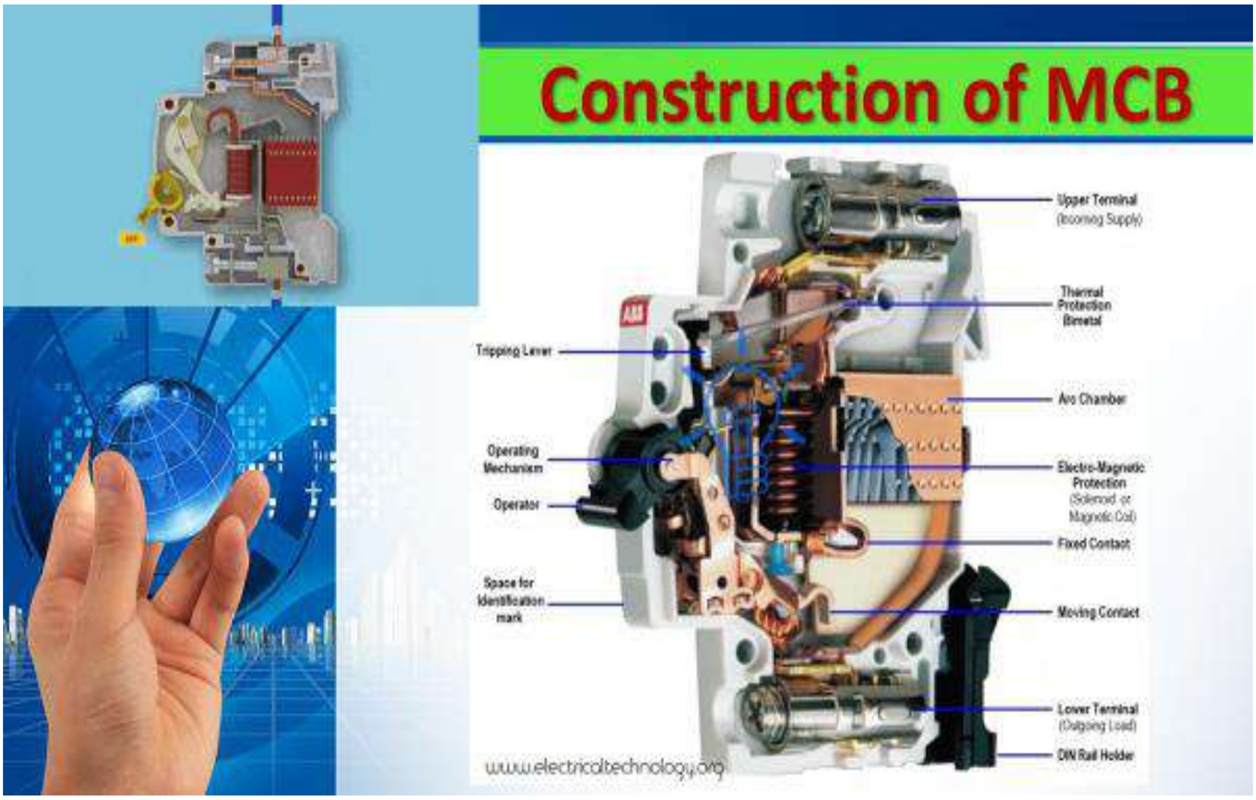
Earthing

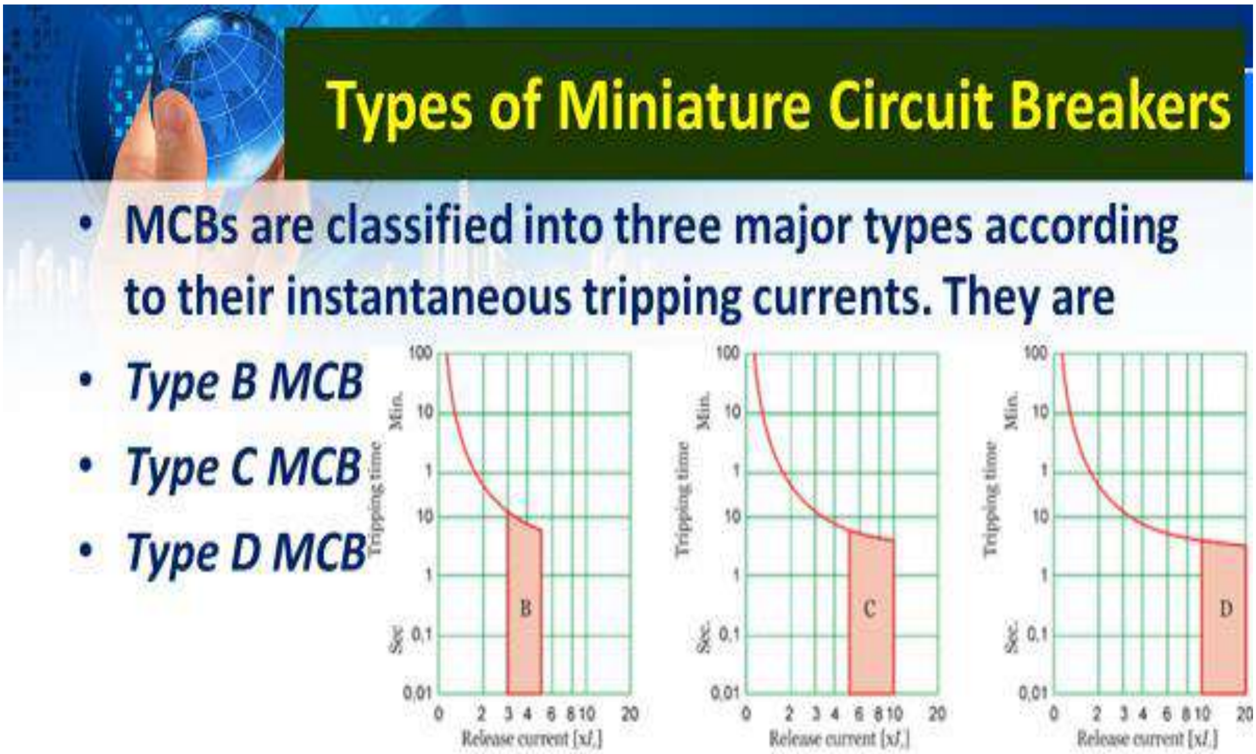
- Earthing is the general term used
  - Connecting the Non Current Carrying Metallic parts of Electrical Equipment to ground
  - By Efficient Manner
- Water Line Pipes also earthed
- Patient test table of EEG, ECG, CT Scan, MRI Scan Etc. also earthed

Neutral Grounding

- In Three Phase Power Supply System – In case of Neutral Failure
  - Phase to Neutral Voltages will raise high
- Results in Failure of Single Phase Equipment / Appliances
- Methods to Protect from Such Situation is
  - Neutral Grounding at your Premises



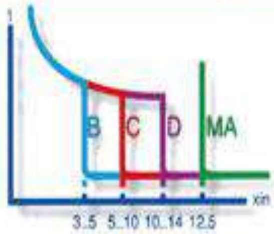

Construction of MCB
Upper Terminal (Incoming Supply)
Thermal Protection Bimetal
Tripping Lever
Arc Chamber
Operating Mechanism
Electro-Magnetic Protection (Solenoid or Magnetic Coil)
Operator
Fixed Contact
Space for Identification mark
Moving Contact
Lower Terminal (Outgoing Load)
DIN Rail Holder
www.electricaltechnology.org


Types of Miniature Circuit Breakers
• MCBs are classified into three major types according to their instantaneous tripping currents. They are
• Type B MCB
• Type C MCB
• Type D MCB
Tripping time
Min.
Sec.
100
10
1
10
1
0,1
0,01
0 2 3 4 6 8 10 20
Release current [xIn]
B
C
D

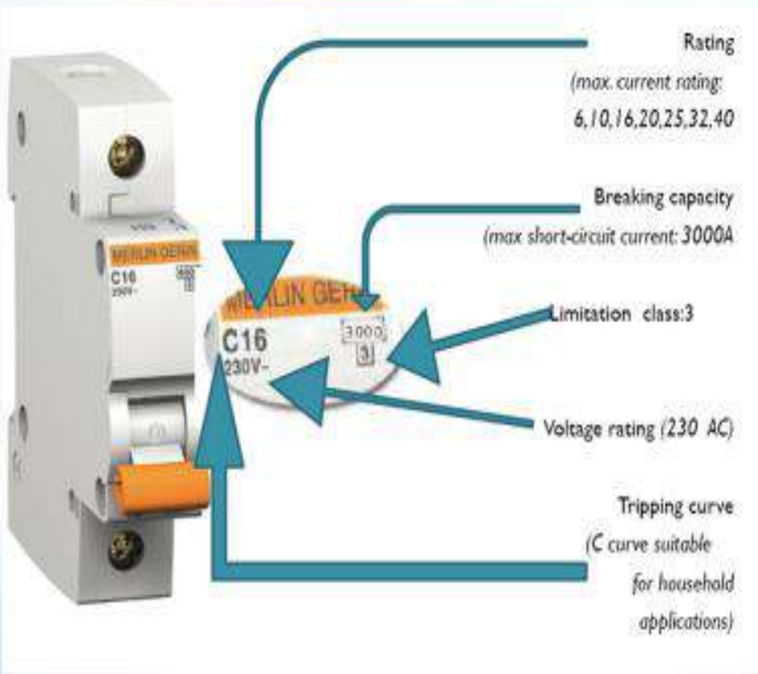
MCB's Inrush Current Rating

MCB Type	Minimum Trip Current	Maximum Trip Current
B Type	$3\,I_r$	$5\,I_r$
C Type	$5\,I_r$	$10\,I_r$
D Type	$10\,I_r$	$20\,I_r$

I_r – Inrush Current



MCB Name Plate Specifications



Physiological Effects of Electricity in Human Body

- More than 3 mA
  - Painful shock
- More than 10 mA
  - Muscle contraction "no-let-go" danger
- More than 30 mA
  - Lung paralysis- usually temporary
- More than 50 mA
  - Possible ventricular fib. (heart dysfunction, usually fatal)
- 100 ma to 4 amps
  - Certain ventricular fibrillation, fatal
- Over 4 amps
  - Heart paralysis; severe burns. Usually caused by >600 volts

Earth Leakage Circuit Breakers (ELCB/RCCB/GFCI)

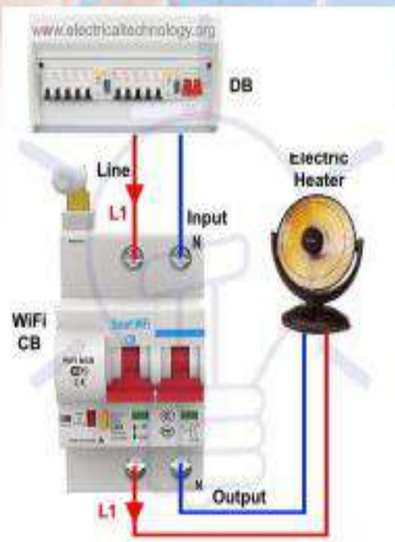
- The main purpose of Earth leakage protectors is to prevent injury to humans and animals due to electric shock.

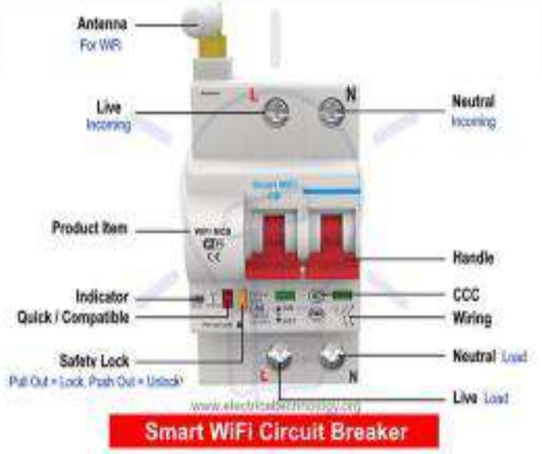
- Legrand
- Havells
- ABB (ASEA Brown Boveri)
- Crabtree
- Siemens AG
- Schneider Electric
- Vguard

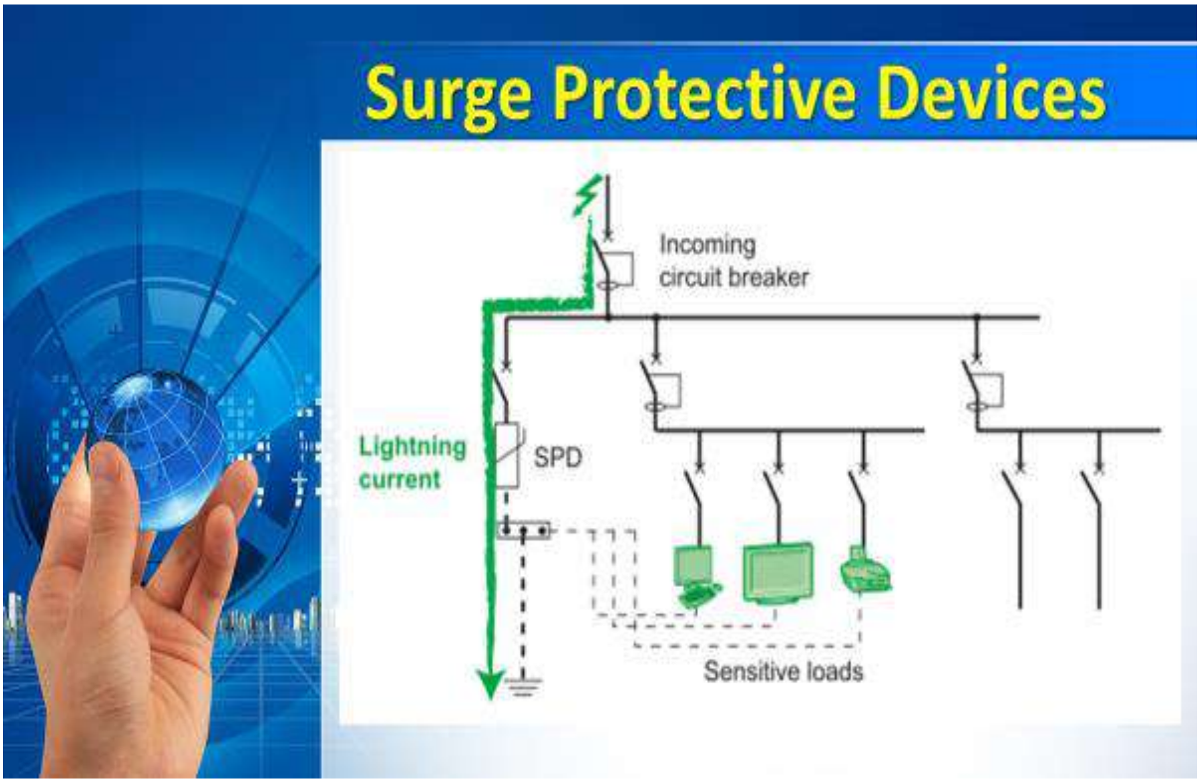
WiFi Circuit Breaker

- WiFi circuit breakers are same like normal and ordinary CBs with
  - An antenna for WiFi signals
  - a special mechanical switch mechanism for automatic ON/OFF operation

WiFi Circuit Breaker






Surge Protective Devices
Incoming
circuit breaker
Lightning
current
SPD
Sensitive loads


To Summarize
• Choose a Right Protective Device
• Select Rating as per the Load
• Monitor the Performance of Protective Devices
• Minimize Peak Demand
• Be Safe and Create Safe Working Environment

DAY-5

28.07.2020

Tuesday

AN Session

02.00 PM to 04.00 PM

Resource Person

Dr.C.Sharmeela

Associate Professor, Anna University

Chennai, Tamil Nadu

Topic: Protection Requirements for Solar Photovoltaic Systems

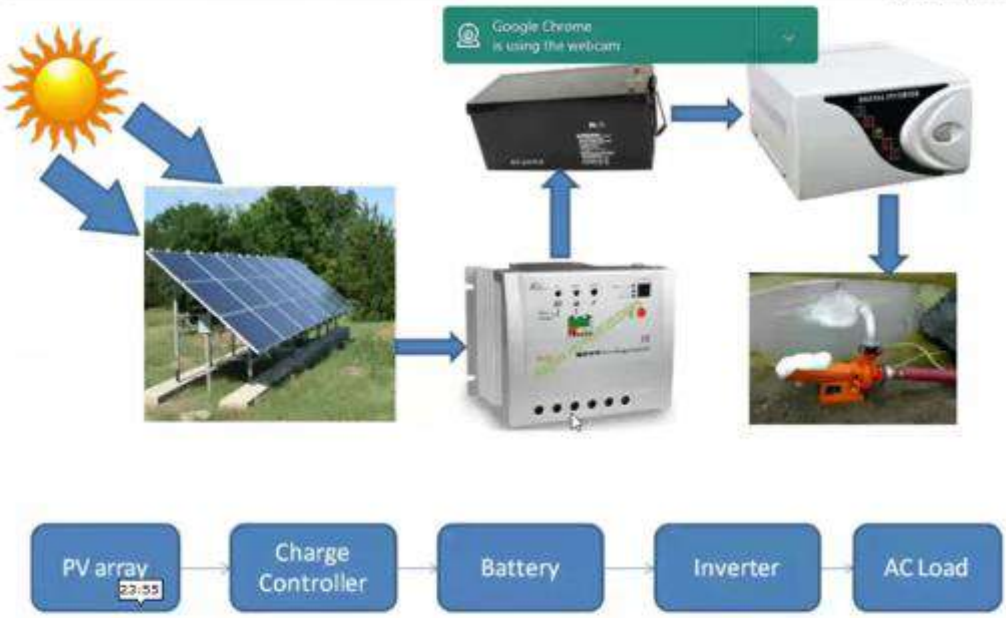
COMPONENTS OF SOLAR PV SYSTEMS

Dr. C. SHARMEELA
Assistant Professor in EEE,
Anna University, Chennai – 25.
E-Mail: sharmeela20@yahoo.com
CELL: 9841363144

CONTENTS

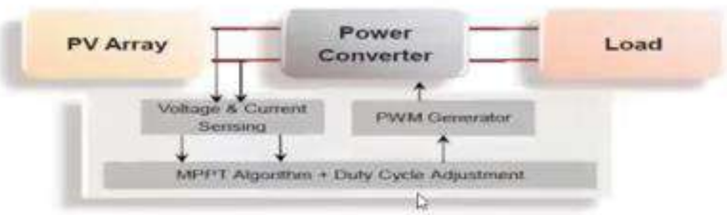
- Solar PV system components –Overview
- DC-DC converters in Solar PV systems
- Inverters for Solar PV
- Energy Storage Devices in Solar PV systems
- Current Trends in Solar PV market
- Concluding remarks

AC Systems with Storage



MPPT CHARGE CONTROLLER

- MPPT Charge controller is usually a non isolated DC-DC converter with a special algorithm based PWM driver unit.
- MPPT can be implemented in DC-DC controller or in the inverter. In general a solar power conditioning unit has DC-DC converter, battery charge controller and inverter.



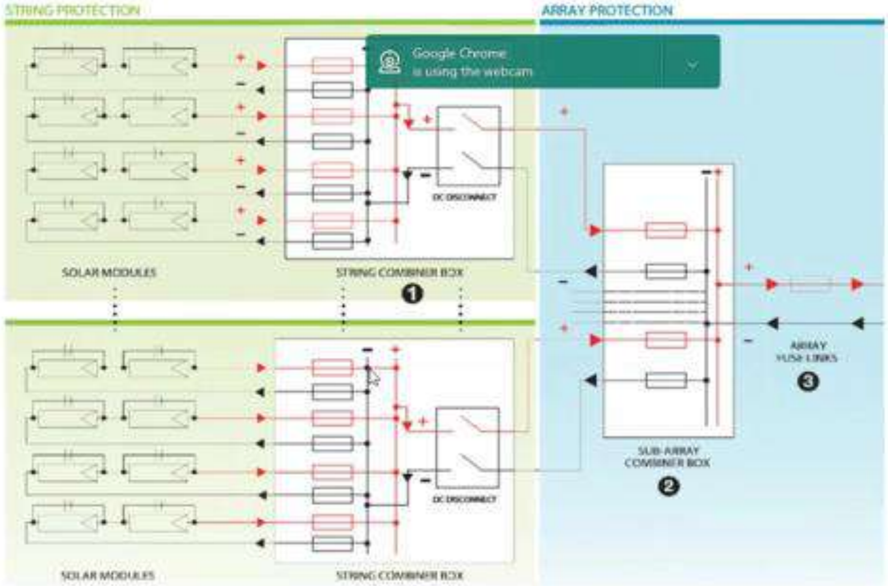
Categories of Inverters

Central Inverter	String Inverter	Module Inverter	Multi String
• High Power • 100kW-500kW	• Medium Power • 3kW-20kW	• Low Power • 50-500W	• Various DC-DC Converters • High Power Common Inverter

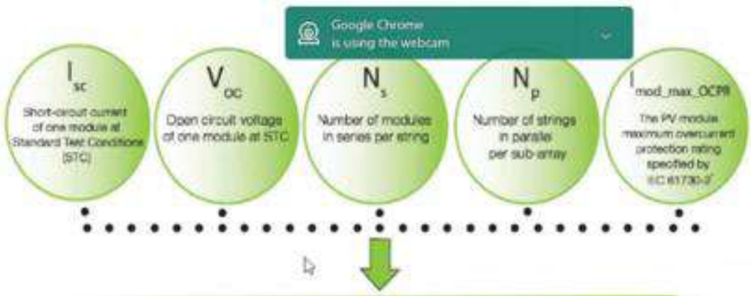
Silicon Carbide in Power electronics

- **Silicon has long bee**[illegible]miconductor of choice for such power electronics. But soon this ubiquitous substance will have to share the spotlight.
- Devices made from silicon carbide (SiC)—a faster, tougher, and more efficient alternative to straight silicon—are beginning to take off.
- SiC power devices will also become vital in solar and wind energy creation, by reducing the energy lost as electricity is converted to a form that can be used on the power grid.

DC Side Protections



String protection



If $N_p \geq 3$

The fuse link's ratings should be selected as follows:

- Voltage rating $\geq 1.20 \times V_{oc} \times N_s$
- Current rating $> 1.56 \times I_{sc}$
- Current rating $\leq I_{mod\_max\_OCPR}$

Cooper Bussmann recommends using fuse links in positive and negative cables, each with adequate voltage (as above).

Array protection

If $N_{sub} < 3$ and the cable is rated at $1.56 \times I_{sc} \times N_p$

For arrays with only one or two sub-arrays and sub-array cables adequately sized, fusing may only be required if local installation regulations or codes require them.

However Cooper Bussmann recommends fuse link protection in all PV systems as unpredicted fault currents may occur in the event of inverter failure.

Or

If $N_p < 3$ and the cable is not rated at $1.56 \times I_{sc} \times N_p$

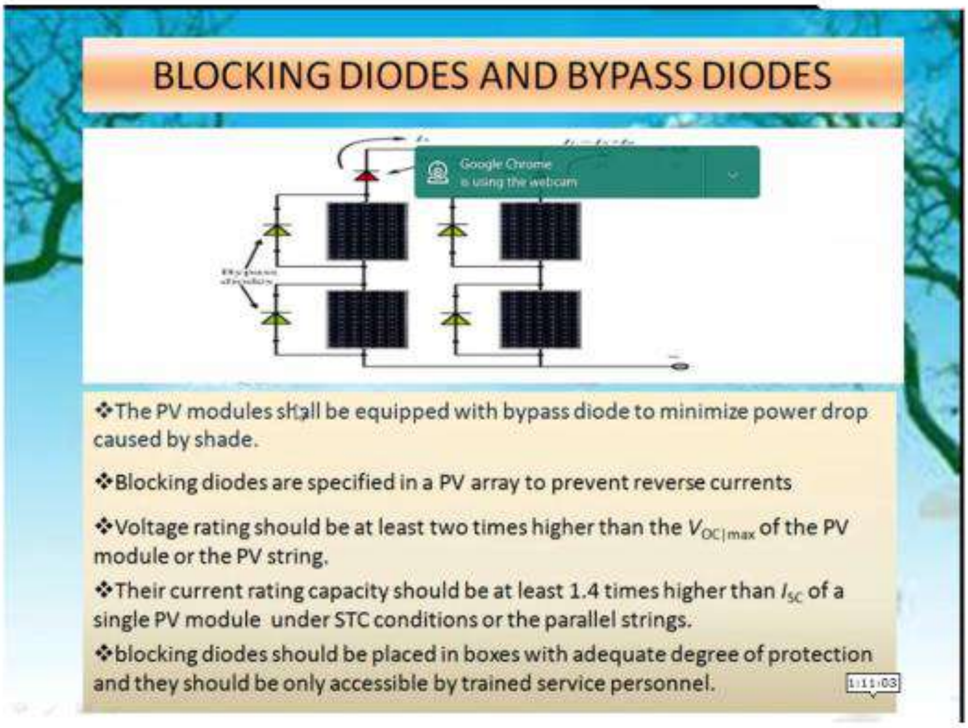
Select fuse link to protect cable:

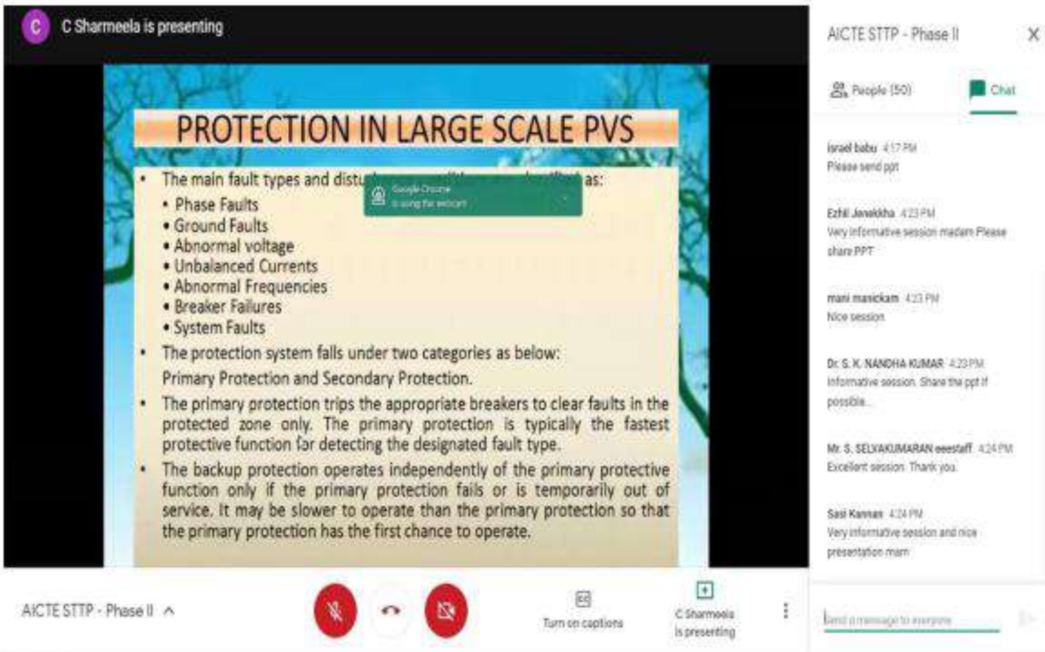
- Fuse link current rating $\leq I_z$ = sub-array cable rating
- Voltage rating $\geq 1.20 \times V_{oc} \times N_s$

Protection against over current DC Side

Circuit breakers or fuses

Circuit breakers or fuses can be used to provide overcurrent protection. Fuses, usually on the fuse holder or directly connected to bars or cables, do not provide a load-break switch function. So when fuses are used, load-break switches should also be used to disconnect fuses from the inverter in order to allow cartridge replacement. So an array box with fuses on fuse holders as string protection, for example, should also incorporate a main switch. Circuit breakers offer finetuned adjustment and greater accuracy than fuses in order to allow the use of cables, especially for sub-array cables, that are smaller than fuses.


BLOCKING DIODES AND BYPASS DIODES
Google Chrome
is using the webcam
❖The PV modules shall be equipped with bypass diode to minimize power drop caused by shade.
❖Blocking diodes are specified in a PV array to prevent reverse currents
❖Voltage rating should be at least two times higher than the $V_{OC|max}$ of the PV module or the PV string.
❖Their current rating capacity should be at least 1.4 times higher than I_{SC} of a single PV module under STC conditions or the parallel strings.
❖blocking diodes should be placed in boxes with adequate degree of protection and they should be only accessible by trained service personnel.
1:11:03


C Sharmeela is presenting
PROTECTION IN LARGE SCALE PVS
• The main fault types and distu as:
• Phase Faults
• Ground Faults
• Abnormal voltage
• Unbalanced Currents
• Abnormal Frequencies
• Breaker Failures
• System Faults
• The protection system falls under two categories as below: Primary Protection and Secondary Protection.
• The primary protection trips the appropriate breakers to clear faults in the protected zone only. The primary protection is typically the fastest protective function for detecting the designated fault type.
• The backup protection operates independently of the primary protective function only if the primary protection fails or is temporarily out of service. It may be slower to operate than the primary protection so that the primary protection has the first chance to operate.
AICTE STTP - Phase II
People (50)
Chat
israel babu
Please send ppt
Ezhil Jenakkha
Very informative session madam Please share PPT
mani manickam
Nice session
Dr. S. K. NANDHA KUMAR
Informative session. Share the ppt if possible..
Mr. S. SELVAKUMARAN eeestaff
Excellent session. Thank you.
Sasi Kannan
Very informative session and nice presentation mam
AICTE STTP - Phase II
Turn on captions
C Sharmeela is presenting

DAY-6

29.07.2020

Wednesday

FN Session

10.00 AM to 12.00 PM

Resource Person

Dr.S.Kumaravel

Associate Professor, NIT

Calicut

Topic: Power Electronic Applications in High Voltage Engineering

Power Electronic Applications in High Voltage Engineering

29.07.2020

Organized by

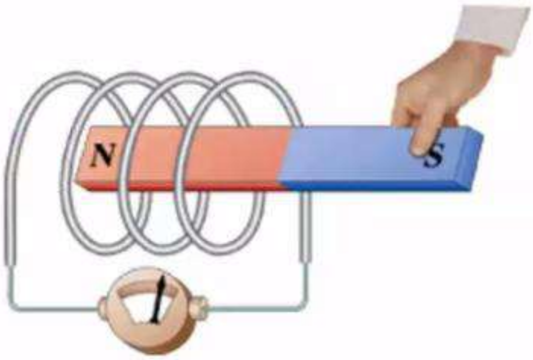
Department of Electrical & Electronics Engineering, Saranathan College of Engineering, Trichy

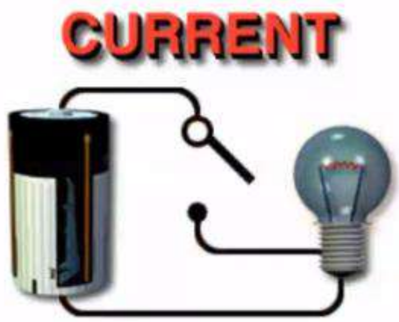
Presented by

Dr. KUMARAVEL SUNDARAMOORTHY

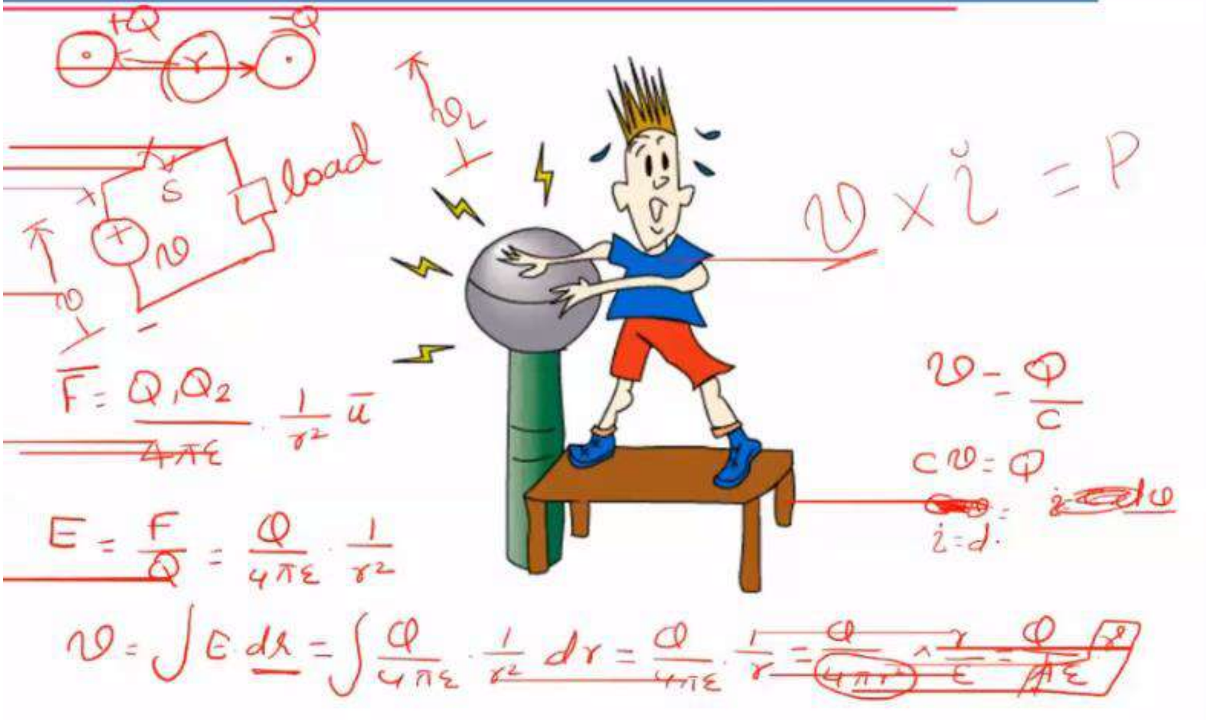
Department of Electrical Engineering
National Institute of Technology Calicut, Kerala

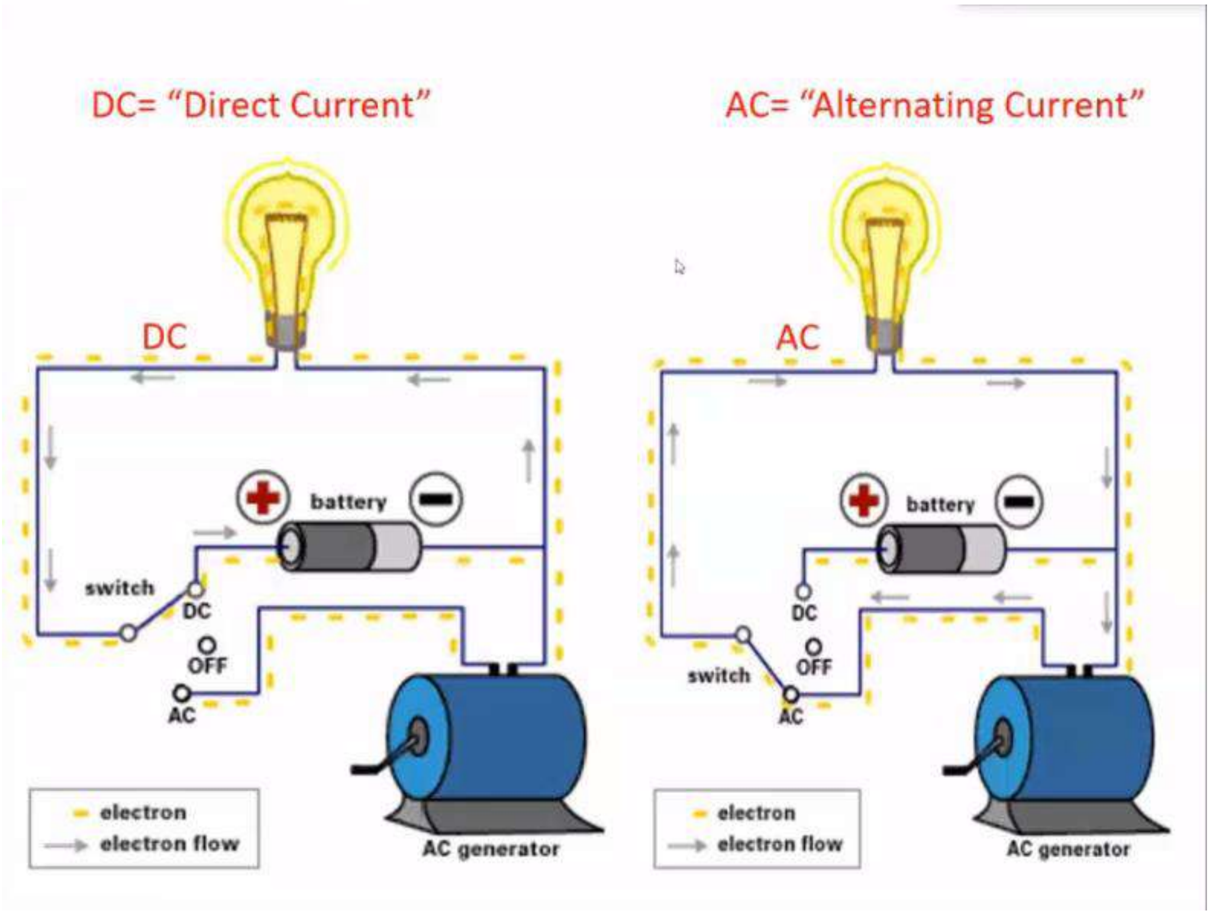
Fourth Basic Need of Human

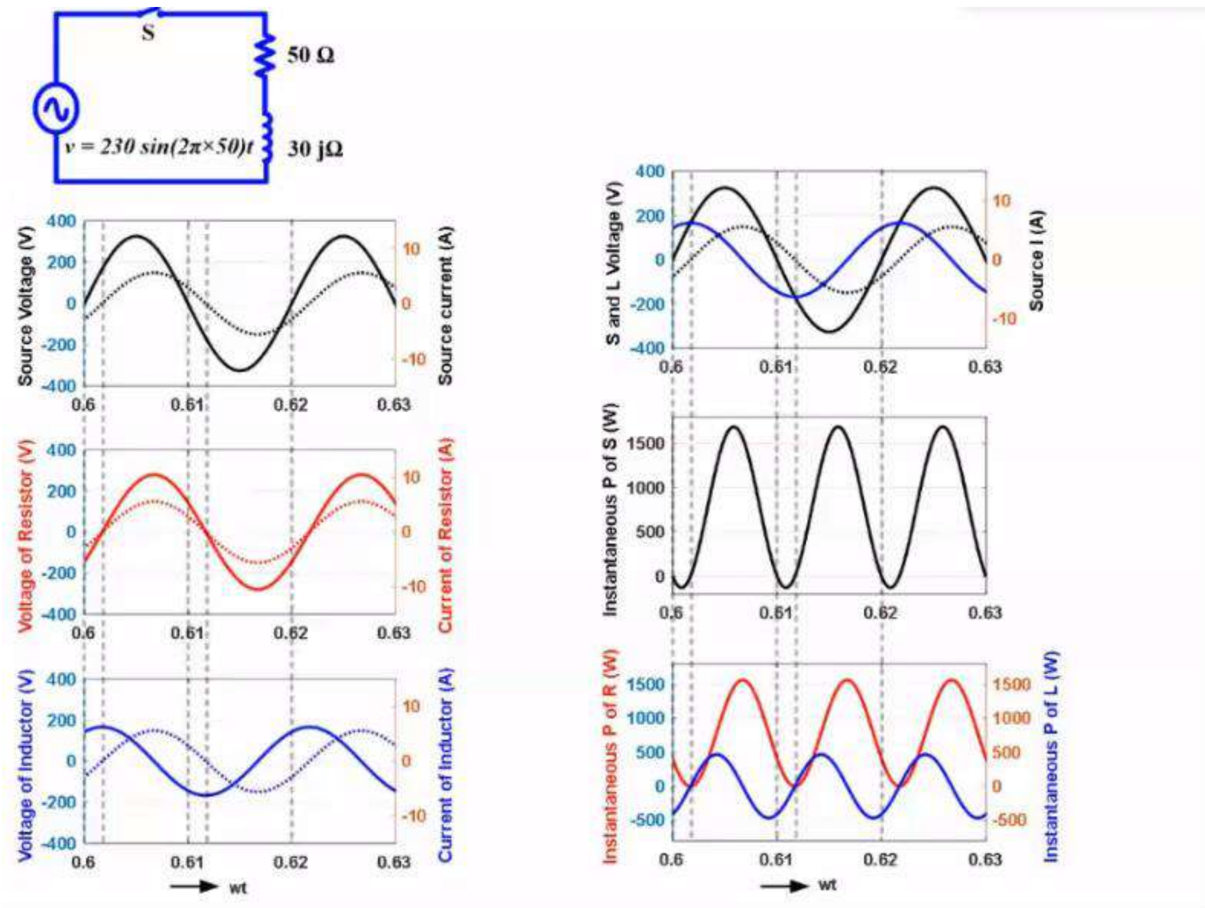




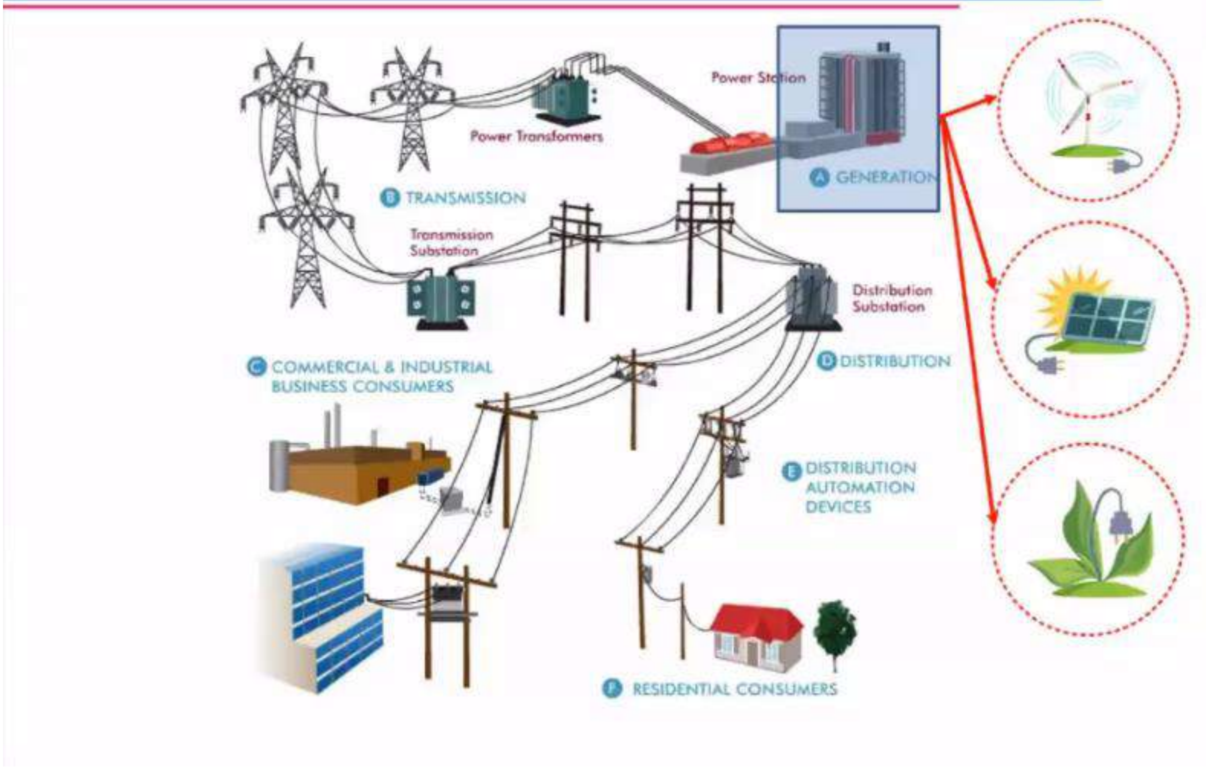
What is Electrical Energy?



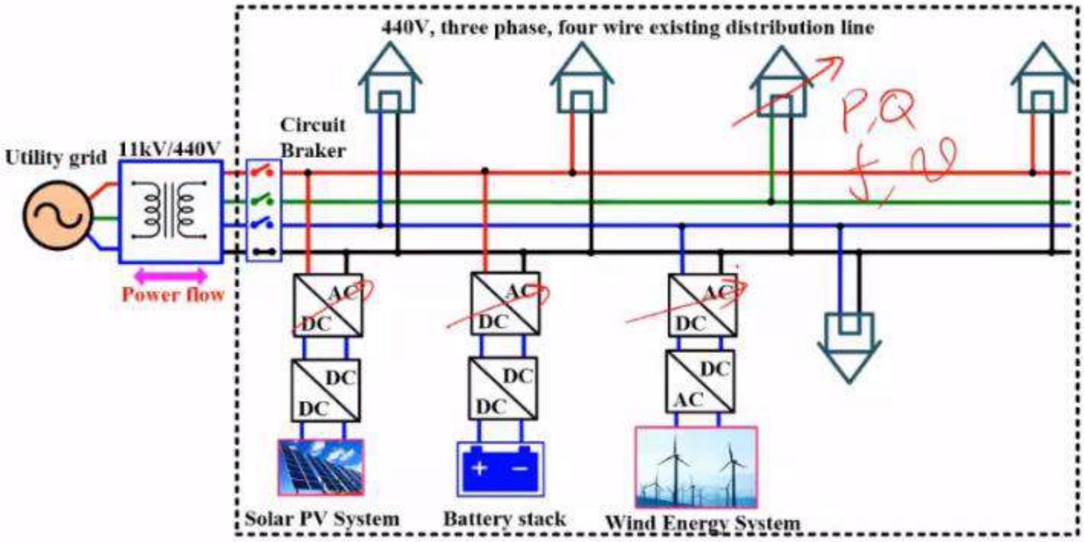




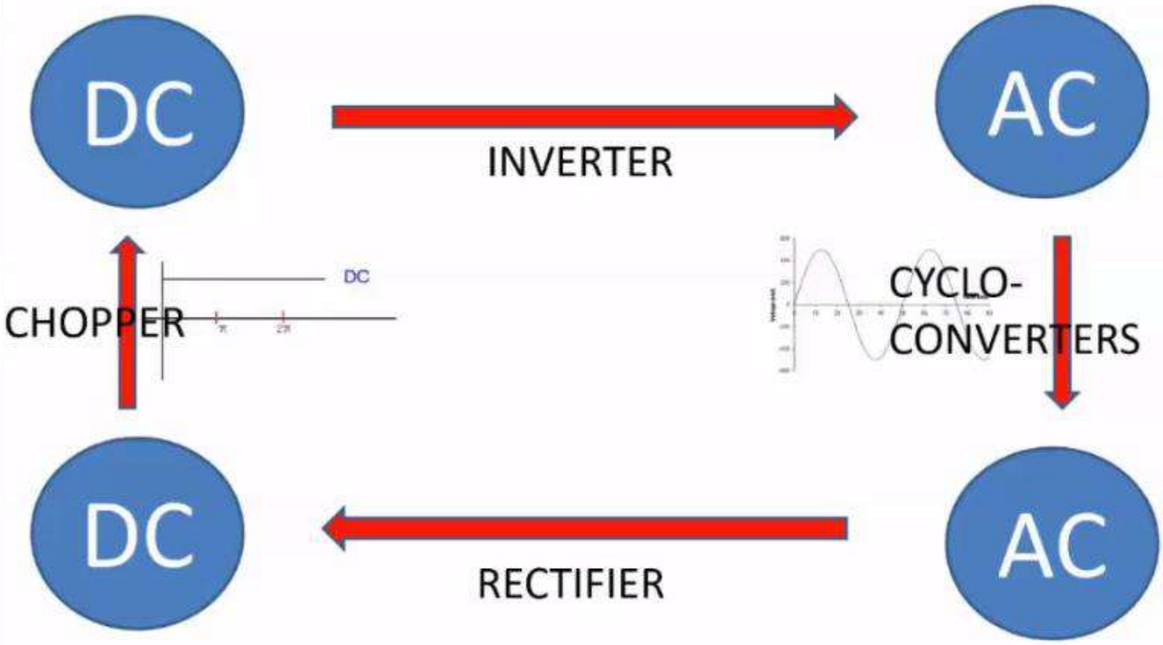
Structure of Present Power System



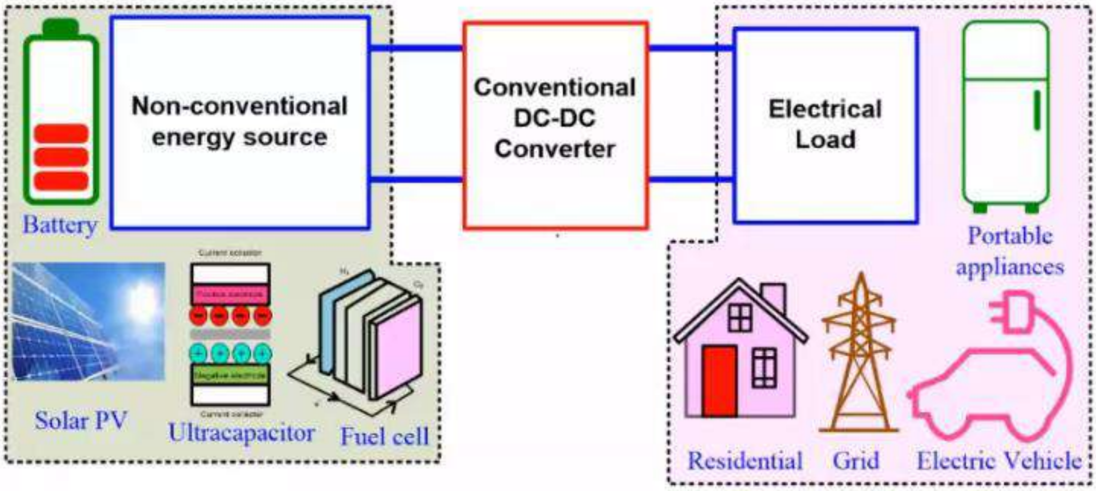
Structure of Microgrid



Power Converter for Renewable Energy

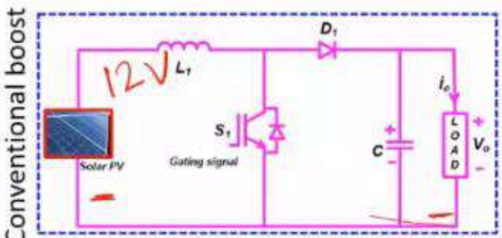


DC-DC Converter

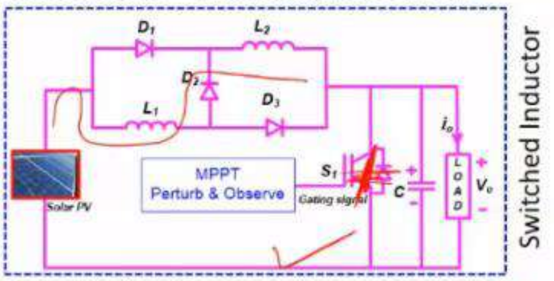


DC-DC Converters

- Nonisolated High gain DC-DC Converters – Literature review



350V

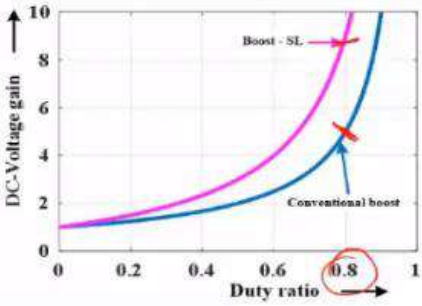


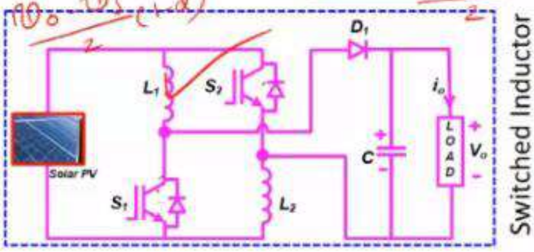
$$350 \quad V_0 = \frac{V_{in}}{(1-D)} = D > 0.93$$

$$v_{L_1} = v_s \quad V_0 = \frac{(1+D)}{(1-D)} V_{in} \quad v_{L_2} = v_o - v_s$$

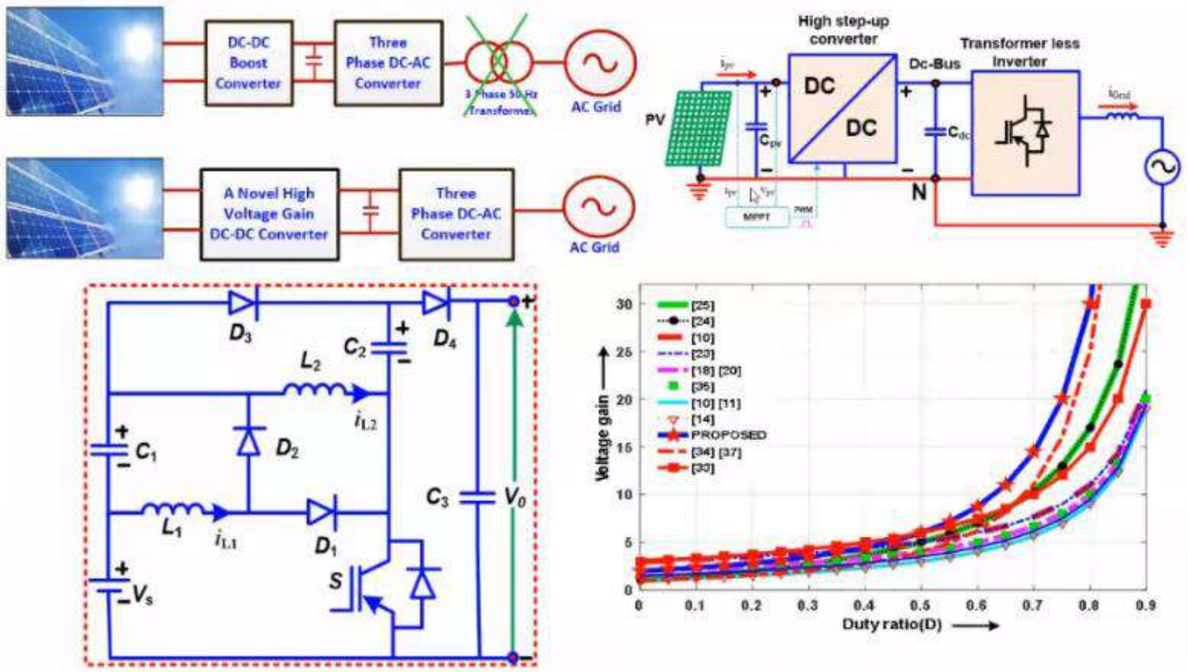
$$v_L = v_o - v_s$$

$$v_s d = \frac{v_o - v_s}{2}(1-d)$$

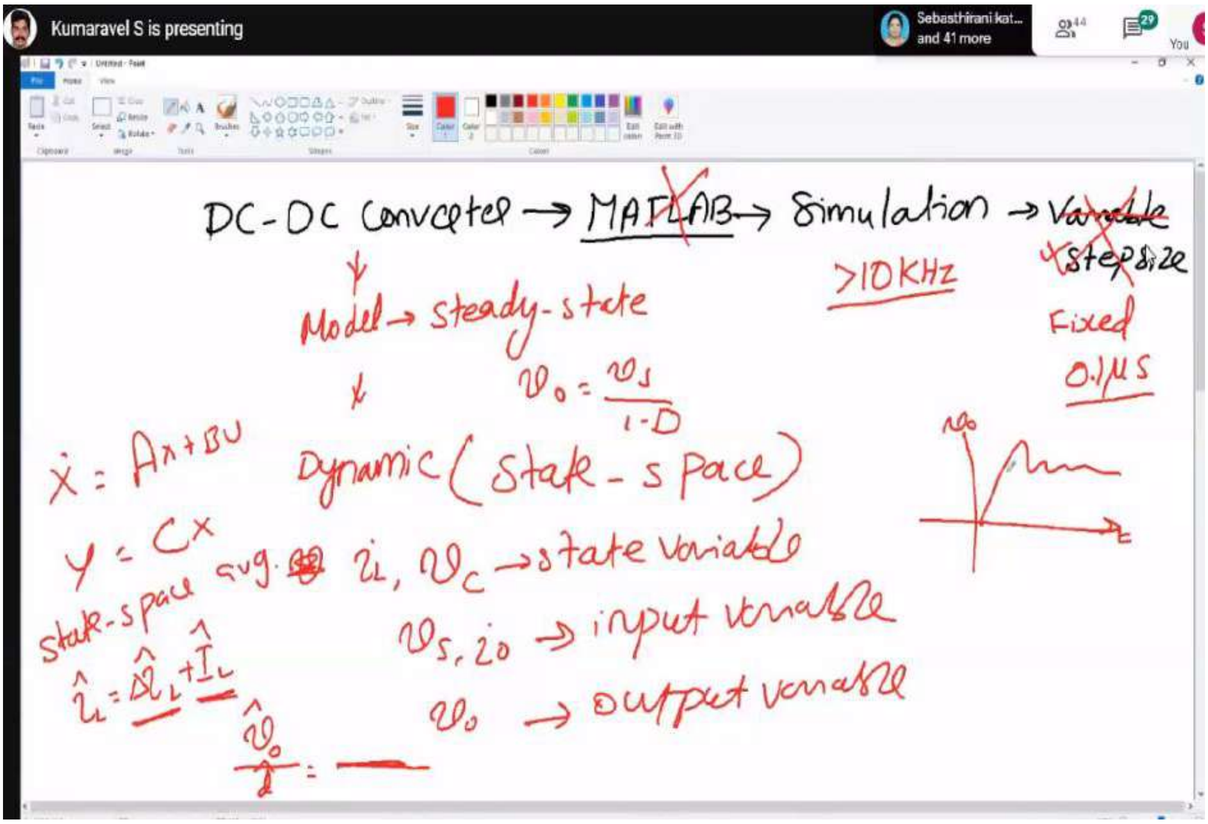




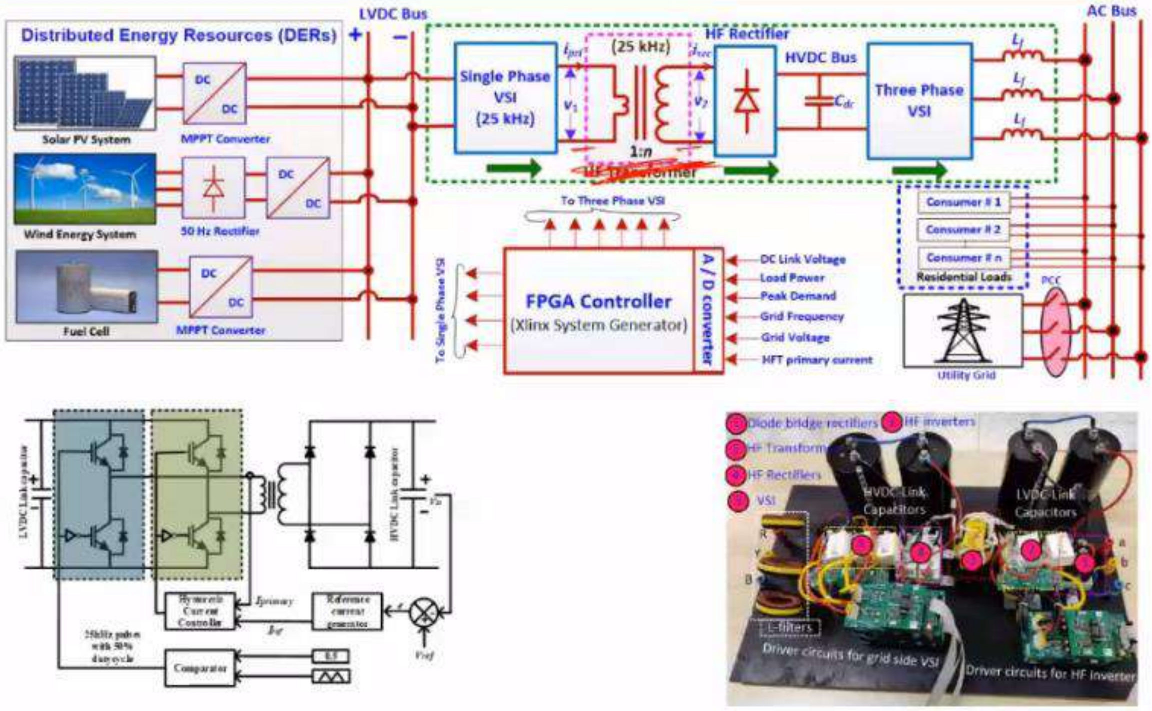
Design and Development of
Non-isolated High Gain DC-DC Converters



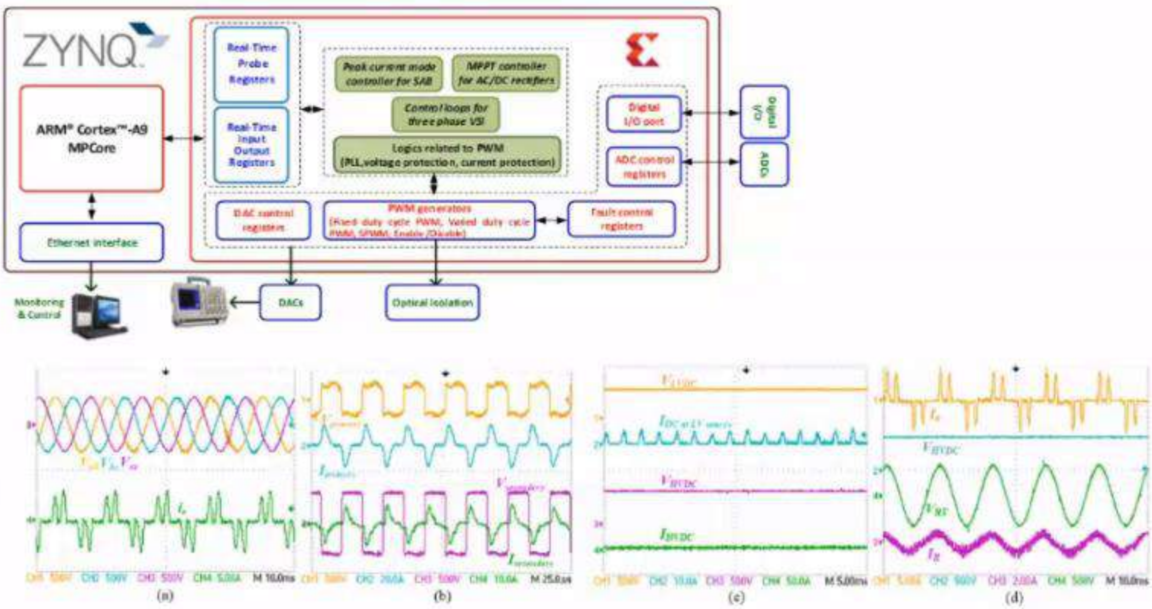
Kumaravel S. et. al., Switched Capacitor-Inductor Network based Ultra-Gain DC-DC Converter using Single Switch, IEEE Trans. on Indu. Elect., 2020



Solid-State Transformer



Solid-State Transformer



Ref: Haritha G, Kumaravel S and Ashok S, Xilinx System Generator-based Rapid Prototyping of Solid-State Transformer for On-Grid Renewable Energy Integration", IEEE Journal of Emerging and Selected Topics in Power Electronics

DAY-6

29.07.2020

Wednesday

AN Session

02.00 PM to 04.00 PM

Resource Person

Dr.P.Maruthupandi

Assistant Professor, Government College of Engineering

Coimbatore, Tamil Nadu

Topic: Control and Protection Schemes in Grid Connected PV Systems

CONTROL AND PROTECTION STRATEGIES OF ON GRID SOLAR PV SYSTEMS

Dr. P. MARUTHUPANDI M.E. Ph.D.,
Asst.Professor/ Electrical Engg.,
Government College of Technology,
Coimbatore-641 013
pandi@gct.ac.in

OVER VIEW OF THE PRESENTATION

- Characteristics of solar cell
- Off grid Solar PV System
- Maximum Power Point Tracking in solar system
- Grid Connected PV System
- Control of grid connected inverter
- Protection -LVRT, Anti-Islanding requirements
- Conclusions

OVER VIEW OF THE PRESENTATION

- **Characteristics of solar cell**
- **Off grid Solar PV System**
- **Maximum Power Point Tracking in solar system**
- **Grid Connected PV System**
- **Control of grid connected inverter**
- **Protection -LVRT, Anti-Islanding requirements**
- **Conclusions**

Merits of Renewable Energy Sources

1. Renewable Energy sources are ever lasting
2. Maintenance requirements are lower
3. No pollution
4. Renewables lower reliance on foreign energy sources

Demerits

1. **Higher installation cost**
2. **Intermittency**
3. **Storage capabilities**
4. **Geographic limitations**

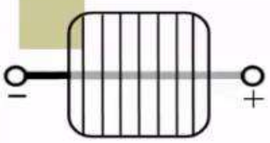
Renewable energy has more benefits than drawbacks

Not only save money but also promote a cleaner, healthier environment for the future.

Installing solar panels is one of the easiest ways to go green.

Google Hangouts is sharing your screen with meet.google.com. Stop sharing Hide

Solar Cell to Solar PV Module



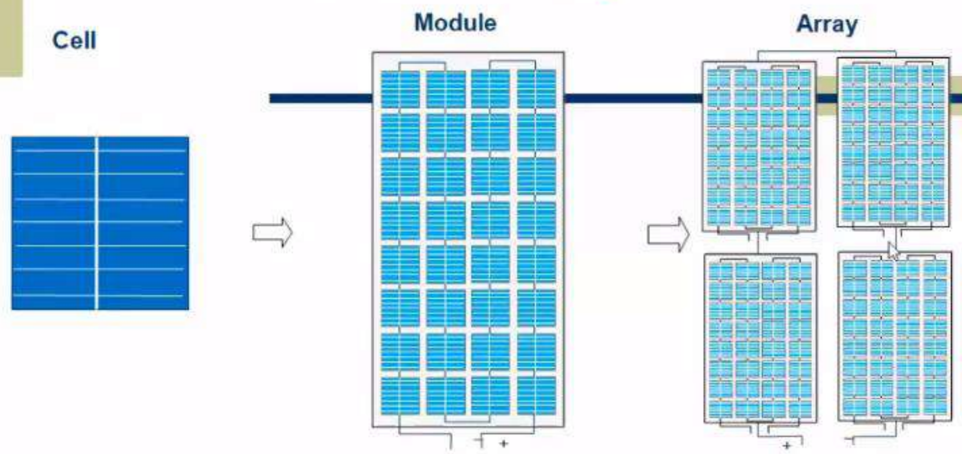
Single solar cell

Cell Rating	
I_m	$= 5$ A
V_m	$= 0.5$ V
P_m	$= 2.5$ W

Generate 15 Watts using single solar cell ?

Technical issues
Homogeneity Problem,
Fabrication issues- may become brittle
Handling is difficult

Solar PV array



Provide power of 100 W to several MW

Types of PV Panels

- **Mono Crystalline**
  - **Highest efficiency (≈ 25%)**
  - **Long life (25 Years)**
  - **Most expensive**
  - **Requires micro-inverter under partial shading conditions**
- **Poly Crystalline**
  - **Less efficiency (≈ 17%)**
  - **Less costly**
  - **Poor aesthetic look**
- **Thin Film**
  - **Poor efficiency (≈ 14%)**
  - **Less cost, Less weight**
  - **Flexible**
  - **Less affected by shading**

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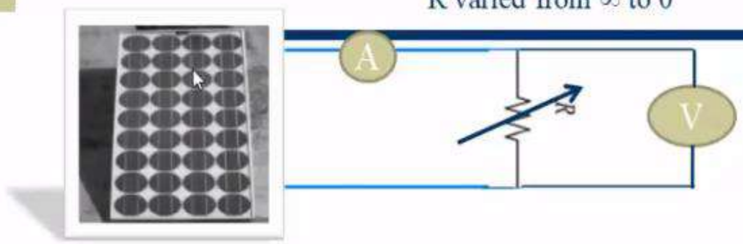
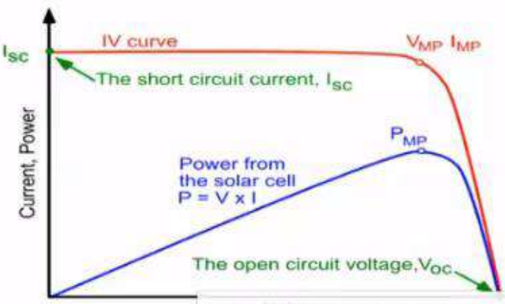
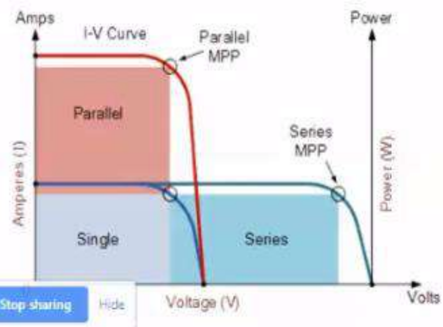
I-V characteristics of a PV module

R varied from ∞ to 0



At STC





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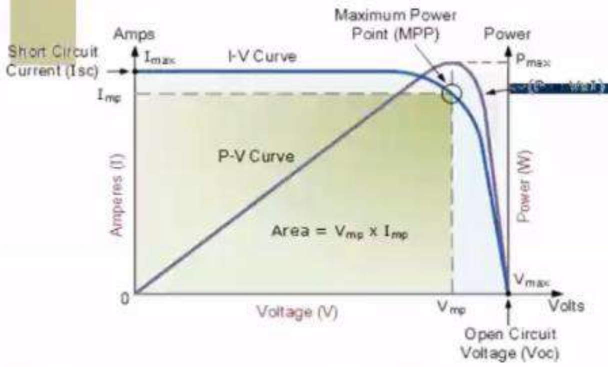
Solar cell-Parameters



- Open Circuit voltage
- Short Circuit Current
- Efficiency
- Fill Factor

Fill Factor: Measure of quality of a solar cell

It is the ratio of available power at the maximum power point (P_m) divided by the open circuit voltage (V_{OC}) and the short circuit current (I_{SC}) FF=VmxIm/ Vocx Isc

Cell efficiency: The fraction of incident power converted into electricity.
Efficiency= VoxIo/WxA

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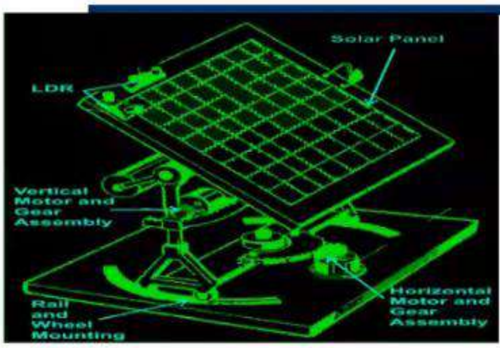
Maximizing the solar PV output

- Mechanical Tracking



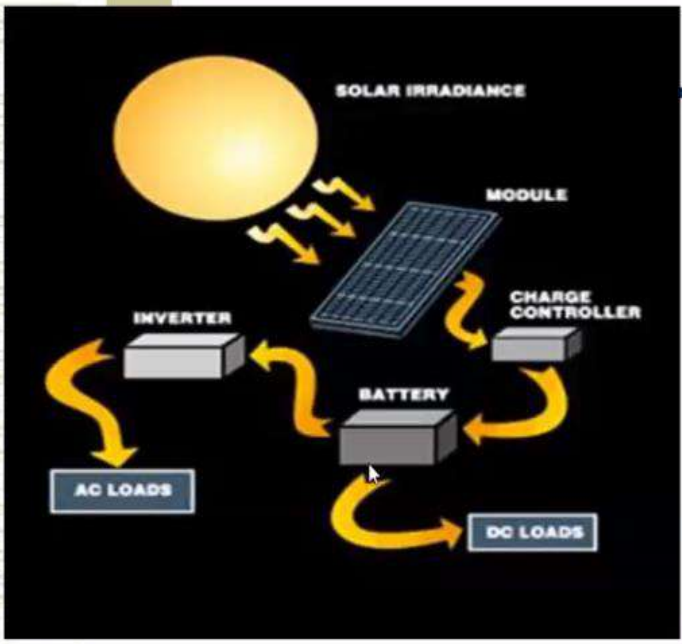
- Electrically tracking the operating point –load matching

15

MPPT TECHNIQUES FOR PV SYSTEMS

- Perturb and Observe (P&O) method
- Incremental Conductance method
- Fractional Voltage and Current method

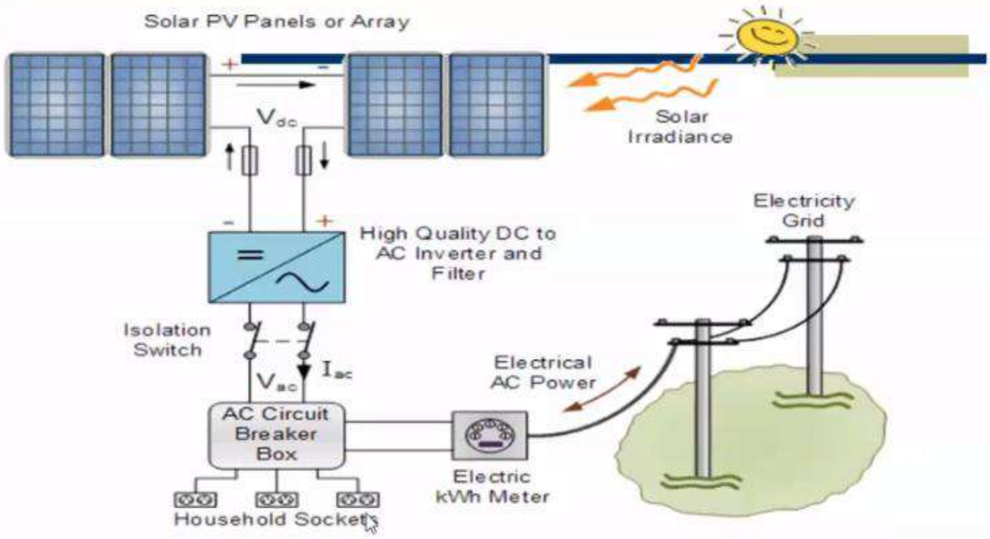
Off grid (Stand alone) Solar PV System



Most suitable locations: Remote villages, mountains, islands and base stations .

No connection to grid,
Self-sufficient system,
Independent energy supply

Grid Connected PV System



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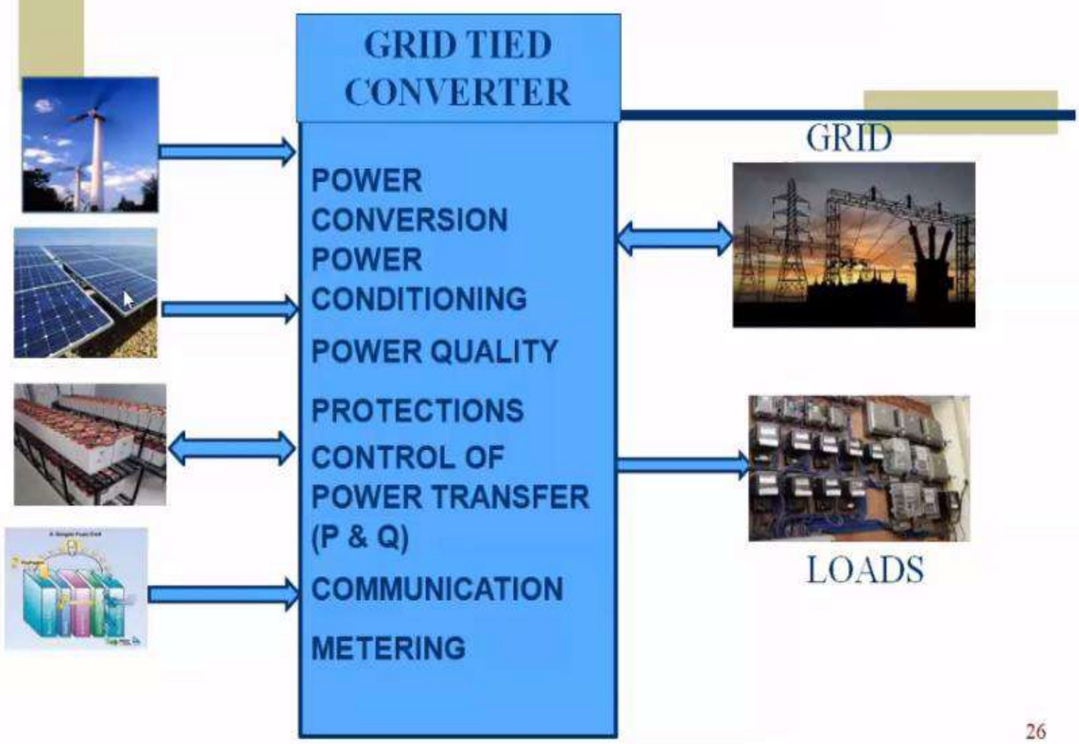
Role of Power Electronics in Grid Integration



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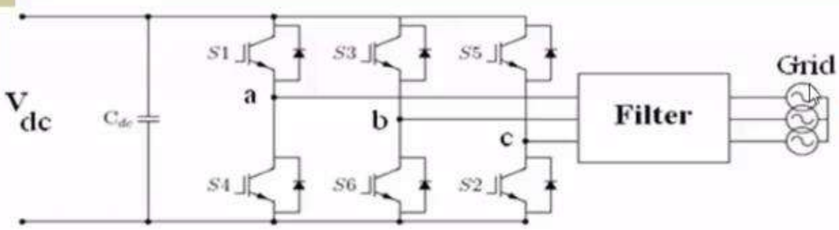
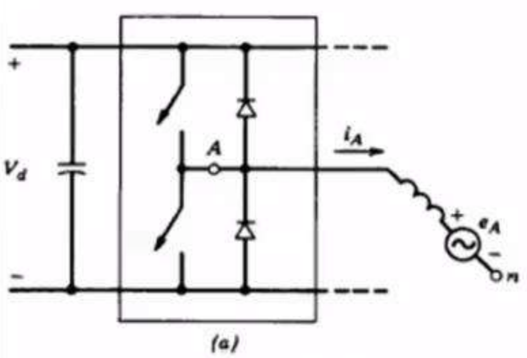
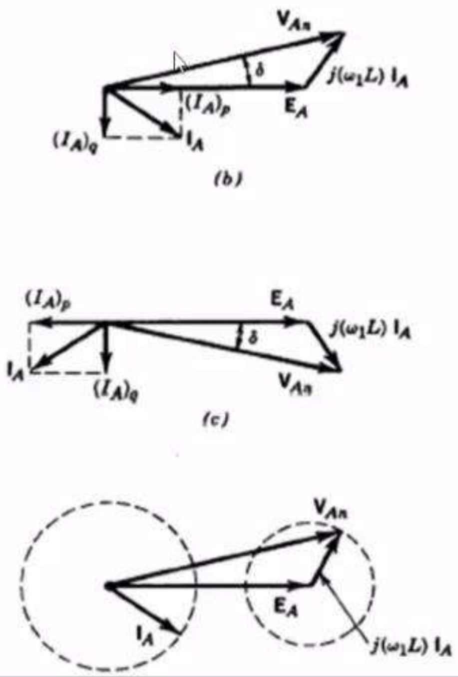
FUNCTIONS OF GRID TIED INVERTER



- AC voltage generation
- Synchronization to grid
- Independent control of active and reactive powers
- Meeting the harmonics standards
- Control under grid fault and distorted grid conditions
- Islanding detection and isolation

ACTIVE AND REACTIVE POWER FLOW

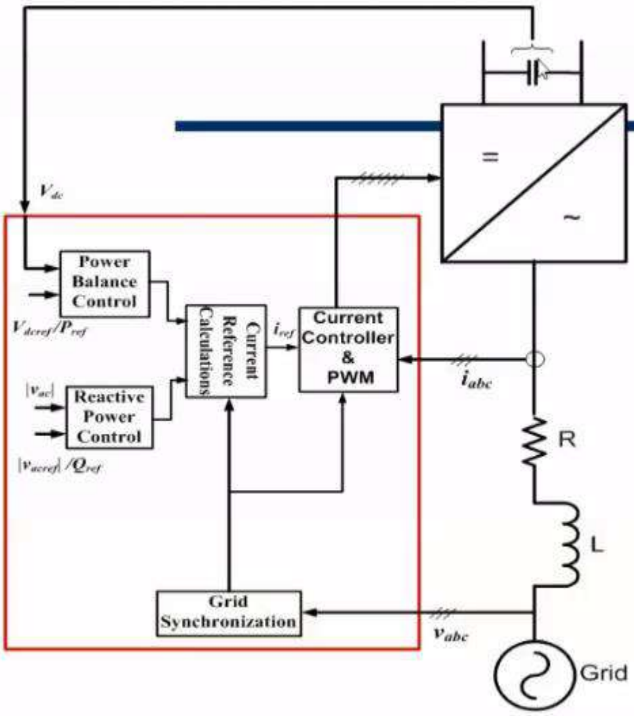




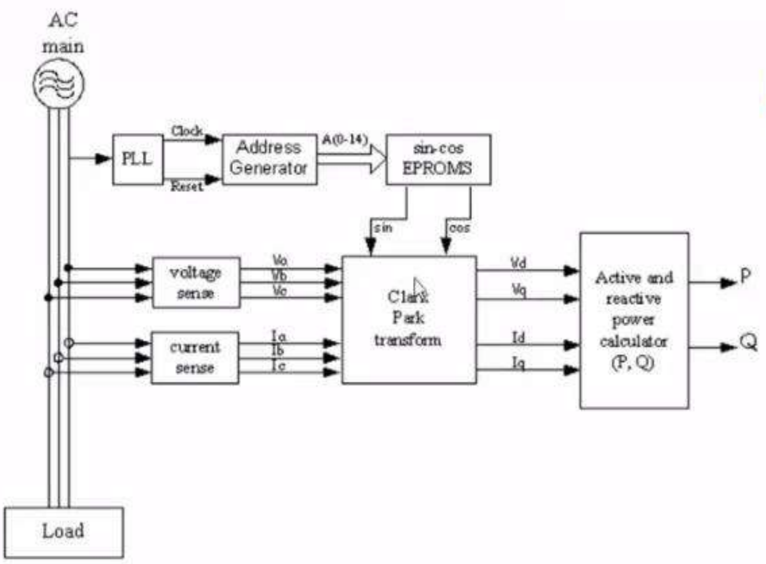
$$P = V_A I_{A1} \cos\theta = \frac{V_A^2}{\omega L_A}\left(\frac{E_A}{V_A}\sin\delta\right)$$

$$Q = V_A I_{A1} \sin\theta = \frac{V_A^2}{\omega L_A}\left(1 - \frac{E_A}{V_A}\cos\delta\right)$$

General structure of control of grid connected converter



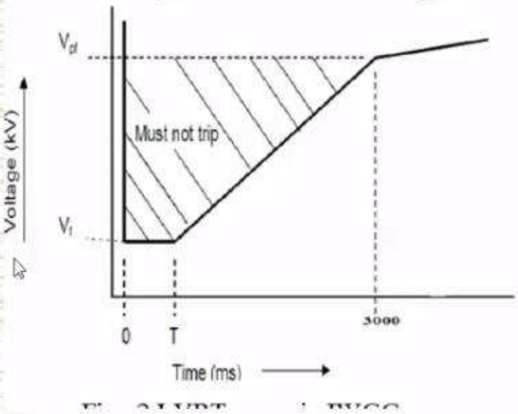
Measurement System

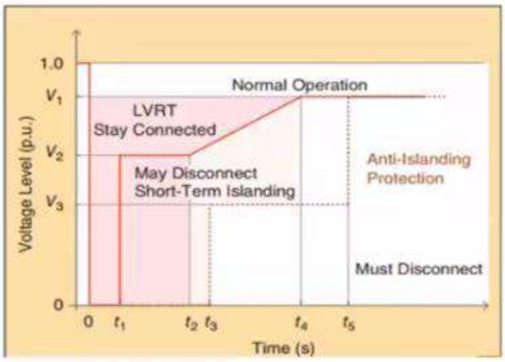


Power Equations: $P = \frac{3}{2}\left(u_d i_d + u_q i_q\right)$ $Q = \frac{3}{2}\left(u_q i_d - u_d i_q\right)$

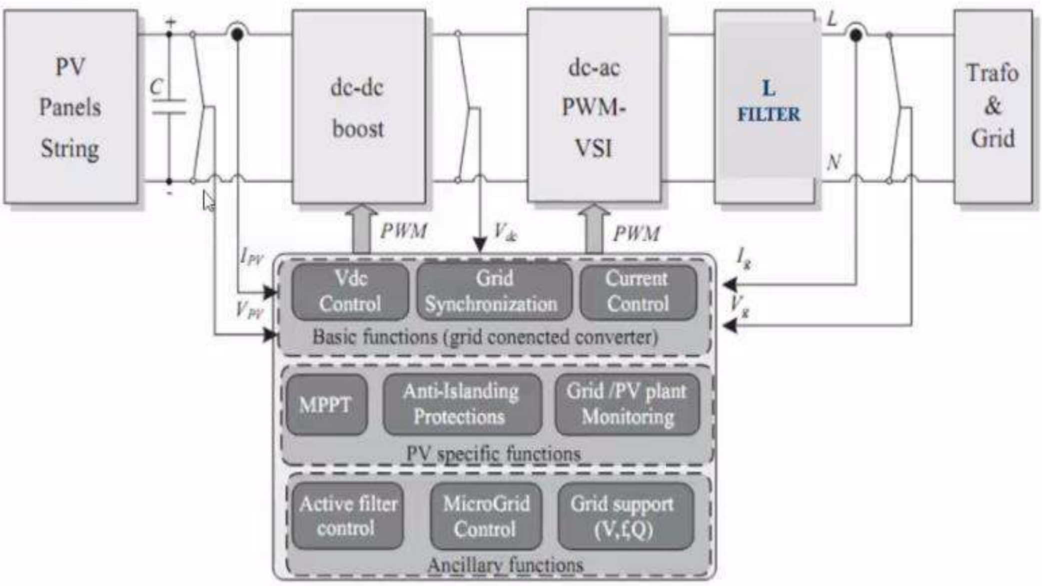
LVRT and Islanding Detection Requirements of PV Inverter

During minor fault or transients, drop in grid voltage occur.
Fault Ride Through (FRT), Low Voltage Ride Through (LVRT) are the capability of electric generators to stay connected during short period of voltage dip





CONVERTERS IN PHOTOVOLTATIC SYSTEMS



VALEDICTORY SESSION

The six days AICTE Sponsored Online Short-Term Training Programme on Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switch Gear (Phase-II) ended with a valedictory session. Mr. P. Ram Prakash, Assistant Professor, Department of Electrical and Electronics Engineering thanked all the participants and resource person with his valedictory speech.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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sponsored

online Short Term Training Programme (STTP)

on

Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switchgear

03.08.2020 - 08.08.2020 (Phase III)

KEYNOTE SPEAKERS

Dr.S.Vasantharathna
Professor, CIT Coimbatore

Dr. Manoj Tripathy
Asso.Professor, IIT Roorkee

Dr. Premalata Jena
Asso. Professor, IIT Roorkee

Dr. Bhavesh Bhalja
Asso. Professor, IIT Roorkee

Dr. Avik Bhattacharya
AP, IIT Roorkee

Dr.Dipayan Guha
AP, MNNIT Allahabad

Dr.A.Karthikeyan
AP, NIT Suratkal

Dr.Pradeep Kumar Yemula
AP, IIT Hyderabad

Dr.M.Suman
AP, MNNIT Allahabad

Dr.Rupesh Wandhare
AP, IIT Hyderabad

Dr. Sumit Ghatak Choudhuri
AP, IIT Roorkee

Mr.V.Vijay Karthik
Technical Lead, GE T&D Chennai

Dr.C.Krishnakumar	Dr.D.Valavan	Shri.S.Ravindran
HoD / EEE, Coordinator	Principal	Secretary

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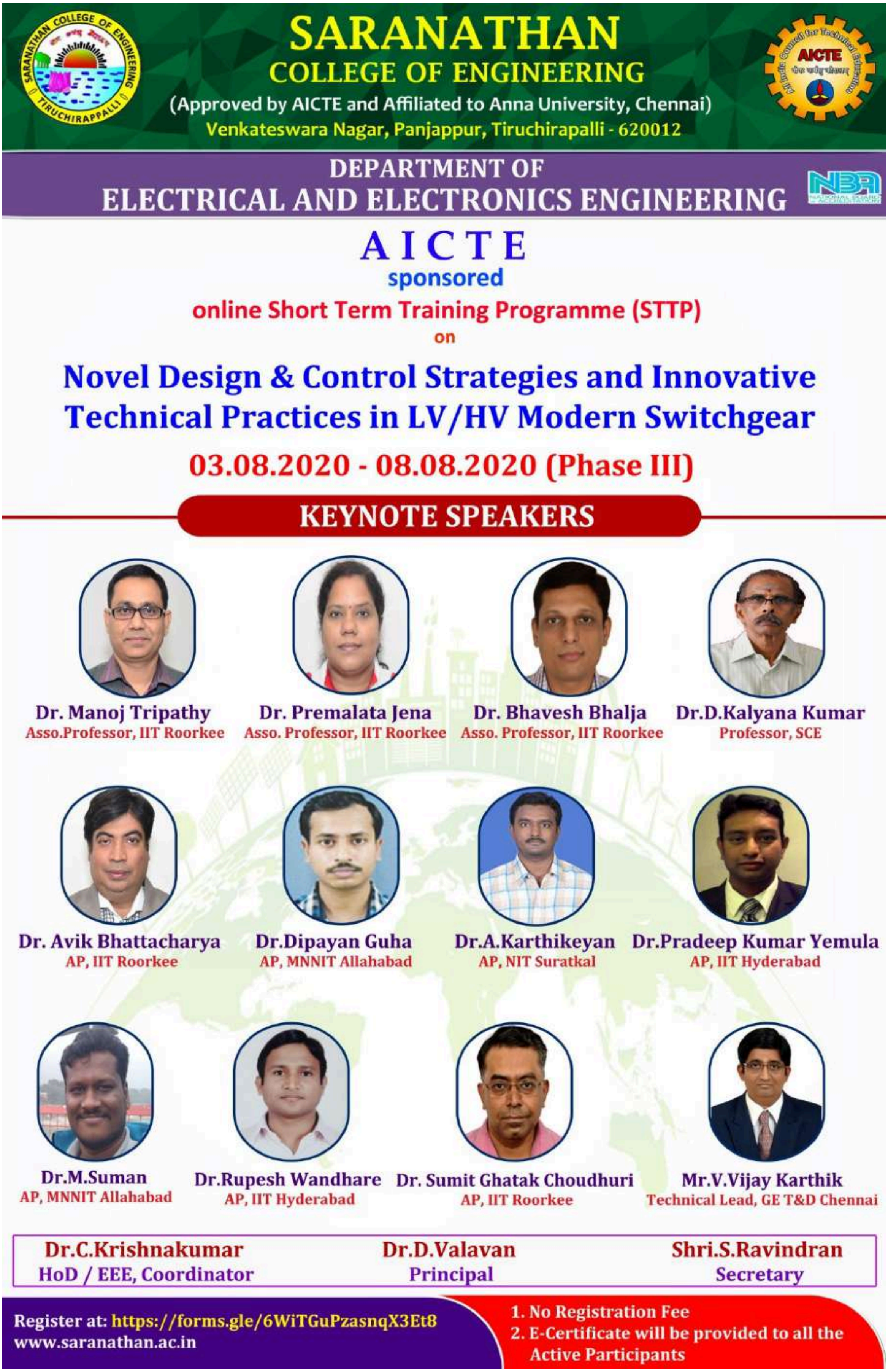
Brochure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KEYNOTE SPEAKERS
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Dr. Premalata Jena
Asso. Professor, IIT Roorkee
Dr. Bhavesh Bhalja
Asso. Professor, IIT Roorkee
Dr.D.Kalyana Kumar
Professor, SCE
Dr. Avik Bhattacharya
AP, IIT Roorkee
Dr.Dipayan Guha
AP, MNNIT Allahabad
Dr.A.Karthikeyan
AP, NIT Suratkal
Dr.Pradeep Kumar Yemula
AP, IIT Hyderabad
Dr.M.Suman
AP, MNNIT Allahabad
Dr.Rupesh Wandhare
AP, IIT Hyderabad
Dr. Sumit Ghatak Choudhuri
AP, IIT Roorkee
Mr.V.Vijay Karthik
Technical Lead, GE T&D Chennai
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
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AICTE Sponsored Six day Online Short Term Training Programme on Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switch Gear (Phase III)

SCHEDULE OF TRAINING PROGRAMME

Day/ Session	FORENOON SESSION (10.00 A.M -12.00 P.M)		AFTERNOON SESSION (2.00 P.M -4.00 P.M)
03.08.20 MON	**Dr.D.Kalyana Kumar** Professor, SCE **TECHNICAL REQUIREMENTS -** *from ProtectionPerspectives* **forPower System Reliability**	LUNCH BREAK	**Dr.A.Karthikeyan** Assistant Professor, NIT Suratkal **Power Electronic Application to Power System and Protection**
04.08.20 TUE	**Dr. ManojTripathy** Associate Professor, IIT Roorkee **Protection Schemes in Microgrids and Smartgrids**		**Avik Bhattacharya** Assistant Professor, IIT Roorkee **Power Electronic Applications in High Voltage Engineering**
05.08.20 WED	**Mr.V.VijayKarthik** Lead-Technical, GE T&D India Limited, Chennai		**Dr. BhaveshBhalja** Associate Professor, IIT Roorkee **Digital Protection on Power System Network**
06.08.20 THU	**Premalatajena** Associate Professor, IIT Roorkee		**Dr.DipayanGuha** Assistant Professor, NIT Allahabad **Control System Advancement and Application in Practical Systems**
07.08.20 FRI	**Dr. RupeshWandhare** Assistant Professor, IIT Hyderabad **Design, Control and Reliability of Power Converter and Power Conditioning Unit**		**Dr. Pradeep Kumar Yemula** Assistant Professor, IIT Hyderabad **Campus Energy Monitoring System (CEMS)**
08.08.20 SAT	**Dr. SumitGhatakChoudhuri** Assistant Professor, IIT Roorkee **Multi-Modular UPS Inverters System for Critical Load applications**		**Dr.M.Suman** Assistant Professor, MNNIT Allahabad **Unintentional Islanding Detection**

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Venkateswara Nagar, Panjappur, Tiruchirappalli – 12

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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Cordially invites you

for the Inaugural function of the

AICTE Sponsored

Six days online Short TermTraining Programme (STTP)

on

Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switch Gear (Phase III)

Chief Guest

Dr.D.Kalyanakumar
Professor, EEE
Saranathan College of Engineering, Trichy.

03-08-2020
09:30 am

Dr.C.Krishnakumar **Coordinator,** **Prof & Head /EEE**	**Dr.D.Valavan** **Principal**	**Shri.S. Ravindran** **Secretary**

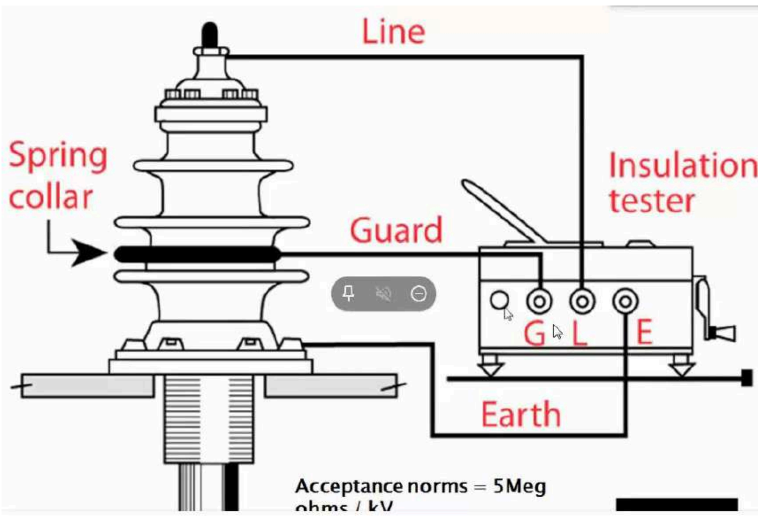
INAUGURAL CEREMONY

The six days AICTE Sponsored Online Short Term Training Programme on Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switch Gear (Phase - III) started on 3rd August with an inauguration ceremony. Coordinator of the STTP, Dr. C.Krishnakumar, Professor & Head, Department of Electrical and Electronics Engineering welcomed all the participants with his welcome address. Dr. D.Valavan, Principal of Saranathan College of Engineering, added a special value to the STTP by delivering felicitation address. The Inauguration ceremony ended with vote of thanks given by Mr.P.Ramprakash, Assistant Professor, EEE, SCE.

Day 1: 03-08-2020 - FN Session

Dr.D.Kalyanakumar, Professor, Saranathan College of Engineering, Tiruchirappalli, has deliverd a lecture on **"TECHNICAL REQUIREMENTS -** ***from ProtectionPerspectives*** **forPower System Reliability"**

Resource Person Dr.D.Kalyana kumar was delivering the lecture



Dr.D.Kalyanakumar explained about the test on bushings

Day 1 : (03-08-2020) AN Session

Dr.A.Karthikeyan, Assistant Professor, NIT Suratkal has delivered a lecture on "**Power Electronic Application to Power System and Protection"**

Day 2 : (04-08-2020) FN Session

Dr. ManojTripathy, Associate Professor, IIT Roorkee, delivered a lecture on **"Protection Schemes in Microgrids and Smartgrids"**

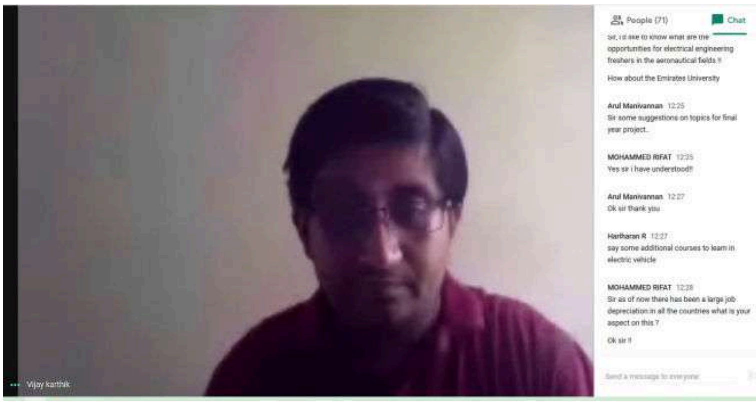
Dr.Manoj Tripathy is interacting with the participants

Day 2 : (04-08-2020) AN Session

Avik Bhattacharya, Assistant Professor, IIT Roorkee, delivered a lecture on **"Power Electronic Applications in High Voltage Engineering**"

Day 3 : (05-08-2020) FN Session

Mr.V.VijayKarthik, Lead-Technical, GE T&D India Limited, Chennai handled the session. He delivered a lecture on **"Digital Substation 2.O"**



Mr.V.Vijay Karthik is delivering lecture.

Day 3 : (05-08-2020) AN Session

Dr. BhaveshBhalja, Associate Professor, IIT Roorkee, handled the session. He shared his knowledge with the participants on **“Digital Protection on Power System Network”**

Day 4 : (06-08-2020) FN Session

Premalata Jena, Associate Professor, IIT Roorkee delivered a lecture on “**Smart Grid – A New Vision”**

Day 4 : (06-08-2020) AN Session

Dr.DipayanGuha, Assistant Professor, NIT Allahabad, delivered a lecture on **“Control System Advancement and Application in Practical Systems”.**

Dr.Dipyan Guha is presenting his lecture to the participants

Day 5 : (07-08-2020) FN Session

Dr. RupeshWandhare, Assistant Professor, IIT Hyderabad, handled the session. He delivered his views on **“Design, Control and Reliability of Power Converter and Power Conditioning Unit”.**

Day 5 : (07-08-2020) AN Session

Dr. Pradeep Kumar Yemula, Assistant Professor, IIT Hyderabad delivered a lecture on **“Campus Energy Monitoring System (CEMS)”.**

Day 6 : (08-08-2020) FN Session

Dr. Sumit Ghatak Choudhuri, Assistant Professor, IIT Roorkee delivered a lecture on **“Multi-Modular UPS Inverters System for Critical Load applications”.**

Dr.Sumit Ghatak Choudhuri is delivering his talk to the participants

Day 6 : (08-08-2020) AN Session

Dr.M.Suman, Assistant Professor, MNNIT Allahabad, has delivered a lecture session on **“Unintentional Islanding Detection”**

VALEDICTORY SESSION

The six days AICTE Sponsored Online Short Term Training Programme on Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switch Gear (Phase - III) ended with a valedictory session. Mr.R.Sridhar, Assistant Professor, Department of Electrical and Electronics Engineering thanked all the participants and resource person with his valedictory speech.

DAY 1 (03.08.2020, Monday) FN Session

Dr.D.Kalyana Kumar
Professor, Saranathan College of Engineering, Tiruchirappalli

TECHNICAL REQUIREMENTS - *from Protection Perspectives* for Power System Reliability

TECHNICAL REQUIREMENTS - ***from protection perspectives***
for
POWER SYSTEM RELIABILITY

Dr.D.Kalyanakumar, Professor, EEE dept

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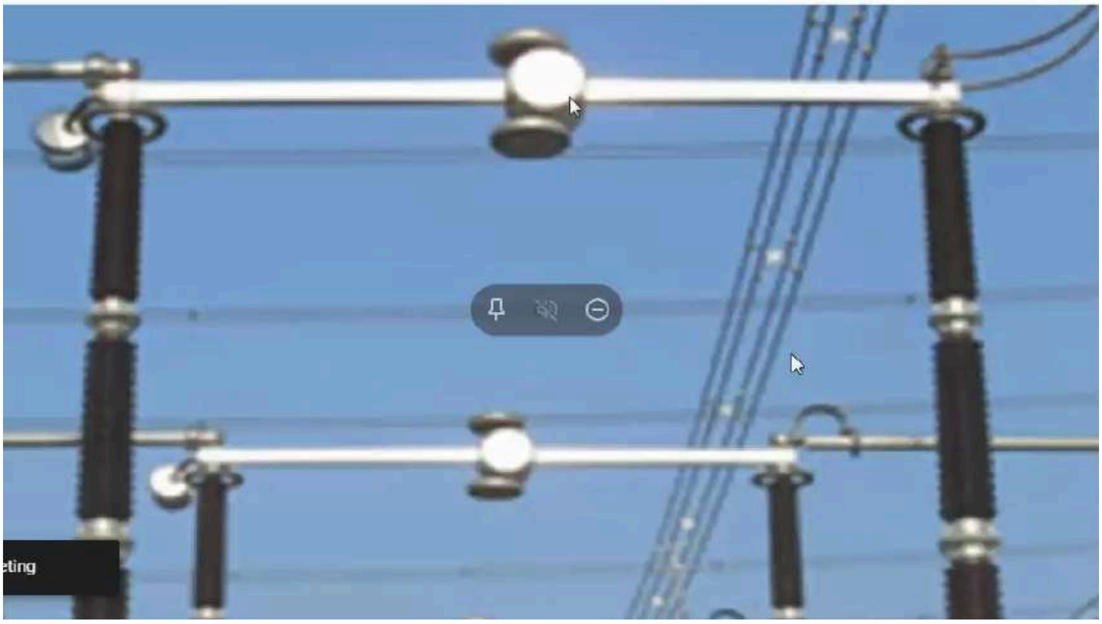
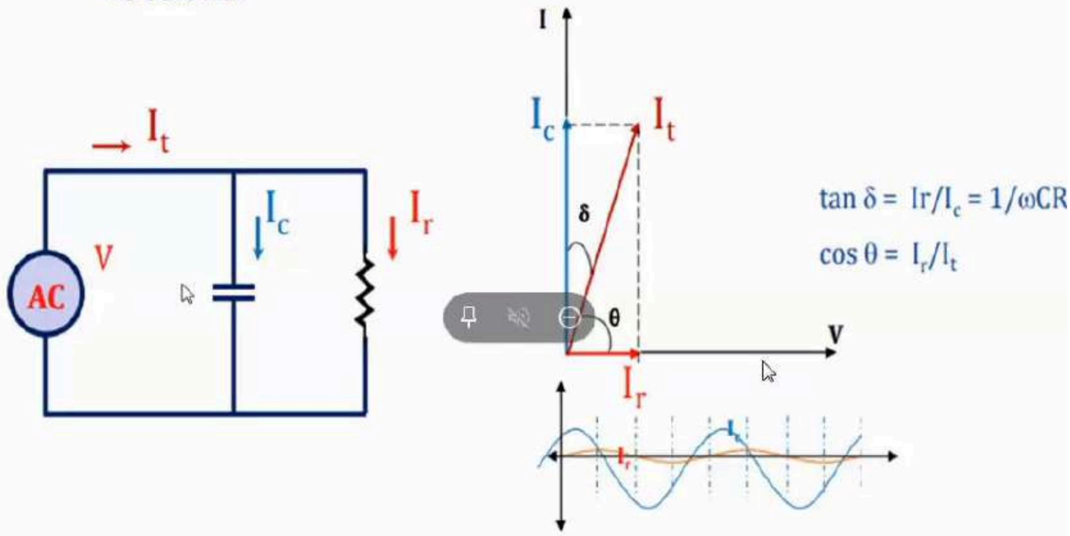
CENTRE BREAK ISOLATOR IN OPEN POSITION

400KV CENTRE BREAK ISOLATOR IN CLOSED POSITION

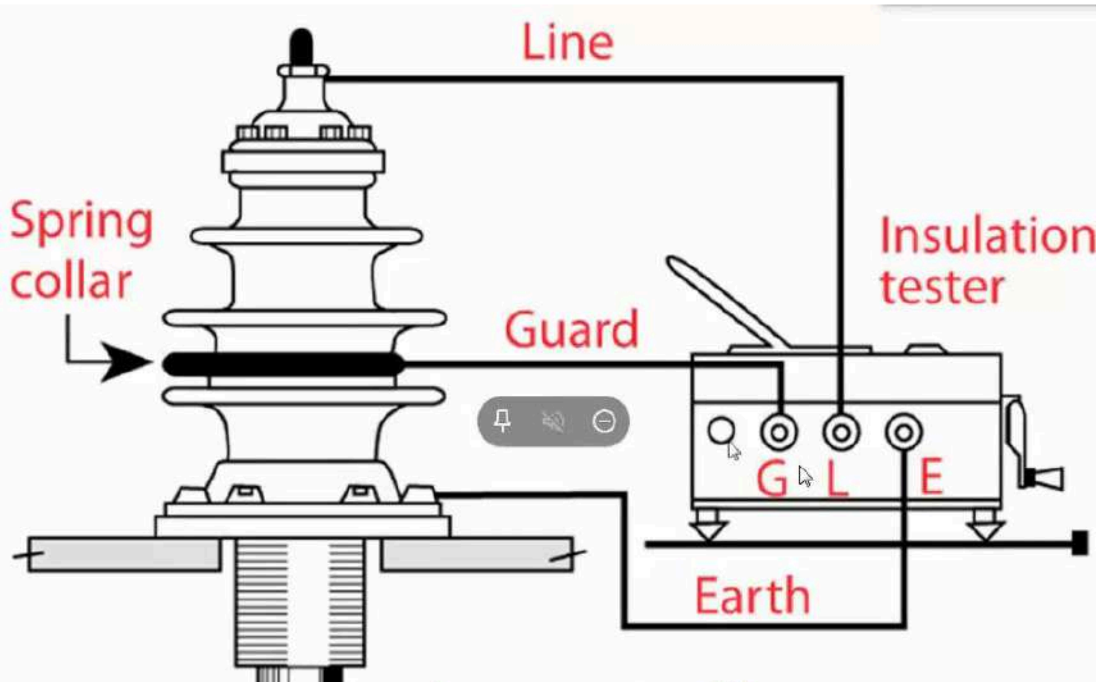


VERTICAL BREAK ISOLATOR IN CLOSED POSITION

- A dielectric can be modeled as a capacitor in parallel with a resistor for AC behavior



- ***For a good dielectric***
  - $I_c > 100 * I_r$
- ***For a marginally good dielectric***
  - $I_c > 50 * I_r$



Acceptance norms = 5Meg ohms / kV

Properties of Transformer Insulating Oil

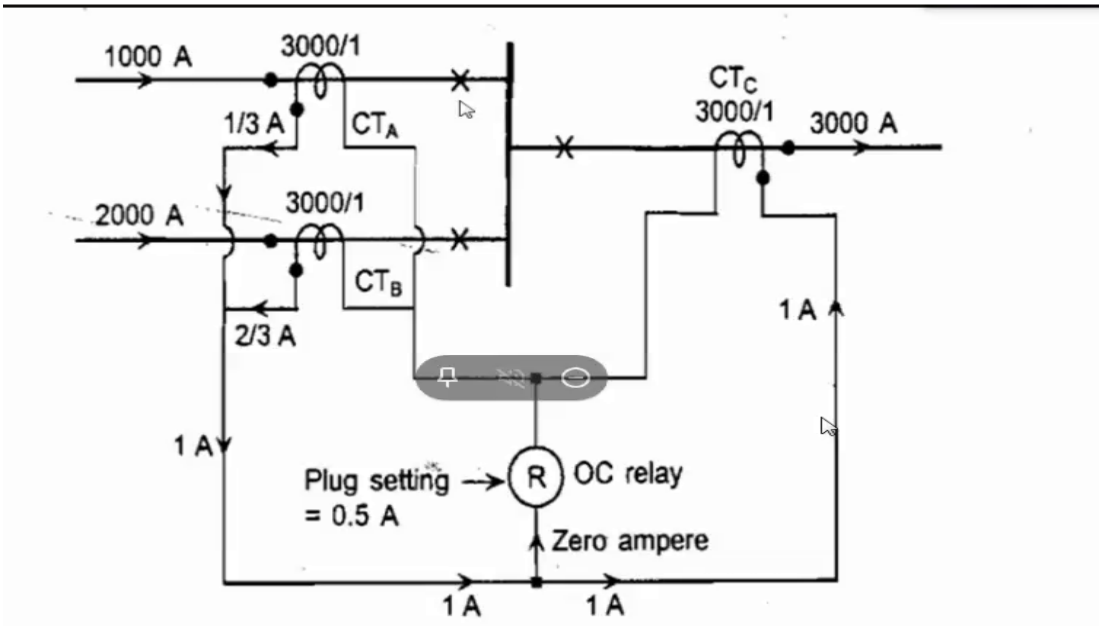
Some specific parameters of insulating oil should be considered to determine the serviceability of that oil.

Parameters of Transformer Oil

The parameters of transformer oil are categorized as,
•Electrical parameters: – Dielectric strength, specific resistance, dielectric dissipation factor.
•Chemical parameter: - Water content, acidity, sludge content.
•Physical parameters: - Inter facial tension, viscosity, flash point, pour point.
Dielectric strength of transformer oil is also known as
OD EEE has left the meeting **oltage of transformer oil** or **BDV of transformer**

TYPICAL NAMEPLATE DETAILS FOR 220KV OUTDOOR CT

Particulars	Rating/value
Make	–
Reference standard	IS 2705-1992
BIL	1050/460 kV
Frequency	50 Hz
Making capacity	100 KAP
Serial number/year	5643/1997
Type	IT-245
HSV/NSV	245/220 kV
Short-time current	40/1 kA/sec

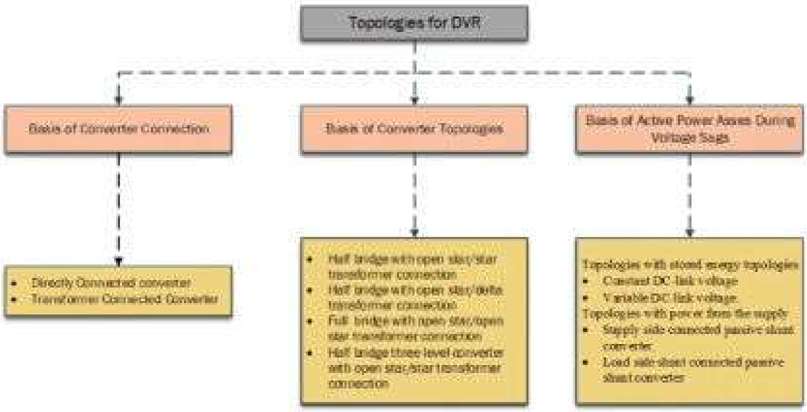


DAY 1 (03.08.2020, Monday) AN Session

Dr.A.Karthikeyan
Assistant Professor, NIT Suratkal

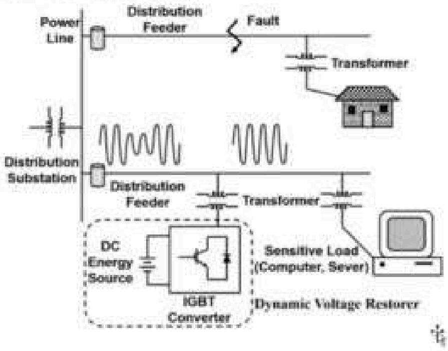
Power Electronic Application to Power System and Protection

TOPOLOGIES FOR DVR

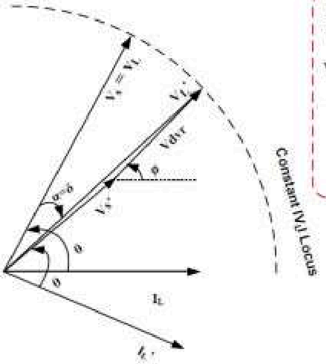


OPERATING PRINCIPLES OF DVR

- Injecting three single phase AC voltages in series with the three phase incoming network voltages during a sag, compensating for the difference between faulty and nominal voltages.

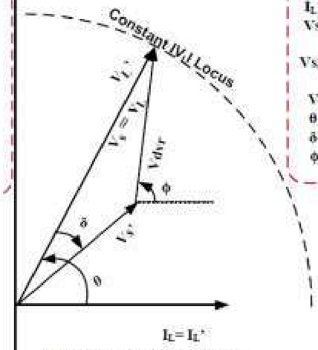


COMPENSATION SCHEMES



I_L - Pre-Sag Load current
I_L'-Post Sag Load current
Vs', V_L' - Post Sag Supply and load voltages
Vs, V_L -Pre-sag Supply and Load Voltages
Vdvr- DVR injected Voltage
θ – Load power factor angle
δ-Phase jump in supply voltage
ϕ – Phase angle of injected voltage
α- Phase Jump in load voltage

(a) In-Phase Compensation



$I_L = I_L$'

I_L - Pre-Sag Load current
I_L'-Post Sag Load current
Vs', V_L' - Post Sag Supply and load voltages
Vs, V_L -Pre-sag Supply and Load Voltages
Vdvr- DVR injected Voltage
θ – Load power factor angle
δ-Phase jump in supply voltage
ϕ – Phase angle of injected voltage

(b) Pre-sag Compensation

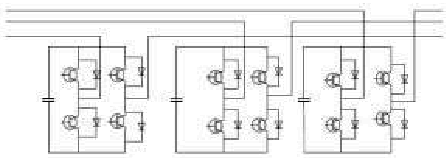
Directly connected DVR

Advantage:

- Performance is improved as bandwidth is not decreased by transformer
- Bulky transformer can be avoided so compact DVR solution can be developed with low volume, low weight etc.

Disadvantage:

- Protection of power electronic become more complicated
- Converter topology become more complex and a high isolation to ground has ensured
- Converter topology become more complex and higher number of component is expected



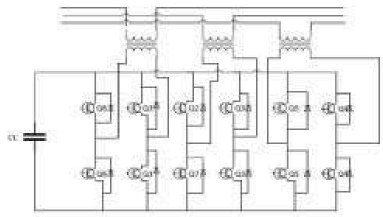
Transformer connected DVR

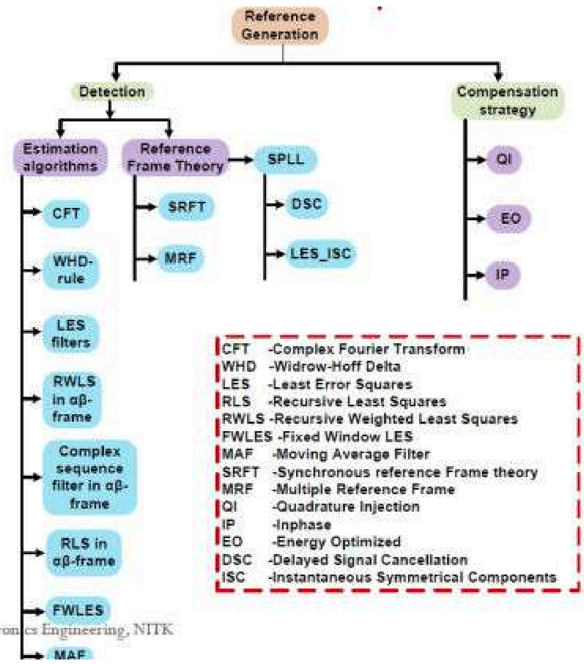
Advantage:

- Transformer ratio can be chosen.
- Scaled to standard industrial converter voltage
- Transformer ensure basic insulation level.
- Transformer can be used as important line-filter.
- Simple converter topology with six switches can be used.
- One DC-link is sufficient

Disadvantage:

- Increases loss
- Have a non-linear behaviour
- Low frequency transformer are bulky with high cost

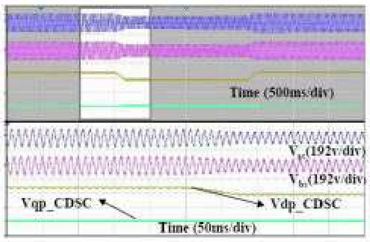


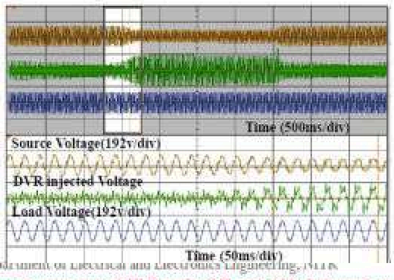


Reference Generation

- Grid voltage disturbances includes both symmetric and asymmetric voltages sags and harmonics.
- Under balanced voltage sags : positive sequence component alone is required for DVR injection voltage.
- During unbalanced voltage sags : both positive and negative sequence components are required.
- Hence, robust algorithm for extraction of instantaneous symmetric components is needed.
- Instantaneous symmetric component extraction
  - Estimation algorithms
  - Reference frame theory (using PLL)

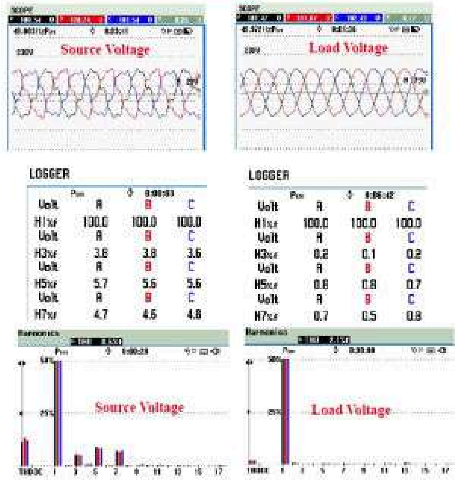
Source voltages and estimated dq_{qp}- voltages of CDSC-PLL under SH with 30% balanced sag





Dynamic response of DVR under SH with 30% balanced sag

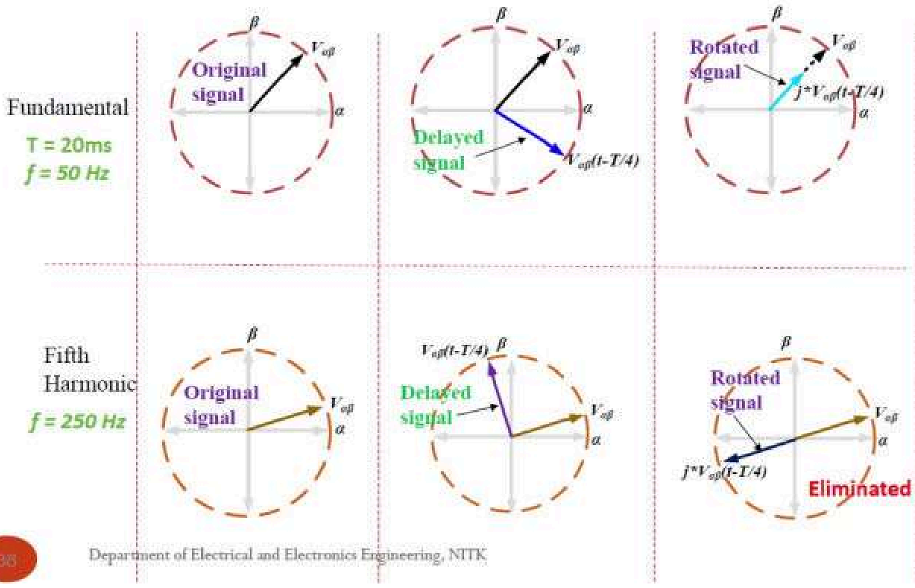
Steady state – source voltage & Load voltage



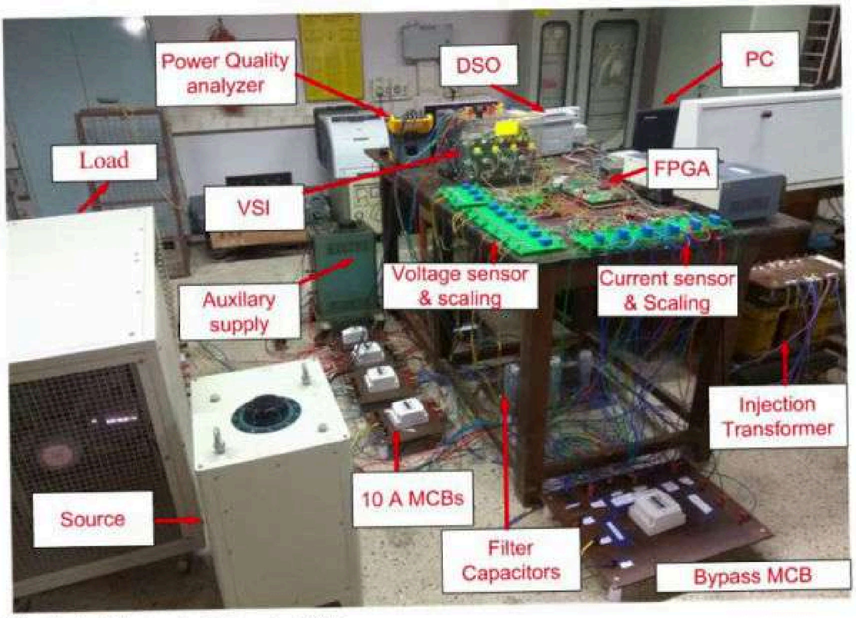
Volt	A	B	C
H1%f	100.0	100.0	100.0
H3%f	3.8	3.8	3.6
H5%f	5.7	5.6	5.6
H7%f	4.7	4.6	4.8

Volt	A	B	C
H1%f	100.0	100.0	100.0
H3%f	0.2	0.1	0.2
H5%f	0.6	0.8	0.7
H7%f	0.7	0.5	0.8

Harmonic spectrum of source and load voltages during symmetric harmonics.



Photograph of the setup



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DAY 2 (04.08.2020, Tuesday) FN Session

Dr. Manoj Tripathy
Associate Professor, IIT Roorkee

Protection Schemes in Microgrids and Smartgrids

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

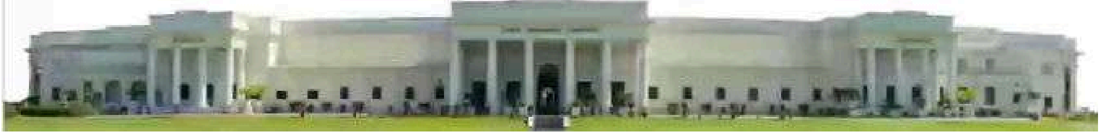
Short Term Training Programme

on

Novel Design & Control Strategies and Innovative Technical Practices in LV/HV Modern Switch Gear

Protection Schemes in Microgrids and Smart Grids

Prof. Manoj Tripathy
Associate Professor
Department of Electrical Engineering
IIT Roorkee, Roorkee 24766, India



INTRODUCTION

- Depletion and burning of fossil fuels such as coal, oil, natural gases etc. has resulted in very serious environmental concerns such as greenhouse gases accumulation, air pollution, water pollution, damage to land surface and depletion of the ozone layer.

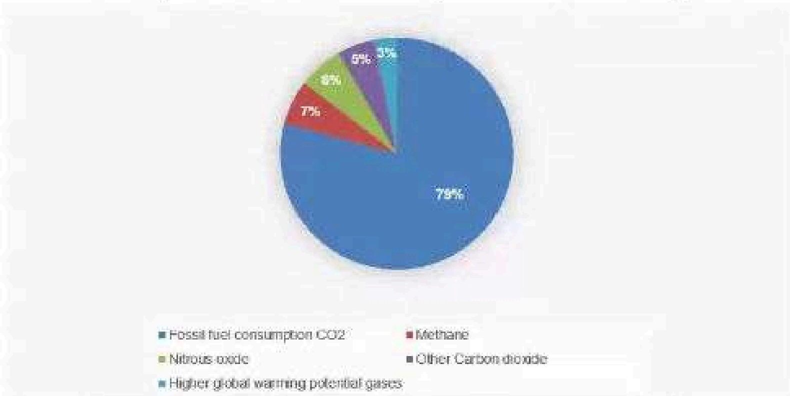
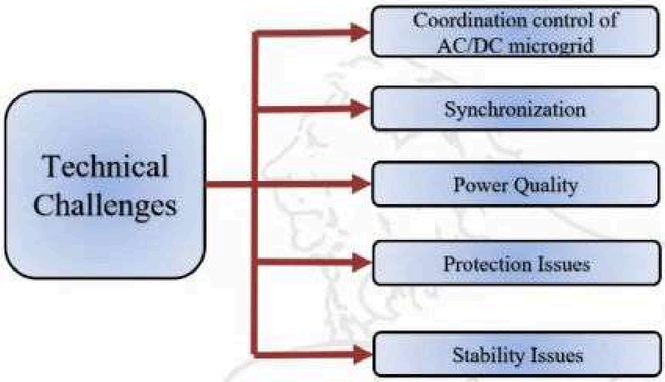


Fig. 1.1 Greenhouse gases emission based on 100-year global warming potential data [2]

- Researcher to focus towards the development and integration of Renewable Energy Resources (RESs) as an alternative to the conventional energy sources.

INTRODUCTION TO HYBRID AC/DC MICROGRID…

Technical challenges associated with Hybrid AC/DC microgrid



- When hybrid AC/DC microgrid reconnects to main grid, mismatch in voltage, frequency and phase angle should remain within the limits.

INTRODUCTION ...

Advantages and Challenges associated with RESs

RENEWABLE ENERGY SOURCES

ADVANTAGES

- Improvement of reliability of the system.
- Reduction in physical as well as electrical distance between generation and loads.
- Reduction of line losses etc.
- Minimal impact on the environment.

TECHNICAL CHALLENGES

- Lack of Inertia.
- Variable output voltage and frequency.
- Increase in short circuit current due to DG installation.

LITERATURE SURVEY …
AC microgrid protection

S.no.	Methodology	Merits	Limitation
1.	**Adaptive protection scheme [11-18].**	• Adaptive i.e. threshold value of the relay changes with any change in system configuration. • Because of adaptive nature, it provides protection in both grid connected as well as islanded condition.	• Applied only for radial electrical network. • Does not consider the effect of HIF. • Does not work satisfactorily in noisy and transient conditions.
	a) Adaptive overcurrent protection. [11-12] .	• It follows inverse time characteristics i.e. operating time of relay decreases for large value of fault current.	• Doesn't determine type of fault and location of fault.
	b) Adaptive differential protection.[13-15].	• It is not sensitive to bidirectional power and reduction in fault current level in islanded condition. • Lower dependency on fault resistance. • Provides protection for radial and loop microgrid.	• Requires communication system, its failure may result in the failure of the protection. • Requires costly equipment for synchronization in communication system. • Does not work satisfactorily in noisy and transient conditions.
	c) Adaptive protection based on symmetrical components [16-18].	• It is applicable in both radial and loop microgrid. • It is independent of magnitude of fault current and fault resistance. • It is independent of system configuration.	• Under normal condition, zero sequence and negative sequence component are present due to single phase loads or three phase unbalanced loads. • Doesn't consider the effect of switching transients and noise which introduces zero and negative sequence in the system.

Introduction of Microgrid

✓ **MGs can be operated**

- Grid connected mode
- Islanding mode/ Stand-alone operation

✓ **Grid connected mode**

Cont…

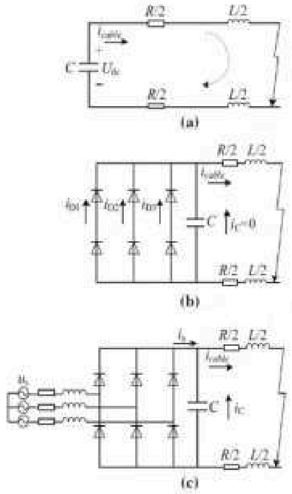


Fig. 7. Equivalent circuit for pole-to-pole short-circuit fault [4]

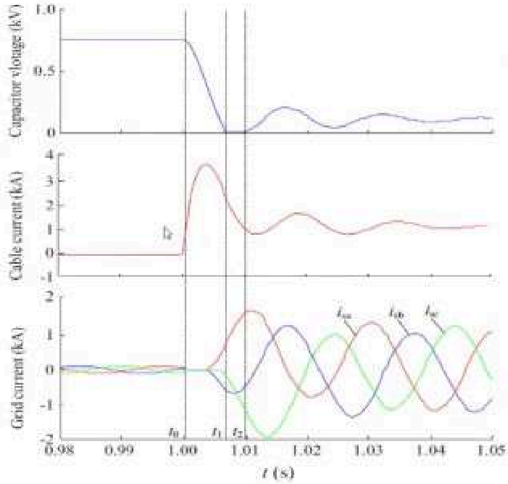


Fig. 8. Typical pole-to-pole fault characteristics [4]

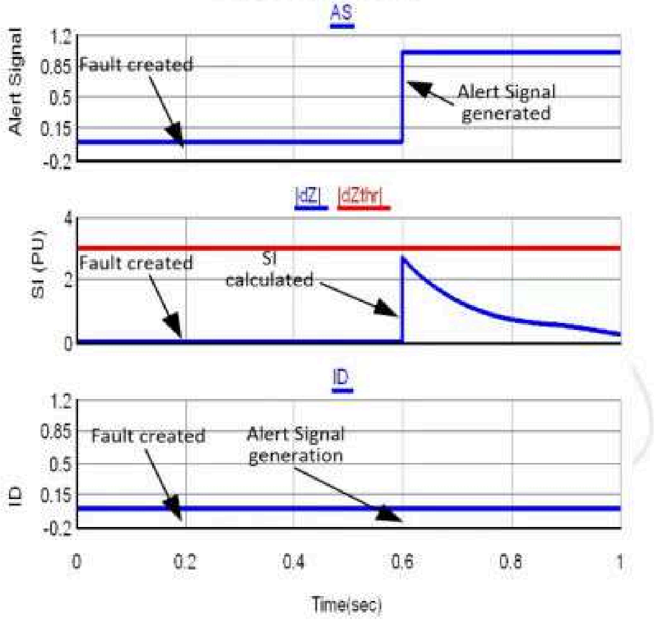
- ➢ Entire analysis has been conducted using Laplace transform [16].

16. Yang J, Fletcher JE, O'Reilly J, "Multiterminal DC wind farm collection grid internal fault analysis and protection design," *IEEE Trans Power Deliv.*, vol. 25, no. 4, pp. 2308–2318, 2010.

Islanding detection scheme for microgrid…

Results

Fault at PCC



Issues Addressed in DCMG Protection

S.No	Author/Paper	Publication	Work	Remark
1	D. Salomonsson, L. Sooder, and A. Sannino, "Protection of low-voltage DC microgrids,".	IEEE Trans. Power Deliv vol. 24, no. 3, pp. 1045–1053, 2009.	(i) Consider the di/dt for the protection of converter. (ii) This method provides the protection of converter, feeder and battery. (iii) Coordination between the feeder and converter relays utilize combination of derivative of converter current and dc link voltage.	(i) Battery is direct connected to the grid without PE interface, which reduces the overall flexibility of the system.
2	R. Mohanty and A. K. Pradhan, "A Superimposed Current Based Unit Protection Scheme for DC Microgrid".	IEEE Trans. Smart Grid, vol. 9, no. 4, pp. 3917–3919, 2018.	(i) Superimposed fault currents from both ends of a line segment is represented on Δi-plane to derive trip decision. (ii) Fast protection scheme with high selectivity for DCMG	(i) Better result than current differential protection. (ii) Perform well in high resistance fault.
3.	R. Mohanty and A. K.Pradhan, "Protection of smart DC microgrid with ring configuration using parameter estimation approach," .	IEEE Trans. Smart Grid, vol. 9, no. 6, pp. 6328–6337, 2018.	(i) Forward and reverse faults is discriminated with respect to the IED based on LS based technique, determines fault path inductance. (ii) It supports fault ride-through (FRT) of converter.	(i) Performs well for higher loading above 0.4pu where current direction method fails. (ii) Its drawback is that it doesn't provide any back up scheme.

Comparison of Protection Methods

S.No	Protection Method	Advantages	Disadvantages
1.	Distance Protection	• Simple algorithm.	• More sensitivity to fault resistance . • Usually needs a back-up unit. • Limited accuracy in short lines.
2.	Differential Protection	• Better sensitivity. • Lower dependency to fault impedance. • Independent of the current direction. • Independent of high raising rate of DC currents and fault resistance.	• Need of high bandwidth communication link. • Does not work satisfactorily with noisy measurements. • Needs fast and accurate data synchronization.
3.	Over-current Protection	• Simple algorithm. • Applicable in fault interrupt methods.	• Applicable only to low- and medium-voltage. • Should be used with other schemes or used by communication links to provide selectivity. • Require accurate and fast methods for detecting the current direction. • Cannot detect high-impedance faults.

DAY 2 (04.08.2020, Wednesday) AN Session

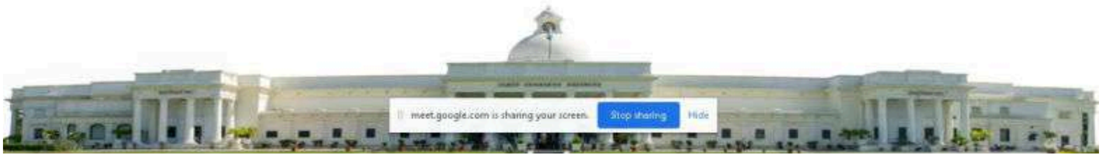
Avik Bhattacharya
Assistant Professor, IIT Roorkee

Power Electronic Applications in High Voltage Engineering

Power Electronic Applications in High Voltage Engineering

Dr. Avik Bhattacharya
Assistant Professor

Department of Electrical Engineering
Indian Institute of Technology Roorkee



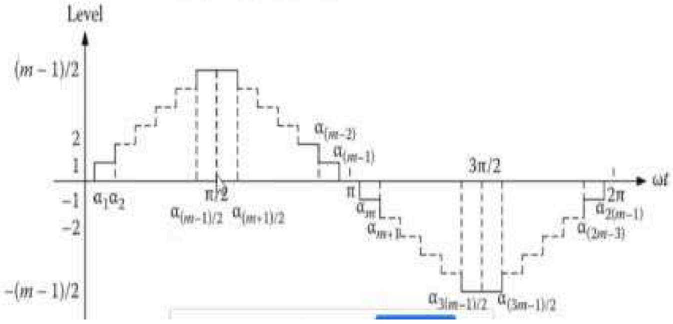
Contents

- Introduction
- SCR Rectifier
- Conventional Two level inverter
- Multilevel Inverter
- Reduced switch MLI topologies
- Power quality mitigating devices at medium voltage
- FACTS device at medium and high voltage

Multilevel Inverter (Cont...)

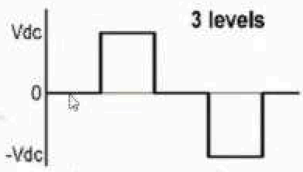
Switching angle calculation techniques

The switching angle is defined as the moment of level change. Generally, m-level inverter requires (m−1)/2 main switching angles. The calculation of main switching angles in the first quadrant(0° − 90°) is enough for calculating the remaining switching angles in the other quadrants.



Multilevel Inverter (Cont...)

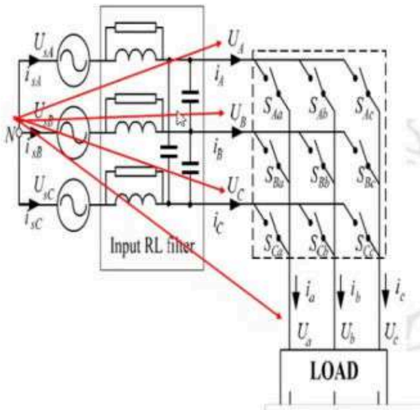
- The general structure of the multi-level inverter (MLI) is to obtain a sinusoidal voltage from several level of voltages, obtained from various capacitor voltage sources.
- The MLI start from three-levels.

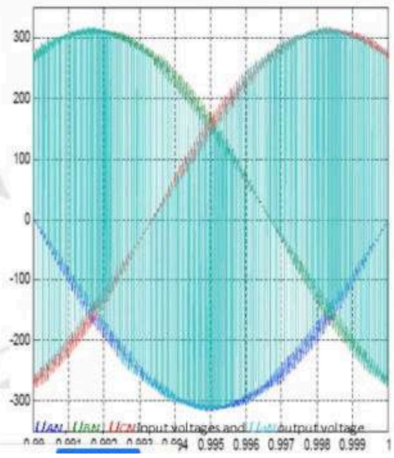


- The unique structure of MLI allows them to reach high voltages with lower harmonics without the use of transformer or series-connected synchronized switching devices.

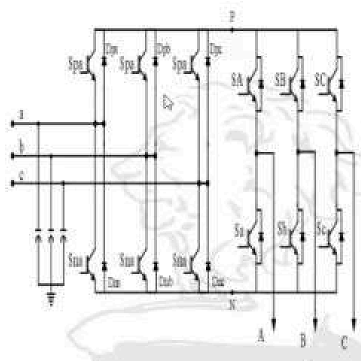
Direct Matrix Converter (DMC) (Cont…)

Waveforms

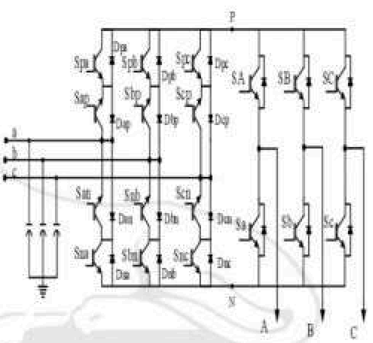




Indirect Matrix Converter (Cont…)



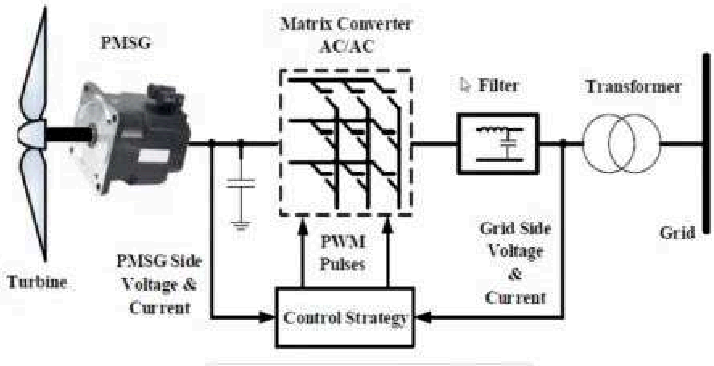
First IMC topology with supressed DC link capacitor



Power circuit for IMC

Application: PMSG based WECS for Grid Integration using DMC

- The block diagram of the proposed matrix converter with PMSG based wind energy conversion system shown in fig

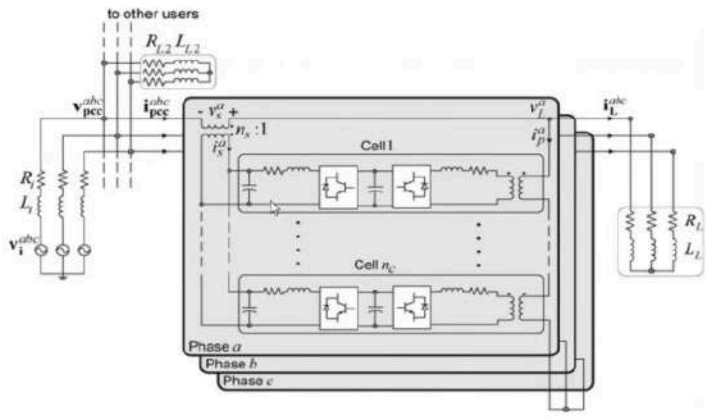


Indirect Matrix Converter (Cont…)

➢ In case of VSMC as middle switch is absent only 2 control signal is required for each leg of rectifier. While in case of USMC, as the number of switches reduced to one, the number of control signal for each leg of inverter also remains one.

Converter Types	Number of Transistors	No Of Diodes	Isolated Driver Potentials
CMC	18	18	6(CC),9(CE)
IMC	18	18	8
SMC	15	18	7
VSMC	12	30	10
USM			

MLI based UPQC (Cont…)



Flexible AC Transmission Systems (FACTS) devices

- FACTs devices are used for the improvement of the power flow in the transmission system.
- The most common Facts devices are SVC , STATCOM, TCR, TCS, SSSC and UPFC
- Among this STATCOM, SSSC and UPFC are used in high and medium voltage application
- The structure of this device are almost equal to the power quality mitigation device. But control strategy will be different

FACTS device	PQ mitigating device
STATCOM	Shunt APF
SSSC	Series APF
UPFC	UPQC

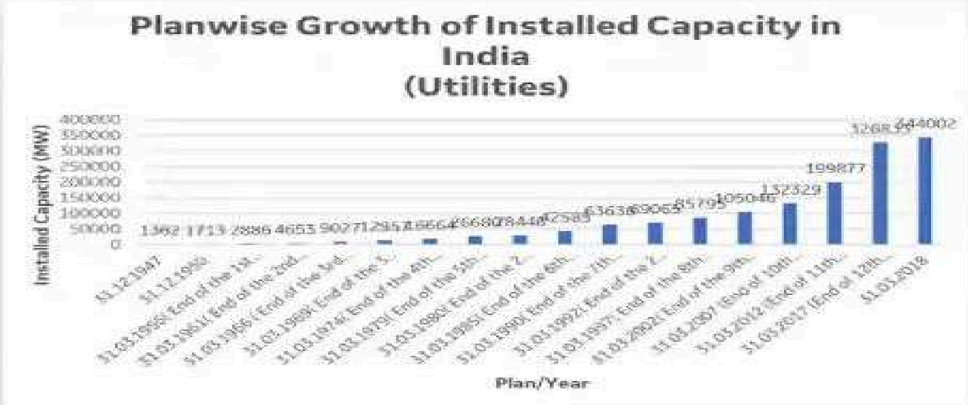
<u>DAY 3 (05.08.2020, Wednesday) FN Session</u>

Mr.V.Vijay Karthik
Lead-Technical, GE T&D India Limited, Chennai

Digital Substation 2.O

Set Up Monitors

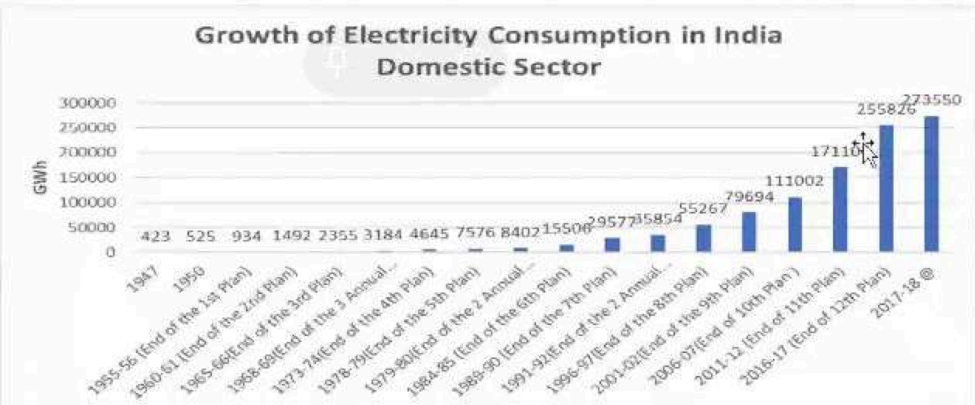
GROWTH SNAPSHOT – INSTALLED CAPACITY



See tutorial regarding confidentiality disclosures. Delete if not needed.

Set Up Monitors

GROWTH SNAPSHOT – CONSUMPTION – DOMESTIC SECTOR

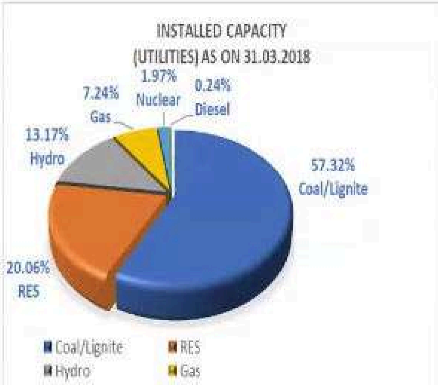


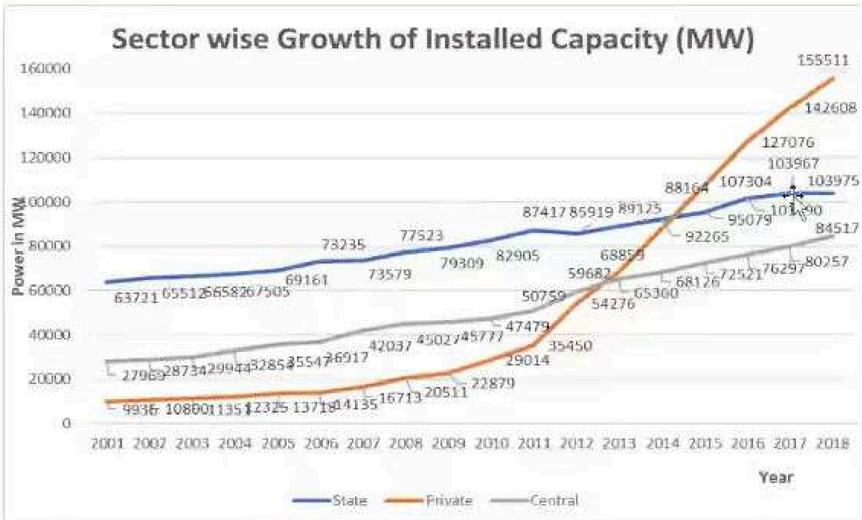
Mr. V. Vijay Karthik

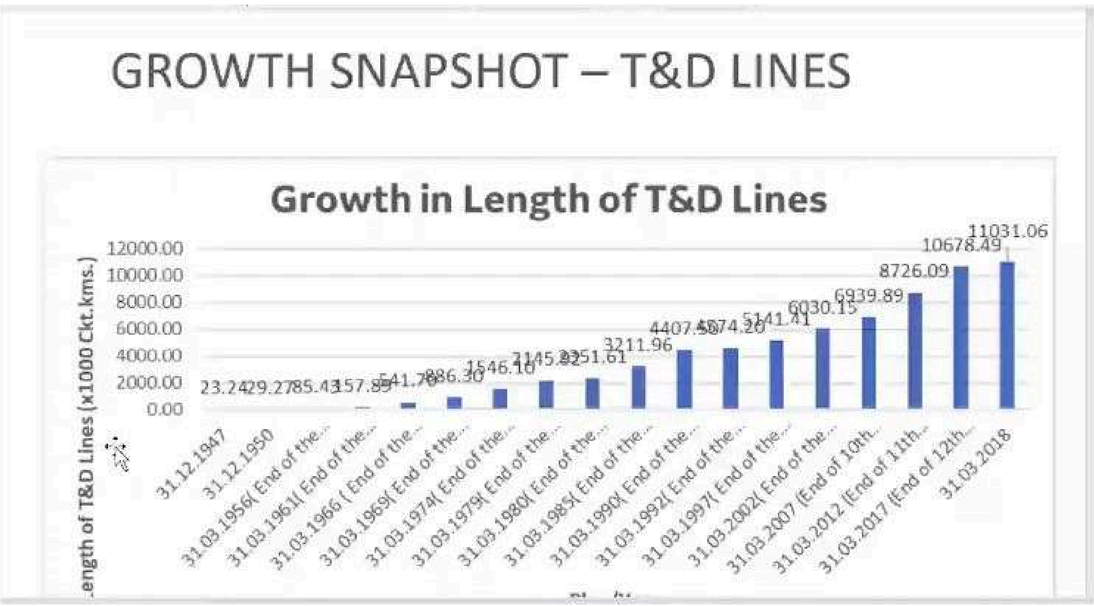
- Lead - SAS Technical Institute, GE T&D India Ltd.
- Responsible for designing Courses on Protection & Automation to address customer requirements
- Certified "Expert" by GE Grid Solutions with expertise on carrying Power System Studies, Relay Coordination Studies
- Provide solutions for issues in Power Systems
- Address customer queries on Numerical Relays
- Expertise on Cost effective redesign, Standardization of conventional relays
- Development of automated test benches, Failure Analysis & Rectification, Designed Small prototypes of protective relays based on processors & controllers etc

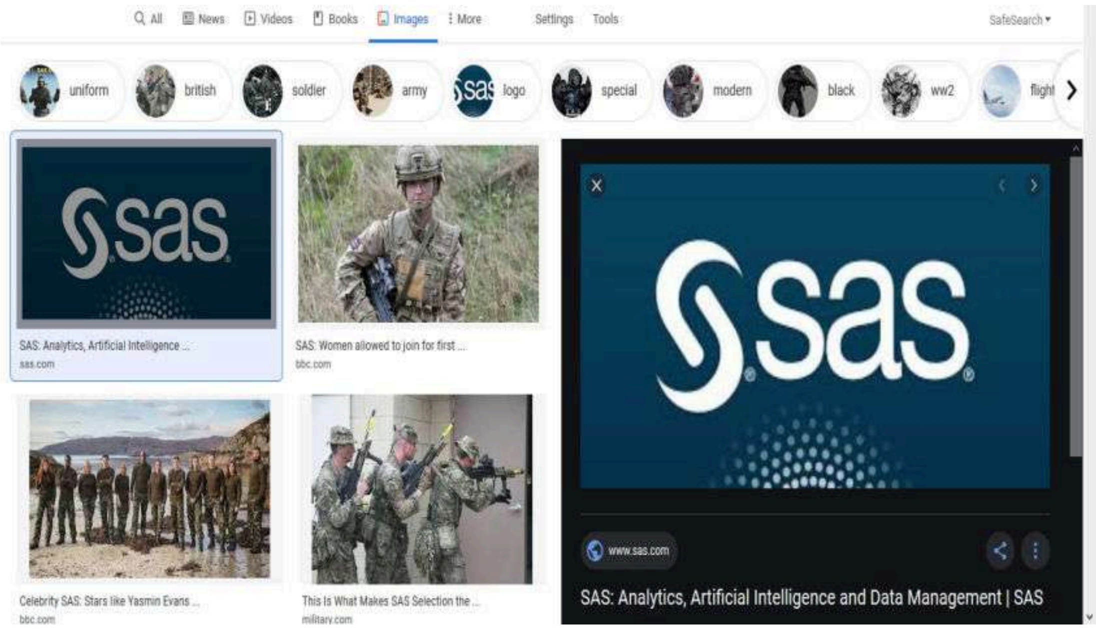
SEGMENTWISE SPLIT UP – GENERATION SEGMENT

Source	Capacity in MW	Percentage of Contribution
Coal/Lignite	197172	57.32%
RES	69022	20.06%
Hydro	45293	13.17%
Gas	24897	7.24%
Nuclear	6780	1.97%
Diesel	838	0.24%
Total	344002	






GROWTH SNAPSHOT – T&D LINES
Growth in Length of T&D Lines
Length of T&D Lines (x1000 Ckt.kms.)
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
11031.06
10678.49
8726.09
6939.89
6030.15
3211.96
31.12.1947
31.12.1950
31.03.2018


All
News
Videos
Books
Images
More
Settings
Tools
SafeSearch
uniform
british
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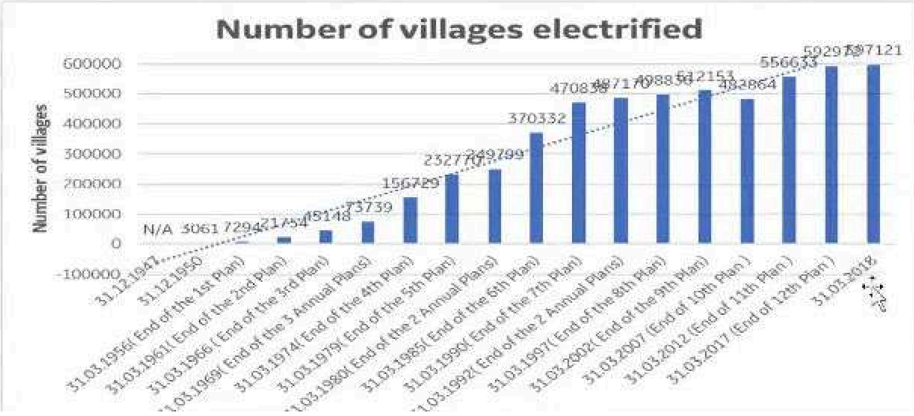
logo
special
modern
black
ww2
sas
SAS: Analytics, Artificial Intelligence ...
sas.com
SAS: Women allowed to join for first ...
bbc.com
Celebrity SAS: Stars like Yasmin Evans ...
bbc.com
This Is What Makes SAS Selection the ...
military.com
www.sas.com
SAS: Analytics, Artificial Intelligence and Data Management | SAS

GROWTH SNAPSHOT – RURAL ELECTRIFICATION



DAY 3 (05.08.2020, Wednesday) AN Session

Dr. Bhavesh Bhalja
Associate Professor, IIT Roorkee

Digital Protection on Power System Network

IIT ROORKEE

swayam

NPTEL ONLINE CERTIFICATION COURSE

Practical Implications of Faults in Power System Network

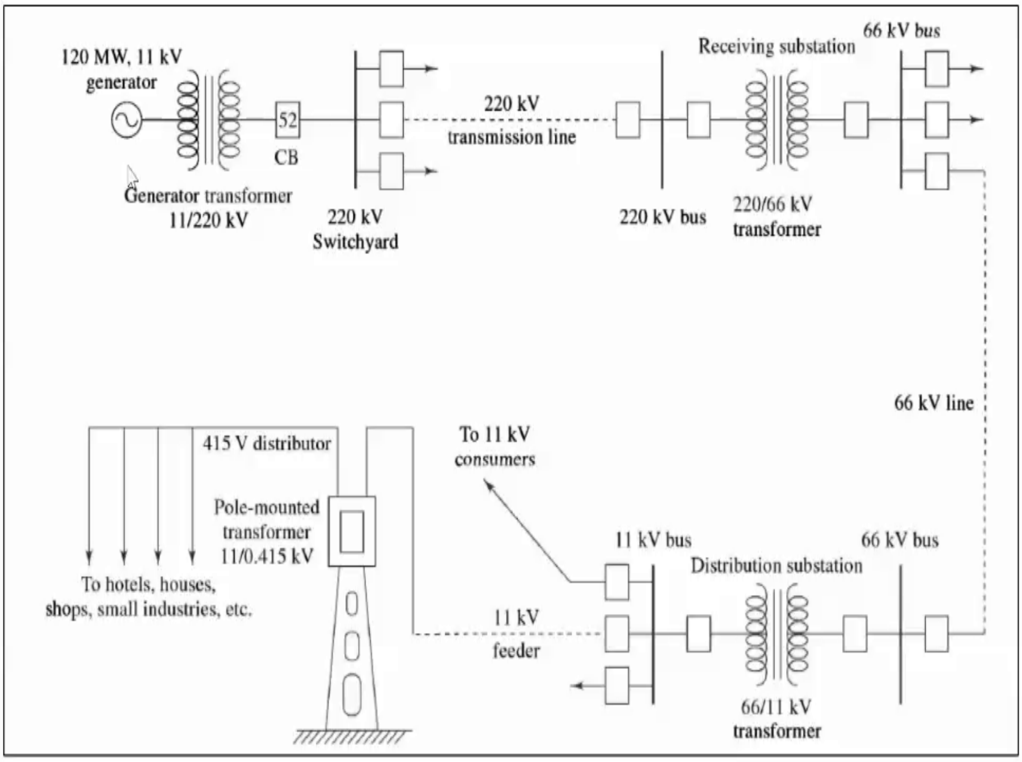
Dr. Bhavesh Bhalja

Associate Professor, Department of Electrical Engineering, IIT Roorkee

E-mail: brb14fee@iitr.ac.in

Occurrence of a Fault can cause

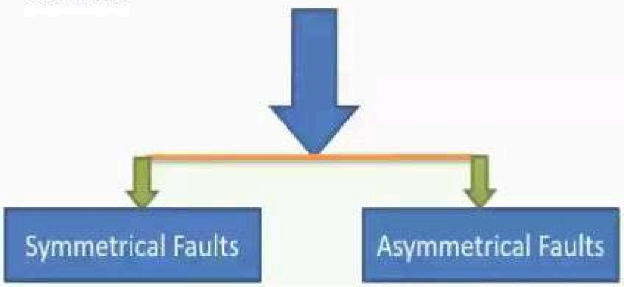
- Interruption in the power supply to the consumers.
- Substantial loss of revenue due to interruption of service.
- Loss of synchronism.
- Extensive damage to equipment
- Serious hazard to Personnel



Fault?

⌘ Definition

- Flow of current to the undesired path or abnormal stoppage of current.



Tripping Mechanism of Relay

The relay is always connected in the secondary circuit of CT and PT.

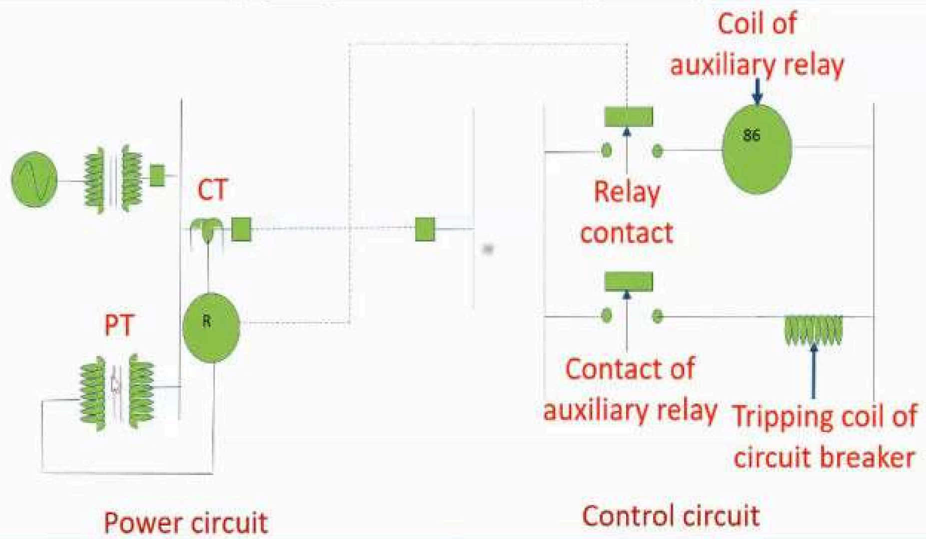
The main function of any type of relay is to detect/sense the inception of fault, whereas the tripping task is carried out by auxiliary relay and circuit breaker.

Since the relay only does the function of sensing, the speed of the relay is increased, and hence, it operates instantaneously.

⌘ Auxiliary relay

- It carries high value of trip coil current during a fault.
- It also gives signals to perform certain other functions associated with relays such as alarms and interlocking.

Tripping Mechanism of Relay



Disadvantages of Electromechanical/Static Relays

⌘ Instantaneous value of fault current is given by

$$i = \frac{E_m}{Z}\left[e^{(-Rt/L)} + \sin(wt + \theta - \phi)\right]$$

$$Z = \sqrt{R^2 + (wL)^2}$$

$$\phi = \tan^{-1}\frac{wL}{R}$$

$$\theta = \text{swithcing ins tan t angle}$$

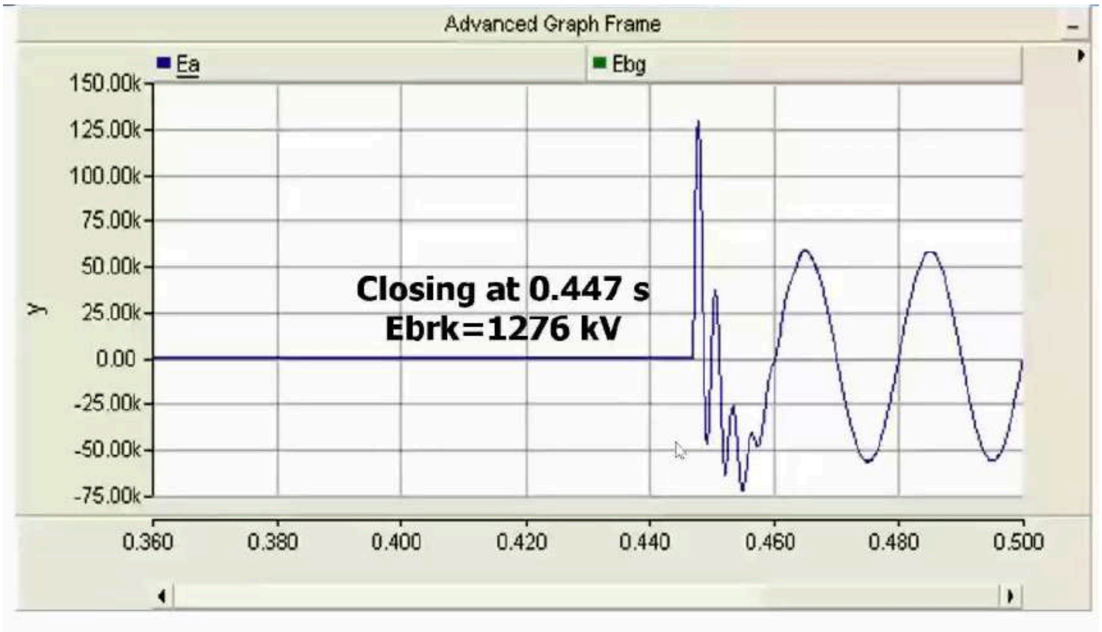
Requirements of Protective System

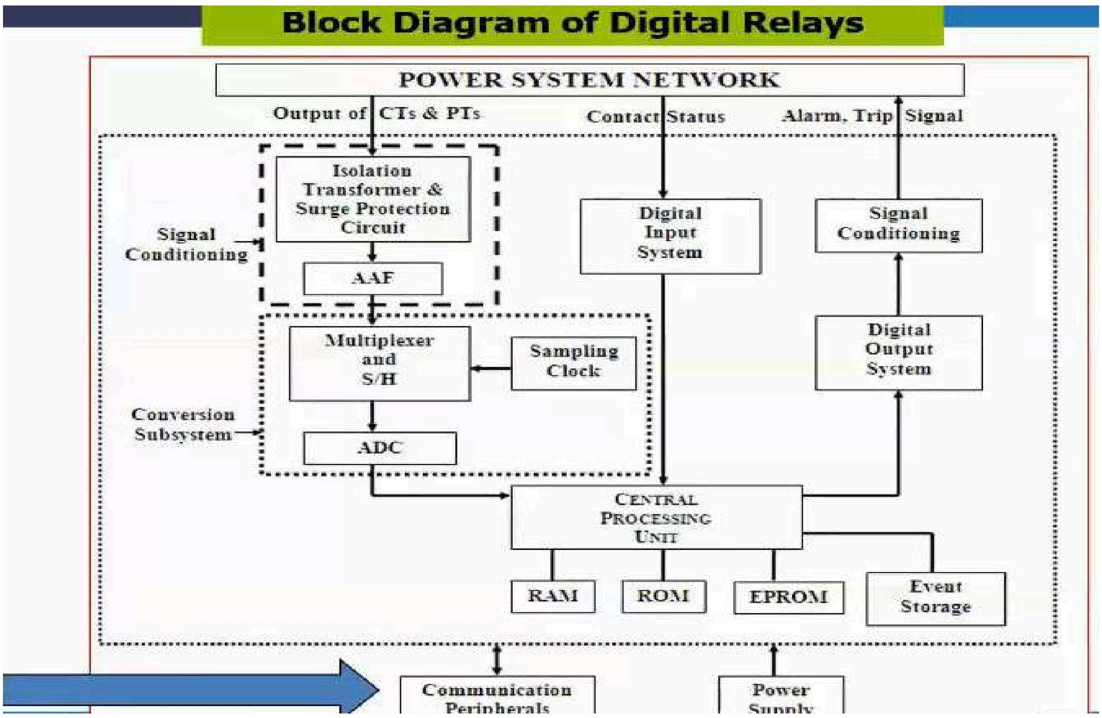
(i) Selectivity (ii) Speed (iii) Sensitivity
(iv) Discrimination (v) Stability (vi) Reliability

⌘ Besides the six factors mentioned above, economics of protective relays is another important factor which should be considered.

⌘ A good protective relay system should combine both features of maximum protection and minimum cost.

⌘ Moreover, some of these properties are contradictory to one another, and it is the duty of the protection engineer to maintain a balance amongst them, when choosing a protection scheme for a particular application.


Advanced Graph Frame
Ea
Ebg
150.00k
125.00k
100.00k
75.00k
50.00k
25.00k
0.00
-25.00k
-50.00k
-75.00k
y
Closing at 0.447 s
Ebrk=1276 kV
0.360
0.380
0.400
0.420
0.440
0.460
0.480
0.500


Block Diagram of Digital Relays
POWER SYSTEM NETWORK
Output of CTs & PTs
Contact Status
Alarm, Trip Signal
Isolation Transformer & Surge Protection Circuit
Signal Conditioning
AAF
Digital Input System
Signal Conditioning
Multiplexer and S/H
Sampling Clock
Conversion Subsystem
ADC
Digital Output System
CENTRAL PROCESSING UNIT
RAM
ROM
EPROM
Event Storage
Communication Peripherals
Power Supply

DAY 4 (06.08.2020, Thursday) FN Session

Premalata Jena
Associate Professor, IIT Roorkee

Smart Grid – A New Vision

Motivation

Total Installed Capacity: 370.11 GW Peak Demand : 176.72 GW (Apr'20)
Renewable: 87.33 GW

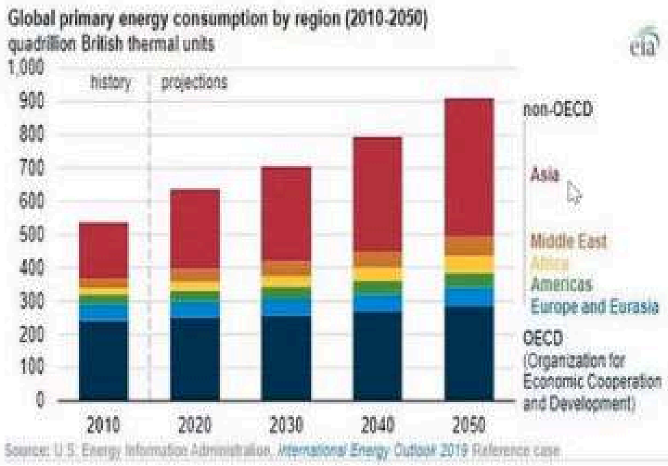
- Reduction of CO_2 emission, Reduction of global warming and peak energy deficit with renewable sources.

- Key renewable sources in India
  -wind-solar

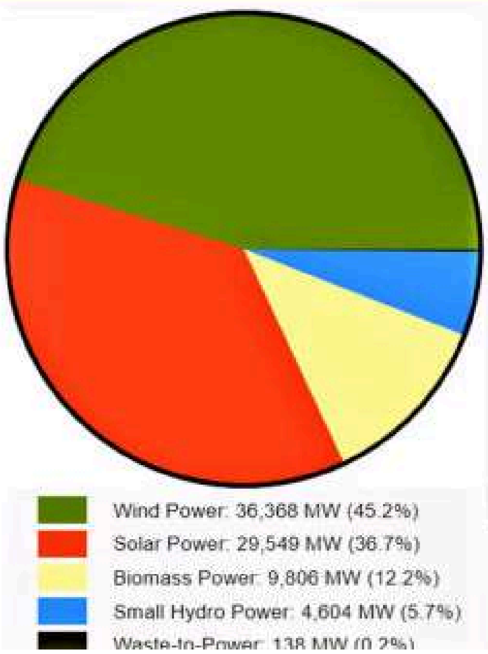
- India targets to install 100 GW of solar and 75 GW of wind by 2022.

Energy Scenario for the Globe

Till 31st March , 2020



Installed grid interactive renewable power capacity in India as of 30 June 2019 (excluding large hydro)

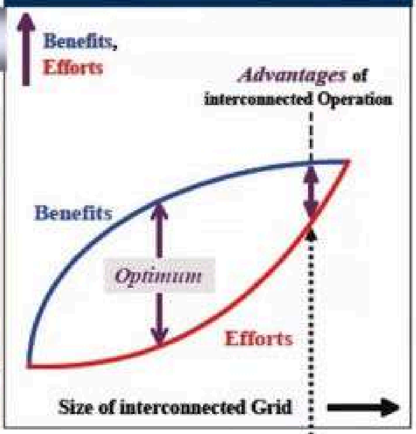


2020- 87,027.68 MW

2022- 175,000 MW (Target)

THE ELECTRIC POWER INFRASTRUCTURE ("THE GRID")

Cost-to-Performance Ratio



Limitations of large AC Systems

Long-Distance Transmission Systems

- Voltage Stability
- Reactive Power Problems
- Steady-state Stability
- Transient Stability
- Subsynchronous Oscillations

Interconnected Systems

- Load-Flow Problems (Management of Congestion required)
- Frequency Control
- Voltage Stability
- Oscillation Stability
- Inter-Area Oscillations
- Blackout Risk due to Cascading Effects
- Interactions between the Power Systems in Terms of Physics

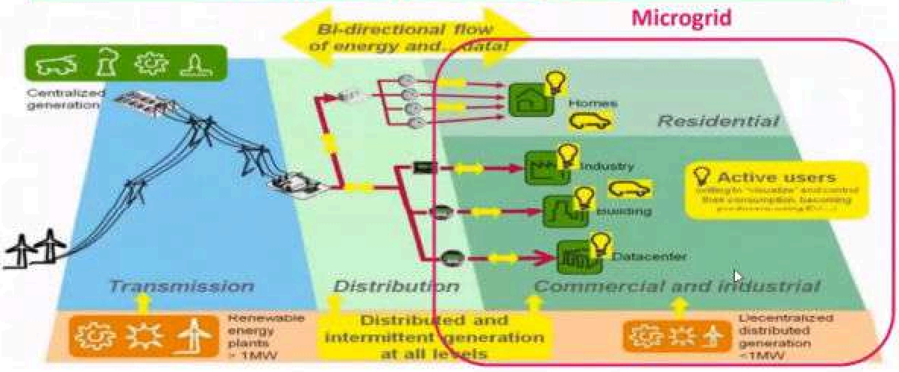
When the Synchronous System is very large – Advantages diminish

THE ELECTRIC POWER INFRASTRUCTURE ("THE GRID")

- No large scale storage in the system
- The electric grid is an ultimate just-in-time product delivery system
- Unidirectional flow of energy
  - large generating plants - transmission - distribution networks - the consumers
  - No real-time communication and information flow between generators and consumers
  - supply and demand balance is achieved in real-time by adjusting only the supply side as a reaction to load change as indicated by system frequency.
  - The demand side control is almost non-existent in the present grid except for load shedding

Definition of Microgrid

An integrated energy system consisting of interconnected loads and distributed energy resources which as an integrated system can operate *in parallel with* the grid or in an intentional *islanded* mode.



Mini-grids

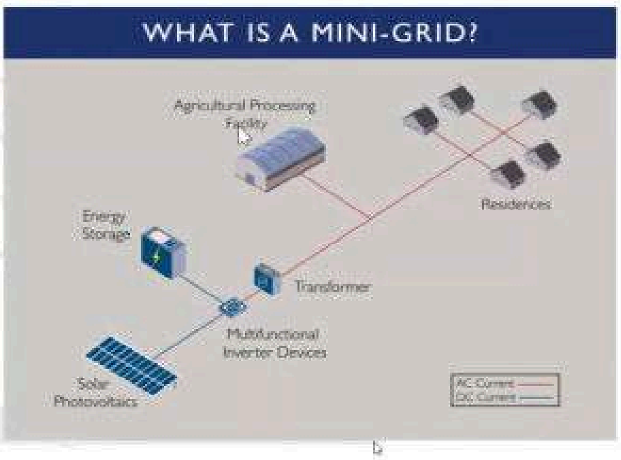
➢ The United Nations Framework Convention on Climate Change (UNFCCC) defines a Mini-grid with a **power rating below 15MW** and disconnected from larger electric grids.

➢Mini-grids are relatively quick and easy to implement in areas without electricity.

➢ They reduces operating costs and reliance on often fluctuating fuel prices.

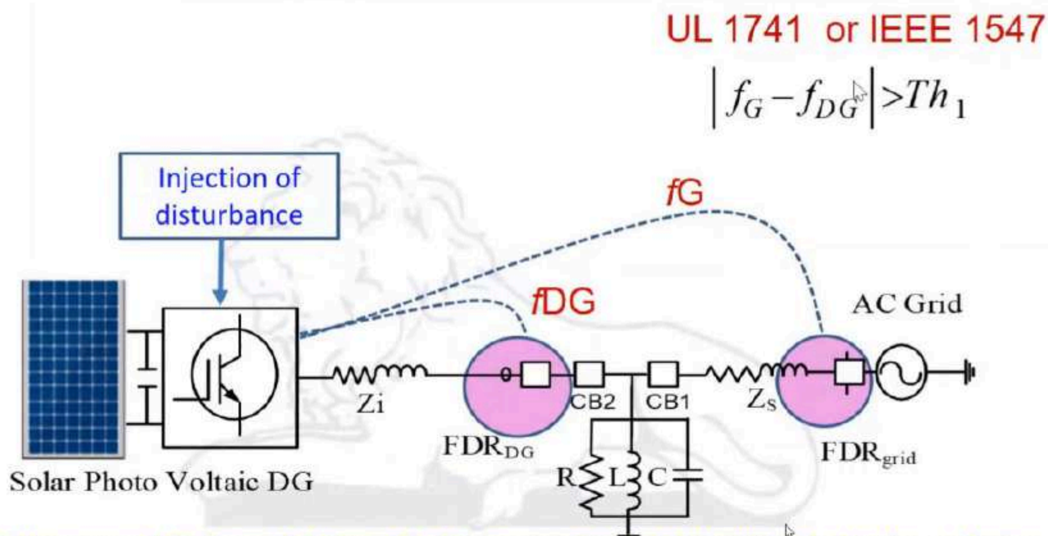
➢ Mini-grids also require less maintenance than larger electrical grids.

➢ **mini-grid operates at less than 11 kV.**



➢ **They involve small-scale electricity generation (10 kW to 10MW) which serves a limited number of consumers via a distribution grid that can operate in isolation from national electricity transmission networks**

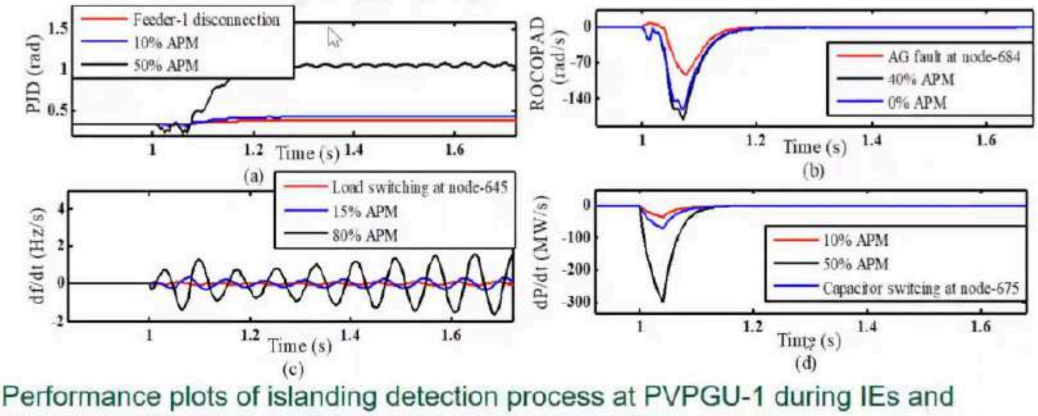
Active Islanding Detection Techniques



P. Kumar and P. Jena, "Active slip frequency based islanding detection scheme for grid tied inverters," IEEE Transactions. on Industrial Informatics, Accepted, 2019. (IMPACT FACTOR – 7.5)

Conventional passive islanding detection techniques

- Rate of change of frequency(ROCOF)
- Phase jump detection(PJD)
- Rate of change of power(ROCOP)
- Rate of change of voltage (ROCOV)



Performance plots of islanding detection process at PVPGU-1 during IEs and NIEs: (a) PJD; (b) ROCPAD; (c) ROCOF; (d) ROCOP

DAY 4 (06.08.2020, Thursday) AN Session

Dr.Dipayan Guha
Assistant Professor, NIT Allahabad

Control System Advancement and Application in Practical Systems

CONTROL SYSTEM ADVANCEMENT AND APPLICATION IN PRACTICAL SYSTEMS

Presented By
Dr. Dipayan Guha
Assistant Professor
Electerical Engineering Department
Motilal Nehru National Institute of Technology Allahabad
Prayagraj-211004, UP, India
August 6, 2020

Control System

System: **A group of components or devises connected together to perform a specific task.**

Signal: **Time-varying quantity caries meaningful information.**

Control System: **The control system is that means by which any kind of interest in machine, mechanism or other equipment's can be altered or changed in accordance with a desired manner.** *"Output of the system follow input"*

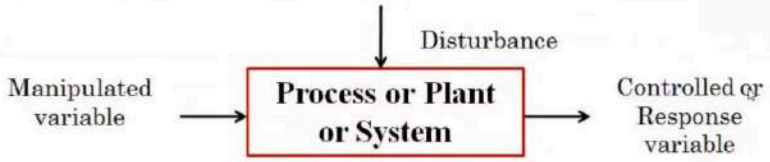


Fig. 1 Control System

Tilt-Integral-Derivative Controller

- Cascade controller is commonly exercised in a multi-loop control system for good set-point tracking and better disturbance rejection.
- Inner loop responds much faster than the outer loop.

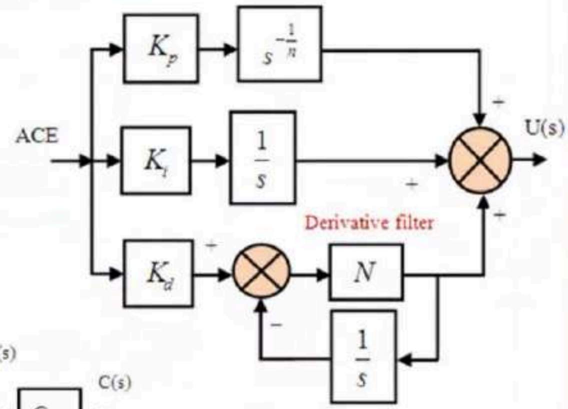


Fig. 4 Block diagram of TID controller with filter

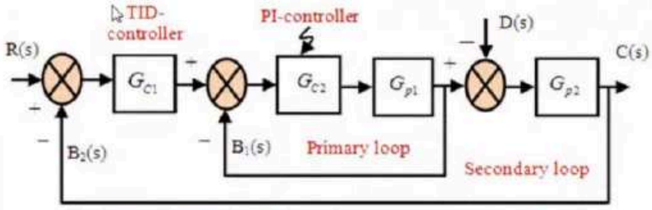


Fig. 5 Block diagram of cascade controller

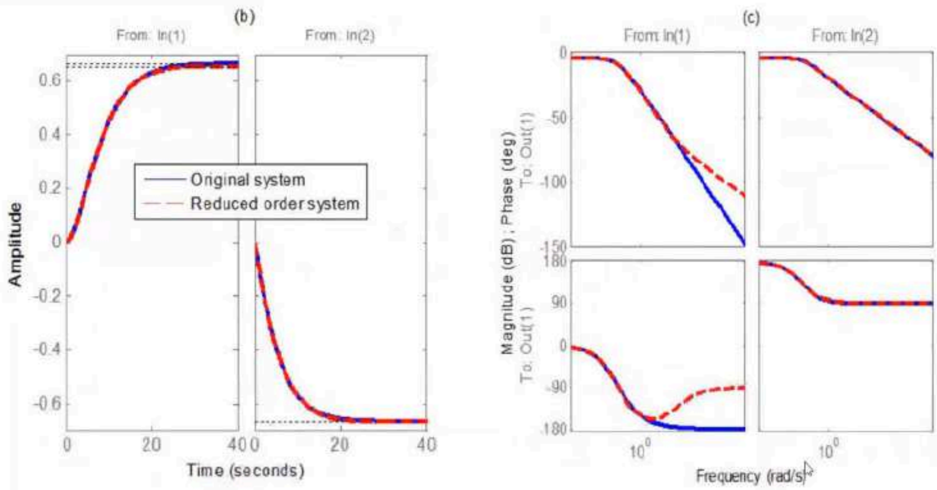


Fig. 9. (b) Comparative step response, (c) Comparative frequency response

Eigen values

$$\left.\begin{aligned} \lambda_{HOM} &= -0.0441 \pm j0.0733; -5; -0.6667; -0.5117; -0.25 \\ \lambda_{LOM} &= -0.2161 \pm j0.0741 \end{aligned}\right\}$$

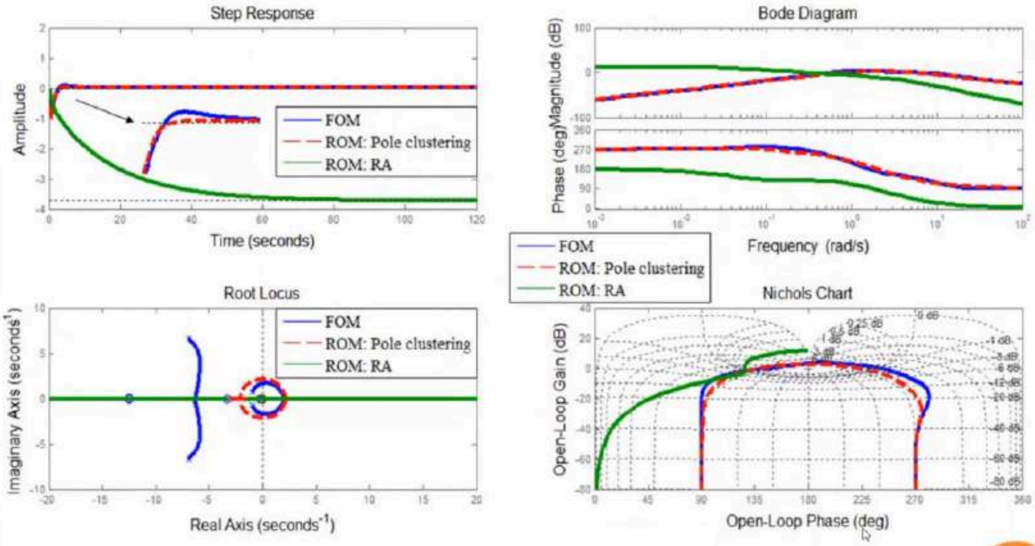
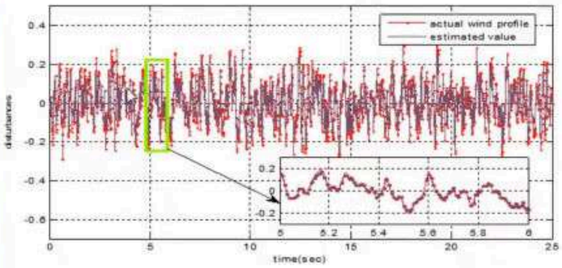


Fig. 12. Feasibility study of derived ROMs of test system-3 in terms of step response, Bode plot, root-locus, & Nichols chart

- The change in frequency obtained with MOSO is plotted and compared with the integral controller and LQR in Fig. 14.

Parameters	Integral controller	LQR	MOSO	DOSFC
Settling time	21.79s	11.93s	11.83s	11.63s
Overshoot	0.0036	0	0	0
Undershoot	-0.0179	0.0029	0.0025	0.0011



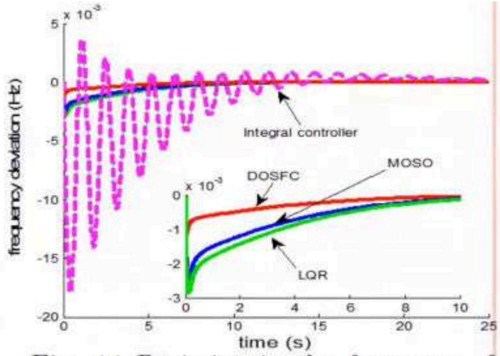


Fig. 14 Deviation in the frequency of HPS following 0.01 pu load perturbation

DOSFC: Disturbance observer aided state feedback controller

DISTURBANCE OBSERVER

- Disturbances/uncertainties widely present in the system and has adverse effects on the performance of the system and stability of the system [3].
- Disturbance observer made its first appearance in 1983 by Prof. Ohnishi in an application to a velocity controlled DC motor.

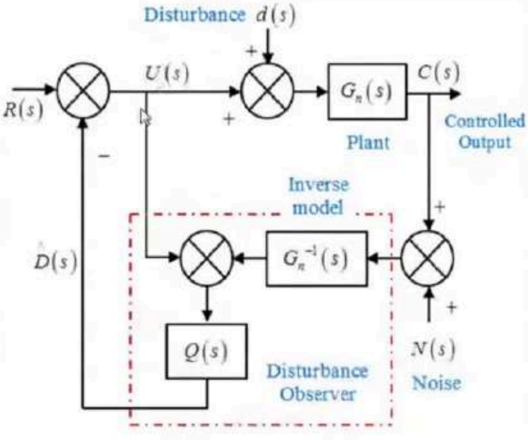


Fig. 15. Model of Disturbance Observer

The control input to the plant is given by

$$u(t) = r(t) - \hat{d}(t) + d(t)$$

[3] Chen C, Zhang K, Yuan K, Gao Z, Teng X, Ding Q.: 'Disturbance rejection-based LFC for multi-area parallel interconnected AC/DC system,' IET Gen Trans Dist., 2016, 10(16), pp. 4105-17.

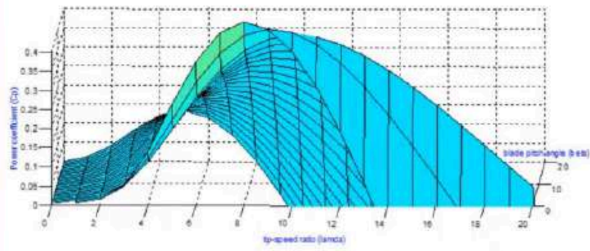
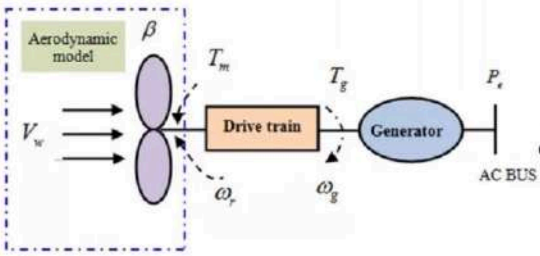


Fig. 20 Plot of wind rotor power coefficient with λ and β

$$P_m = \frac{\rho_{air} A_{blade} C_p V_w^3}{2}; T = \frac{P_m}{\omega_r}$$

$$C_p(\lambda,\beta) = \alpha_1\left(\frac{\alpha_2}{\lambda_i} - \alpha_3\beta - \alpha_4\right)e^{-\frac{\alpha_5}{\lambda_i}} + \alpha_6\lambda$$

$$where,\ \frac{1}{\lambda_i} = \frac{1}{\lambda + 0.08\beta} - \frac{0.035}{\beta^3+1},\ \lambda = \frac{\omega_r R}{V_w}$$



$$\dot{\omega}_r = -\left(\frac{B_r + B_{sh}}{J_r}\right)\omega_r + \left(\frac{B_{sh}}{J_r}\right)\omega_g - \left(\frac{1}{J_r}\right)T_{sr} + \left(\frac{1}{J_r}\right)T_m$$

$$\dot{\omega}_g = \left(\frac{B_{sh}}{2J_g}\right)\omega_r - \left(\frac{B_g + B_{sh}}{J_g}\right)\omega_g + \left(\frac{1}{N_g J_g}\right)T_{sr} - \left(\frac{1}{J_g}\right)T_g$$

$$\dot{T}_{sr} = K_{sh}\omega_r - \left(K_{sh}/N_g\right)\omega_g$$

Fig. 21 Schematic diagram of variable speed wind turbine model

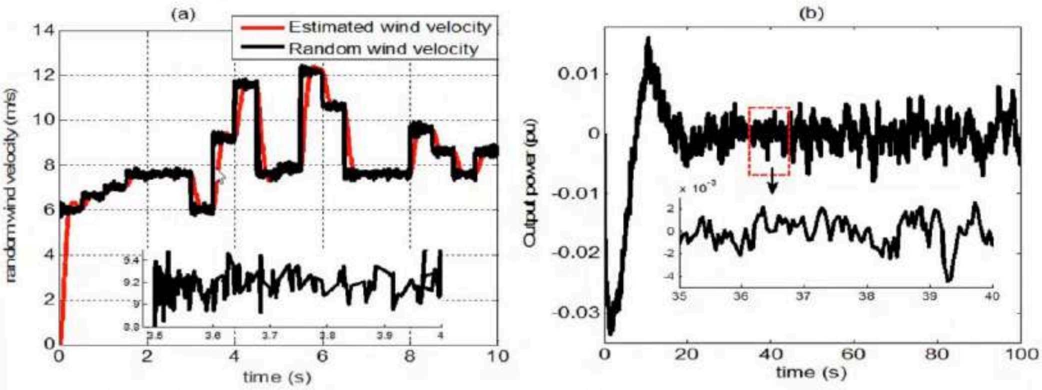


Fig 22 Profiles of (a) random wind velocity, (b) output power of WPG

KHARITONOV'S RECTANGLES

Zero exclusion principle: A system is robustly stable if the Kharitonv's rectangles are not including the origin (0, 0) while frequency (ω) is varying.

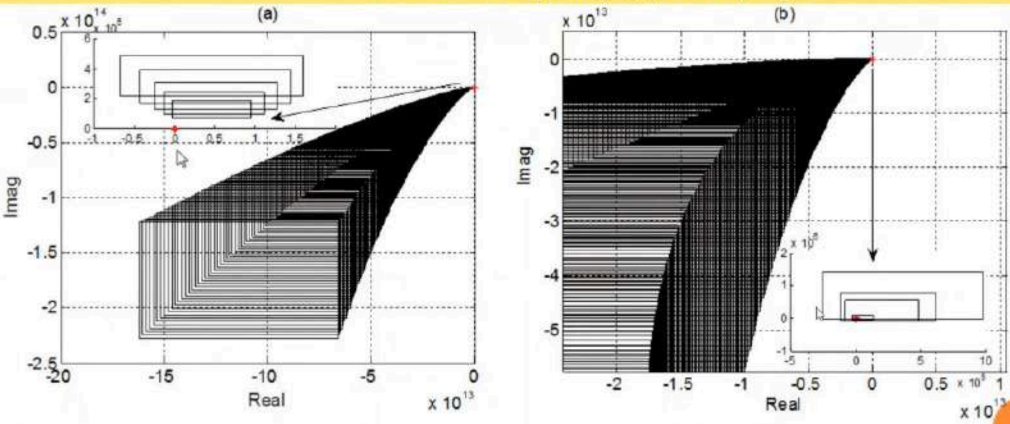


Fig. 26. The Kharitonov rectangles for full order system with (a) ±25% and (b) ±50% variation in system parameters

DAY 5 (07.08.2020, Thursday) FN Session

Dr. Rupesh Wandhare
Assistant Professor, IIT Hyderabad

Design, Control and Reliability of Power Converter and Power Conditioning Unit

Design, Control and Reliability of Power Converter and Power Conditioning Unit

by

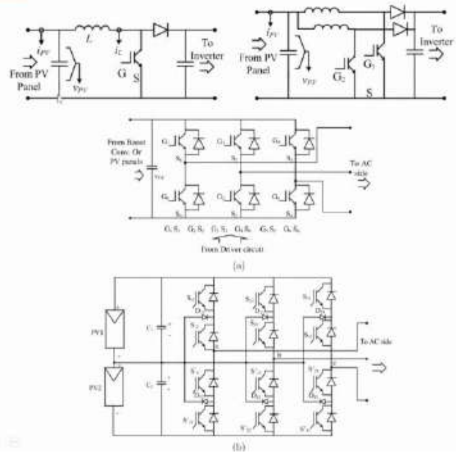
Dr. Rupesh Wandhare

Indian Institute of Technology Hyderabad

Dept. of Electrical Engineering

Indian Institute of Technology-Hyderabad

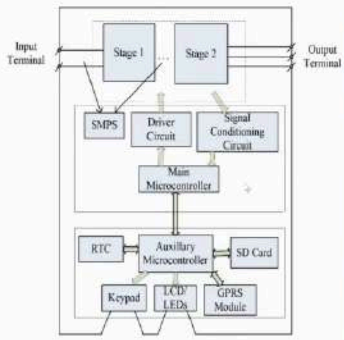
Power Electronics Converter Studied in Text Book



Renewable Energy Sources

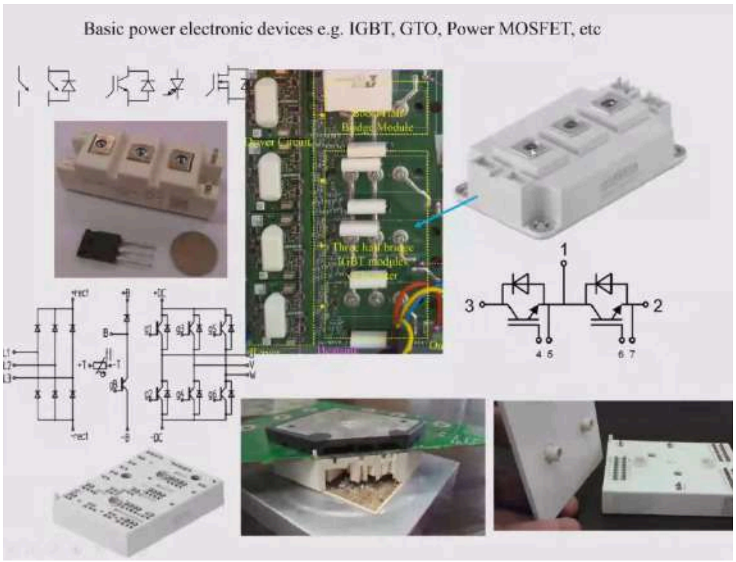
Renewable Energy Sources

Renewable Energy Sources



Block diagram of internal structure of a typical power conditioning unit.


GPRS Module
Keypad
Display
Memory card
HMI Microcontroller
RTC
Input Connector
Signal Conditioning Circuit
Main Microcontroller
DC Link Capacitor
Fan
Driver Circuit
Three half bridge IGBT modules
SMPS
OnBoardLayer
Heatsink
Output Connector


Basic power electronic devices e.g. IGBT, GTO, Power MOSFET, etc
1
2
3
4 5
6 7

DAY 5 (07.08.2020, Thursday) AN Session

Dr. Pradeep Kumar Yemula
Assistant Professor, IIT Hyderabad

Campus Energy Monitoring System (CEMS)

Campus Energy Monitoring System (CEMS)

Dr. Pradeep Kumar Yemula
Assistant Professor, EE Department
Indian Institute of Technology Hyderabad (IITH)
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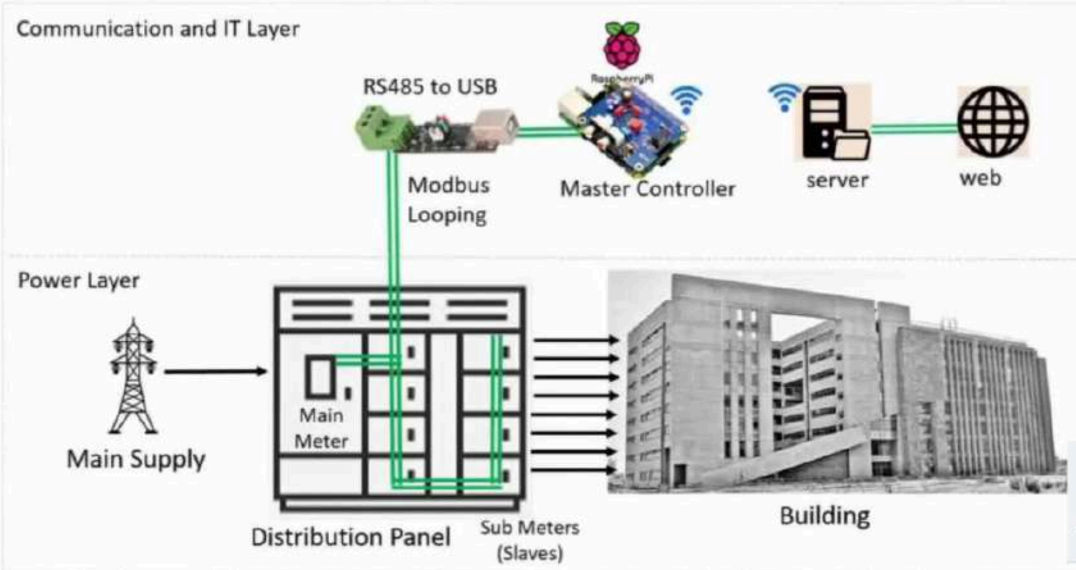
Charan Teja S
Research Scholar, EE Department
Indian Institute of Technology Hyderabad (IITH)
Email: ee14resch01005@iith.ac.in

Block Diagram of Building Monitoring System



Data Analytics based on Building Monitoring System

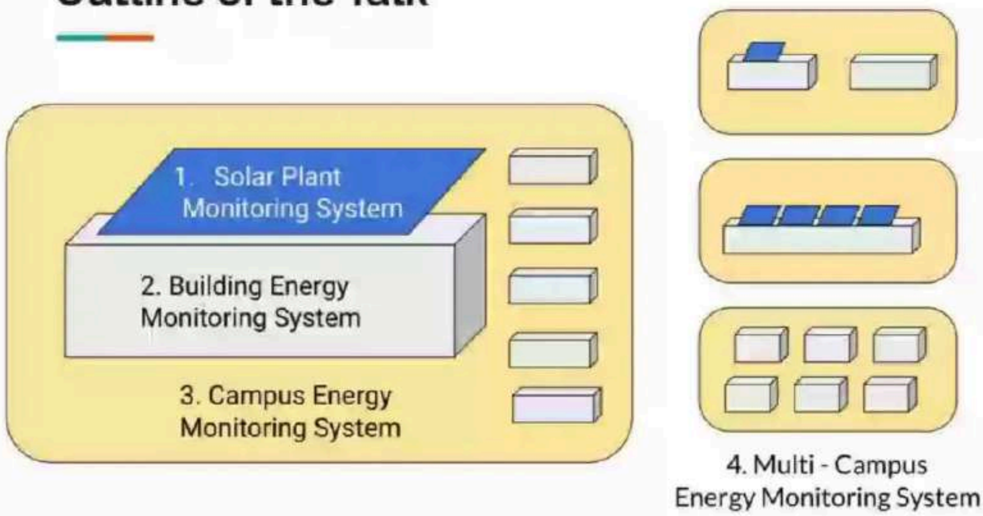
Alerts:

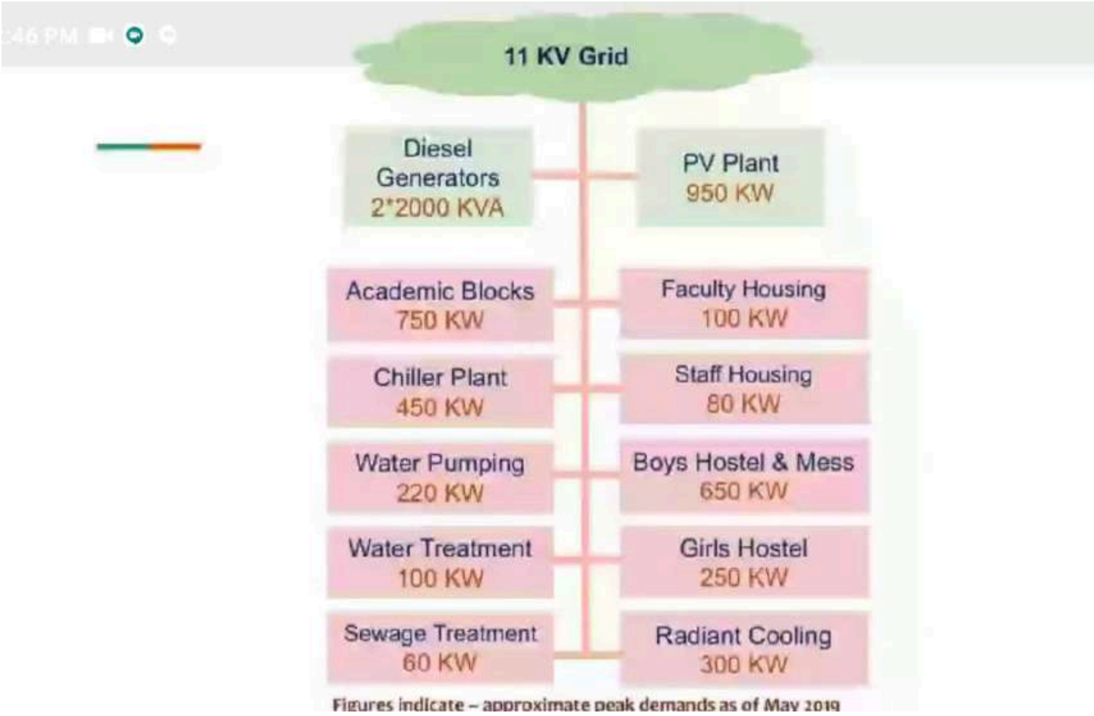
1. Under voltage (<220 V) and over voltage (>240 V).
2. Power Failure.
3. Excessive Consumption at each Circuit/Panel than their max rated power.
4. Crossing EMD more than prescribed limit.
5. Energy leakages due to human mistakes.
6. Auto Email/SMS to each block on their monthly power usage.

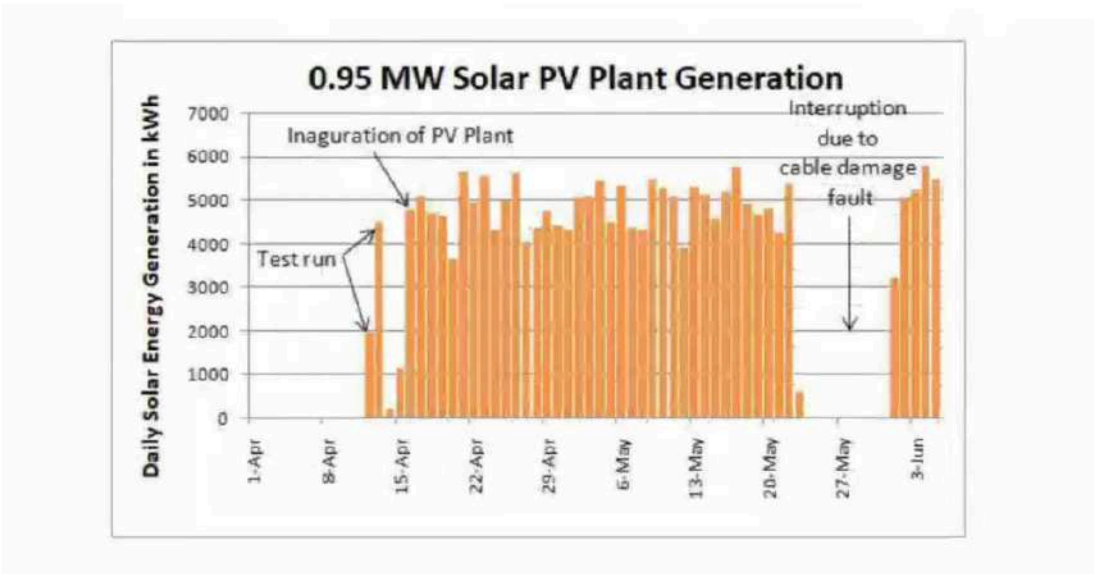
Analysis:

1. Break even analysis of energy consumption for each floor and/or meter.
2. Normalised Consumption pattern (KWH/Sqm) for each floor and common area.
3. Benchmarking Each office/block etc against the standard green building practises
4. Weekend/holiday consumption.
5. Comparison of average power consumption against peak consumption for each meter.
6. Analysis to track health condition of any critical equipment like Motors and Lifts
7. Billing calculation.
8. Accountability of diesel consumption.

Outline of the Talk

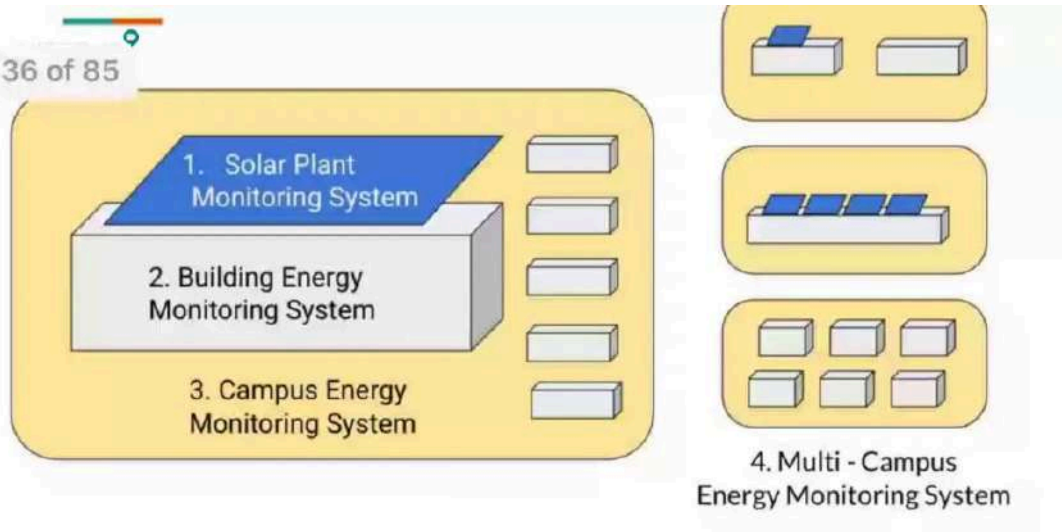



11 KV Grid
Diesel Generators 2*2000 KVA
PV Plant 950 KW
Academic Blocks 750 KW
Faculty Housing 100 KW
Chiller Plant 450 KW
Staff Housing 80 KW
Water Pumping 220 KW
Boys Hostel & Mess 650 KW
Water Treatment 100 KW
Girls Hostel 250 KW
Sewage Treatment 60 KW
Radiant Cooling 300 KW
Figures indicate – approximate peak demands as of May 2019


0.95 MW Solar PV Plant Generation
Daily Solar Energy Generation in kWh
7000
6000
5000
4000
3000
2000
1000
0
Inaguration of PV Plant
Test run
Interruption due to cable damage fault
1-Apr
8-Apr
15-Apr
22-Apr
29-Apr
6-May
13-May
20-May
27-May
3-Jun

Why Multi Campus ?

- Renewable energy sources are being added to various campuses in a bid to reduce dependence on grids and save on electricity bills
- Every campus is characterised with unique energy consumption pattern
- Understanding these patterns would help in better achieving the above objectives
- Campus Energy Monitoring System (CEMS) is a fundamental step
- IITH will be glad to work with interested campuses in setting up CEMS




Not for Profit
Build Research Community
Career Growth
Invest and grow
Not a finished product
Develop Research Skill
Gain Recognition for your Institute
Saving in Electricity Bill
Work in Parallel & Build modules
Lowering Cost of Technology
Quality Publications
Spread Awareness


IITH- VVIT Collaboration
Electrician and Carpenter Debating the panel design
Retrofitting of Existing Old panel with New Meters and Data Collection module

<u>DAY 6 (07.08.2020, Thursday) FN Session</u>

Dr. Sumit Ghatak Choudhuri
Assistant Professor, IIT Roorkee

Multi-Modular UPS Inverters System for Critical Load applications

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

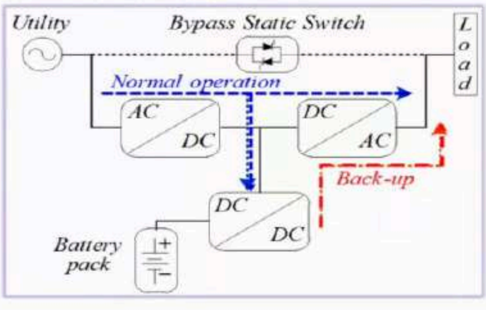
Multi-Modular UPS Inverters System for Critical Load Applications

AICTE Workshop Aug 08, 2020

Dr. Sumit Ghatak Choudhuri
Fellow, IE(I), Fellow, IETE, Senior Member, IEEE, Member, IET, Life Member, ISTE
Assistant Professor, Department of Electrical Engineering,
Room No. 218(B), East Wing, First Floor, Department of Electrical Engineering,
Indian Institute of Technology Roorkee, Roorkee-247667, Uttarakhand, India
Tel: +91-1332-285034(O), +91-9411150684(M), Fax:+91-1332-273560
Email: sumit@ee.iitr.ac.in , sgceefee@ieee.org , sgceefee@theiet.org
Web: www.iitr.ac.in/~EE/sgceefee

Uninterruptible Power Supply (UPS)

UPS is a power electronics system that maintains the continuity and quality of power to critical loads in the event normal power source fails to do so.



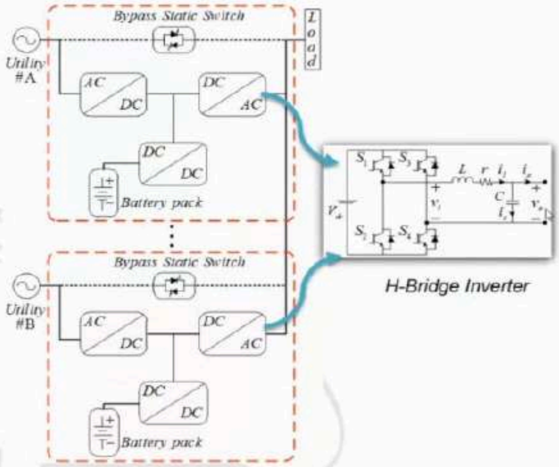
- Feature of an UPS:
  - Output Voltage: Regulated Sinusoidal, Low THD%
  - Zero Transition Time: Normal to Back-up Mode and vice-versa

Multi-Modular (M-M) UPS Inverters System

- Requirement of UPS: Scalability

Cater an ever increasing power demand as more and more critical loads get integrated to the UPS

- Solution: Multiple Inverters connected in Parallel
  - Raises Power Capacity
  - Redundancy increases reliability
  - Better current handling and heat dissipation
  - Cost effective



- Challenges of Parallel Inverter
  - Voltage Regulation of Total System
  - Current Control of Total System

Fig.: Parallel inverters being fed from dedicated utilities, such as various Renewable Energy Sources (RES)

Multi-Modular (M-M) UPS Inverters System

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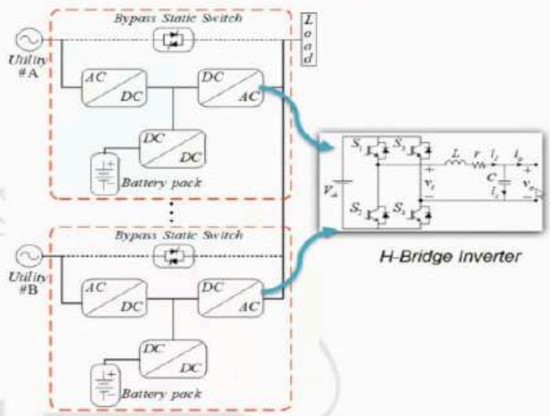


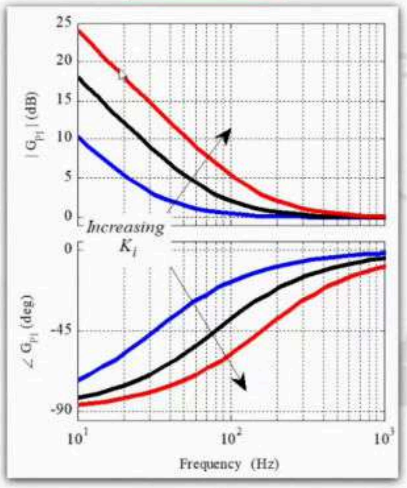
- Challenges of Parallel Inverter
  - Voltage Regulation of Total System
  - Current Control of Total System

Fig.: Parallel inverters being fed from dedicated utilities, such as various Renewable Energy Sources (RES)

Integral Controllers

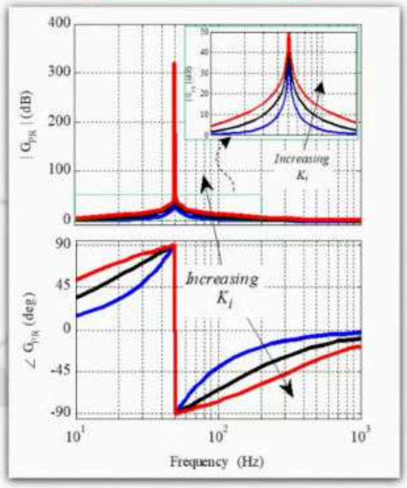
- **Proportional Integral (PI)**

$$G_{PI}(s) = K_p + \frac{K_i}{s}$$



- **Proportional Resonant (PR)**

$$G_{PR}(s) = K_p + K_i \frac{2s}{s^2 + \omega_o^2}$$

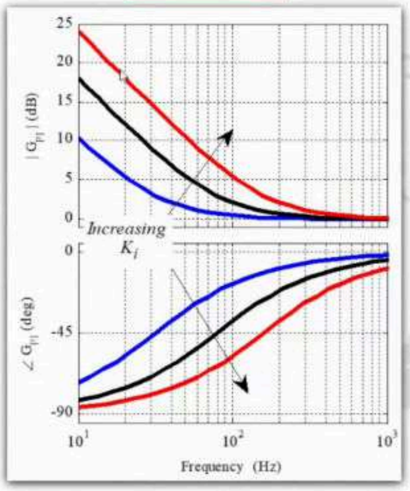


Bode-plot for (a) *PI* controller, G_{PI} and (b) *PR* controller, G_{PR}, where $K_p = 1$; $K_i = 200$, 500 and 1000

Integral Controllers

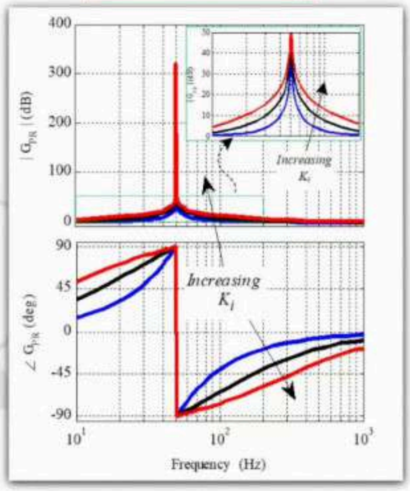
- **Proportional Integral (PI)**

$$G_{PI}(s) = K_p + \frac{K_i}{s}$$



- **Proportional Resonant (PR)**

$$G_{PR}(s) = K_p + K_i \frac{2s}{s^2 + \omega_o^2}$$

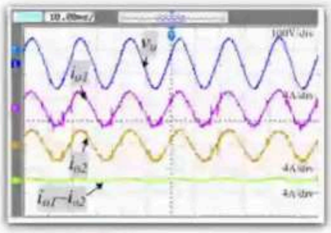


Bode-plot for (a) *PI* controller, G_{PI} and (b) *PR* controller, G_{PR}, where $K_p = 1$; $K_i = 200$, 500 and 1000

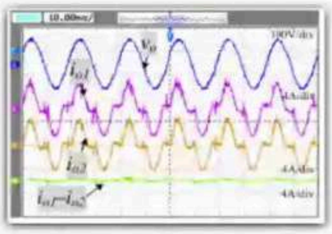
IIT ROORKEE

Experimental Results

- On-Load
  Steady State condition:

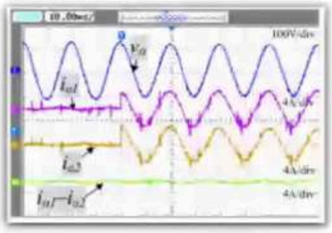


(a) Linear load

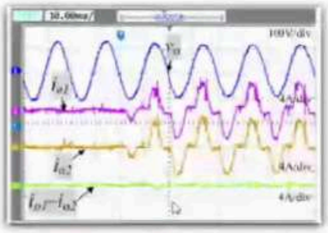


(b) Non-Linear load

- Step Load
  Application
  Transient condition:



(a) Linear load



(b) Non-Linear load

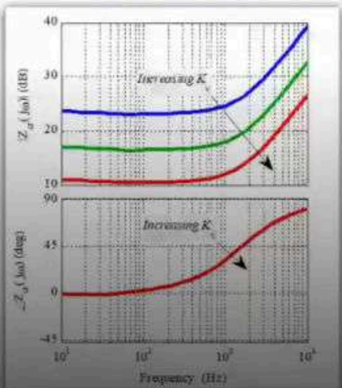
Effect of Controller Parameter on Z_{cr}

- Circulating Current Impedance with
  P–Voltage Controller and PR–Current Controller :

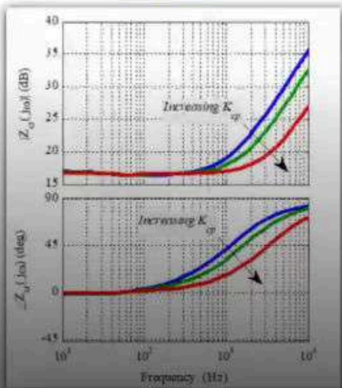
$$Z_{cr}^{P-PR}(s) = \frac{sL + r + G_c^{PR}(s)}{G_v^{P}(s)\,G_c^{PR}(s)}$$

$$G_v^{P} = K_v; \quad G_c^{PR} = K_{cp} + K_{ci}\frac{2\omega_c s}{s^2 + 2\omega_c s + \omega_o^2}$$

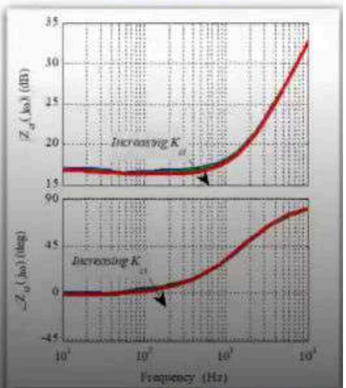
- Effect of K_v variation (0.07, 0.15 & 0.3)



- Effect of K_{cp} variation (7, 10 & 20)

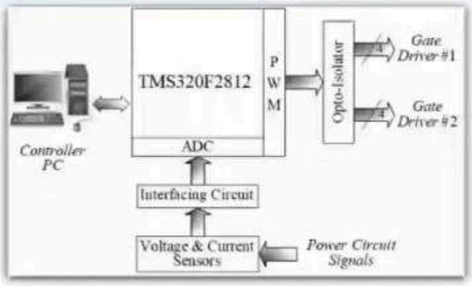


- Effect of K_{ci} variation (200, 400 & 750)

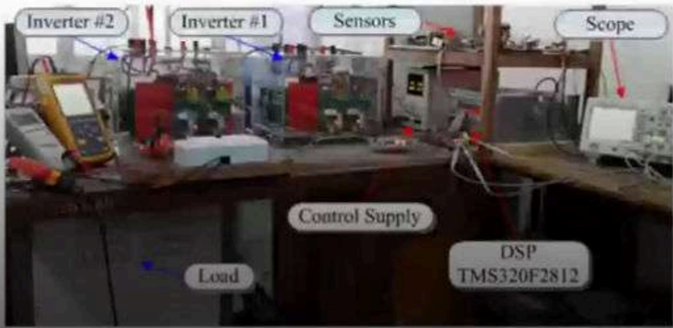


Appendix: Experimental Set-up

- Control Architecture for Bi-modular UPS Inverter



- Photograph of Experimental Set-up



Parameters for inverter modules

Parameter	*Inverter #1*	*Inverter #2*
Filter Inductances, *L*	1.0 mH	1.5 mH
ESR, r	0.5 Ω	0.7 Ω
Filter Capacitance, *C*	18.0 μF	18.0 μF

Load Parameters

Load:	*Linear*	*Non-Linear*		
	$R(\Omega)$	$R_s(\Omega)$	$C(\mu F)$	$R(\Omega)$
Values	25.60	1.02	2298.22	57.53

Conclusions

- **To improve UPS inverter performance**
  - **Quality of output voltage for Uni-Modular UPS Inverter**
  - **Proper current sharing between various parallel connected inverter modules along with quality output voltage at the load end of the Multi-Modular (M-M) parallel connected UPS Inverters System**

- **Alternate Control Strategies for single-phase, UPS inverters** depending on control loop, mode of operation and current feedback

DAY 6 (07.08.2020, Thursday) AN Session

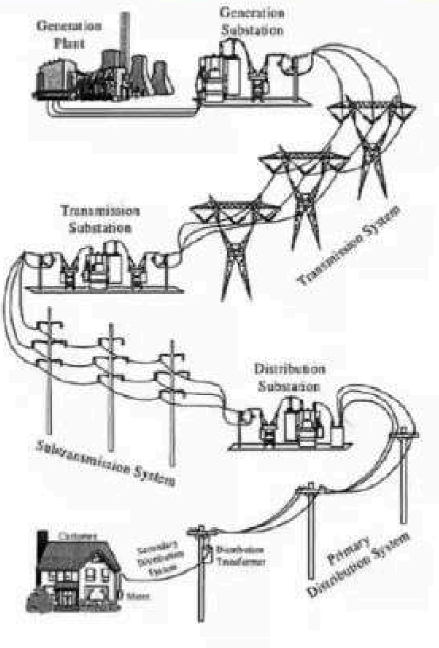
Dr.M.Suman
Assistant Professor, MNNIT Allahabad

Unintentional Islanding Detection

Unintentional Islanding Detection

Dr. Suman M
Assistant Professor
Electrical Engineering Department
Motilal Nehru National Institute of Technology Allahabad
India

Basic Structure of Power System



Source: https://images.app.goo.gl/qzNUKTrgyETNQRdQ8

(1) **Power Generation**

- Centralized power generation
- Conventional energy resources (fossil fuels - Coal, Nuclear etc.)

(2) **Power Transmission**

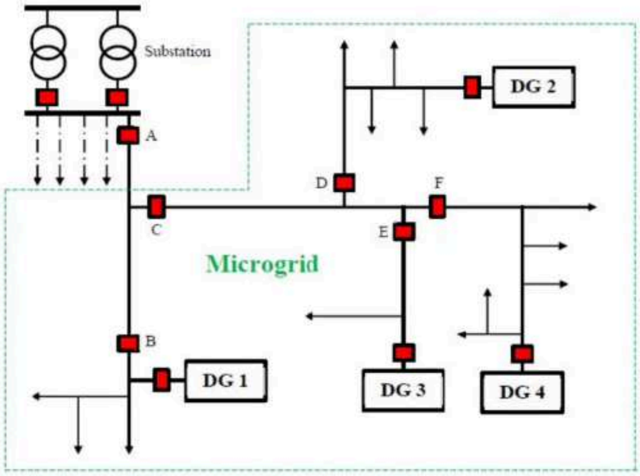
- Over a longer distance with increased voltage level

(3) **Power Distribution**

- At the reduced voltage level required for the customers

Microgrid

A microgrid is a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid.



Microgrid Definition

M. Pesin, "U.S. department of energy electricity grid research and development," presentation at the American Council of Engineering Companies, Environment and Energy Committee Winter Meeting, 9 Feb 2017.

"A microgrid is a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that act as a single controllable entity with respect to the grid. A microgrid can connect and disconnect from the grid to enable it to operate in both grid-connected or island-mode. A remote microgrid is a variation of a microgrid that operates in islanded conditions."

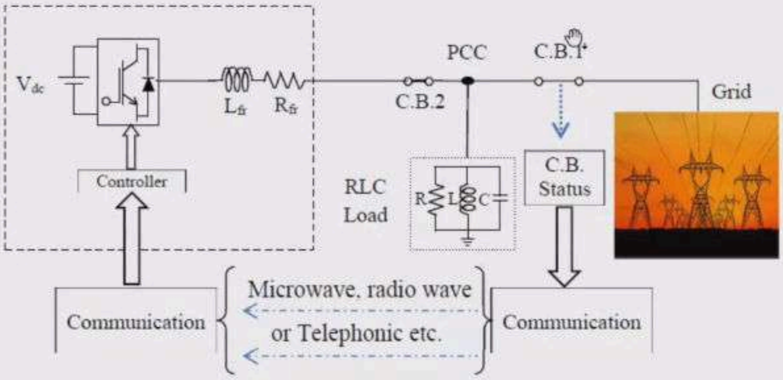
Cigre, "Working group C6.22. Microgrids 1 Engineering, Economics, & Experience," In CIGRE session Technical Brochure, Oct 2015.

"Microgrids are electricity distribution systems containing loads and distributed energy resources (such as distributed generators, storage devices, or controllable loads,) that can be operated in a controlled, coordinated way either while connected to the main power network or while islanded."

Remote Technique

Communication based methods

(1) Signal produced by disconnect



Few other passive techniques

Pai et. al., IEEE Transactions on Energy Conversion, 2001.

- Frequency
- Rate of change of frequency

Laaksonen, IEEE Transactions on Power Delivery, 2013.

- Three phase voltage
- Voltage unbalance and total harmonic distortion

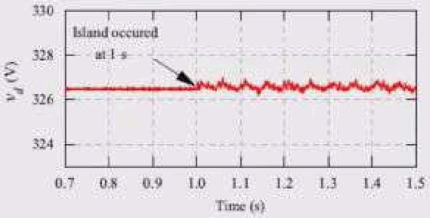
Guha et. al., IEEE power and Energy Technology Systems Journal, 2016.

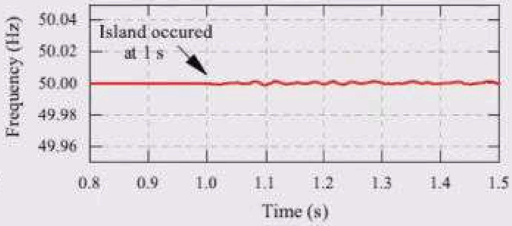
- Three phase voltage
- Voltage ripple

Discussion on Passive Technique

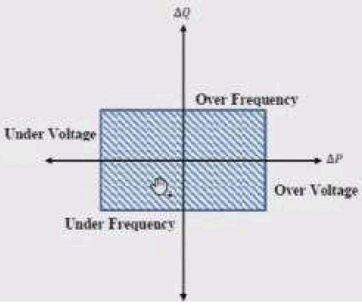
Perfectly Matched Power Condition

d-axis voltage variation | Frequency variation





Non Detection Zone (NDZ)



Various Operating Conditions

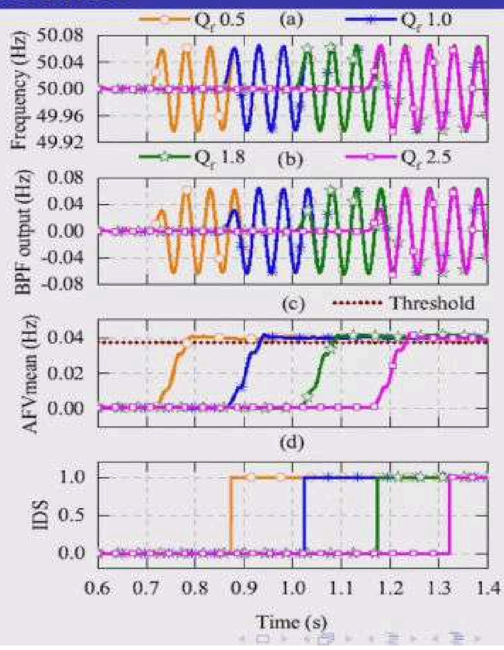
(1) $P_{DG} > P_{load}$

(2) $P_{DG} = P_{load}$

(3) $P_{DG} < P_{load}$

Decentralised Islanding Detection

Case	No. of DGs Islanded
1	3 (900kW)
2	2 (700kW)
3	2 (500kW)
4	1 (300kW)



Decentralised Islanding Detection

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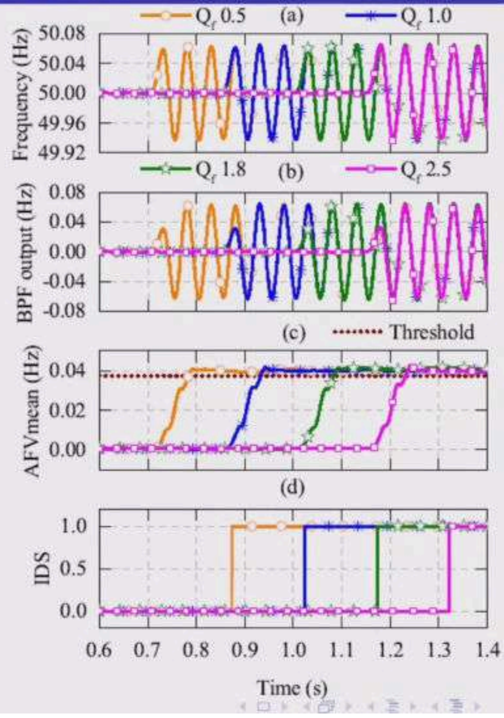
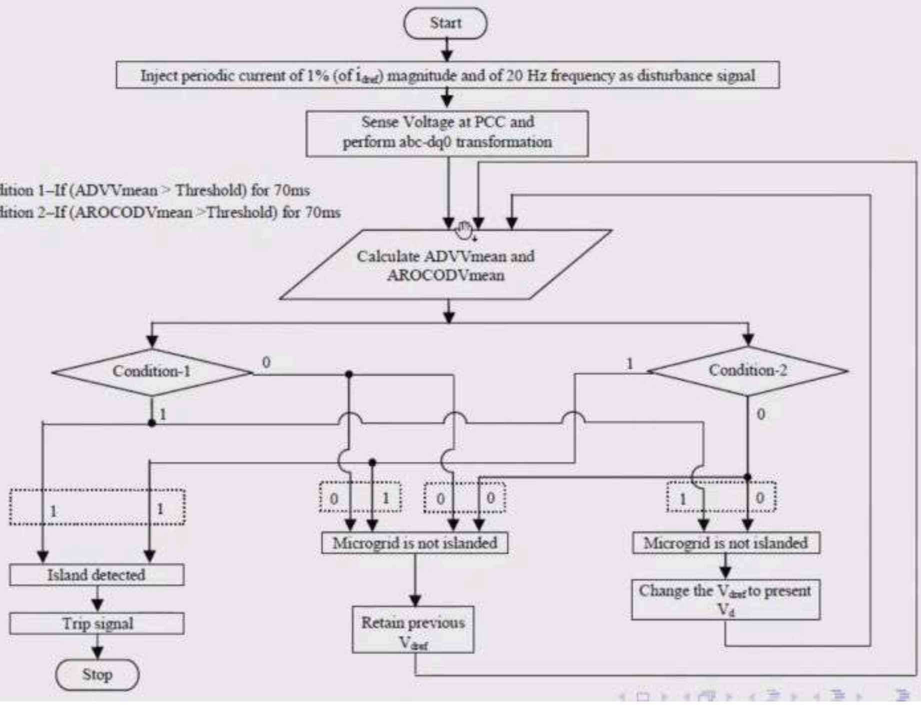


Flow Chart of the Proposed Analysing Methodology

Condition 1–If (ADVVmean > Threshold) for 70ms
Condition 2–If (AROCODVmean >Threshold) for 70ms



SARANATHAN COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Cordially Invite You

for the

Two day Workshop

"MULTIFUNCTIONAL DIGITAL MEASURING INSTRUMENTS"

Date: 04-09-2019 & 05-09-2019

Venue: CONTROL & INSTRUMENTATION Laboratory

Coordinators:

Dr.S.Vijayalakshmi, ASP/EEE
Ms.R.S.Priyaa Dharshini, AP/EEE
Ms.A.R.Danila Shirly, AP/EEE

HOD/EEE	Principal	Secretary
Dr.C.Krishnakumar	Dr.D.Valavan	Shri.S.Ravindran

SARANATHAN COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

(Accredited by NBA)

26.08.2019

CIRCULAR

Department of EEE is proposed to conduct two days **workshop** titled **"Digital Measuring Instruments"** from **04.09.2019 to 05.09.2019** for **II year EEE** students. Registration fee is **Rs.120/-** per student which includes certificate, manual and refreshment. Interested candidate can enroll their names to **Ms.R.S.Priyaa Dharshini , AP/EEE** on or before 28.08.2019.

28/8/19

HoD/EEE

SARANATHAN COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIRUCHIRAPALLI - 620 012.

EEE

Date : 17.08.2019

Ref No : SCE/EEE/Workshop/2019-2020/01

To

The Principal
Saranathan College of Engineering
Trichy – 12

Through HOD/EEE,

Respected Sir,

Sub: Requisition for approval to conduct two day workshop - reg.

To enhance the technical knowledge in core area for our second year EEE students, we have proposed to conduct two day workshop titled "**Multi-functional Digital Measuring Instruments**" on **5th&6th Sep 2019**. Workshop registration fee is **Rs. 120/-**. The registration fee includes manual, certificate, and refreshments. Hereby we request you to kindly approve this workshop. The tentative budget is mentioned below for your perusal.

Tentative Budget

1. Certificate	- Rs. 20/-
2. Refreshment	- Rs. 50/-
3. Manual	- Rs. 50/-
Total	- Rs. 120/-
Registration amount from the Student	- Rs. 120/-

(Rupees one hundred and twenty only)

Thanking you,

Yours faithfully,

(Dr.S. Vijayalakshmi)

Recommended for,
1. 40 students expected.
2. 3 EEE staff to handle.
3. Venue 1/2 day theory and 1/2 day lab.
4. Approval may be granted.

17/8/19

40
PV & Dean ch Study
Prepd
Power Electronics

17/8/19

Saranathan College of Engineering

Department of Electrical & Electronics Engineering

MULTIFUNCTIONAL DIGITAL MEASURING INSTRUMENTS WORKOPSH

Date: 04.09.2019 & 05.09.2019 **Venue : Control & Instrumentation Lab**

SI.NO	Batch No	Name	Year/ Sec	04.09.2019 FN	04.09.2019 AN	05.09.2019 FN	05.09.2019 AN
1	213118	S Rohith		S.Rohith	S.Rohith	S.Rohith	S.Rohith
2	213114	S B Mithun Raja		[illegible]	[illegible]	[illegible]	[illegible]
3	213043	S Kaushik	II/A	Kaushik	Kaushik	Kaushik	Kaushik
4	213026	R Giridharan				R.Giridharan	R.Giridharan
5	213009	R Anandh		R.[illegible]	R[illegible]	R.[illegible]	R[illegible]
6	213046	T V Kirthiga Reshmi		[illegible]	[illegible]	[illegible]	[illegible]
7	213047	S Lavanya		[illegible]	[illegible]	[illegible]	[illegible]
8	213034	S R Harni	II/A	[illegible]	[illegible]	[illegible]	[illegible]
9	213055	S Monica		Monica	Monica	Monica	Monica
10	213022	M Divyasri		[illegible]	[illegible]	[illegible]	[illegible]
11	213005	A R Akshara Shree		AR Akshara	[illegible]	Akshara	[illegible]
12	213007	P Amirthaa		P[illegible]	P[illegible]	P.[illegible]	P.[illegible]
13	213018	V A Bharathi Priya	II/A	Bharathipriya	Bharathi priya.	Bharathi Priya	Bharathi Priya.
14	213019	S Deepthi		Deepthi	Deepthi	Deepthi	Deepthi
15	213036	S V Janani		S.V.janani.	S.V.janani.	S.V.Janani	S.V.Janani
16	213101	M Thendral		Thendral M	Thendral M	Thendral M	Thendral M
17	213097	K Subiksha		K.Subiksha	K.Subiksha	K.Subiksha	K.Subiksha
18	213063	S Pankaj Bharathi	II/B	S.Pankaj	S.Pankaj	S.Pankaj	S.Pankaj
19	213058	M A J Nancy De Johnpaul		Nancy..	Nancy..	Nancy.	Nancy..
20	213065	M Poojah		M.Poojah.	Poojah	[illegible]	[illegible]
21	213075	G Rajalingam		Rajalingam	Rajalingam		
22	213088	R Satish Kumar		Sathish.	Sathish	Sathish.	Sathish.
23	213106	R Vasanth	II/B	R.Vasanth	R.Vasanth	R.Vasanth	R.Vasanth
24	213090	R Senthil Kumar		R.[illegible]	R.[illegible]	R.[illegible]	R.[illegible]
25	213102	S Thirumoorthi		S.Thi	S.Thi	S.Thi	S.Thi
26	213112	M Yogeshwaran		[illegible]	M.Yogesh	[illegible]	[illegible]
27	213107	J Vasantha Kumar		J.V.Kumar.	[illegible]	J.V.Kumar	J.V.Kumar
28	213100	M Sundar	II/B	M.Sundar	M.Sundar	M.Sundar	M.Sundar
29	213108	A Veron Lobo		A.Veron	A.Veron	A.Veron	A.Veron
30	213109	K Vignesh		K.Vignesh	K.Vignesh	K.Vignesh	K.Vignesh

SARANATHAN COLLEGE OFENGINEERING

TRICHY-12

RESEARCH CELL-EEE

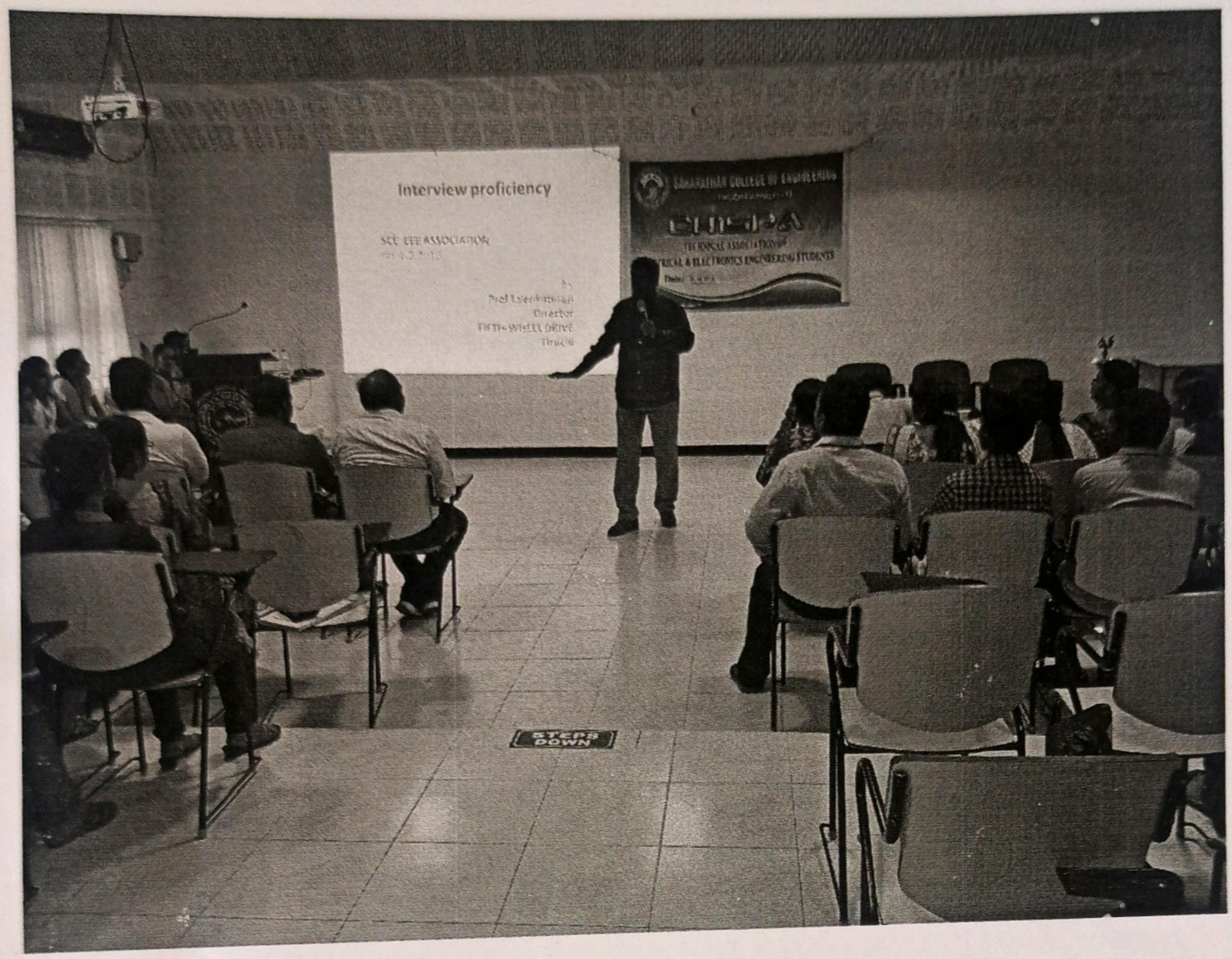
Department of Electrical and Electronics Engineering

Certificate

This is to certify that

has Participated in the 2 day Workshop on **MULTIFUNCTIONAL DIGITAL MEASURING INSTRUMENTS** conducted by Research Cell-EEE during 04-09-2019 to 05-09-2019 at Saranathan College of Engineering and has successfully implemented a concept validating prototype of Digital Frequency Meter/Tachometer.

Dr.S. Vijayalakshmi (Workshop Convener)	Dr.C. Krishnakumar (Head- Dept of EEE)	Dr.D. Valavan (Principal)



Special Lecture by :Prof.T.Venkatesan,Director,Fifth Wheel Drive, Trichy

EEE ASSOCIATION INAGURAL FUNTCTION

The EEE Students Association Inauguration function was convened by the Department of Electrical and Electronics Department at Saranathan College of Engineering between 11.00 am to 12.30 pm. Final year students and all EEE staffs participated in the function. Prof.T. Venkatesan, Director, Fifth wheel drive, Trichy was the Chief Guest and gave the special Lecture as "**Interview Proficiency**". In his address, He discussed about "How to attend the interview" and also the challenges faced by students during the interview.

Ms.M. Nethra, students Secretary welcomed the gathering, Ms.X. Merlin Antonita, Vice-President addressed the Office bearers and Mr.N. Vishal, President delivered vote of thanks to the gathering.

Inaugural Function

Introduction of office bearers

SARANATHAN COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIRUCHIRAPALLI - 620 012.

Ref No : SCE/EEE/EEEA/2019-2020/01 **Date : 05.08.2019**

Submitted to : The Principal

Submitted through: The HOD/EEE

Submitted by : Dr.S. Vijayalakshmi & Mr.M. Marimuthu

Account settlement report for EEE – Association Inaugural function on 02-08-2019.

Expenditure Details

1.	Honorarium for the Resource Person	- Rs. 2,500.00
	Total	**- Rs. 2,500.00**

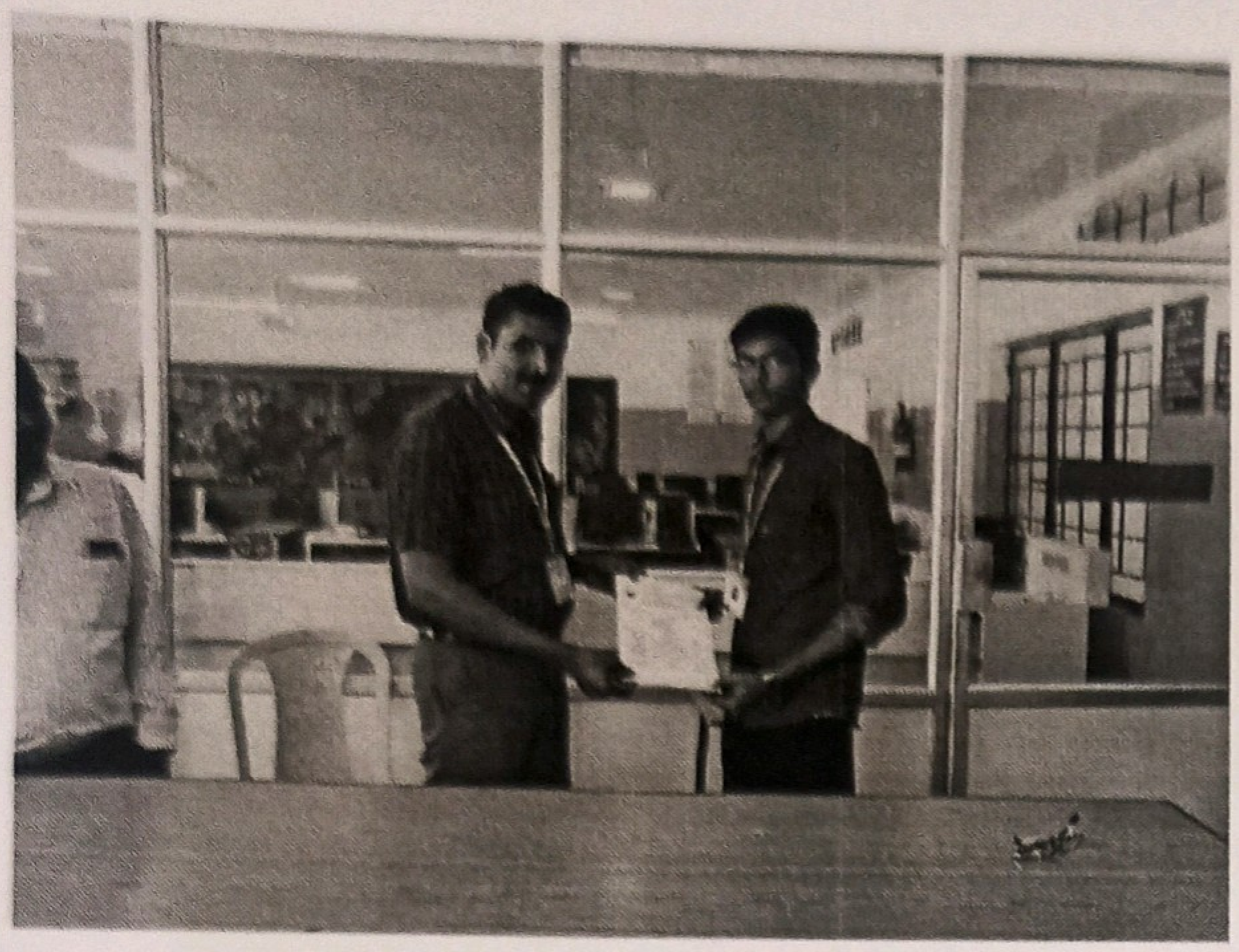
Amount to be settled to Dr.S.Vijayalakshmi, Asso. Prof/EEE - Rs. 2,500.00

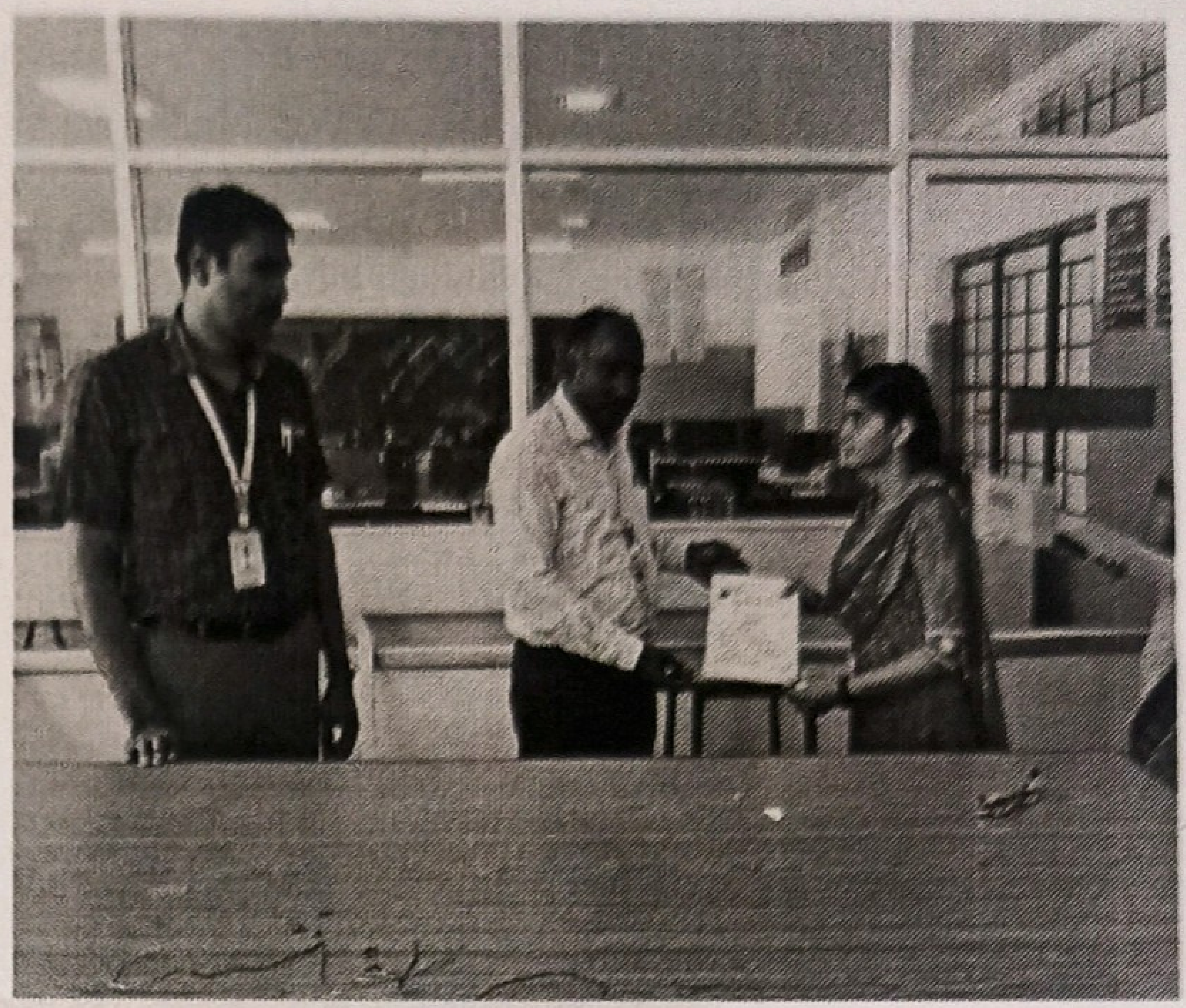
Thanking you

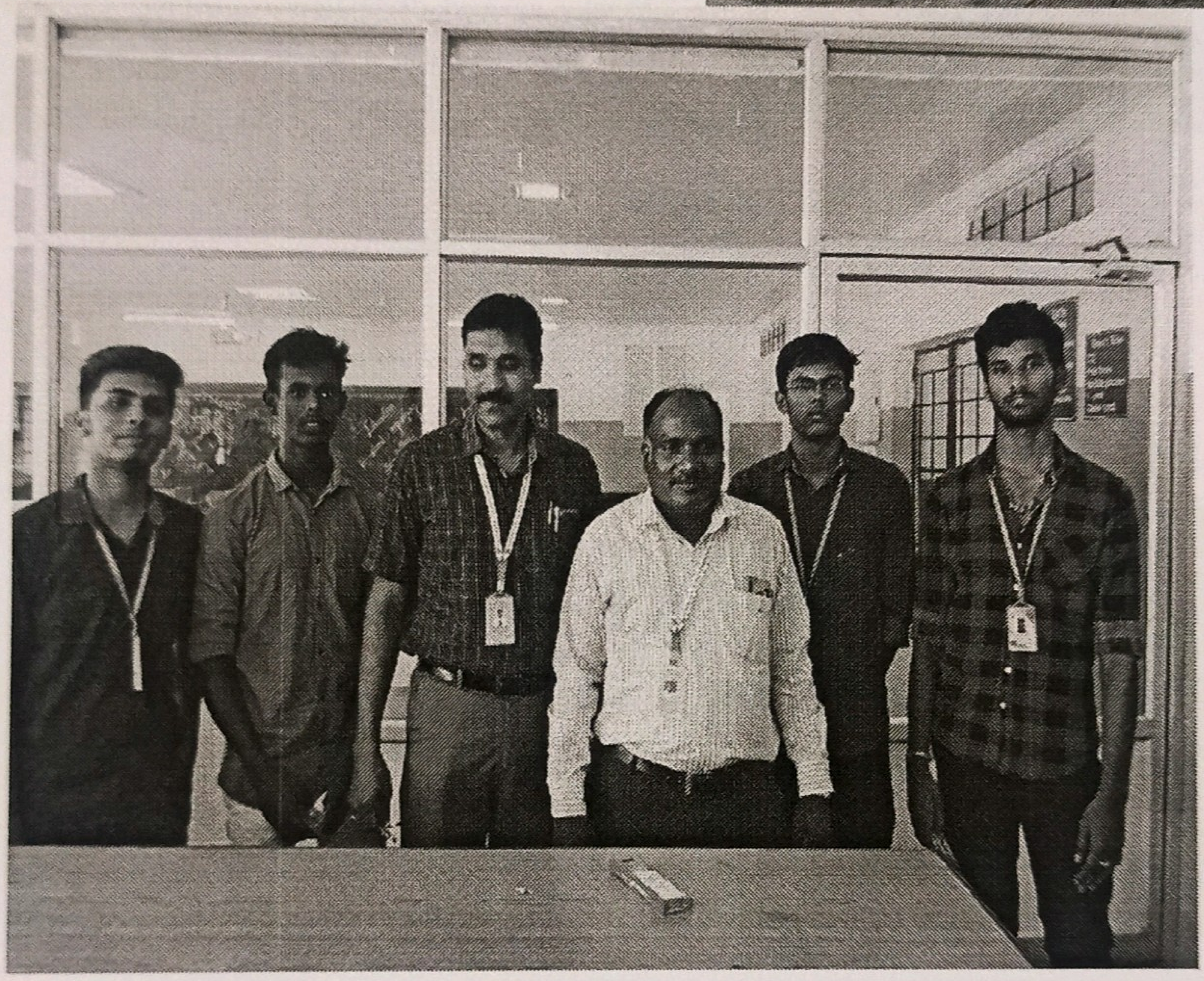
Yours truly

(Dr.S. Vijayalakshmi

M. Marimuthu)







Valediction

EEE students Association meeting was convened by the Department of Electrical and Electronics Engineering at Saranathan college of Engineering on 28.09.2019 at MBA Seminar hall for third year EEE students. S. Ragavendran, IEI students chapter Chairman welcomed the gathering, the dignitaries on the Dias lighted kuthuvilaku and K.Sudhagar introduced the office barrers of IEI students chapter. The guest introduction is given by K.Devapriya followed by presenting memento to the Chief Guest by Dr.C.Krishnakumar, HOD-EEE and chief guest addressed the students with his speech. Prize distribution for the competitions held on Engineers day was distributed by the Chief Guest to the prize winners. Then the vote of thanks was delivered by S.Yamuna, Secretary of IEI students chapter.

SARANATHAN COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

TIRUCHIRAPALLI - 620 012.

Ref No : SCE/EEE/IEI/2020-2019/01 **Date : 24.09.2019**

Proposal for Engineers' Day Celebration

Submitted to : The Prinicpal

Submitted by : Dr.S. Vijayalakshmi, Mr.M. Marimuthu

Submitted through : The HOD, Department of EEE

Sir,

Our EEE Department has planned to celebrate Engineers' Day on 28.09.2019 (Saturday) at Civil Seminar Hall between 3.30 pm to 4.30 pm under students chapter of IEI. The Keynote address will be delivered by Prof. **Mr. B S Chandramouli, M.Com., M.B.A, Department of MBA, Saranathan College of Engineering, Trichy** for our third year EEE students. In this regard, technical demonstration session on **"ETAP and PLC/SCADA"** will be provided by Livewire, Trichy between 1.30 pm to 3.30 pm. We request you to kindly approve the programme and also sanction the amount of Rs.5,300/- (Rupees Five thousand three hundred only) from the students IEI membership amount (2019-2020) paid in the office.

Chief Guest Memento	– Rs. 1,000/-
Refreshment for both students & faculty members	- Rs. 1,800/-
Prize amount for two competitions	- Rs. 2,000/-
Other expenses (Certificates, Photo, reception material etc.)	- Rs. 500/-
Total	- Rs. 5,300/-

Thanking you

Submitted to the Principal.
* Technical demo will be useful to students.
* No financial Commitments to Institution.

24/9/19

24/9/19

Yours truly

1. [signature]
2. M. Marimuthu

1.(Dr.S. Vijayalakshmi,
2.M. Marimuthu)

SARANATHAN COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

(Accredited by NBA)

28.08.2019

Mini-project competition – Circular

In view of Engineers day celebrations, our college organizes project day on 13.09.2019 for II year students and on 14.09.2019 for III year students.

All Project batches are requested to demonstrate their project moules in front of the department committee as per the schedule given below.

Sl.No	Batch No.	Name of the Students	Project Batch No.	Title of the Project	Name of the Mentor	Date and Time
1	213084	M.Santhiya	II-B-1	Development of Napkin Vendor	Ms.N.Gayathri	05.08.2019 04.00 PM – 04.45 PM
	213105	M.Varshinee				
	213070	B.Ragasudha				
	213068	K.A.Preethikaa				
	213095	S.Sivapriya				
2	213098	R.Sudharsan	II-B-2	**Mini CNC**	**Ms.N.Gayathri**	
	213100	M.Sundar				
	213086	R.Sargurunathan				
	213097	K.Subiksha				
	213101	M.Thendral				
3	213112	M.Yogeshwaran	II-B-3	**Home Automation**	**Mr.P.Ramesh babu**	
	213102	S.Thirumoorthy				
	213093	I.Sheik Mohamed				
	213091	R.Senthil Kumar				
	213078	S.Roche Roshan				
4	213107	J.Vasanth Kumar	II-B-4	Robotics	Ms.N.Gayathri	
	213108	A.Veron Lobo				
	213109	K.Vignesh				
	213110	M.Vijay Sai				
	213071	P.S.Ragul Vasanth				
5	213106	R.Vasanth	II-B-5	Gas Leakage Detection System	Mr.P. Ramesh babu	
	213088	R.Sathish Kumar				
	213104	S.Vairavan				
	213115	S.Gokul				
	213075	G.Rajalingam				
6	213066	R.Prajeeth Chander	II-B-6	**Smart Home Appliances**	**Mr.P.Ram Prakash**	
	213074	S.Rahul				
	213073	A.Rahul				
	213113	A.Albert Raj				
7	213058	M.A.J.Nancy De Johnpaul	II-B-7	**Fire Fighting Robotic Vehicle**	**Mr.R.Sridhar**	
	213059	A.Nisha				
	213063	S.Pankaj Bharathi				
	213065	M.Poojah				
	213069	M.Priyadharshini				

7	203043	KRISHNA BADRINATH	III-A7	**IoT based water quality monitoring system**	**Mr.P.Ram Prakash**	**06.08.2019 04.00 PM – 04.45 PM**
	203051	MOHAMED AASHIQUE. K. S				
	203057	MURUGAN. E				
	203027	HARIHARAN. V				
	203125	SENTHIL KUMAR. B				
8	203026	HARIHARAN. V	III-A8	**Motion sensor Robot**	**Mr.B.Paranthagan**	
	203039	KARUNAKARAN. G				
	203058	NAVEEN KUMAR. S				
	203035	JAYA CHANDRAN. S				
9	203003	ABINASHKUMAR. V	III-A9	**Non-invasive blood glucose level estimation**	**Mr.P.Ramesh Babu**	
	203018	DHARUN. M				
	203025	GOKUL. E				
	203017	DHARNEESH . K				
	203052	MOHAMED IRFAN. N				
10	203015	DEEPAK KUMAR. A	III-A10	**Wireless charging system**	**Mr.R.Balasubramanian**	
	203033	JACOB SELWYN. D				
	203048	MAKESHWARAN. B				
	203028	HARIPRASATH. S				
	203014	DEENAA ROHIT. A				
11	203056	MOHAMMED RIFAT	III-A11	Automatic Suitcase follower	Mr.M.Marimuthu	
	203037	JOSE MERRIL. S				
	203031	IMRAN. S				
	203012	CHANDRA KISHORE.				
12	203024	GOGUL. M	III-A12	**Arduino based Quadcopter Drone**	**Mr.R.Venugopal**	
	203005	ABINESH. R				
	203008	ARUL. S				
	203009	ASWIN KUMAR. A				

Sl.No	Batch No.	Name of the Students	Project Batch No.	Title of the Project	Name of the Mentor	Date and Time
1	203076	REVATHI. V	III-B1	**Traffic density monitoring using Arduino**	**Dr.Suganyadevi**	**06.08.2019 11.55 AM – 12.45 PM**
	203117	YAMUNA. S				
	203118	YASHWANDHNI. K				
	203063	PAVITHRA. K				
2	203124	KEERTHIGA. P	III-B2	**Accidents Prevention System**	**Mr.S.Ramprasath**	
	203082	SANKARI. S				
	203083	SANTHIYA. C				
3	203077	ROSHINI. R	III-B3	**Design of two wheel self balancing Bot**	**Mr.S.Sivakumar**	
	203072	PRIYANKA. E				
	203104	SUDHILAYA. M				
4	203087	SHALINI. S	III-B4	**Automatic Indiction System of Glucose Level in Trip Bottle**	**Ms.N.Gayathri**	
	203094	SIRISHA. S				
	203107	SWEATHA SRI. R				
	203102	SUBIKSHA. P				
5	203093	SINDHUJA. M	III-B5	**Charging Phones by using coins**	**Dr.S.Vijalakshmi**	
	203100	STEFFY JONES. A				
	203088	SHAMNI. J				
	203064	POORANI. J				
6	203070	PREETHI. V	III-B6	**Water flow-Level Indicator**	**Mr.S.Ramprasath**	
	203071	PRIYADHARSHINI. Y				
	203101	SUBALAKSHMI. G				
	203097	SRIJAH. R				

7	203065	PRAHATHISH. B	III-B7	**Day-to-day monitoring of Energy consumption**	**Dr.M.V.Suganyadevi**	**06.08.2019 11.55 AM – 12.45 PM**
	203062	PASHITH. H				
	203061	NOORUL AMEEN. S				
	203112	UDHAYAKUMAR. S				
8	203086	SENTHIL KUMAR. A	III-B8	Solar Tracking	Mr.S.Sivakumar	
	203099	SRIRAM. R S				
	203098	SRINIVASAN. S				
	203109	THAMILVANAA. T S				
9	203084	SANTHOSH KANNA. N	III-B9	**Smart Jammer for Mobile phone systems**	**Mr.R.Vijay**	
	203078	SABARISH. B				
	203081	SAMUEL RAJ. S				
	203132	TANWEER AHAMED				
10	203073	RAGHAVENDRAN. S	III-B10	IoT based water level and pressure indicator	Dr.S.Thamizharasan	
	203103	SUDHAKAR. H M				
	203108	SYED ZAMEERBASHA				
11	203085	SARAVANAN. S	III-B11	Einvironmental aspects	Mr.S.Ramprasath	
	203068	PRAVIN KUMAR. N				
	203074	RAKESH. K K				
	203079	SAKTHI RAJA. V				
12	203075	RAVICHANDRAN. P	III-B12	Automatic water stopper system	Mr.R.Venugopal	
	203066	PRAVEEN. R				
	203095	SIVARAMAKRISHNAN. T				
	203067	PRAVEENKUMAR. K				

28/8/19

Coordinator

28/8/19

HoD/EEE

Saranathan College of Engineering

NH 45, Venkateswara Nagar, Panjappur, Tiruchirappalli-620012

(Approved by AICTE, New Delhi and Affiliated to ANNA University, Chennai)

Engineer's Day Celebration

Project EXPO

Certificate of Participation

This is to certify that, **Mr. / ~~Ms.~~** BANUCHANDAR. B

of II / ~~III~~ / ~~IV~~ *Year,* **Department of** ELECTRICAL AND ELECTRONICS ENGINEERING

has presented the project titled GESTURE CAR

along with his/her team in the Project Competition on **13th & 14th September 2019**.

Head of Department

Principal

AGENDA

- INVOCATION
- WELCOME ADDRESS BY STUDENT PRESIDENT(IEI)
- LIGHTING KUTHU VILAKKU
- INTRODUCTION OF OFFICE BARRERRS BY STUDENT SECRETARY(IEI)
- SPECIAL NOTE ON IEI
- FELICITATION ADDRESS BY PRINCIPAL
- CHIEF GUEST INTRODUCTION
- MOMENTO FOR CHIEF GUEST
- CHIEF GUEST ADDRESS
- PRIZE DISTRIBUTION
- VOTE OF THANKS BY STUDENT VICE –PREIDENT(IEI)
- NATIONAL ANTHEM

H.O.D. ([illegible])
Saranathan College of Engg.,
Tiruchirappalli - 620 012.

ABOUT THE COLLEGE

Saranathan College of Engineering was founded by philanthropist Vidya Seva Ratnam Shri. K. Santhanam, in the year 1998 and was named after the great educationist Prof. V. Saranathan. The campus is located on Trichy - Madurai highway having an area of 21 acres with a built-up area of 2,60,000 Sq.ft. Seven U.G Programmes and Five P.G programmes are offered. Six eligible UG programmes are NBA accredited. All the programmes are affiliated to the Anna University - Chennai, and approved by AICTE, New Delhi.

ABOUT THE DEPARTMENT

Department of EEE was started in the year 1998. It is equipped with modern facilities besides conventional infrastructures. The department has well qualified experienced faculty, supporting staff and it is a recognized Research Centre by Anna University. The department has received grants from central and state government organizations like MNRE, DRDO, CSIR, AICTE and TNSCST for carrying out research work and organizing National Conferences / Workshops / Seminars. The sheer hard work and enthusiasm of the faculty members and students of the department helped making it as one of the best departments in the campus. There are about 23 faculty members in the department. Among them six are Ph.D. holders and twelve are pursuing Ph.D. The department has been extending the consultancy services to various industries with a special focus on Energy Auditing and Power Quality. It also offers value added training program in Protection and Switchgear for Industries and Academia, as a continuous learning program.

ABOUT THE PROGRAM

This program provides theoretical and practical knowledge on the course **EE8602 -Protection and Switchgear** for the faculty members to teach the students effectively. With the sophisticated Switchgear Lab facility (first of its kind), hands-on experience on practical circuit breakers and protective relays are employed. Sample HT/LT modern circuit breakers are provided for testing, troubleshooting and maintenance. Proper procedural methods to carry out insulation resistance tests, contact resistance measurements, polarity checking and terminal marking of current transformers, testing of relays, etc. will be demonstrated to the participants.

SCOPE OF THE PROGRAM

The program covers the following important aspects of Protection and Switchgear

- Causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system
- Characteristics and functions of relays and protection schemes
- Apparatus protection, static and numerical relays
- Electrical and Mechanical operation of Circuit Breakers
- Checking of various Switchgear interlocking requirements
- Testing of protective relays and establishing characteristics
- Design and execution of control and power wiring of LT switchgear
- Insulation measurements on HT Switchgear

RESOURCE PERSONS

Eminent Professors from reputed Institutions like IIT, NIT, AU, etc., and Experts from Industry.

Six-Day FDTP
on

EE8602
Protection and Switchgear

09.12.19 – 14.12.19

Coordinators

Dr.C.Krishnakumar
Professor & Head / EEE
Dr.D.Kalyankumar
Professor / EEE

PROGRESS THROUGH KNOWLEDGE

Jointly Sponsored by

**Anna University
Chennai**
&

Department of Electrical and Electronics Engineering
(NBA Accredited)
Saranathan College of Engineering
(Approved by AICTE, New Delhi & Affiliated to Anna University - Chennai) Venkateswara Nagar, Panjappur, Tiruchirapalli-620012

SARANATHAN COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

09.12.2019

ANNA UNIVERSITY SPONSORED
FACULTY DEVELOPMENT TRAINING PROGRAMME
ON

EE8602 – PROTECTION AND SWITCHGEAR

INAUGURAL FUNCTION - BRIEF REPORT

The Department of Electrical and Electronics Engineering organizes Anna University sponsored Faculty Development Training Programme (FDTP) on EE8602 – Protection and Switchgear from 09.12.2019 to 14.12.2019. Thirty faculty members from Anna University affiliated institutions are attending this event. Mr. Vijay Karthick, Lead Technical Support Specialist, General Electric India Limited, Chennai, inaugurated this Programme on 09.12.2019 at 09.30 AM and handled the morning session. In the session, he enlightened the recent trends in power system protection and automation. He also explained the need of various types of relays and other protection systems along with their practical applications. The participants participated enthusiastically and they felt the session was most valuable. Earlier, Dr.C.Krishnakumar, Head of the Department welcomed the gathering and the event was felicitated by Dr.Valavan, Principal.

Mr. Vijay Karthick during the session

Dr.D.Valavan, Principal, felicitated the even

Dr.C.Krishnakumar, HOD/EEE, welcomed the gathering

SARANATHAN COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIRUCHIRAPALLI - 620 012.

Date :19.12.2019

Ref No : SCE/EEE/FDTP/2019-20/01

Submitted to :The Principal

Submitted by : Dr.C.Krishnakumar

Account settlement report for Anna University sponsored Faculty Development Training Programme on EE8602 – Protection and Switchgear.

Expenditure Details

Sl.No	Voucher No. / Bill No.	Description	Details	Amount (Rs)
1.	SCE/EEE/ FDTP/01	Remuneration and Travel expenses for Resource Persons	Mr. Vijay Karthik, Dy.Gen. Manager, GE, Chennai	10,000.00
	02		Mr. P.S.Arunkumar, Manager,Schneider Electric Private Limited, Bengaluru	4,000.00
	03		Dr.V.Saravanan, TCE, Madurai	5,000.00
	04		Dr.Charles Raja, TCE, Madurai	5,000.00
	05		Dr.S.Venkatesh, VIT, Vellore	6,000.00
	06		Dr.S.Senthil Kumar, NIT, Trichy	5,000.00
	07		Dr.M.Venkata Kirthiga, NIT, Trichy	5,000.00
	08		Dr.Balasingh Moses, AUT, Trichy	4,000.00
	09		DrS.Bhagya Shree, UCE, Dindigul	4,000.00
	10		Dr.P.Anbalagan, AUT, Trichy	4,000.00
2.	060	Course Materials (including CD)	For 30 participants	1,890.00
3.	College-59	Food and Refreshment	For Participants and Resource Persons	30,608.55
			Total	**84,498.55**

Total Amount sanctioned - Rs.87,900.00 (Including Food and Refreshment)
Advance amount received from the Office - Rs.58,500.00 (Excluding Food and Refreshment)
Amount spent - Rs.53,890.00 (S.No 1 and 2)

Balance - Rs. 4,610.00

Amount yet to be settled by the office - Rs. 30,608.55/- (S.No.3 – Bill No. College-59)

19/12/19

Yours truly,

19/12/19

(Dr.C.Krishnakumar)

SCHEDULE OF TRAINING PROGRAMME

Subject Code& Name : **EE 8602 – PROTECTION AND SWITCHGEAR**

Branch / Semester : **ELECTRICAL AND ELECTRONICS ENGINEERING / VI SEMESTER**

Day/ Session	Session –I (9.00 A.M -10.30 A.M)		Session –II (10.45 A.M – 12.15 P.M)		Session- III (1.30 P.M -3.00 P.M)		Session- IV (3.15 P.M -4.45 P.M)
09.12.19 MON	**Mr.Vijay Karthik** (Fundamentals of PS Protection)	TEA BREAK	**Mr.Vijay Karthik** (Fundamentals of PS Protection)	LUNCH BREAK	**Mr. P.S.Arunkumar** (Resource Person from Schneider Electric India, Chennai)	TEA BREAK	**Mr. P.S.Arunkumar** (Resource Person from Schneider Electric India, Chennai)
10.12.19 TUE	**Dr.V.Saravanan** (Electromagnetic Relys)		**Dr.V.Saravanan** (Electromagnetic Relys)		**Dr. S.Charles Raja** (Transmission Line Protection)		**Dr. S.Charles Raja** (Transmission Line Protection)
11.12.19 WED	**Dr.S.Venkatesh** (Design of Circuit Breakers)		**Dr.S.Venkatesh** (Design of Circuit Breakers)		**Dr. V.Senthil Kumar** (Protection Schemes)		**Dr. V.Senthil Kumar** (Protection Schemes)
12.12.19 THU	**Dr. M.Venkata Kirthiga** (Rating and selection of Circuit breakers.)		**Dr. M.Venkata Kirthiga** (Rating and selection of Circuit breakers.)		**Dr.M.Balasing Moses** (Motor and Generator Protection)		**Dr.M.Balasing Moses** (Motor and Generator Protection)
13.12.19 FRI	**Dr.S.Baghya Shree** (CT,PT, Apparatus Protection)		**Dr.S.Baghya Shree** (CT,PT, Apparatus Protection)		**Dr.P.Anbazhagan** (Numeric Relays)		**Dr.P.Anbazhagan** (Numeric Relays)
14.12.19 SAT	**Test for participants**		**Group Discussion / Lab Visit**		**Presentation by participants**		**Test paper distribution / feedback**

HOD/ EEE

SCHEDULE OF TRAINING PROGRAMME

Code& Name : EE 8602 – PROTECTION AND SWITCHGEAR

Branch / Semester : ELECTRICAL AND ELECTRONICS ENGINEERING / VI SEMESTER

Day/ Session	Session –I (9.00 A.M -10.30 A.M)		Session –II (10.45 A.M – 12.15 P.M)		Session- III (1.30 P.M -3.00 P.M)		Session- IV (3.15 P.M -4.45 P.M)
09.12.19 MON	**Mr.Vijay Karthik** (Technical Lead, GE, Chennai)	TEA BREAK	**Mr.Vijay Karthik** (Technical Lead, GE, Chennai)	LUNCH BREAK	**Mr. P.S.Arunkumar** Manager, Level-3, Schneider Electric, Bengaluru	TEA BREAK	**Mr. P.S.Arunkumar** Manager, Level-3, Schneider Electric, Bengaluru
10.12.19 TUE	**Dr. V.Saravanan** (Assistant Professor, TCE, Madurai)		**Dr. V.Saravanan** (Assistant Professor, TCE, Madurai)		**Dr. S.Charles Raja** (Assistant Professor, TCE, Madurai)		**Dr. S.Charles Raja** (Assistant Professor, TCE, Madurai)
11.12.19 WED	**Dr.S.Venkatesh** (Associate Professor, VIT, Vellore)		**Dr.S.Venkatesh** (Associate Professor, VIT, Vellore)		**Dr.S.Senthil Kumar** (Assistant Professor, NIT,Trichy)		**Dr.S.Senthil Kumar** (Assistant Professor, NIT,Trichy)
12.12.19 THU	**Dr. M.Venkata Kirthiga** (Associate Professor, NIT,Trichy)		**Dr. M.Venkata Kirthiga** (Associate Professor, NIT,Trichy)		**Dr.M.Balasing Moses** (Professor, AUT, Trichy)		**Dr.M.Balasing Moses** (Professor, AUT, Trichy)
13.12.19 FRI	**Dr.S.Bhagya Shree** (Assistant Professor, UCE, Dindigul)		**Dr.S.Bhagya Shree** (Assistant Professor, UCE, Dindigul)		**Dr.P.Anbalagan** (Assistant Professor, AUT, Trichy)		**Dr.P.Anbalagan** (Assistant Professor, AUT, Trichy)
14.12.19 SAT	**Test for participants**		**Group Discussion / Lab Visit**		**Presentation by participants**		**Test paper distribution / feedback**

HOD/ EEE

SARANATHAN COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
Anna University Sponsored FDTP on EE8602 - Protection and Switchgear
09.12.2019 - 14.12.2019

Sl.No	Name of the Participant	Name of the College & Place	Signature											
			09.12.2019		10.12.2019		11.12.2019		12.12.2019		13.12.2019		14.12.2019	
			FN	AN	FN	AN	FN	AN	FN	AN	FN	AN	FN	AN
1	V.SRIDEVI	JAYARAM COLLEGE OF ENGINEERING AND TECHNOLOGY, TRICHY												
2	S.GANESH	SRM TRP ENGINEERING COLLEGE, TRITCHY												
3	K.KIRUBA	SRM TRP ENGINEERING COLLEGE,TRICHY												
4	S.SINDHUJA	SRM TRP ENGINEERING COLLEGE,TRICHY												
5	UPASANA SAPRA	SRM TRP ENGINEERING COLLEGE,TRICGY												
6	R.NAVANEETHAN	JAYARAM COLLEGE OF ENGINEERING AND TECHNOLOGY, TRICHY												
7	DR.N.SHOBANADEVI	UNIVERSITY COLLEGE OF ENGINEERING, ARIYALUR												
8	S.SUBASH	DR. NAVALAR NEDUNCHEZHIYAN COLLEGE OF ENGINEERING, THOZHUDUR												
9	J.DEEPIKA	M.A.M SCHOOL OF ENGINEERING												
10	S.NAGAMUNEESWARAN	FATIMA MICHEL COLLEGE OF ENGGINEERING AND TECHNOLOGY,MADURAI												
11	G.MONICA	TRICHY ENGINEERING COLLEGE, TRICHY												
12	R.SARANYA	TRICHY ENGINEERING COLLEGE, TRICHY												
13	T.A.SHEEBA	TRICHY ENGINEERING COLLEGE, TRICHY												
14	K.JAYASUDHA	TRICHY ENGINEERING COLLEGE, TRICHY												
15	K.MANIKANDAN	GOVERNMENT COLLEGE OF ENGGINEERING, SRIRANGAM												
16	V.LOGESHWARI	GOVERNMENT COLLEGE OF ENGGINEERING, SRIRANGAM												
17	A.PRIYA FATHIMA RANI	KURINJI COLLEGE OF ENGGINEERING AND TECHNOLOGY, MANAPPARAI												
18	J.AMALA AROCKIARAJ	KURINJI COLLEGE OF ENGGINEERING AND TECHNOLOGY, MANAPPARAI												
19	G.SUNDARARAJAN	JJ COLLEGE OF ENGINEERING AND TECHNOLOGY, AMMAPETTAI, TRICHY												

Sl.No	Name of the Participant	Name of the College & Place	Signature											
			09.12.2019		10.12.2019		11.12.2019		12.12.2019		13.12.2019		14.12.2019	
			FN	AN	FN	AN	FN	AN	FN	AN	FN	AN	FN	AN
20	S.ANTONYRAJ	ANJALAI AMMAL MAHALINGAM ENGINEERING COLLEGE, THIRUVARUR												
21	J.AROKIARAJ	KINGS COLLEGE OF ENGINEERING, PUDUKOTTAI												
22	B.GAYATHRI DEVI	MOOKAMBIGAI COLLEGE OF ENGINEERING, TRICHY												
23	R.RAJTHILAK	MOOKAMBIGAI COLLEGE OF ENGINEERING, TRICHY												
24	V.JEYAMALINI	MOOKAMBIGAI COLLEGE OF ENGINEERING, TRICHY												
25	P.RATHI DEVI	JJ COLLEGE OF ENGINEERING AND TECHNOLOGY, TRICHY												
INTERNAL PARTICIPANTS														
26	DR.K.RAJKUMAR	SARANATHAN COLLEGE OF ENGINEERING, TRICHY												
27	MR.R.BALASUBRAMANIAN	SARANATHAN COLLEGE OF ENGINEERING, TRICHY												
28	MR.P.RAMESH BABU	SARANATHAN COLLEGE OF ENGINEERING, TRICHY												
29	MR.R.SATHEESH	SARANATHAN COLLEGE OF ENGINEERING, TRICHY												
30	MR.N.VIJAYASARATHI	SARANATHAN COLLEGE OF ENGINEERING, TRICHY												

H.O.D. ([illegible])
Saranathan College of Engg.,
Tiruchirapalli - 620 012.

CERTIFICATE

CENTRE FOR FACULTY DEVELOPMENT

ANNA UNIVERSITY :: CHENNAI

Ms. A. Priya Fatima Rani, Assistant Professor

Kurinji College of Engineering & Technology, Manapparai

took part in a six-day Faculty [illegible]lopment Training Programme

EE 8602 - Protection & Switchgear

conducted by the Department of Electrical & Electronics Engineering

at Saranathan College of Engineering, Tiruchirapalli

from 09.12.2019 to 14.12.2019

DIRECTOR
Centre for Faculty Development

REGISTRAR
Anna University

06-06-2019

Submitted for Approval

We have enclosed the approval copy of the letter for organizing the switchgear training programme for the industrial participants (Adani Power Plant), sponsored by the Rural Energy Centre, Gandhi gram University, Gandhi gram, Dindigul district. We could not adhere to the originally proposed schedule due to our tight academic work and other activities like college day, convocation day and sports day functions. Also the Loksabha election activities in the campus posed further difficulties.

The revised schedule for the Switchgear Workshop is furnished below:

Title of the Workshop: **"Industrial Practices & Learning of State-of-Art LV and HV Switchgear"**

The total number of participants = 33 nos

10-06-19(Day-1) Monday – First batch of 17 nos of participants

11-06-19(Day-2) Tuesday- Second batch of 16 nos of participants

12-06-19(Day-3) Wednesday- First batch of 17nos of participants

13-06-19(Day-4) Thursday- Second batch of 16nos of participants

Registration fee per participant- Rs.1, 500/-

Each day we are providing lunch and morning/evening snacks & tea

Each day we are providing our college van (morning and evening) to pick up & drop from /at the Trichy Railway station (Junction) at 9.00 am and 5.00pm respectively.

Dhkumh

D.Kalyanakumar
EEE dept

6/6/19

6/6/19

Principal has discussed with Secretary and obtained oral approval
Dhkum
06/06/19

SARANATHAN COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
Venkateswara Nagar, Panjapur, Tiruchirapalli - 620 012.

Department of Electrical & Electronics Engineering

" Industrial Practices & Learning of State - of - Art LV and HV Switchgear"

VENUE: SWITCHGEAR TRAINING & RESEARCH LAB

Department of Electrical and Electronics Engineering

Vision

Will strive continuously in pursuit of creativity, innovations and ethics in the field of Electrical and Electronics Engineering to blossom into Centre of Excellence.

Mission

1. To impart total quality education through broader exposure, value additions and effective teaching learning process.
2. To mould students to meet professional challenges and to become outstanding Engineers and Technocrats.
3. To pursue research in the field of Electrical and Electronics Engineering to serve the needs of the industry, scientific community and society.

About The College

Saranathan College of Engineering wasfounded by philanthropist VidyaSevaRatnamShri.K.Santhanam, in the year 1998and was named after the great educationistProf. V. Saranathan. The campus islocated on Trichy – Viralimalai – Madurai highway having an area of 21 acres with abuilt up area of 2,60,000Sq.ft.. Seven U.GProgrammes and Four P.G programmes areoffered. Six eligible UG courses are NBAaccredited. All the programmes areaffiliated to the Anna University, Chennai,and have the approval of the AICTE, New
Delhi.

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Outline of the training programme

Our Faculty members are actively involved in training and preparing the students/practicingEngineers to meetout the requirements of real life situation, by taking them through various rigorous training and exercises. In today’s world, barriers are breaking down and business environment is becoming highly competitive. In such a post-modern scenario, it is imperative to formulate new perspectives to add values through application oriented approaches to meet the challenge of changes and dynamism. Electrical and Electronics Engineering department will continue to help students and Engineers in shaping them as future professionals and assist them to improve their performance by imparting career oriented courses periodically. The switchgear training programme provides the basic skills required to operate and test the switchgear and protective devices. Hands on experience on practical circuit breakers and protective relays are employed. Sample HT/LT modern circuit breakers are provided for testing, trouble shooting and maintenance. Proper procedural methods to carryout insulation resistance tests, contact resistance measurements, polarity checking and terminal marking of currenttransformers, testing of relays,etc will be demonstrated to the participants.

Infrastructure and vision

- To train the students to meet the challenges and demand for industrial skills in terms of quality of professional, safety, time & technical excellence.
- To identify the training needs of professional workforce and set standards to monitor occupational competencies and the technicalskills deployed in the industries.
- To disseminate knowledge and appropriate skill practices through recognized systems of training, testing and certification.
- To serve the social objectives of the institution through channelizing the potential and strength of the students for producing trained professionals, who are capable of delivering results, conforming to the industrial standards.

Scope of Training Programme

- Familiarize Switchgear and its Specifications
- Perform Electrical and Mechanical operation of Circuit Breakers
- Testing of Switchgear
- Checking of various Switchgear interlocking requirements
- Interpretation of Electrical wiring and Schematic diagrams of Switchgear
- Testing of protective relays and establishing characteristics
- Learning programming of Numerical relays
- Design and selection of protection transformers
- Understanding single line diagrams of distribution substation
- Demonstration of sequential substation interlocks
- Field measurements at prevailing load conditions
- Design and execution of control and power wiring of LT switchgear
- Insulation measurements on HT Switchgear
- BDV test on mineral oil
- Extensive hands on training with lucid presentations

Key takeaways

Acquire exposure and knowledge on

- Design of control and power circuits
- Fault diagnosis in Electrical Circuits
- Switchgear maintenance practices
- Testing of circuit breakers as per National standard
- Calibration of protective relays
- Single line diagrams of Distribution substation
- Various interlocking requirements for Switchgear and substations
- Distribution Boards and Terminations
- Distribution Transformer Protections
- Bus bar Layouts
- Selection of Current Transformers for Protection and Metering

Duration of Training

Two days

Eligibility Criteria

Third year, Final year and PG students of Electrical Engineering stream/practicing Engineers from Industries

Registration

Rs 1500 / Participant

Participant Strength: Limited to twenty numbers in view of practical Demos

Course Material: Soft copy of two days learning.

Patron: Shri. S. Ravindran,Secretary

Advisory board

Dr. D. Valavan, Principal

Dr. C. Krishnakumar, Professor & Head/EEE Dept.

Course coordinator

Dr. D.Kalyanakumar

Organizers

Prof. R.Venugopal

Prof. T.Tamilarasan

Prof. P.Ramprakash

Prof. R.Sridhar

SARANATHAN COLLEGE OF ENGINEERING-TRICHY
DEPARTMENT OF EEE

14.06.2019

SWITCHGEAR TRAINING WORKSHOP - REPORT

The Department of Electrical and Electronics Engineering, Saranathan College of Engineering has conducted from **10-06-19 to 13-06-19** a value-added Two Days training program titled "**INDUSTRIAL PRACTICES AND LEARNING OF STATE-OF- THE-ART IN LV & HV SWITCH GEARS".** This training program was conducted for the employees of ADANI Green Energy Limited, Kamuthi, Ramanathapuram at Switchgear Research Laboratory in our campus, to expose the participants to the modern trends and Cutting Edge Technologies in the Switchgear front. Such a practical switchgear training in an Engineering college is the first and only one of its kind in India- a training that exposed the participants to every aspect of switchgear and protection engineering through a state-of-the-art training facilities, backed by a well-equipped laboratory and testing systems.

Two batches (16+16) totaling 32 participants attended the program. The first batch attended from 10.06.19 & 11.06.19 while the second batch was accommodated from 12.06.19 & 13.06.19. The program started at 09.30 AM with Dr.C. Krishnakumar, HoD/EEE, welcoming the gathering and highlighting the importance of industry-institute collaboration in research and development activities.

The forenoon session of the first day of training was handled by Dr. D. Kalyankumar, Prof./EEE. During this session, he explained the operation of various relays, the modern design of control and power circuits, substation requirements, field measurements of electrical parameters at the prevailing load conditions, various interlocking arrangements in the switchgear, wiring practices of LV switchgear, HV testing of insulation, selection of CTs for protection and metering, etc.

During the afternoon session, the participants were exposed to the operation of substation, transformers, grid connection and also to the solar power plant installed in our campus.

During the second day of training, the students were given the hands-on training on Invert Definite Minimum Time over current Relay, Numeric overcurrent and earth fault relay, Designing of AC Starters and the testing as per International Standards of High Voltage Circuit breakers. The sessions were handled by Mr. T. Tamilarasan, AP/EEE, Mr. R. Venugopal, AP/EEE, Mr. P. Ram Prakash, AP/EEE and Mr. R. Sridhar, AP/EEE.

After successful completion of training, a test was conducted for the students followed by a valedictory session at 4.45 PM.

Dr. S. Thamizharasan, Asso.Prof./EEE, delivered the valedictory address for first batch participants and distributed the certificates. Dr. S. Vijayalakshmi, Asso.Prof./EEE, delivered the valedictory address for second batch participants and distributed the certificates

During the training, the participants had enthusiastically interacted with the trainers. This training will help them to broaden their technical skills and meet the prevailing industrial demands, professional challenges and corporate expectations and also give them a new and positive attitude towards the work culture that would enhance the productivity by ensuring energy efficient operation and reduced downtime of machinery. We received a very good feedback for this value-added program from the participants. Based on the feedback of the participant trainees the program seems to have attained its intended goal - to give a practical feel to students regarding modern trends on low voltage and High voltage switchgear products.

HoD / EEE

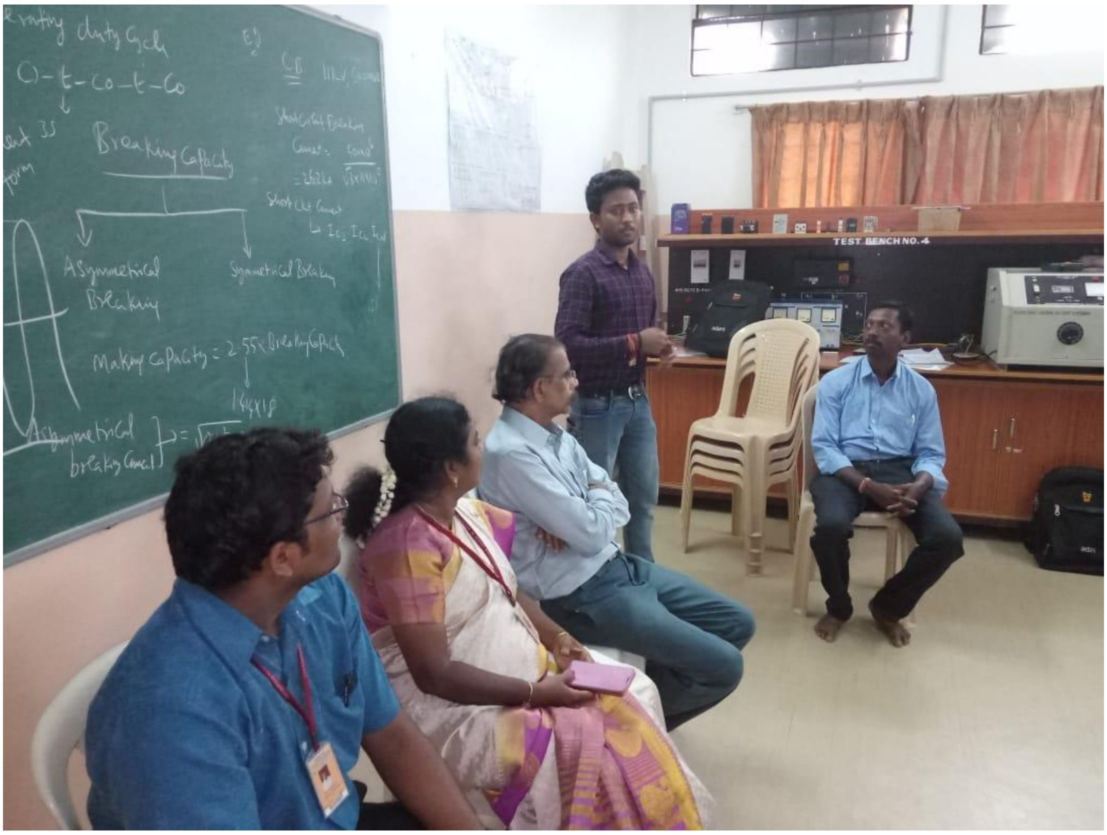
H.O.D. (EEE)
Saranathan College of Engg.,
Trichirapalli - 620 012.

Dr.K.Krishnakumar, Professor&Head,EEE, welcomed the gathering

Dr.Kalyankumar, Professor/EEE during the session

Dr.Kalyankumar, Professor/EEE explaining the operation of transformer in substation

Mr.R.Sridhar,AP/EEE, explaining the operation of IDMT Relay



Feedback given by the participants

Dr.S.Vijayalkshmi, Asso.Prof./EEE, distributing the certificate to the participant

Batch-II

Batch-I

HoD / EEE

H.O.D. (EEE)
Saranathan College of Engg.,
Trichirapalli - 620 012.

GRI transferred
Rs 49,500/- on 13/08/2019
Ref NO NACH272804 -
C 081901563672
C 081901569755

Department of Electrical & Electronics Engineering
SARANATHAN COLLEGE OF ENGINEERING
Trichy - 620012.

SCE/EEE/SWGR/GRI/JUN 19-1 12-07-2019

THE REGISTRAR,
Gandhigram Rural Institute,
Gandhigram-624302

Name of Training Programme: Switchgear Training **Dates of training:** 10-06-19 to 13-06-19
Venue: Switchgear Research and Training Laboratory
Participants: 33 nos of students (B.Voc course), Rural Energy Centre, Gandhigram Rural Institute

REGISTRATION FEE FOR PARTICIPATION

SL.NO	DESCRIPTION	REGISTRATION FEE PER PARTICIPANT	TOTAL AMOUNT NETT
1	Registration fee per participant	Rs.1,500/-	------
2	Registration fees for 33 nos of participants 33 x 1500 =	--------	Rs.49,500/-
Total Registration Fees (Rupees Forty Nine Thousand Five Hundred)		**Rs.49,500/- nett**	

Bank Details for Money Transfer:

Name of Account: Saranathan College of Engineering
Account No: 023001000138318
Bank Name: City Union Bank
Account Type: Saving Accounts
IFS Code: CIUB0000023
MICR CODE: 620054002
Branch: TRICHY MAIN BRANCH

Sent to GRV
in College
Letter Head.

-Sd-

Dr.C.Krishnakumar

SCE/EEE/SWGR/B.VOC/Adani/GRI

09-07-2019

TO
THE REGISTRAR,
Gandhigram Rural Institute,
Gandhigram-624302.
Dindigul District,
Tamilnadu.

Sir,

This refers to the Switchgear workshop organized by the Department of Electrical&Electronics Engineering, Saranathan College of Engineering, Trichy, from 10-06-2019 to 13-06-2019 at the Switchgear Research Laboratory. This workshop has been successfully completed for thirty three numbers of participants attended from Rural Energy Centre (B.Voc course). We request you to kindly transfer the registration fee of Rs.49, 500/- (Rupees Forty Nine Thousand Five Hundred) at the rate of Rs.1500/- per participant (Rs.1500 x 33= Rs.49, 500/-) to the following account:

Name of Account:	**Saranathan College of Engineering**
Account No:	**023001000138318**
Bank Name:	**City Union Bank**
Account Type:	**Saving Accounts**
IFS Code:	**CIUB0000023**
MICR CODE:	**620054002**
Branch:	**TRICHY MAIN BRANCH**

Thanking you,

Yours truly,

— Sd/ —

Dr.C.Krishnakumar

Sent to GRU
in College
letterhead

List of Students who got first five scores

S.NO	Name of the Student	Marks Obtained out of 50
1	Rajkumar K	43
2	Anupam Pradhan	41
3	Vinay Kumar. C	39
4	Ajay	39
5	Chandan Acharya	38
6	Vinay. S	37
7	Pavan Kumar	37

List of Students who got last five scores

S.NO	Name of the Student	Marks Obtained out of 50
1	Sachitra Swain	24
2	Ashadeep Anand	23
3	Abhijeet Kumar	23
4	Bhabani Sankar Sahoo	23
5	Manju Nath	21
6	Jidh Kumar	21
7	Niranjan MallicK	19
8	Sibaram Badatya	12

Score Range of Students

S.No	Score Range	No. of Students
1	41-50	2
2	31-40	12
3	21-30	16
4	11-20	2
5	0-10	0

SARANATHAN COLLEGE OF ENGINEERING

TIRUCHIRAPPALLI-620012

DEPARTMENT OF EEE

SWITCHGEAR TRAINING-TWO DAYS WORKSHOP

FOR ADANI GROUP EMPLOYEES- JUNE 10-13,2019

MARK STATEMENT

S.NO	Name of the Student	Marks Obtained out of 50
1	Bipin Pradhan	31
2	Niranjan MallicK	19
3	Vinay. S	37
4	Anupam Pradhan	41
5	Prakash Chandra Sahoo	26
6	Pramod Kumar Behera	27
7	Subrata Kumar Patra	26
8	Sibaram Badatya	12
9	Ashadeep Anand	23
10	Sudesh Yadav	32
11	Rajkumar K	43
12	Soumen Kumar Sahu	34
13	Ravi Teja	33
14	Savan Singa	28
15	Vinay Kumar. C	39
16	Manju Nath	21
17	Sachitra Swain	24
18	Rajiranjan Pani	33
19	Buddha Priyo Paul	29
20	Chandrakanta Rout	28
21	Ajay	39
22	Abhijeet Kumar	23
23	Pavan Kumar	37
24	Rajesh Nayak	34
25	Bhabani Sankar Sahoo	23
26	Rahul Renjan	33
27	Samir Ranian Sahoo	29
28	Chandan Acharya	38
29	Vishal Sikha	26
30	Rohit Kumar Ojha	28
31	Abbu Thorab	29
32	Jidh Kumar	21

H.O.D. (EEE)
Saranathan College of Engg.,
Tiruchirapalli - 620 012.

SARANATHAN
COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
Venkateswara Nagar, Panjapur, Tiruchirapalli - 620 012.

Department of
Electrical & Electronics Engineering

CERTIFICATE OF PARTICIPATION

VINAY S
....

participated in the training programme entitled

" Industrial Practices & Learning of State - of - Art LV and HV Switchgear"

held on ....JUNE 10-03, 2019........ at

Saranathan College of Engineering.

Dr.D.KALYANAKUMAR	Dr.C. KRISHNAKUMAR	Dr.D. VALAVAN
Professor / EEE dept	Professor & Head / EEE	Principal

SARANATHAN COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

(Accredited by NBA)

20.01.2019

Switch Gear Training - Circular

Department of Electrical and Electronics Engineering organizes Switch Gear Training series titled "**INDUSTRIAL PRACTICES AND LEARNING OF STATE-OF- THE-ART IN LV & HV SWITCH GEARS".**

In this Regard, The Training Program will be conducted as a phased manner. Each phase contains around 16 students and the program will be conducted for Two days. The detailed schedule of the training program is given below.

Batch -1

Sl.No	Time	Particulars	Resource Person(s)
Day-1			
1.	09.15 AM	Registration	
2.	09.30 AM – 12.30 PM	Overview of Protection in Power Systems	Dr.D.Kalyanakumar
3.	01.30 PM – 04.30 PM	(i) IDMT Relay operation (ii) Numeric Relay operation (iii) Star-Delta Starter operation (iv) Transformer – High voltage Testing	Mr.R.Sridhar Mr.P.Ram Prakash Mr.T.Tamilarasan Mr.R.Venugopal
Day-2			
4.	09.30 AM – 12.30 PM	(i) IDMT Relay operation (ii) Numeric Relay operation (iii) Star-Delta Starter operation (iv) Transformer – High voltage Testing	Mr.R.Sridhar Mr.P.Ram Prakash Mr.T.Tamilarasan Mr.R.Venugopal
5.	01.30 PM – 04.30 PM	Field Visit and Practical Testing of Protection and Switchgears	Dr.D.Kalyanakumar

HoD / EEE

H.O.D. (EEE)
Saranathan College of Engg.,
Trichirapalli - 620 012.

ACADEMIC YEAR 2020-2021

DEPARTMENT OF MECHANICAL ENGINEERING

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)
Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

STTP- Sanction Letter

Ref. No. 34-66/231/FDC/STTP/Policy-1/2019-20 Date 10 AUG 2020

From

Director,
Faculty Development Cell,
AICTE, New Delhi-110070

To

The Drawing and Disbursing Officer,
All India Council for Technical Education,
Nelson Mandela Marg,
Vasant Kunj, New Delhi – 110070

Sub: Release of grant for conduct of Short Term Training Programme (STTP) under AQIS 2019-20 during the financial year 2020-21– reg.

Sir,

This is to convey the sanction of the Council for payment of **Rs. 191667** /- **(Rupees One Lakh NinetyOne Thousand Six Hundred SixtySeven Only)** for conduct of Short Term Training Program as per details given below:-

1.	Name and address of the beneficiary University / Institution	SARANATHAN COLLEGE OF ENGINEERING VENKATESWARA NAGAR EDAMALAIPATTIPUDUR POST PANJAPPUR VILLAGE SRIRANGAM TALUK Tamil Nadu 620012
2.	Permanent ID of Institute	1-4190371
3.	Institute type	Unaided - Private
4.	Name of Coordinator	Dr. BASKAR NEELAKANDAN
5.	Amount sanctioned	Rs. 191667/-
6	Amount to be released	Rs.191667/- Full & final payment
7.	Head of account	**601.15(a) Gen. Short Term Training Programme (Plan)**
8	The authorized officer in whose favour Cheque/ Demand Draft/ RTGS is to be made	REGISTRAR / DIRECTOR / PRINCIPAL
9.	Title of the programme	Rudiments and practices of Computational Fluid Dynamics in Thermo-fluid Analysis

1. The amount of the grant shall be drawn by the Drawing and Disbursing Officer, All India Council for Technical Education on the grant-in-aid bill and shall be disbursed to and credited to the Registrar/ Director/Principal of the institute through RTGS.
2. This grant-in-aid is being released in conformity with the terms & conditions as well as norms of the scheme as already communicated, and also being communicated in this letter.
3. The Principal of the Institute and the Coordinator of the Program are requested to verify the correctness of the under-mentioned Bank Account / RTGS Details submitted by them alongwith the proposals, in

The members of the said PMC shall not be below the rank of Associate Professor. A test shall be conducted by Project Monitoring Committee (PMC) at the end of the program and the certificates shall be issued to those participants who have attended the program and have qualified in the test. The minutes of the meetings, along with PMC report, are to be submitted to the Council at end of the program along with other mandatory documents.

j. **GoI GFR rules** (@https://doe.gov.in/order-circular/general-financial-rules2017-0) should be followed during utilization of grant.

k. This Sanction Order may be treated as Offer Letter for all purposes.

NOTE:- Any deviation from the above will invoke serious action against the Institute.

Yours sincerely,

(Col. B Venkat)
Director (FDC)

10 AUG 2020

Copy forwarded for information and necessary action to: -

1. **Name and Address of the Coordinator**
   Dr. BASKAR NEELAKANDAN
   SARANATHAN COLLEGE OF ENGINEERING
   VENKATESWARA NAGAR EDAMALAIPATTIPUDUR POST PANJAPPUR VILLAGE SRIRANGAM TALUK Tamil Nadu620012

2. **The Registrar / Director / Principal**
   SARANATHAN COLLEGE OF ENGINEERING
   VENKATESWARA NAGAR EDAMALAIPATTIPUDUR POST PANJAPPUR VILLAGE SRIRANGAM TALUK Tamil Nadu620012

3. **Guard File**

SARANATHAN COLLEGE OF ENGINEERING
TIRUCHIRAPALLI - 12

Dr. D. VALAVAN B.E.,M.Tech.,Ph.D.
PRINCIPAL

Ref : SCE / AQIS – STTP / 2019- 2020 / 1863

Dated 15th July 2021

To
Col.B. Venkat
Director, Faculty Development Cell
All India Council for Technical Education
Nelson Mandela Marg, Vasant Kunj
New Delhi – 110 070

Sir,

Sub : AICTE – MECH - STTP – converted into online mode – refund of balance amount – NEFT – sent – Reg.

Ref : 1. Sanction letter Ref.No.34-66/231/FDC/STTP/Policy-1/2019-20 dated 10/08/2020
2. Circular-online mode for STTP dated 14.09.2020.

Vide letter cited under reference (1), an amount of Rs. 1,91,567/- (Rupees one lakh ninety one thousand five hundred and sixty seven only) towards organizing a Short Term Training Programme (STTP) under the Scheme AQIS 2019-20 had been sanctioned to our institution on 10.08.2020.

Vide letter cited under reference (2), the AICTE has given us an option to conduct the STTP in an online mode. The amount sanctioned for the conduct of E-STTP being Rs.1,86,000/- (Rupees one lakh and eighty six thousand only),the above referred sanction letter also instructed us to refund the balance amount of Rs.5,567/- (Rupees five thousand five hundred and sixty seven only).

SARANATHAN COLLEGE OF ENGINEERING

TIRUCHIRAPALLI - 12

Dr. D. VALAVAN B.E.,M.Tech.,Ph.D.
PRINCIPAL

The utilization certificate and other necessary documents confirming the successful conduct of the faculty development programme are enclosed for your kind perusal.

As instructed we have sent the balance amount of Rs.5,567/- (Rupees five thousand five hundred and sixty seven only) to the State Bank of India account no. 55113199952 of Member Secretary, AICTE, New Delhi through RTGS mode on 09.07.2021 (Reference number of online transaction is CIUBH21190003250).

The receipt of the same may please be acknowledged.

Thanking you,

Yours faithfully,

COLLEGE OF ENGINEERING TRICHY 620 012. SARANATHAN

PRINCIPAL
Saranathan College of Engineering
TRICHY - 12.

Encl.:

1. STTP sanction Letter
2. Sanction letter-online mode for FDP
3. Utilization Certificate
4. Brochure

VENKATESWARA NAGAR, EDAMALAIPATTI PUDUR (P.O.) PANJAPPUR VILLAGE, SRIRANGAM TALUK, TIRUCHIRAPALLI - 620 012.
Ph : 8489915204 Telefax - 0431 - 2473684, e-mail : principal@saranathan.ac.in

Annexure - II

Short Term Training Programme (STTP)

UTILIZATION CERTIFICATE

AICTE File No. : Ref.No.34-66/231/FDC/STTP/Policy-1/2019-20 dated 10/08/2020

Name of the Coordinator : Dr. N. Baskar

Title of the Programme : One Week Short Term Training Programme (STTP) on "Rudiments and Practices of Computational Fluid Dynamics in Thermo-fluid Analysis"

Dates of the Progrmme : Phase I: 10/05/2021 – 15/05/2021
Phase II: 24/05/2021 – 29/05/2021

S. No.	AICTE Sanction Order/Letter No. & Date	Amount (Rs.)	
1.	Ref.No.34-66/231/FDC/STTP/ Policy-1/2019-20 dated 10/08/2020	Rs. 1,91,567/-	Certified that out of **Rs.1,91,567/-** of Grant-in-aid sanctioned by the AICTE during the financial year 2019-2020 in favour of Principal under this Institution Letter No. **Ref.No.34-66/231/FDC/STTP/ Policy-1/2019-20 dated 10/08/2020** given in the margin a sum **Rs. 1,86,000/-** has been utilized for the purpose of **Short Term Training Programme (STTP)** for which it was sanctioned and that the balance of **Rs. 5,567/-** remaining unutilized at the end of the year has been surrendered to the All India Council for Technical Education.
2.	Grant Received	Rs. 1,91,567/-	
3.	Balance to be reimbursed to AICTE	Rs. 5,567/-	

Certified that I have satisfied myself that the conditions on which the grant-in-aid was sanctioned have been duly fulfilled and that I have exercised the following checks to see that the money was actually utilized for the purpose for which it was sanctioned.

Kinds of checks exercised:-

1. Remuneration to speakers
2. Designing and printing expenses
3. Miscellaneous expenses

SARANATHAN COLLEGE OF ENGINEERING TRICHY 620 012.

N. B. [signature]

Name & Signature of the Coordinator with Seal

Dr. N. BASKAR M.E., Ph.D.
Supervisor Registration No. 18.279.01
Professor / Dept. of Mechanical Engineering,
Saranathan College of Engineering,
Trichy - 620 012.

[signature]

Name & Signature of the Head of Institute with Seal

Dr. D. Valavan, M.Tech., Ph.D.,
Principal
Saranathan College of Engineering
Trichy - 12.

Signature of Chartered Accountant :

Name of Chartered Accountant :

Membership No. :

Full Address with Seal :

For M.RAJU & Co.,
CHARTERED ACCOUNTANTS
[signature]
(A.KUMAR)
M.No: 026517
PROPRIETOR

M.RAJU & Co., For CHARTERED ACCOUNTANTS TRICHY FRN:003481S

Annexure - III

Short Term Training Programme (STTP)

STATEMENT OF EXPENDITURE

AICTE File No. : Ref.No.34-66/231/FDC/STTP/ Policy-1/2019-20 dated 10/08/2020

Name of the Coordinator : Dr. N. Baskar

Title of the Programme : One Week Short Term Training Programme (STTP) on "Rudiments and Practices of Computational Fluid Dynamics in Thermo-fluid Analysis"

Dates of the Programme : Phase I: 10/05/2021 – 15/05/2021
Phase II: 24/05/2021 – 29/05/2021

Sanction No. & Date	Grant Sanctioned	Details of Expenditure Incurred Item wise	No. of Participants	Duration of the Programme (with dates)
Ref.No.34-66/231/FDC/STTP/ Policy-1/2019-20 dated 10/08/2020	Rs. 1,91,567/-	Remuneration to speakers - **Rs. 83,000/-**	59	**One Week** **Phase I:** 10/05/2021 – 15/05/2021
		Designing and printing expenses – **Rs. 3,500/-**		
		Miscellaneous expenses – **Rs.6,500/-**		
		Remuneration to speakers - **Rs. 83,000/-**	41	**One Week** **Phase II:** 24/05/2021 – 29/05/2021
		Designing and printing expenses - **Rs. 3,500/-**		
		Miscellaneous expenses – **Rs.6,500/-**		
		Total Expenditure	**Rs. 1,86,000/-**	
		Grant Received	**Rs. 1,91,567/-**	
		Balance to be reimbursed to AICTE	**Rs. 5,567/-**	

N. B

Name & Signature of the Coordinator with Seal
Dr. N. BASKAR M.E, Ph.D
Supervisor Registration No. 18.279.01
Professor / Dept. of Mechanical Engineering,
Saranathan College of Engineering
Tiruchirappalli - 620 012.

SARANATHAN COLLEGE OF ENGINEERING TRICHY 620 012.

Name & Signature of the Head of Institute with Seal
Dr. D. Valavan, M.Tech.,Ph.D.,
Principal
Saranathan College of Engineering
Trichy - 12.

Signature of Chartered Accountant :

Name of Chartered Accountant : For M.RAJU & Co
CHARTERED ACCOUNTANTS

Membership No. :

Full Address with Seal : (A.KUMAR)
M.No. 026517
PROPRIETOR

For M.RAJU & Co., CHARTERED ACCOUNTANTS TRICHY FRN:003481S

Annexure - I

SHORT TERM TRAINING PROGRAMME

FEED BACK FORM

AICTE File No. & Date of Offer Letter	:	**Ref.No.34-66/231/FDC/STTP/Policy-1/2019-20 dated 10/08/2020**
Name of the Coordinator	:	**Dr. N. BASKAR**
Name and Address of the Institution	:	**Saranathan College of Engineering Venkateswara Nagar, Edamalaipattipudur Post, Panjappur Village, Tiruchirappalli - 620 012, Tamil Nadu.**
Title of the Programme	:	One Week Short Term Training Programme (STTP) **"Rudiments and Practices of Computational Fluid Dynamics in Thermo-fluid Analysis"**
Dates	:	Phase I: 10/05/2021 – 15/05/2021 Phase II: 24/05/2021 – 29/05/2021
Mode	:	**Online Mode** Phase I Google Meet id : https://meet.google.com/cqh-gria-ink Phase II Google Meet id : https://meet.google.com/qay-tqzo-sfp

Total no. of participants proposed and actually attended

Phase I :	Proposed	40	Attended	59
Phase I :	Proposed	40	Attended	41

No. and date of the offer letter :

Letter No.	Date	Grant Released
Ref.No.34-66/231/FDC/STTP/Policy-1/2019-20	10/08/2020	Rs. 1,91,567/-

Total amount sanctioned	:	Rs. 1,91,567/-
Total expenditure incurred in conducting the seminar	:	Rs. 1,86,000/-
Grant received from various agencies other than AICTE for this Short Term Training Programme	:	Nil
Details of internal revenue if any generated by the Institution / Department on account of this Programme.	:	Nil

N. Baskar

Name & Signature of the Coordinator with Seal

Dr. N. BASKAR M.E, Ph.D.
Supervisor Registration No. 18.279.01
Professor / Dept. of Mechanical Engineering,
Saranathan College of Engineering,
Tiruchirappalli - 620 012.

Name & Signature of the Head of Institute with Seal

Dr. D. Valavan, M.Tech.,Ph.D.,
Principal
Saranathan College of Engineering
Trichy - 12.

SARANATHAN COLLEGE OF ENGINEERING
TRICHY
620 012.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

STTP- Sanction Letter

Ref. No. 34-66/231/FDC/STTP/Policy-1/2019-20 Date 10 AUG 2020

From

Director,
Faculty Development Cell,
AICTE, New Delhi-110070

To

The Drawing and Disbursing Officer,
All India Council for Technical Education,
Nelson Mandela Marg,
Vasant Kunj, New Delhi – 110070

Sub: Release of grant for conduct of Short Term Training Programme (STTP) under AQIS 2019-20 during the financial year 2020-21– reg.

Sir,

This is to convey the sanction of the Council for payment of **Rs. 191667 /- (Rupees One Lakh NinetyOne Thousand Six Hundred SixtySeven Only)** for conduct of Short Term Training Program as per details given below:-

1.	Name and address of the beneficiary University / Institution	SARANATHAN COLLEGE OF ENGINEERING VENKATESWARA NAGAR EDAMALAIPATTIPUDUR POST PANJAPPUR VILLAGE SRIRANGAM TALUK Tamil Nadu 620012
2.	Permanent ID of Institute	1-4190371
3.	Institute type	Unaided - Private
4.	Name of Coordinator	Dr. BASKAR NEELAKANDAN
5.	Amount sanctioned	Rs. 191667/-
6	Amount to be released	Rs.191667/- Full & final payment
7.	Head of account	**601.15(a) Gen. Short Term Training Programme (Plan)**
8	The authorized officer in whose favour Cheque/ Demand Draft/ RTGS is to be made	REGISTRAR / DIRECTOR / PRINCIPAL
9.	Title of the programme	Rudiments and practices of Computational Fluid Dynamics in Thermo-fluid Analysis

1. The amount of the grant shall be drawn by the Drawing and Disbursing Officer, All India Council for Technical Education on the grant-in-aid bill and shall be disbursed to and credited to the Registrar/ Director/Principal of the institute through RTGS.

2. This grant-in-aid is being released in conformity with the terms & conditions as well as norms of the scheme as already communicated, and also being communicated in this letter.

3. The Principal of the Institute and the Coordinator of the Program are requested to verify the correctness of the under-mentioned Bank Account / RTGS Details submitted by them alongwith the proposals, in

Institute PAN No.	Bank Name	Bank Branch Name	Bank Branch Address	Account Holder Name	Account Type	Account Number	IFSC Code
AAETS6115N	CITY UNION BANK	TIRUCHIRAPALLI MAIN	KALLI AMMAN KOIL STREET, SIGC CAMPUS, TIRUCHIRAPALLI - 620002	SARANATHAN COLLEGE OF ENGINEERING	Saving Account	023001000138318	CIUB0000023

Instructions/Guidelines to be followed by the University/Institution

I. Disbursement of funds to University/Institutions

aaaaaa. The full amount of the grant sanctioned is being released as advance to the University/Institute.

b. The amount spent by the institute on the conduct of STTP shall be adjusted on the basis of utilization certificate and detailed expenditure statement submitted by the University/Institution on the prescribed format along with other mandatory documents viz feedback form, copy of proceedings and completion report etc.

bbbbbb. The above said amount of grant shall be refunded back to AICTE if the Letter of Approval (LOA) / Extension of Approval (EOA) is not issued by AICTE to the institute for the academic year 2020-21.

II Maintenance of Accounts

a. The Institute shall strictly follow the provisions laid down in the scheme document as available on the portal.

b. Funds covered by this grant shall be kept separately and would not be mixed up with other funds so as to know the amount of interest accrued on the grant.

c. The University/College/Institute shall maintain proper accounts of the expenditure out of the grants, which shall be utilized only on approved items of expenditure.

d. The grant is intended to cover items of expenditure connected with the Short Term Training Programme such as Boarding & Lodging to the participants, TA to outstation participants, Honorarium to Course Coordinator, reading material to participants, Honorarium to resource persons, TA/DA to resource persons including two outstations resource persons & working expenses (reprographic services, postage, transport, daily wages, tea/coffee etc.

III. Conduct of test and issuance of certificate

A test shall be conducted by Program Monitoring Committee (PMC) at the end of the program and joint certificates shall be issued (by AICTE & conducting institute) to those participants who have attended the program and have scored minimum 60% marks in the test.

IV. Submission of Documents by the University/Institutions to AICTE

a. The following mandatory relevant documents are required to be submitted by the University/Institution within one month of the completion of the program:-

(i) ~~lxvi)~~ Original Statement of actual expenditure & Utilization Certificate in the prescribed proforma duly signed by the Head of the institution and countersigned by Registrar/Finance Officer/Govt. Auditor. In case of self-financing/private institutions, Statement of actual Expenditure & Utilization Certificate are required to be audited & signed and sealed by a Chartered Accountant endorsing the membership number and complete postal address. Format for the same is available on AICTE web portal.

The University/Institution is not required to submit bills/vouchers/invoices etc for the expenditure incurred out of recurring grants. However, such copies of bills/vouchers/invoices shall be digitized by respective institutions receiving grant and uploaded scanned copies of such bills/vouchers/invoices etc on the portal for availability and view at any point of time.

(ii) Feedback form in the prescribed proforma.

(iii) Copy of the proceedings and completion report.

(iv) List of candidates who have successfully completed the program on the basis of the test conducted by Program Monitoring Committee (PMC).

(v) Report submitted by Program Monitoring Committee (PMC).

b. The amount of the grant shall be adjusted on submission of utilization certificate & detailed expenditure statement by University/Institution. On receipt of these documents, the total amount of financial assistance, admissible as per the norms, shall be worked out and grant-in-aid adjusted.

V. General instructions

a. **Preferably 10% of the participants may be industry professionals deputed by industry. Further, not more than 2 participants shall be from the host institution/group of institutions.**

b. **The grant released/or part thereof, if remains unutilized for any reason after expiry of stipulated time period (for any reasons to include unspent amount, interest , penalty if imposed) shall be refunded back to AICTE in the form of RTGS payable to Member Secretary, AICTE, New Delhi. The bank details of AICTE are as under:-**

Account No	:	**55113199952**
Name of the Account Holder	:	**Member Secretary, AICTE, New Delhi**
Bank Name	:	**State Bank of India**
Branch Name	:	**Shastri Bhawan, New Delhi**
IFSC Code	:	**SBIN0050203**

c. **The STTP is a residential program of a duration of six days with minimum 40 participants**. The approved STTP shall be conducted within six months from the date of release of funds.

d. **If programme is not conducted within the period of six months of the release of the 100% grant, the released amount, alongwith interest accrued thereon, has to be necessarily returned back to AICTE within a month through RTGS.**

d. The expenditure under the Heads **'Honorarium to Course Coordinator'** and **'Honorarium to Resource Persons'** shall not exceed **1% & 20% respectively** of the total sanctioned grant for the Programme. However, overall expenditure shall not exceed the funds sanctioned for the Programme.

g. Any extra money required to complete the programme must be borne by the institute from their own resources. But the quality of the activities should not be compromised.

h. Any unavoidable circumstantial change in the program with respect to name of Project Coordinator, Venue and date for organizing STTP would mandatorily require prior approval of the Council. All such requests should be addressed to AICTE, in advance, recording the specific reasons for proposed changes, failing which the offer for the grant already issued would be treated as automatically withdrawn and the financial assistance released in favour of the beneficiary institution shall be refunded immediately to the Council. Kindly mention the File No. 34-66/231/FDC/STTP/Policy-1/2019-20 in your future correspondence.

i. **Steering Committee/Project Monitoring Committee (PMC)** is required to be constituted at institutional level. The constitution of the PEC shall be as under:

(i) Principal/Director/Registrar of the institution (Chairperson).

(ii) (ii) Coordinator of the program (Member Secretary).

(iii) Two HoDs and one subject expert (members).

The members of the said PMC shall not be below the rank of Associate Professor. A test shall be conducted by Project Monitoring Committee (PMC) at the end of the program and the certificates shall be issued to those participants who have attended the program and have qualified in the test. The minutes of the meetings, along with PMC report, are to be submitted to the Council at end of the program along with other mandatory documents.

j. **GoI GFR rules** (@https://doe.gov.in/order-circular/general-financial-rules2017-0) should be followed during utilization of grant.

k. This Sanction Order may be treated as Offer Letter for all purposes.

NOTE:- Any deviation from the above will invoke serious action against the Institute.

Yours sincerely,

(Col. B Venkat)
Director (FDC)

10 AUG 2020

Copy forwarded for information and necessary action to: -

1. **Name and Address of the Coordinator**
   Dr. BASKAR NEELAKANDAN
   SARANATHAN COLLEGE OF ENGINEERING
   VENKATESWARA NAGAR EDAMALAIPATTIPUDUR POST PANJAPPUR VILLAGE SRIRANGAM TALUK
   Tamil Nadu620012

2. **The Registrar / Director / Principal**
   SARANATHAN COLLEGE OF ENGINEERING
   VENKATESWARA NAGAR EDAMALAIPATTIPUDUR POST PANJAPPUR VILLAGE SRIRANGAM TALUK
   Tamil Nadu620012

3. **Guard File**

अखिल भारतीय तकनीकी शिक्षा परिषद्
(भारत सरकार का एक सांविधिक निकाय)
(मानव संसाधन विकास मंत्रालय, भारत सरकार)
नेल्सन मंडेला मार्ग, वसंत कुंज, नई दिल्ली-110070

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(A Statutory Body of the Govt. of India)
(Ministry of Human Resource Development, Govt. of India)
Nelson Mandela Marg, Vasant Kunj, New Delhi-110070

Phone : 011-26131577 - 78, 80
011-29581000
Website : www.aicte-india.org

सत्यमेव जयते

14 Sept 2020

Col. B. Venkat
Director (FDC)
E-mail: director.fdc@aicte-india.org
Mob. No. 8130255472

Sub:–For information of AICTE approved institutes which have received grants for conducting STTP's/FDP's under AQIS 2019-20.

Sir,

This is in reference to grants released by AICTE under AQIS 2019-20 for conduct of STTP's/FDPs. It is being observed that due to present circumstances of ongoing pandemic of COVID-19, most of Institutes are facing difficulties in organizing and conducting STTP's. This office has received a number of requests from various institute to allow on line method of conducting STTP/FDP to complete their commitments.

In this regard, it is to inform that all such institutes, which have already received grants for conducting STTP's/FDPs through prevailing contact mode, are **allowed to conduct STTP's through online mode subject to following conditions:**

(i) The Institute will be allowed to adjust the grants received for STTP at following rates:-

a.	Honorarium for Coordinator	Rs. 5000.00
b.	Honorarium to experts	Rs. 75000.00
c.	Provision for payment to lab attendant engaged during lab practices	Rs. 3000.00
d.	miscellaneous charge	Rs. 10000.00
	Total for each STTP's	**Rs 93000.00**

(ii) The Institute will conduct more than one STTP's in multiples of Rs. 93000.00 within the total grant received by it and shall return the balance unspent amount to AICTE.

e.g.

if an Institute has received grant for STTP	=Rs 3,00,000.00
Cost of three STTP	3x93000= Rs. 279000.00
Balance	**= Rs. 21,000.00**

The institute will return the balance unspent amount of Rs.21,000.00 alongwith interest earned on such amounts to AICTE while submitting UC for adjustment of accounts for keeping its eligibility for receiving grants in next AQIS.

(iii) The institute will conduct all three STTP's as explained above on the same topic which has been approved by AICTE while releasing the grants.

(iv) Firm dates for each program will be intimated to AICTE beforehand.

On similar lines FDP (02 week program) to be conducted online has the following approval totaling to Rs. 1,86,000.00.

a.	Honorarium for Coordinator	Rs. 5000.00
b.	Honorarium to experts	Rs. 1,68,000.00
c.	Provision for payment to lab attendant engaged during lab practices	Rs. 3000.00
d.	miscellaneous charge	Rs. 10000.00
	Total for each FDPs	**Rs 1,86,000.00**

The conducting of FDP's (two weeks program) shall be subjected to the similar conditions (i) to (iv) given above for conduct STTP courses, except rates of Honorarium to experts.

You are requested to acknowledge receipt of above guidelines and convey your consent if your institute is ready for conducting the STTP through online format on conditions explained above.

It is once again reiterated that online conduct of FDP & STTP will be on explicit permission of AICTE.

This provision is valid only till 31 Dec 2020.

14 Sept

Yours sincerely,

Director (FDC)

Saranathan College of Engineering

Tiruchirappalli - 620 012

Department of Mechanical Engineering

15/03/2021

Submitted to the Principal:

Sub : Requisition for permission to form Program Monitoring Committee - reg.

Ref. : STTP-Sanction Letter, Ref.No.34-66/231/FDC/STTP/Policy-1/2019-20

dated 10/08/2020

I have received sanction letter regarding **Short Term Training Programme (STTP)** on **"Rudiments and Practices of Computational Fluid Dynamics in Thermo Fluid Analysis"** from **All India Council for Technical Education (AICTE)** under grant-in-aid scheme and also release of a sum of **Rs. 1,91,567/-** for conducting the programme during the financial year 2020 - 2021. The STTP will be organized in online mode in two phases with minimum of 40 participants in each phase.

As per instructions given in the letter, **Program Monitoring Committee (PMC)** is required to be constituted at institutional level. The role of PMC is to conduct the test at the end of the programme and the certificates shall be issued to those participants who have attended the programme and have qualified in the test.

Hence I request you to give permission to constitute Program Monitoring Committee (PMC) for the same.

Thanking You

Yours faithfully

15/3/2021

15/3/21

Dr. N. Baskar

(Coordinator)

Saranathan College of Engineering
Tiruchirappalli - 620 012
Department of Mechanical Engineering

18/03/2021

Submitted to the Principal:

Sub: Formation of Program Monitoring Committee (PMC) for STTP - reg.

Ref.: STTP-Sanction Letter, Ref.No.34-66/231/FDC/STTP/Policy-1/2019-20 dated 10/08/2020

The AICTE has sanctioned one week **Short Term Training Programme (STTP)** on **"Rudiments and Practices of Computational Fluid Dynamics in Thermo Fluid Analysis"** to be organized by the Department of Mechanical Engineering during Phase-I from 10th May 2021 to 15th May 2021 and Phase-II from 24th May 2021 to 29th May 2021. As per instruction given in the sanction letter, the **Programme Monitoring Committee (PMC)** is constituted on **22nd March 2021** and the details are given below.

S. No.	Staff Name	Designation & Department	Position	Signature
1.	Dr. D. Valavan	Principal/Mechanical Engg.	Chairperson	
2.	Dr. N. Baskar	Professor / Mechanical Engg.	Member Secretary	
3.	Dr. G. Jayaprakash	Professor & Head/ Mechanical Engg.	Member	
4.	Dr. C. Krishnakumar	Professor & Head/E.E.E.	Member	
5.	Dr. A. Mercy Vasan	Associate Professor/ Mechanical Engg.	Subject Expert	

Thanking You,

Yours faithfully

18/3/21

Dr. N. Baskar

(Coordinator)

18/3/2021

Saranathan College of Engineering
Tiruchirappalli - 620 012
Department of Mechanical Engineering

Minutes of Meeting

The **Programme Monitoring Committee (PMC)** meeting is convened on **22nd March 2021** at 10.00 AM in P.G. Research Lab, Department of Mechanical Engineering. The following points are discussed and proposed in the meeting:

- Roles of Programme Monitoring Committee (PMC).
- Duration of the Programme (Phase-I from 10th May 2021 to 15th May 2021 and Phase-II from 24th May 2021 to 29th May 2021).
- Resource persons for the entire duration of the programme.
- Honorarium for the resource persons.
- Selection Procedure for the outside participants.
- Conduct of the program in online mode.
- Conduct of Test and issue of certificates to the participants.
- Distribution of course materials to the participants.
- Proposed budget for the STTP.

Dr. D. Valavan
(Chairperson)

Dr. N. Baskar
(Member Secretary)

Dr. C. Krishnakumar
(Member)

Dr. G. Jayaprakash
(Member)

Dr. A. Mercy Vasan
(Subject Expert)

Saranathan College of Engineering

Trichy-12

Department of Mechanical Engineering

AICTE Sponsored one week Short Term Training Programme (STTP)

on

Rudiments and Practices of Computational Fluid Dynamics in Thermo Fluid Analysis

Phase I - 10/05/2021 to 15/05/2021

The Department of Mechanical Engineering of Saranathan College of Engineering, Trichy organized a one week Short Term Training Programme (STTP) titled "**Rudiments and Practices of Computational Fluid Dynamics in Thermo Fluid Analysis**" in two phases. **Phase I** of the STTP was conducted from 10th May 2021 to 15th May 2021. This program was sponsored by AICTE, New Delhi. The programme began with the keynote address by Dr. S.Vengadesan, Professor, Department of Applied Mechanics, IIT Madras, Chennai, who emphasized the importance of adopting CFD in thermo fluid research and industrial practices. The training program was well structured with twenty-four technical sessions in which lectures were delivered by experts from eminent institutes like IITs, CEG (Anna University) etc. and practising CFD engineers and scientists from PSUs like BHEL (Trichy), IGCAR, Kalpakkam and other corporate units. A broad range of topics were covered during the sessions – topics ranging from fundamental concepts of Computational Fluid Dynamics to live demonstrations on applying CFD software tools in solving real time thermo fluid problems. The CFD team from FOSSEE, IIT Bombay gave a live demonstration on the capabilities of Open FOAM as free CFD software. The training program concluded with a valedictory address by Dr. S.M.Giriraj Kumar, HOD/ICE & Head (T&P), SCE, who gave a brief overview of the National Education Policy (NEP) and highlighted the salient features of the policy. The programme was well attended by academicians and researchers from all over Tamil Nadu and other neighbouring states and 59 participants received certificates.

SARANATHAN COLLEGE OF ENGINEERING
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)
(Accredited by NAAC with A+ Grade)

DEPARTMENT OF MECHANICAL ENGINEERING
(Accredited by NBA)

AICTE Sponsored One Week Short Term Training Programme on Rudiments and Practices of Computational Fluid Dynamics in Thermo Fluid Analysis 03/05/2021

SCHEDULE OF TRAINING PROGRAMME-Phase I (10/05/21 to 15/05/21)

Day/ Session	SESSION-I (9.45 AM -11.15 AM)	SESSION-II (11.30 AM – 1.00 PM)		SESSION-III (2.00 PM – 03.30 PM)	SESSION-IV (3.45 PM – 5.15 PM)
10.05.21 MON	**Prof. Dr. S. Vengadesan,** Professor, Dept. of Applied Mechanics, IIT- Madras, Chennai *Inaugural Address and CFD- Basics and Governing Equations-Part I*	**Prof. Dr. S. Vengadesan,** Professor, Dept. of Applied Mechanics, IIT- Madras, Chennai *CFD- Basics and Governing Equations-Part II*	L U N C H B R E A K	**Dr. K. Arul Prakash,** Professor , Dept.of Applied Mechanics, IIT- Madras, Chennai *Proposed topic: Finite Volume method –Part I*	**Dr. K. Arul Prakash,** Professor , Dept. of Applied Mechanics, IIT- Madras, Chennai *Proposed topic: Finite Volume method –Part II*
11.05.21 TUE	**Dr.R.Sivakumar** Professor & Dean, School of Mechanical Engineering, VIT-Chennai Campus *Proposed topic: Applications of CFD – An Overview*	**Dr.P.R.Naren,** Associate Professor, Dept. of Chemical Engineering, SCBT, SASTRA, Tanjore *Proposed topic: Building and Simulating CFD Models*		**Dr. Kulasekharan Narasingamurthi,** Specialist-Computational Fluid Dynamics, Simulation Metier-GEEDS, Valeo India Private Limited, Chennai *Proposed topics: 1. Design and Development of Compact Heat Exchangers* *2. Gas Turbine Cooling System*	
12.05.21 WED	**Dr.Prasad Patnaik BSV,** Professor, Dept of Applied Mechanics, IIT- Madras, Chennai *Proposed Topic: Turbulent flows and Modelling*	**Dr.K.Venkatasubbiah,** Associate Professor, Department of Mechanical and Aerospace Engineering, IIT Hyderabad *Proposed topic: Computational Fluid Dynamics (CFD) and Heat transfer*		**Dr.M.Ganesan,** Associate Professor, Dept of Mech. Engineering, Saranathan College of Engineering, Trichy *Proposed Topic: Case Study on CFD Simulation*	**Dr. G. Jayaprakash,** Professor & Head, Dept of Mech. Engineering, Saranathan College of Engineering, Trichy *Proposed topic: CFD-Application Problems using ANSYS CFX*

<table>
<tr><th>Day/
Session</th><th>SESSION-I
(9.45 A.M -11.15P.M)</th><th>SESSION-II
(11.30 A.M – 1.00P.M)</th><th rowspan="4">L
U
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K</th><th>SESSION-III
(2.00 PM – 03.30 PM)</th><th>SESSION-IV
(3.45 PM – 5.15 PM)</th></tr>
<tr><td>13.05.21
THU</td><td colspan="2">Dr. Pallab Sinha Mahapatra,
Assistant Professor,
Department of Mechanical Engineering,
IIT- Madras, Chennai

Proposed topic: Multiphase Flow heat transfer</td><td>Dr.P.Harish,
Asst.Professor,
Dept. of Mechanical Engineering
IIT Jammu,J&K

Proposed topic: CFD Modeling of Boiling heat Transfer</td><td>Dr. N. Baskar,
Professor,
Dept of Mech. Engineering,
Saranathan College of Engineering, Trichy

Proposed topic: Optimization of Finite Element Equations in Heat Transfer Problems</td></tr>
<tr><td>14.05.21
FRI</td><td>Prof. Janani Srree
FOSSEE
IIT Bombay

Proposed topic: CFD-OpenFOAM</td><td>Mr. Ashley Melvin and Mr. Divyesh Variya
CFD Members, FOSSEE
IIT Bombay

Proposed topic: Software Demo on CFD problems in Open FOAM</td><td>Prof. Dr. G. Kumaresan,
Associate Professor,
Institute of Energy Studies,CEG, Anna University, Chennai

Proposed topic: CFD Analysis of Thermal System Components</td><td>Dr. A. Mercy Vasan,
Associate Professor,
Dept of Mech. Engineering,
Saranathan College of Engineering, Trichy

Proposed topic: Challenges in applying CFD techniques to solve real time problems in CFB boilers</td></tr>
<tr><td>15.05.21
SAT</td><td colspan="2">Dr R.Elankovan, DGM(Commercial/Fossil Boilers)
B.H.E.L, Trichy

Proposed topic :Grid Generation and Case studies on applications of CFD</td><td>Dr. N. L. Parthasarathi,
Scientific Officer, Metal Forming and Tribology Section,
IGCAR , Kalpakkam

Proposed topic:
Nano materials and coatings in industrial applications: A tribology perspective</td><td>Dr.S.M.Giriraj Kumar,
Professor& Head,
Dept of ICE
&
Head(T&P),
Saranathan College of Engineering, Trichy

Talk on National Education Poilcy(NEP) and Valediction</td></tr>
</table>

Certification test on 15.5.2021 at 3.45PM

Coordinator

DAY 1: 10/05/2021

SESSION 1:

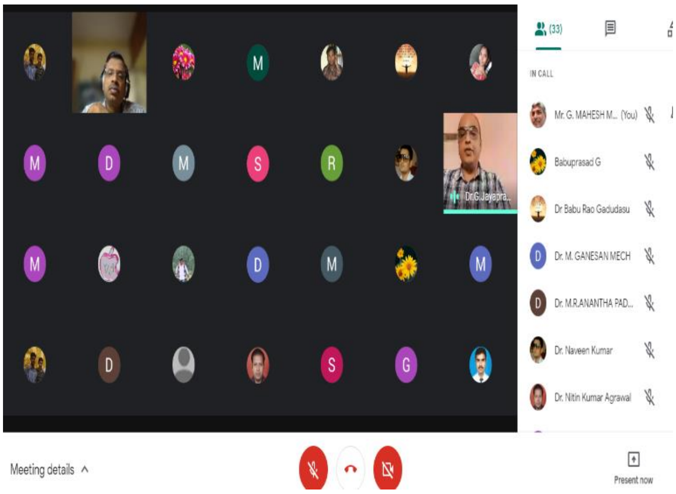
Inauguration & CFD- Basics and Governing Equations-Part I

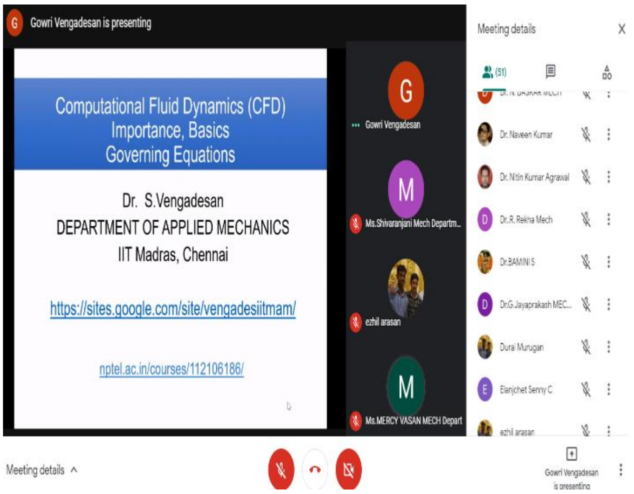
Prof. Dr. S. Vengadesan,
Professor,
Dept. of Applied Mechanics,
IIT- Madras, Chennai.

SESSION 2:

CFD- Basics and Governing Equations-Part II

Prof. Dr. S. Vengadesan,
Professor,
Dept. of Applied Mechanics,
IIT- Madras, Chennai.

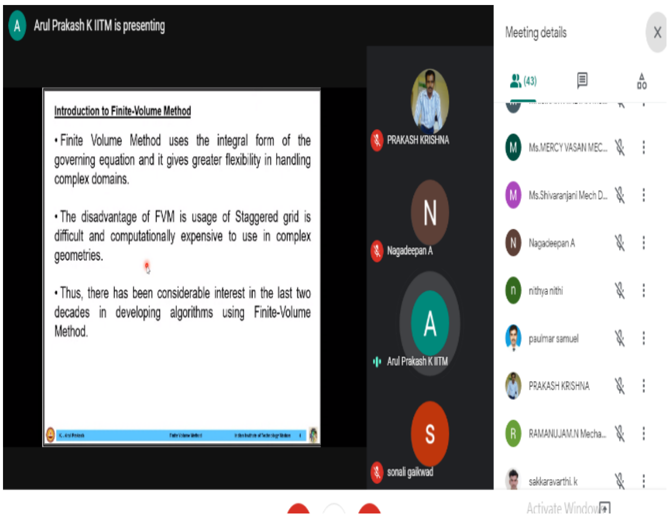


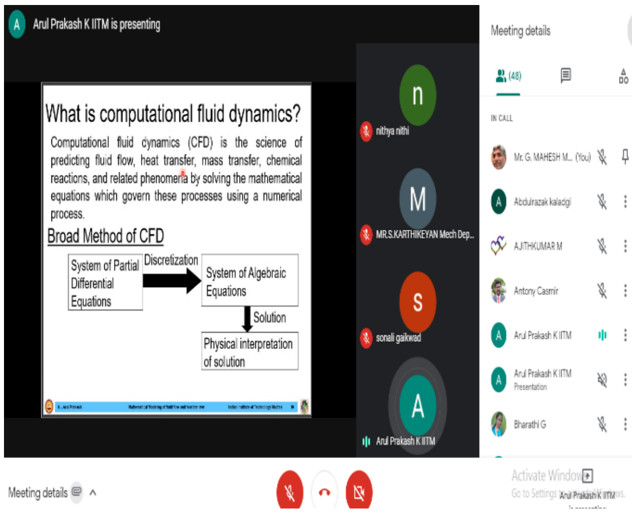


SESSION 3 & 4:

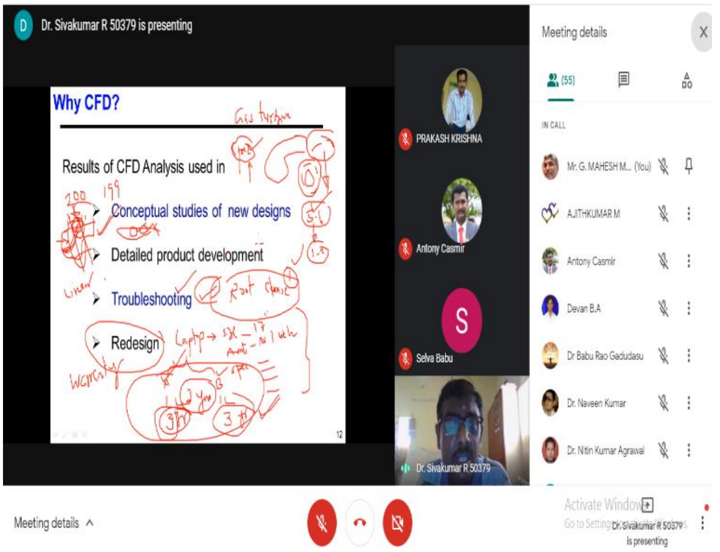
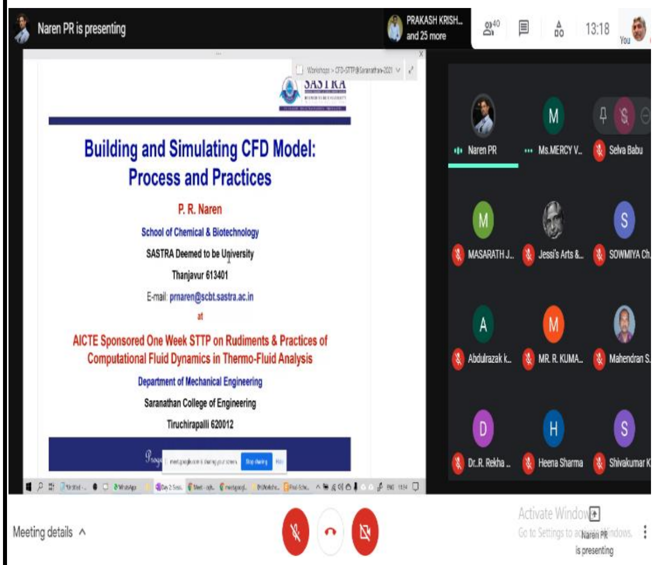
Finite Volume method

Dr. K. Arul Prakash,
Professor,
Dept.of Applied Mechanics,
IIT- Madras, Chennai





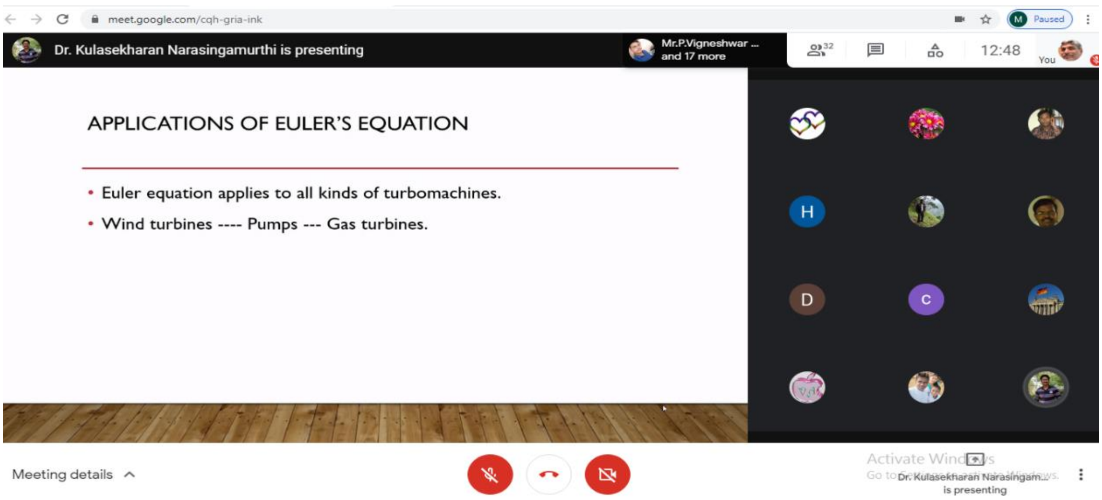
DAY 2: 11/05/2021

SESSION 1:	SESSION 2:
Applications of CFD – An Overview Dr.R.Sivakumar Professor & Dean, School of Mechanical Engineering, VIT-Chennai Campus	Building and Simulating CFD Models Dr.P.R.Naren, Associate Professor, Dept. of Chemical Engineering, SCBT, SASTRA, Tanjore
	

SESSION 3& 4:

1. Design and Development of Compact Heat Exchangers
2. Gas Turbine Cooling System

Dr. Kulasekharan Narasingamurthi,
Specialist-Computational Fluid Dynamics, Simulation
Metier-GEEDS, Valeo India Private Limited, Chennai.



DAY 3: 12/05/2021

SESSION 1:

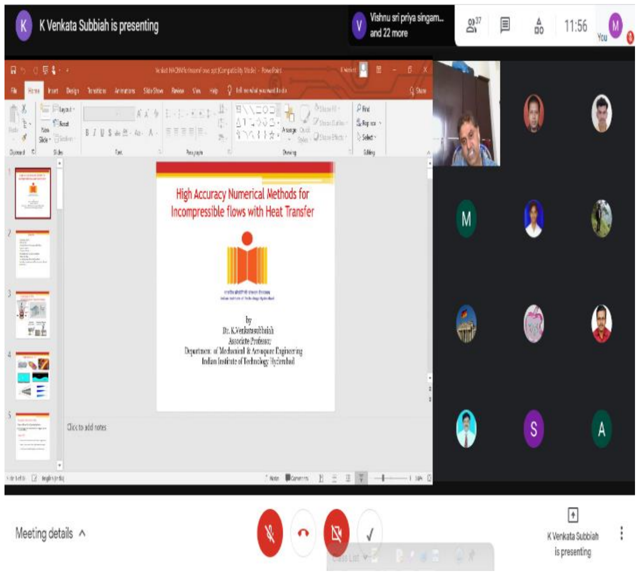
Proposed Topic: Turbulent flows and Modelling

Dr.Prasad Patnaik BSV,
Professor,
Dept of Applied Mechanics,
IIT- Madras, Chennai

SESSION 2:

Computational Fluid Dynamics (CFD) and Heat transfer

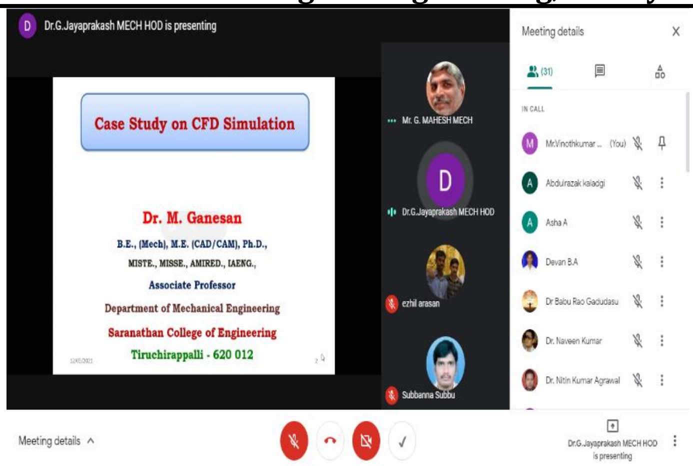
Dr.K.Venkatasubbiah,
Associate Professor,
Department of Mechanical and Aerospace Engineering,
IIT Hyderabad



SESSION 3:

Case Study on CFD Simulation

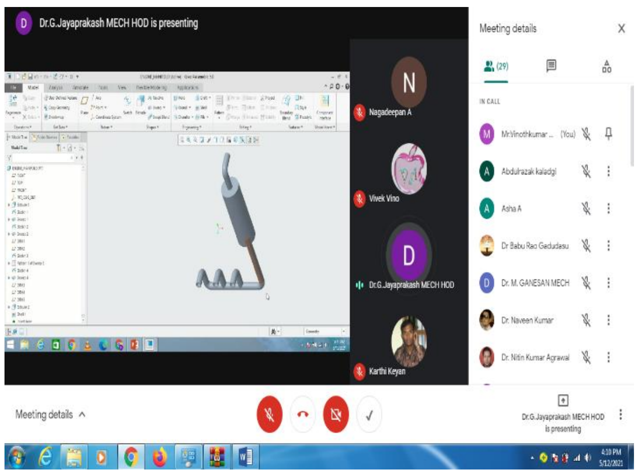
Dr.M.Ganesan,
Associate Professor,
Dept of Mech. Engineering,
Saranathan College of Engineering, Trichy



SESSION 4:

CFDApplication Problems using ANSYS CFX

Dr. G. Jayaprakash,
Professor & Head,
Dept of Mech. Engineering,
Saranathan College of Engineering, Trichy

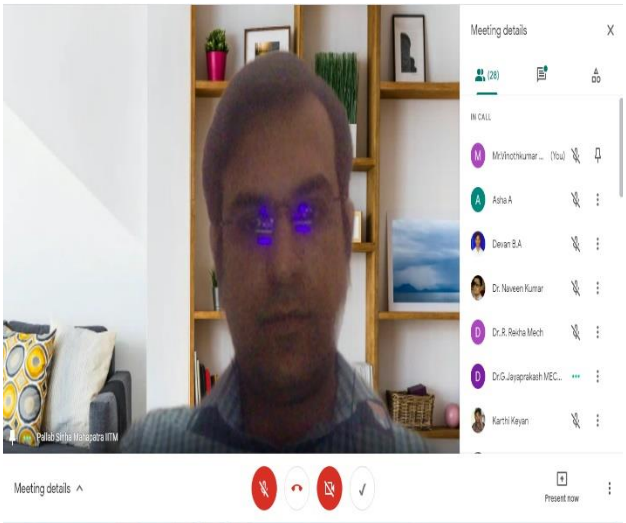


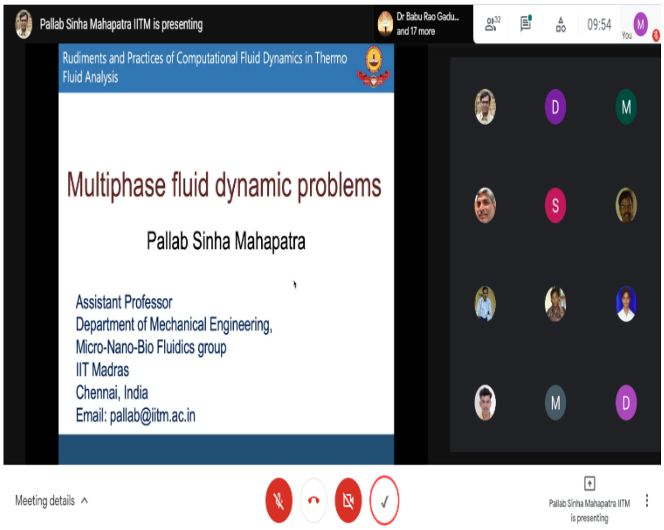
DAY 4: 13/05/2021

SESSION 1&2:

Multiphase Flow heat transfer

Dr. Pallab Sinha Mahapatra,
Assistant Professor,
Department of Mechanical Engineering,
IIT- Madras, Chennai



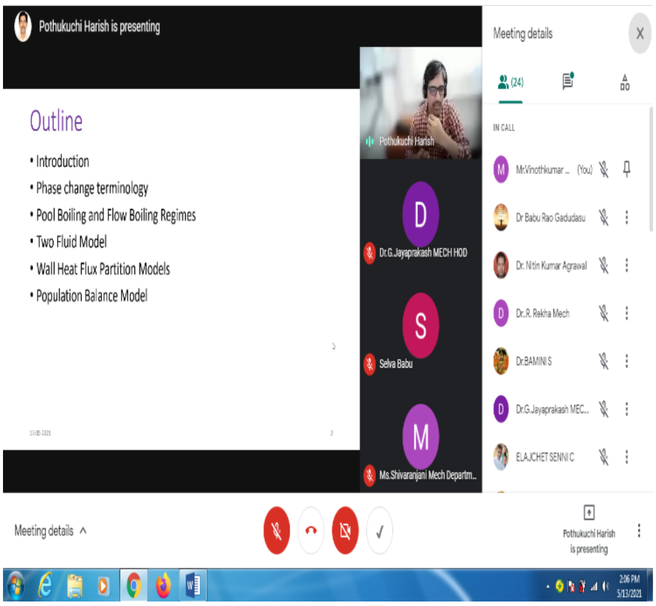


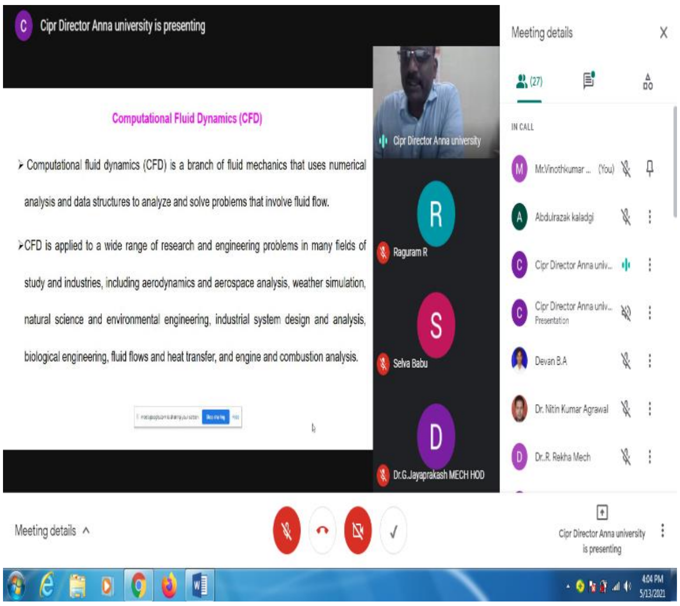
SESSION 3:

CFD Modeling of Boiling Heat Transfer
Dr.P.Harish,
Asst.Professor,
Dept. of Mechanical Engineering
IIT Jammu,J&K

SESSION 4:

Research Patenting
Dr. M. Kantha Babu,
Director, CIPR, andProfessor,
Dept. of Manufacturing Engineering, CEG,
Anna University, Chennai.



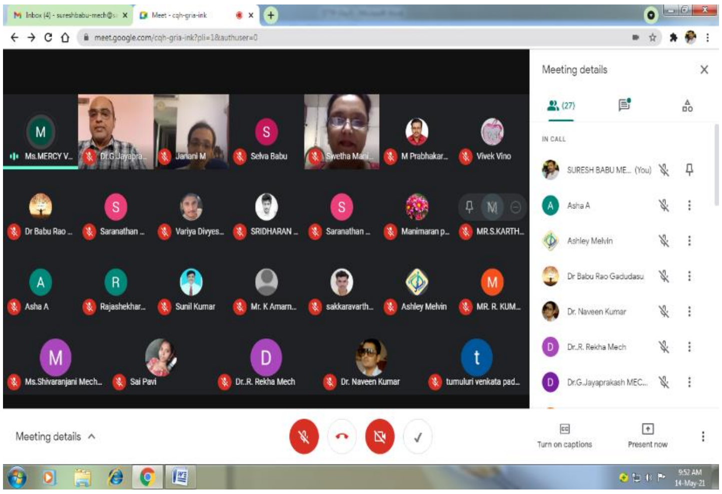


DAY 5: 14/05/2021

SESSION 1:

CFD – Open FOAM

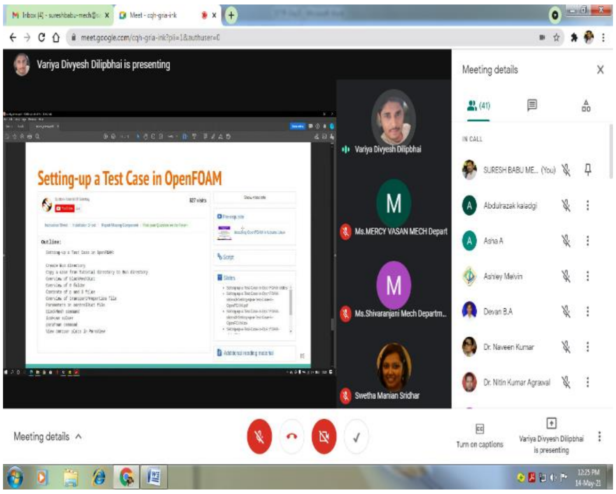
Prof Janani Srree,
FOSSEE,
IIT Bombay



SESSION 2:

Software Demo on CFD problems in open FOAM

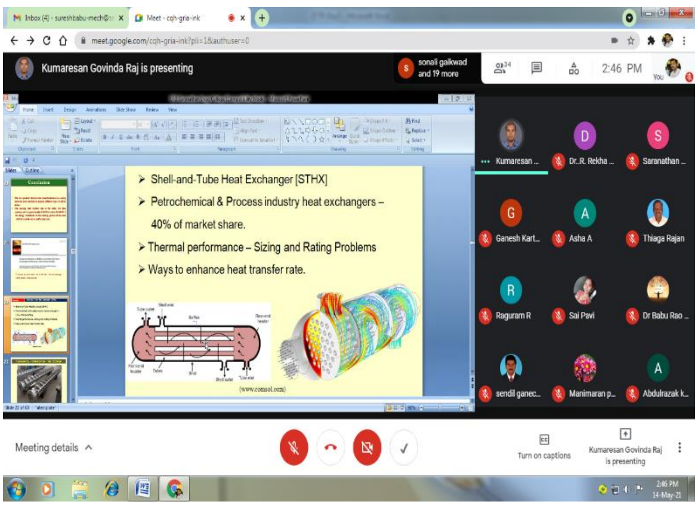
Mr. Ashley Melvin and Mr. Divyesh Variya,
CFD Members,
FOSSEE,
IIT Bombay.



SESSION 3:

CFD Analysis of Thermal System Components.

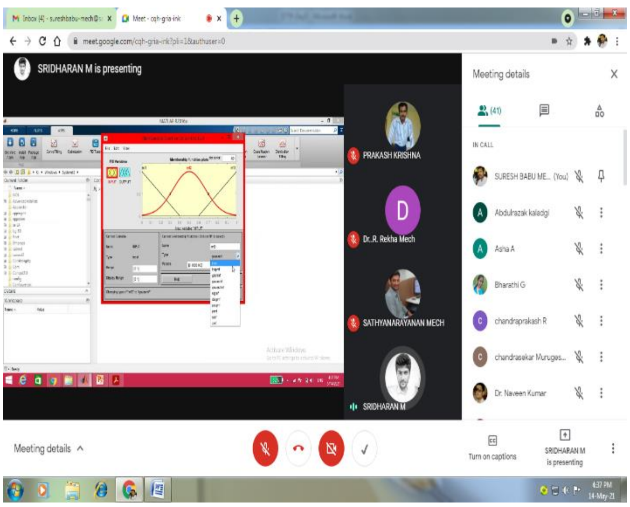
Prof. Dr. G.Kumaresan,
Associate Professor,
Institute of Energy Studies,
CEG,
Anna University,
Chennai



SESSION 4:

Applications of Fuzzy Logic Expert Systems in the Field of Termo-Fluidics.

Dr. M.Sridharan,
Associate Professor,
Dept of Mech. Engineering,
K.Ramakrishnan College of Engineering,
Trichy



DAY 6: 15/05/2021

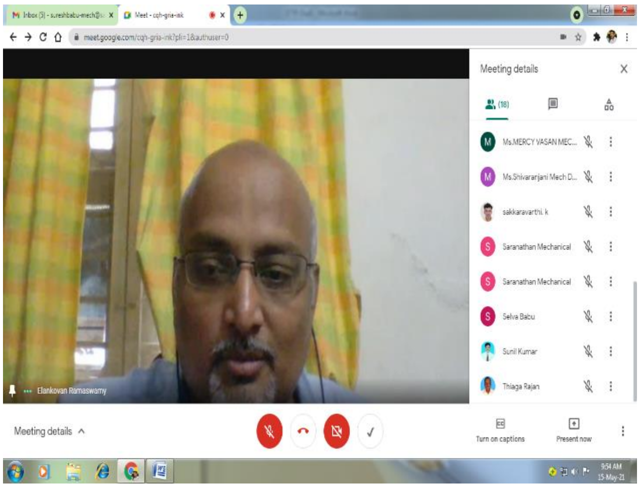
SESSION 1& 2:

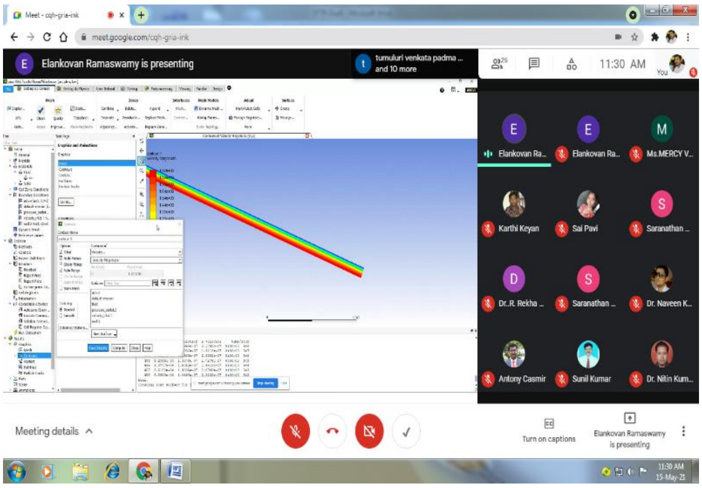
Grid Generation and Case studies on applications of CFD

Dr.R.Elangovan,

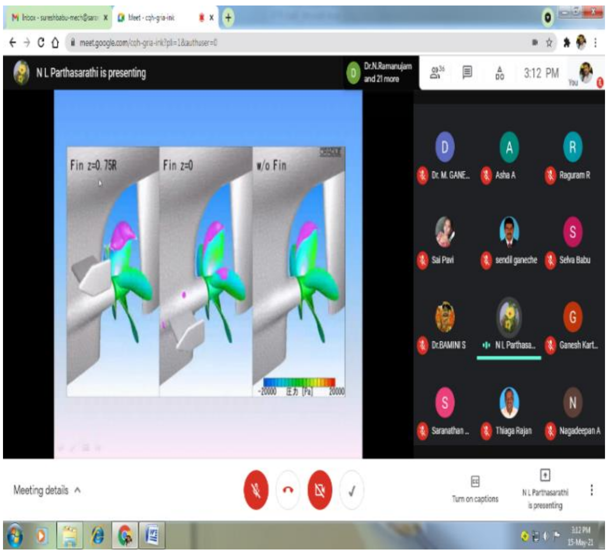
DGM (Commercial/Fossil Boilers),

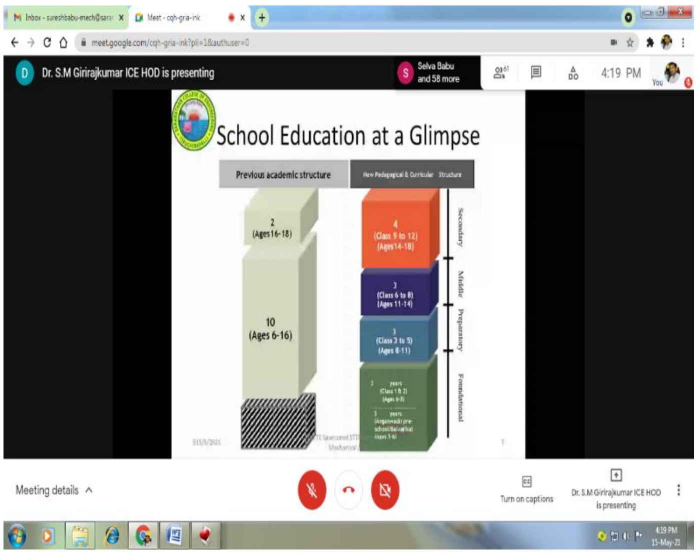
B.H.E.L., Trichy





SESSION 3:	**SESSION 4:**
Nano materials and coatings in industrial applications : A tribology perspective **Dr. N.L.Parthasarathi,** **Scientific Officer,** **Metal Forming and Tribology Section,** **IGCAR,Kalpakkam.**	**Talk on National Education Policy (NEP).** **Dr. S.M.Giriraj Kumar,,** **Professor & Head,** **Dept of ICE & Head (T & P),** **Saranathan College of Engineering, Trichy**





ABOUT THE COLLEGE

Saranathan College of Engineering was founded in the year 1998 by "VidyaSevaRatnam", "Guru Seva Mani" Auditor Sri. K. Santhanam. The institution was so named in respectful memory of his Guru Prof. Saranathan, the then Principal of National College, Tiruchirappalli. Saranathan College of Engineering is a self-financing college approved by AICTE and affiliated to Anna University, Chennai for the UG courses it offers(Civil, CSE, EEE, ECE, IT, ICE and Mechanical Engineering). All the six (6) eligible UG branches are accredited by NBA, New Delhi. An enviable 'A+' rating by "NAAC" stands testimony to the commitment of the college to impart quality education.

ABOUT THE DEPARTMENT

The Department of Mechanical Engineering was started in the year 2005. The department offers an undergraduate programme B.E. in Mechanical Engineering and a postgraduate programme M.E. in Thermal Engineering. The department is accredited by NBA, New Delhi, since June 2018. The department is also a recognized research centre under Anna University, Chennai. The department has all of the following: state-of-the-art laboratories, CAD centre with advanced software, a department library, experienced and expert faculty members having doctoral degrees, outstanding research publications in peer reviewed International/National journals. The department's mission is to generate employable mechanical engineering graduates with knowledge, skills and ethics and provide them with the professional and soft skills necessary to lead a successful career and equip them with the confidence necessary to contribute positively to the society by performing in their respective chosen fields of endeavour.

PROGRAMME EVALUATION COMMITTEE (PEC)

PATRON:

Shri. S. Ravindran
Secretary

CHAIRPERSON:

Dr. D. Valavan
Principal

CO-CHAIRPERSON:

Dr. G. Jayaprakash
Professor & Head, Mechanical Engineering.

COORDINATOR:

Dr. N. Baskar
Professor, Mechanical Engineering
.

PEC MEMBER

Dr. C. Krishnakumar
Professor & Head, Department of Electrical and Electronics Engineering.

CO-COORDINATORS:

Dr. A. Mercy Vasan
Associate Professor, Mechanical Engineering
Dr. R. Rekha
Associate Professor, Mechanical Engineering

CONVENERS:

Dr. M. R. Anantha Padmanaban
Associate Professor,Mechanical Engineering
Dr. M. Ganesan
Associate Professor, Mechanical Engineering

ORGANIZERS:

Dr. G. Mahesh
Associate Professor, Mechanical Engineering
Mr. R. Suresh Babu
Assistant Professor, Mechanical Engineering
Mr. S. Sathyanarayanan
Assistant Professor, Mechanical Engineering

AICTE

Sponsored

One-week Short Term Training Program
on

Rudiments and practices of Computational Fluid Dynamics in Thermo-fluid Analysis

Phase I - 10.05.2021-15.05.2021
Phase II – 24.05.2021-29.05.2021

Organized by

Department of Mechanical Engineering
Accredited by NBA, New Delhi

SARANATHAN COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)
(Accredited by NAAC with A+ Grade)

www.saranathan.ac.in

OBJECTIVES AND CONTEXT

- To provide a comprehensive training to engineers and researchers on application of CFD techniques over a broad range of applications like turbomachinery and multi-phase flows
- To familiarize the basic concepts, methods and mathematical equations controlling practical thermal and fluid flow phenomena
- To correlate theoretical and practical engineering usages of CFD through hands-on –training on various software packages
- To highlight the contemporary research trends in CFD and promote progressive research in product design and development

RELEVANCE

The short-term training programme is essential in the current scenario to facilitate researchers and engineers to adopt CFD as a standard practice in industry and research. With simulation techniques becoming a vital part of the design process in providing within the time constraints efficient solutions to thermal and fluid system, CFD has started playing a crucial role in product development cycle. The major obstacle, to the evolving of CFD from the stage of being a mere research tool to the stage of being used for real time applications in industries, is the lack of fundamental knowledge and high level of expertise in coding and software usage. This program aims to bridge that gap.

RESOURCE PERSONS

Experts from IITs, NITs, Anna University, DRDO, IGCAR, Industry, etc.

EXPECTED OUTCOMES

This program will enable the faculty, practising engineers and researchers

- ✓ To solve fundamental equations relating to fluid flow and heat transfer problems
- ✓ To acquire software computing skills in CFD and interpret results to make design decisions
- ✓ To forecast implications of design changes and optimize a design, based on CFD results, with an aim to create quality product development and to carry out virtual experimentation on complicated prototypes

TOPICS OF INTEREST

- Fundamental knowledge in theory and concepts of Computational Fluid Dynamics
- Hands on training on modern CFD software tools for solving Thermo-fluid problems
- Industrial visits to understand the significance of CFD applications in solving real time industrial flow problems

EXPECTED SKILLS AND SUGGESTED FURTHER ACTIONS

- Fundamental knowledge in theory and concepts of Computational Fluid Dynamics
- Industrial visits to understand the significance of CFD applications in solving real time industrial flow problems

COURSE DURATION

Each STTP is for a duration of 6 days and will be held online through Google meet. For an effective utilization of the program and to become eligible for the e-certificate attendance on all the days is important. Based on their convenience participants can choose to attend any one of the phases of STTP listed.

REGISTRATION

Registration is based on first come first served basis. Google Meet link will be provided by E-Mail, to the selected participants only.

NO REGISTRATION FEE.

Registration Link :

https://forms.gle/NFq498upV8vqsxVTA

CONDUCT OF TEST AND ISSUANCE OF CERTIFICATE

All the participants have to appear for a test at end of the program. E-Certificates will be issued only to those participants who have attended the program on all the days and have qualified in the evaluation test.

IMPORTANT DATES

Last date of Receipt Application: 04-05-2021
(Google form)
Intimation to Selected Participants: 05-05-2021
(Mail)

ADDRESS FOR CORRESPONDENCE

Dr.G.Mahesh (+91 8610337854)
Associate Professor,
Department of Mechanical Engineering
Saranathan College of Engineering, Panjappur, Tiruchirappalli, Tamil Nadu 620012.

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STTP PHASE I - PARTICIPANTS LIST

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48	shivakumar@avit.ac.in	Mr. N. SHIVAKUMAR	Assistant Professor	Mechanical Engineering	Aarupadai Veedu Institute of Technology	Chengalpattu
49	sonalig.15@gmail.com	Dr. SONALI SHANKAR GAIKWA	Assistant Professor	Computer Science	Shri Shivaji Science and Arts College, Chikhli	Aurangabad
50	sowmiya.c2020@vitstudent.ac.i	Mr. C. SOWMIYA	Research Scholar	Mathematics	VIT, Vellore	Vellore
51	sridharan.mech@krce.ac.in	Dr. M. SRIDHARAN	Assistant Professor	MECHANICAL ENGINEERING	K. RAMAKRISHNAN COLLEGE OF ENGINEERING	TIRUCHIRAPPALLI

52	subbu07mtech@gmail.com	Dr. K. SUBBANNA	Assistant Professor	Mathematics	Shri Gnanambica Degree College:Madanapalle	Chittoor
53	skumarbit@gmail.com	Dr. SUNIL KUMAR	Associate Professor	Mechanical Engineering	BIT SINDRI	DHANBAD
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57	venkatakrishnan1000@gmail.co	Mr. S. VENKATA KRISHNAN	Research Scholar	Mechanical Engineering	Saranathan College of Engineering	Trichy
58	thangakrishna26@gmail.com	Mr. T. VENKATESAN	Lecturer	Civil engineering	AVC POLYTECHNIC COLLEGE	Mayiladuthurai
59	pvivek.vino@gmail.com	Mr. P. VIVEK	Assistant Professor	MECHANICAL ENGINEERING	MOOKAMBIGAI COLLEGE OF ENGINEERING	PUDUKKOTTAI

Co-ordinator

AICTE Sponsored STTP on "Rudiments and Practices of Computational Fluid Dynamics in Thermo- fluid Analysis"

Assessment Test & Feedback Form - Phase - I

Email *

muthiahct2003@gmail.com

Full Name In CAPITAL LETTERS (e.g:Dr. S. Cristiano Ronaldo) *

CT MUTHIAH

Designation *

Associate Professor

Department *

MECHANICAL ENGINEERING

Institute / Organisation Name (Enter the Name of your Institute/ Organisation only, don't enter the full Address) *

RAJALAKSHMI ENGINEERING COLLEGE

District *

CHENNAI

State *

TAMILNADU

Whatsapp Mobile Number *

9994013723

1. Which of these could be an optimal mesh? * 1 point

- (●) a) Non-uniform
- ( ) b) Uniform
- ( ) c) Grids with increasing lengths
- ( ) d) Grids with decreasing lengths

2. The Reynolds transport theorem establishes a relationship between _________ and __________ * 1 point

- (selected) a) Control mass system, Control volume system
- b) Differential equation, Integral equation
- c) Non-conservative equation, Conservative equation
- d) Substantial derivative, Local derivative

3. The physical principle behind the continuity equation is _________ * 1 point

- (selected) a) Mass conservation
- b) Zeroth law of thermodynamics
- c) First law of thermodynamics
- d) Energy conservation

* 1 point

4. Consider a model of finite control volume (volume V and surface area S) fixed in space with elemental volume dV, vector elemental surface area $d\vec{S}$, density ρ and flow velocity $\vec{V}$. What is the net mass flow rate out of the surface area?

a) $\iint v\rho\vec{V}\ .dV$

Option 1

b) $\rho\vec{V}\ .d\vec{S}$

Option 2

c) $\iiint v\rho\vec{V}\ .d\vec{S}$

Option 3

d) $\iint v\rho\vec{V}\ .d\vec{S}$

Option 4

5. What is the physical statement of mass conservation equation for a finite control volume moving along with the flow? * 1 point

- a) Rate of change of mass inside the control volume = 0
- (selected) b) Rate of change of mass inside the control volume = constant
- c) Net mass flow through the control surface = Rate of change of mass inside the control volume
- d) Net mass flow through the control surface≠Rate of change of mass inside the control volume

6. What is the physical statement of mass conservation equation for a finite control volume fixed in space? * 1 point

- a) Net mass flow through the control surface = constant
- b) Rate of change of mass inside the control volume = constant
- (selected) c) Net mass flow through the control surface = Rate of change of mass inside the control volume
- d) Net mass flow through the control surface≠Rate of change of mass inside the control volume

7. Which of these does not characterize a turbulent flow? * 1 point

- (selected) a) Time-independent
- b) Rapid mixing
- c) Three-dimensional fluctuation
- d) Unstable

8. What is Reynolds stress? * 1 point

- (selected) a) Stress due to velocity fluctuations
- b) Tangential component of pressure
- c) Stress due to pressure fluctuations
- d) Normal component of viscosity

9. Eddies in turbulent flows result in _________ * 1 point

- (selected) a) high diffusion coefficients
- b) less diffusion coefficients
- c) high value of the source term
- d) low value of the source term

10. Transfer of kinetic energy from large eddies to smaller eddies is called as _________ * 1 point

- (selected) a) Energy cascade
- b) Momentum cascade
- c) Energy decomposition
- d) Momentum decomposition

11. Reynolds number gives the relative importance of _________ * 1 point

- a) viscous force and tangential force
- b) inertia force and viscous force
- c) inertia force and pressure force
- d) pressure force and viscous force

12. Which is the first step in the numerical solution of a fluid flow problem? * 1 point

- a) Discretization
- b) Physical model of the flow
- c) Mathematical model of the flow
- d) Iteration

13. Choosing a particular type of discretization method is ineffective when __________ * 1 point

- a) mathematical model is complex
- b) mathematical model is simple
- c) grid is coarse
- d) grid is very fine

14. The mathematical model is based on ___________ * 1 point

- (selected) a) physical principles and assumptions
- b) physical principles
- c) flow model
- d) flow model and assumptions

15. Initial conditions are used for _________ problems. * 1 point

- (selected) a) time-dependent problems
- b) boundary value problems
- c) control volume problems
- d) finite difference problems

Feedback Form

How did you come to know of the STTP programme? *

- Social Media
- Friends
- (selected) Your College/Department
- Colleagues

The guest speakers delivered the information I expected to receive *

- (selected) Strongly agree
- Agree
- Neutral
- Disagree

The Subject matter was presented effectively *

- (selected) Strongly agree
- Agree
- Neutral
- Disagree

The pace of the STTP sessions was satisfactory *

- (selected) Fully covered
- Moderately covered
- Poorly covered

Are you interested in attending any future workshops/STTPs/FDPs conducted by our College? *

- [x] Yes
- [ ] No

Overall rating of this STTP *

1	2	3	4	5
○	○	○	○	◉

Any Suggestion/Comments *

EVERYTHING IS FINE

SARANATHAN COLLEGE OF ENGINEERING

(Approved by AICTE- New Delhi, Affiliated to Anna university- Chennai)
(Accredited by NBA and NAAC with A+ Grade)
Venkateswara Nagar, Panjappur, Tiruchirapalli, Tamil Nadu, India.

Certificate No.: AICTE / STTP / MECH / 2020 -2021 / 12

E-CERTIFICATE

The Program Evaluation Committee (PEC), constituted for the AICTE sponsored Six days Short Term Training Programme (STTP) Phase - I on "**Rudiments and Practices of Computational Fluid Dynamics in Thermo Fluid Analysis**" held from 10-May-2021 to 15-May-2021 in the Department of Mechanical Engineering, Saranathan College of Engineering, Tiruchirapalli, certifies that **Mr. C. ELAJCHET SENNI, Assistant Professor, SRM TRP ENGINEERING COLLEGE** has participated in the STTP and successfully qualified in the test conducted on 15-May-2021

Dr. N. Baskar	**Dr. G. Jayaprakash**	**Dr. D. Valavan**
Coordinator	HOD/Mechanical	Principal

Saranathan College of Engineering

Trichy-12

Department of Mechanical Engineering

AICTE Sponsored one week Short Term Training Programme (STTP)

on

Rudiments and Practices of Computational Fluid Dynamics in Thermo Fluid Analysis

Phase II - 24/05/2021 to 29/05/2021

The Department of Mechanical Engineering of Saranathan College of Engineering, Trichy organized a one week Short Term Training Programme (STTP) titled "**Rudiments and Practices of Computational Fluid Dynamics in Thermo Fluid Analysis**" in two phases. **Phase II** of the STTP was conducted from 24th May 2021 to 29th May 2021. This program was sponsored by AICTE, New Delhi. The programme began with the keynote address by Dr. Sudhakar Yogaraj, Assistant Professor, Department of Mechanical Engineering, IIT Goa, who gave a broad perspective of Computational Fluid Dynamics and its relevance in solving real time thermo fluid The training program was well structured with twenty-four technical sessions in which lectures were delivered by experts from eminent institutes like IITs, CEG (Anna University) etc. and practising CFD engineers and scientists from PSUs like BHEL (Trichy), IGCAR, Kalpakkam and other corporate units. A broad range of topics were covered during the sessions – topics ranging from fundamental concepts of Computational Fluid Dynamics to live demonstrations on applying CFD software tools in solving real time thermo fluid problems. The training program concluded with a valedictory address by Dr. S.M.Giriraj Kumar, HOD/ICE & Head (T&P), SCE, who gave a brief overview of the National Education Policy (NEP) and highlighted the salient features of the policy. The programme was well attended by academicians and researchers from all over Tamil Nadu and other neighbouring states and 41 attendees received certificates.

SARANATHAN COLLEGE OF ENGINEERING
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)
(Accredited by NAAC with A+ Grade)
DEPARTMENT OF MECHANICAL ENGINEERING
(Accredited by NBA)
AICTE Sponsored One Week Short Term Training Programme on
Rudiments and Practices of Computational Fluid Dynamics in Thermo Fluid Analysis
SCHEDULE OF TRAINING PROGRAMME-Phase II
(24/05/21 to 29/05/21)

20.05.2021

<table>
<tr><th>Day/
Session</th><th>SESSION-I
(9.45 A.M -11.15 A.M)</th><th>SESSION-II
(11.30 A.M – 1.00 P.M)</th><th rowspan="4">L
U
N
C
H

B
R
E
A
K</th><th>SESSION-III
(2.00 P.M – 03.30 P.M)</th><th>SESSION-IV
(3.45 P.M – 5.15 P.M)</th></tr>
<tr><td>24.05.21
MON</td><td>Dr.Sudhakar Yogaraj,
Assistant Professor,
Dept. of Mechanical Engineering,
IIT, Goa.

Inaugural address and
CFD- Basics and Governing Equations-Part I.</td><td>Dr.Sudhakar Yogaraj,
Assistant Professor,
Dept. of Mechanical Engineering,
IIT, Goa.

Proposed topic:
CFD- Basics and Governing Equations -Part II.</td><td>Dr. K. Arul Prakash,
Professor,
Dept. of Applied Mechanics,
IIT- Madras, Chennai.

Proposed topic:
Finite Volume method –Part I.</td><td>Dr. K. Arul Prakash,
Professor,
Dept. of Applied Mechanics,
IIT- Madras, Chennai.

Proposed topic:
Finite Volume method –Part II.</td></tr>
<tr><td>25.05.21
TUE</td><td>Dr. R. Shivakumar,
Professor & Dean,
School of Mechanical Engineering,
VIT-Chennai Campus.

Proposed topic:
Applications of CFD- An Overview</td><td>Dr.P.R.Naren,
Associate Professor,
Dept Of Chemical Engineering,
SCBT, SASTRA, Tanjore.

Proposed topic:
Reynolds-Averaged Navier-Stokes (RANS) Model Approach for Fluid Flow.</td><td colspan="2">Dr. Pallab Sinha Mahapatra,
Assistant Professor,
Department of Mechanical Engineering,
IIT- Madras, Chennai.

Proposed topic:
Multiphase Flow Modeling.</td></tr>
<tr><td>26.05.21
WED</td><td colspan="2">Dr.S.Vengadesan,
Professor,
Dept.of Applied Mechanics,
IIT- Madras, Chennai.

Proposed topic:
Turbulent flow Modeling</td><td>Dr.Kamatchi Sankaranarayanan,
Assistant Professor-II
(Biophysics), IASST,
Autonomous Institute of DST,
(Govt.of India),
Guwahati, Assam.

Proposed topic:
Multi-tasking Ionic Liquids - From protein stability to Nanomaterial Synthesis.</td><td>Dr. M. Kantha Babu,
Director, CIPR,
and
Professor,
Dept. of Manufacturing Engineering,
CEG,
Anna University, Chennai.

Proposed topic:
Research Patenting.</td></tr>
</table>

<table>
<tr><th>Day/ Session</th><th>SESSION-I
(9.45 A.M -11.15 A.M)</th><th>SESSION-II
(11.30 A.M – 1.00 P.M)</th><th rowspan="4">L U N C H

B R E A K</th><th>SESSION-III
(2.00 P.M – 03.30 P.M)</th><th colspan="2">SESSION-IV
(3.45 P.M – 5.15 P.M)</th></tr>
<tr><td>27.05.21
THU</td><td colspan="2">Dr. Kulasekharan Narasingamurthi,
Specialist-Computational Fluid Dynamics,
Simulation Metier-GEEDS,
Valeo India Private Limited,
Chennai.

Proposed topics:
1. Design and Development of Compact Heat Exchangers
2. Gas Turbine Cooling System</td><td>Dr.M.Ganesan,
Associate Professor,
Dept of Mech. Engineering,
Saranathan College of Engineering, Trichy.

Proposed Topic:
Fluid Flow Analysis using ANSYS-CFX</td><td colspan="2">Dr. G. Jayaprakash,
Professor & Head,
Dept of Mech. Engineering,
Saranathan College of Engineering, Trichy.

Proposed topic:
Fluid solid interaction (FSI) analysis in CFX.</td></tr>
<tr><td>28.05.21
FRI</td><td>Dr Vivek Vittankar
Founder & Director of FluiDimensions, Pune.

Proposed topic:
CFD Application: Software Demo</td><td>Dr.P.Harish
Assistant professor,
Dept. of Mechanical Engineering,
IIT Jammu, J& K.

Proposed topic:
Modelling of boiling heat transfer</td><td>Dr.K.Murugesan,
Professor,
Dept.of Mechanical and Industrial Engineering,
IIT, Roorkee.

Proposed topic:
Computational Fluid Dynamics using Nanofluids by Velocity-Vorticity Equations.</td><td colspan="2">Prof. Dr. G. Kumaresan,
Associate Professor,
Institute of Energy Studies, CEG,
Anna University, Chennai.

Proposed topic:
CFD Analysis of Thermal System Components.</td></tr>
<tr><td>29.05.21
SAT</td><td colspan="2">Dr.R.Elankovan, DGM(Commercial/Fossil Boilers),
B.H.E.L, Trichy.

Proposed topic:
Grid Generation and Case studies on applications of CFD.</td><td>Dr. N. L. Parthasarathi,
Scientific Officer,
Metal Forming and Tribology Section,
IGCAR , Kalpakkam.

Proposed topic:
Application of CFD- A power plant perspective.</td><td>Dr.S.M.Giriraj Kumar,
Professor& Head,
Dept. of ICE & Head(T&P),
Saranathan College of Engineering, Trichy.

Valediction and talk on National Education Poilcy(NEP)</td><td>Certification Test & Feedback</td></tr>
</table>

Certification test on 29/05/2021 at 4.45 p.m.

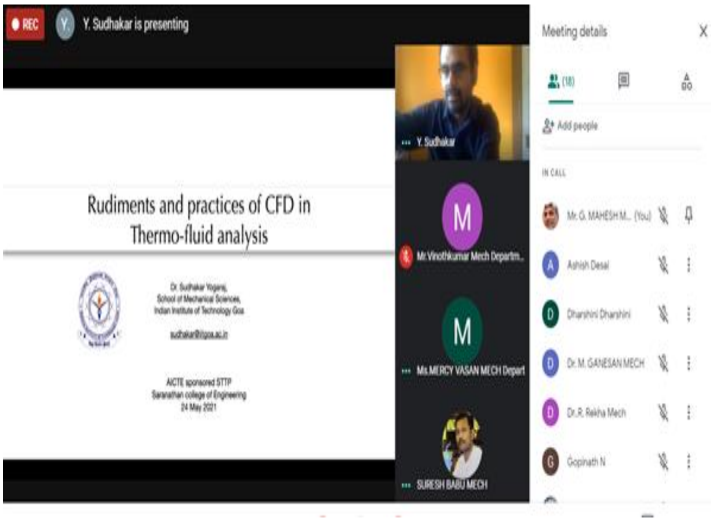
Coordinator

DAY 1: 24/05/2021

SESSION 1:

Inaugural address and
CFD- Basics and Governing Equations-Part I.

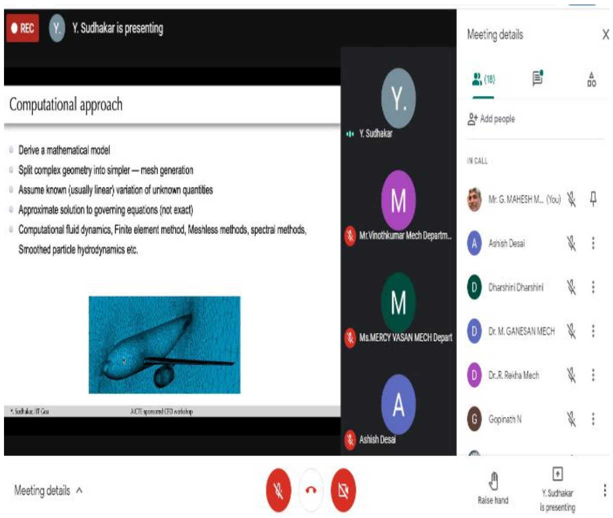
Dr.Sudhakar Yogaraj,
Assistant Professor,
Dept. of Mechanical Engineering,
IIT, Goa.



SESSION 2:

CFD- Basics and Governing Equations -Part II.

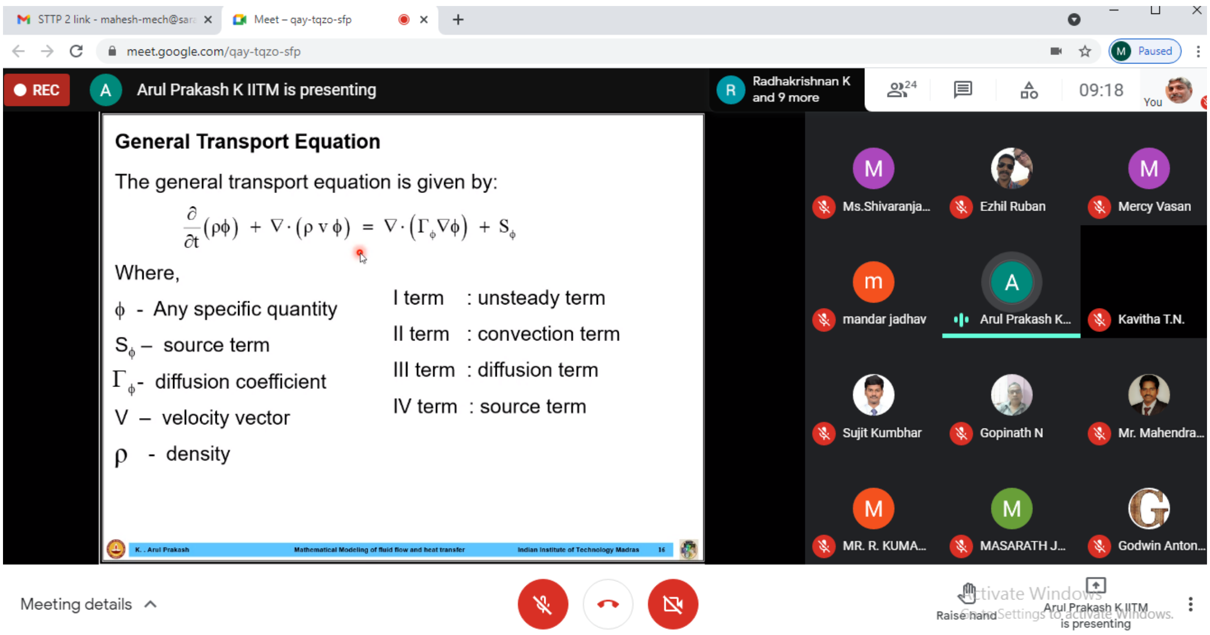
Dr.Sudhakar Yogaraj,
Assistant Professor,
Dept. of Mechanical Engineering,
IIT, Goa.



SESSION 3 & 4:

Finite Volume method

Dr. K. Arul Prakash,
Professor,
Dept.of Applied Mechanics,
IIT- Madras, Chennai.

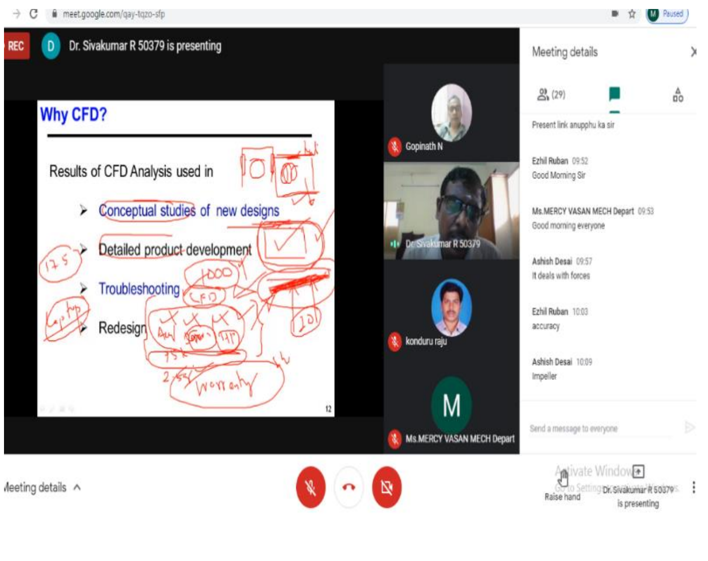


DAY 2: 25/05/2021

SESSION 1:

Applications of CFD- An Overview

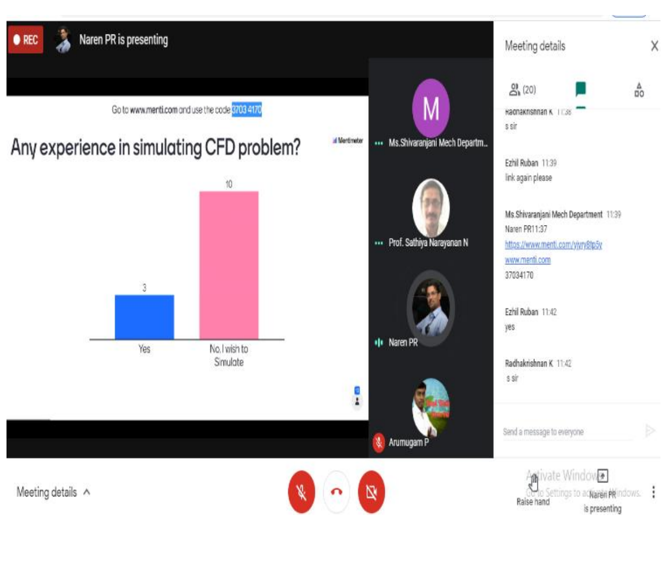
Dr. R. Shivakumar,
Professor & Dean,
School of Mechanical Engineering,
VIT-Chennai Campus.



SESSION 2:

Reynolds-Averaged Navier-Stokes (RANS) Model Approach for Fluid Flow.

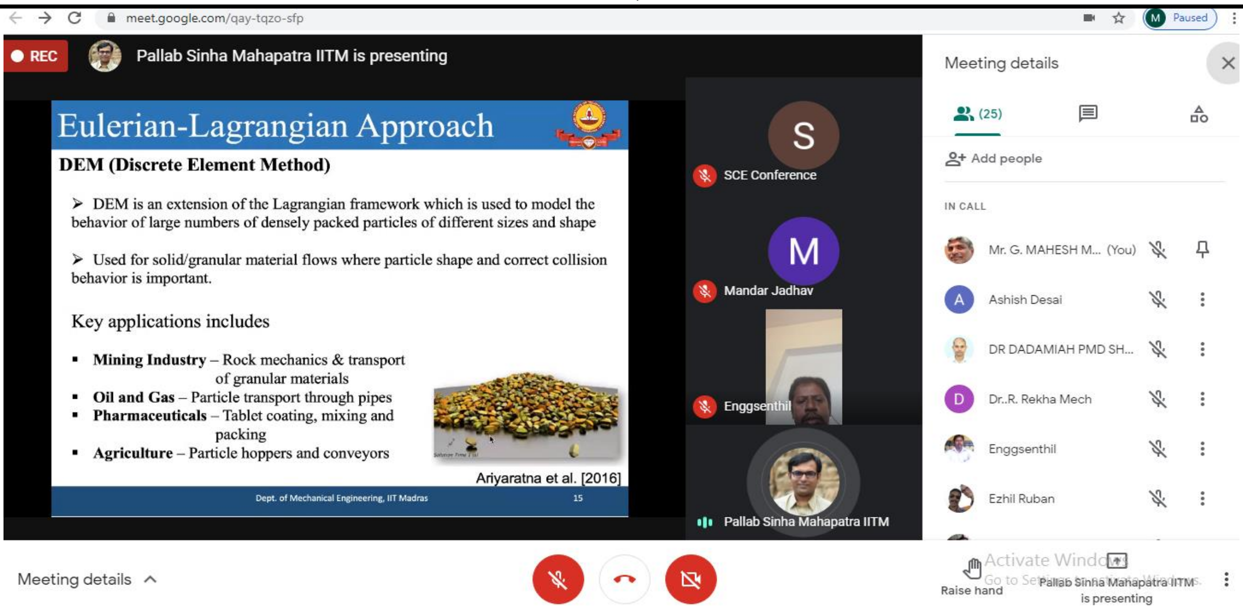
Dr.P.R.Naren,
Associate Professor,
Dept Of Chemical Engineering, SCBT, SASTRA, Tanjore.



SESSION 3 & 4:

Multiphase Flow Modeling.

Dr. Pallab Sinha Mahapatra,
Assistant Professor,
Department of Mechanical Engineering,
IIT- Madras, Chennai.

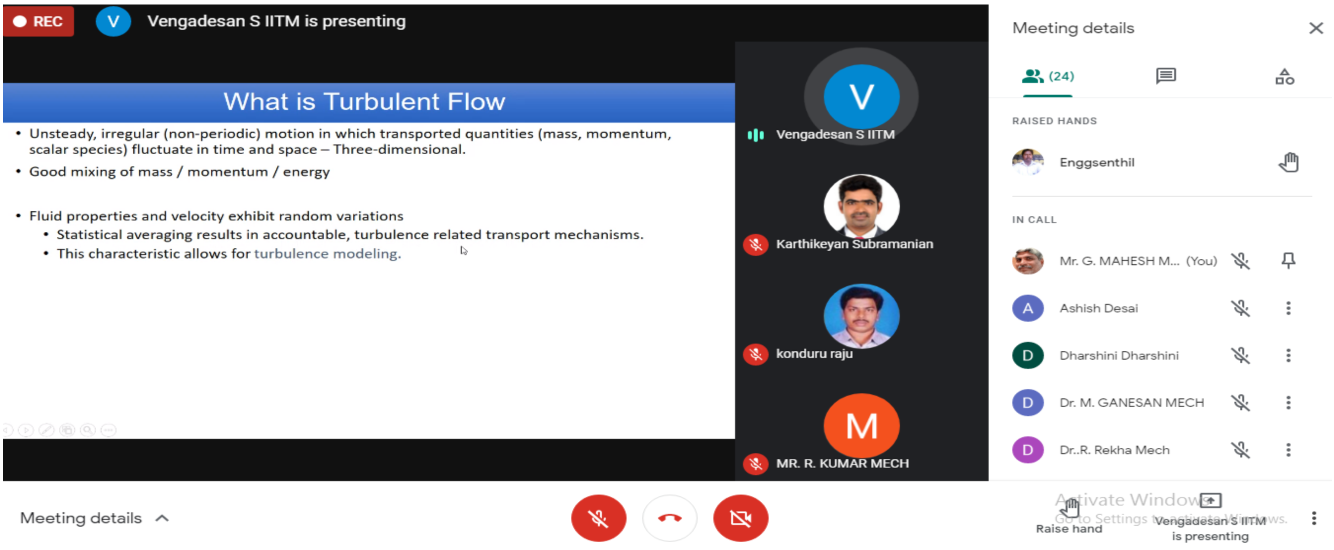


DAY 3: 26/05/2021

SESSION 1&2

Turbulent flow Modeling

Dr.S.Vengadesan,
Professor,
Dept.of Applied Mechanics,
IIT- Madras, Chennai.



SESSION:3

Multi-tasking Ionic Liquids - From protein stability to Nanomaterial Synthesis.

Dr.Kamatchi Sankaranarayanan,

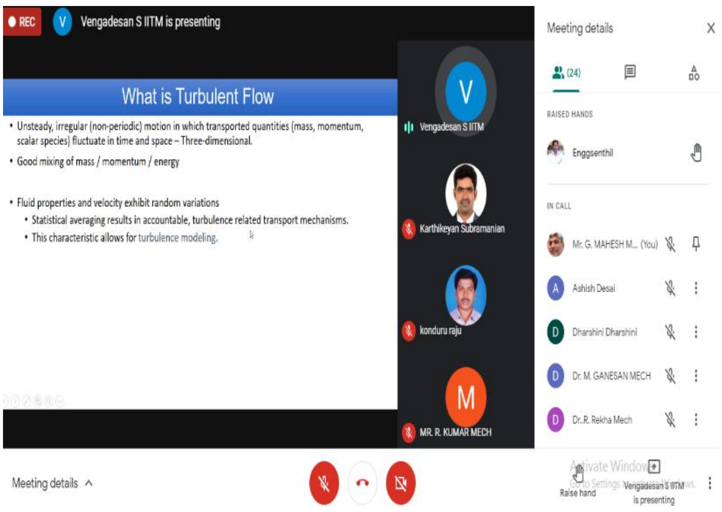
Assistant Professor-II (Biophysics), IASST, Autonomous Institute of DST, (Govt.of India), Guwahati, Assam.

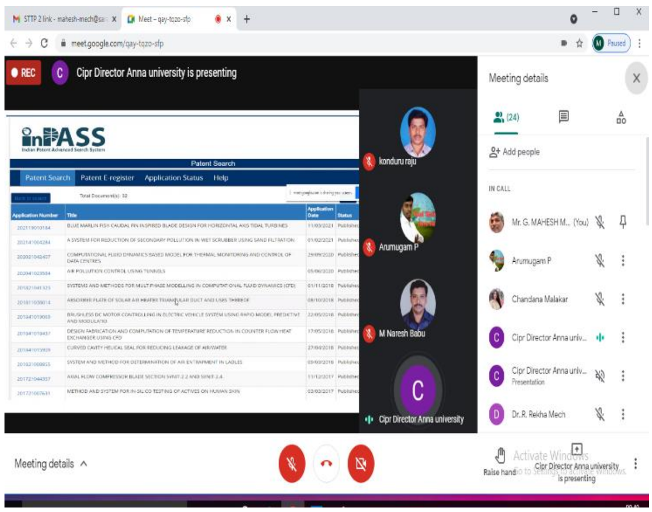
SESSION:4

Research Patenting.

Dr. M. Kantha Babu,

Director, CIPR, and Professor,
Dept. of Manufacturing Engineering, CEG,
Anna University, Chennai.





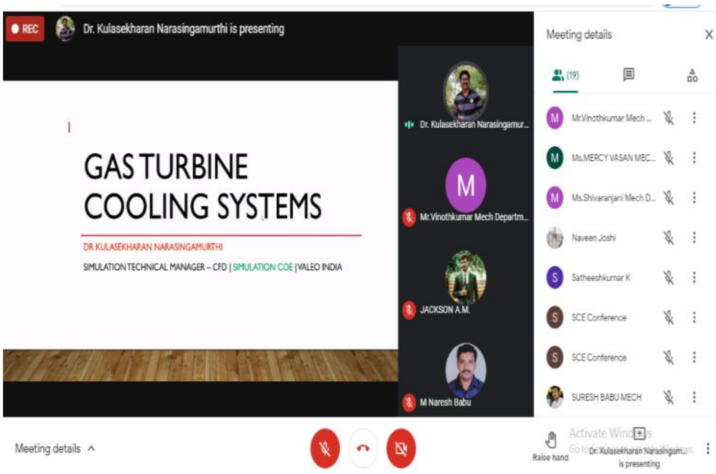
DAY 4: 27/05/2021

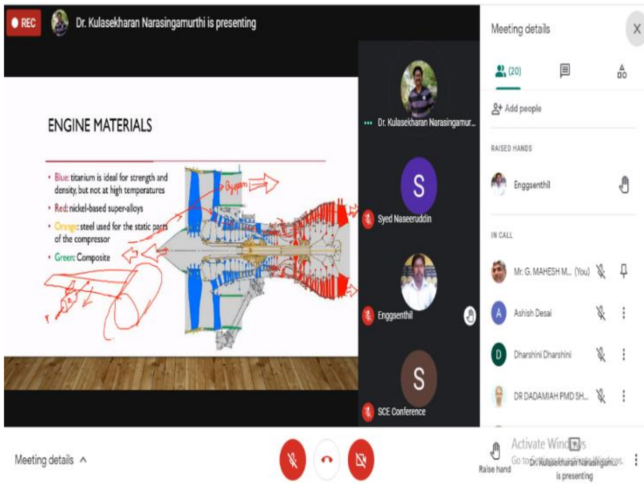
SESSION: 1&2

1. Design and Development of Compact Heat Exchangers

2. Gas Turbine Cooling System

Dr. Kulasekharan Narasingamurthi,
Specialist-Computational Fluid Dynamics,
Simulation Metier-GEEDS,
Valeo India Private Limited,
Chennai.





SESSION:3

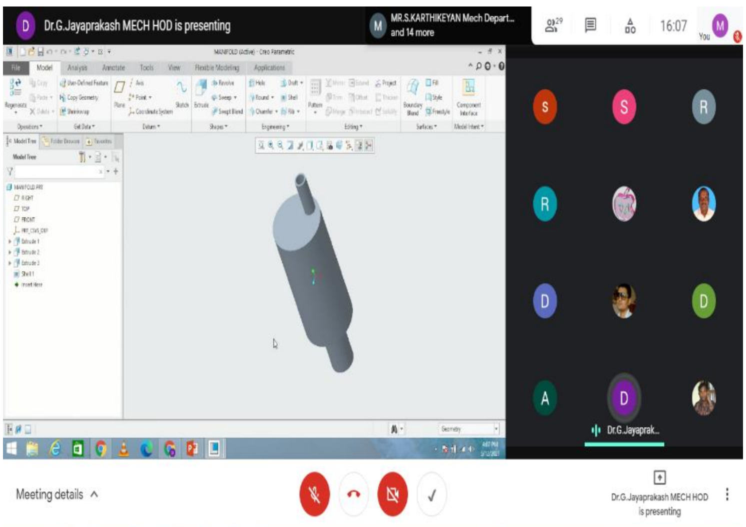
Fluid solid interaction (FSI) analysis in CFX.

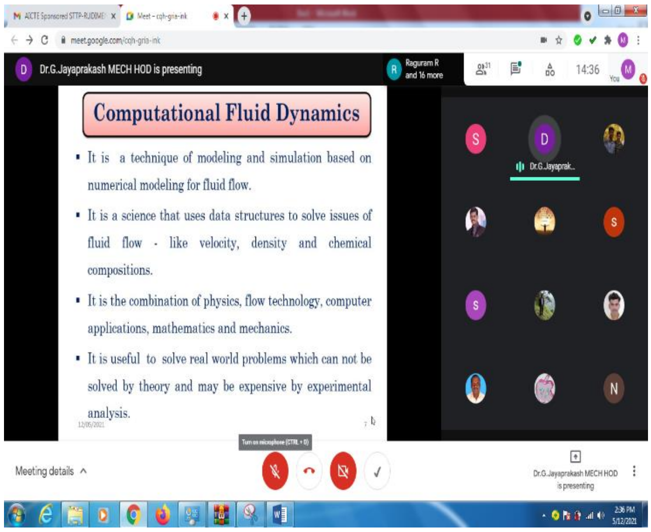
Dr. G. Jayaprakash,
Professor & Head,
Dept of Mech. Engineering, Saranathan College of Engineering, Trichy.

SESSION:4

Fluid Flow Analysis using ANSYS-CFX

Dr.M.Ganesan,
Associate Professor,
Dept of Mech. Engineering,
Saranathan College of Engineering, Trichy.





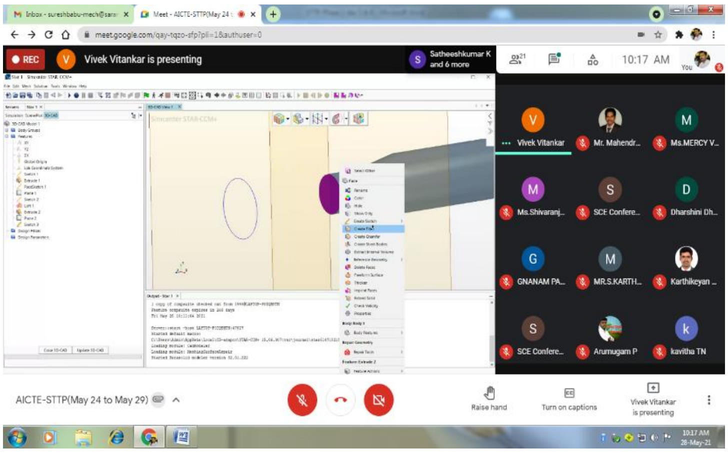
DAY 5: 28/05/2021

SESSION 1:

CFD Application: Software Demo

Dr Vivek Vittankar

Founder & Director of FluiDimensions, Pune.



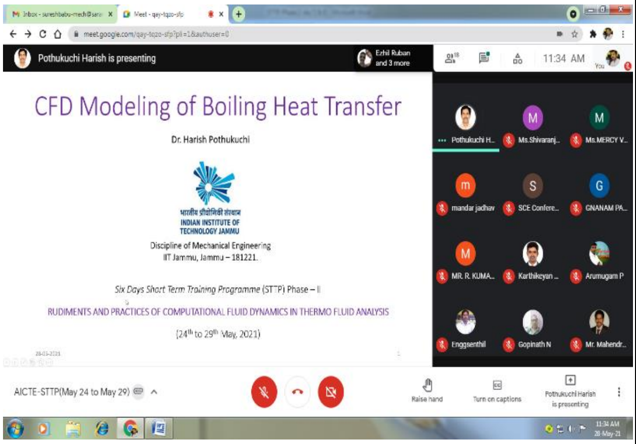
SESSION 2:

Modelling of boiling heat transfer

Dr.P.Harish

Assistant professor,

Dept. of Mechanical Engineering, IIT Jammu, J& K.



SESSION 3:

Computational Fluid Dynamics using Nanofluids by Velocity-Vorticity Equations

Dr.K.Murugesan,

Professor,

Dept.of Mechanical and Industrial Engineering, IIT, Roorkee.

SESSION 4:

CFD Analysis of Thermal System Components

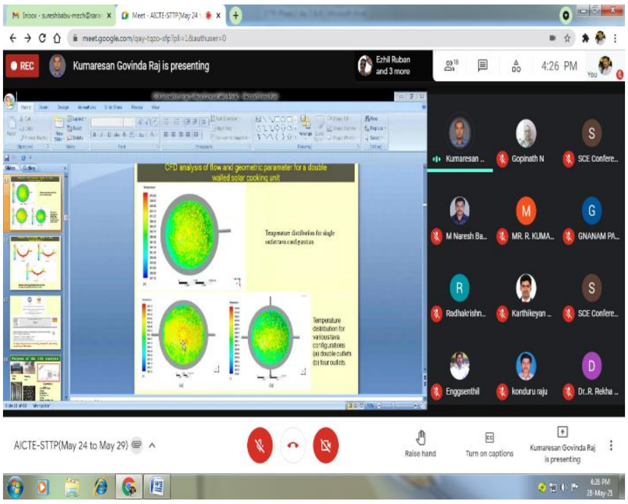
Prof. Dr. G. Kumaresan,

Associate Professor,

Institute of Energy Studies,

CEG,

Anna University, Chennai.



DAY 6: 29/05/2021

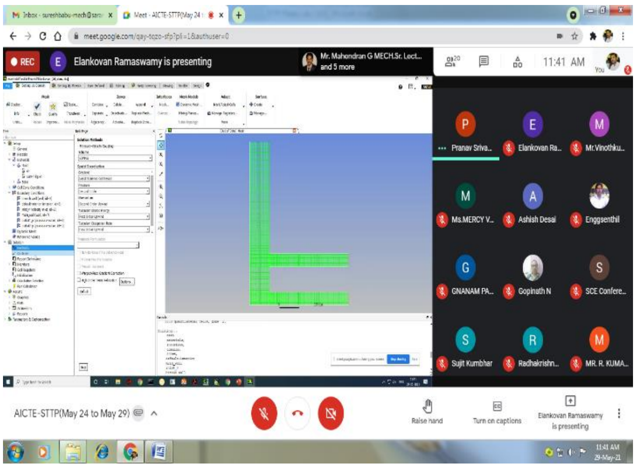
SESSION 1& 2:

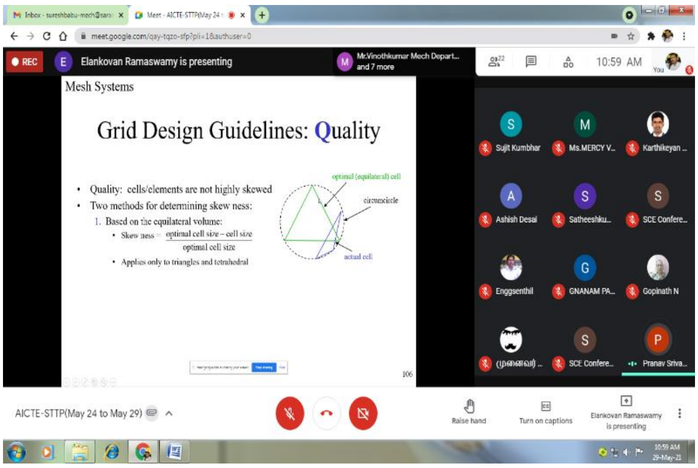
Grid Generation and Case studies on applications of CFD

Dr.R.Elangovan,

DGM (Commercial/Fossil Boilers),

B.H.E.L., Trichy





SESSION 3:

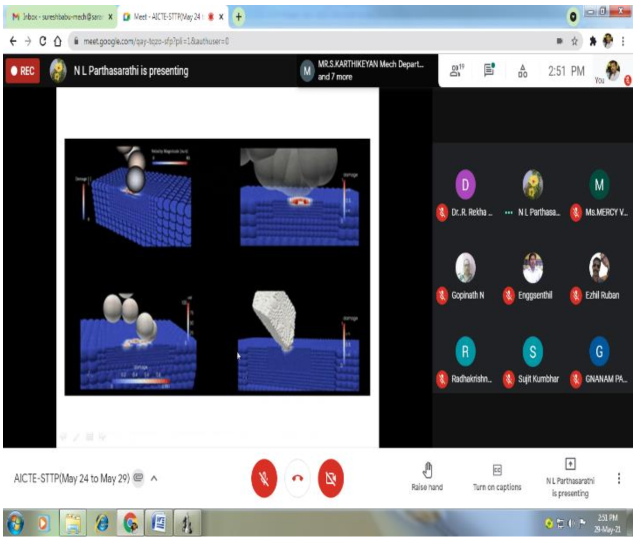
Application of CFD- A power plant perspective.

Dr. N.L.Parthasarathi,

Scientific Officer,

Metal Forming and Tribology Section,

IGCAR,Kalpakkam.



SESSION 4:

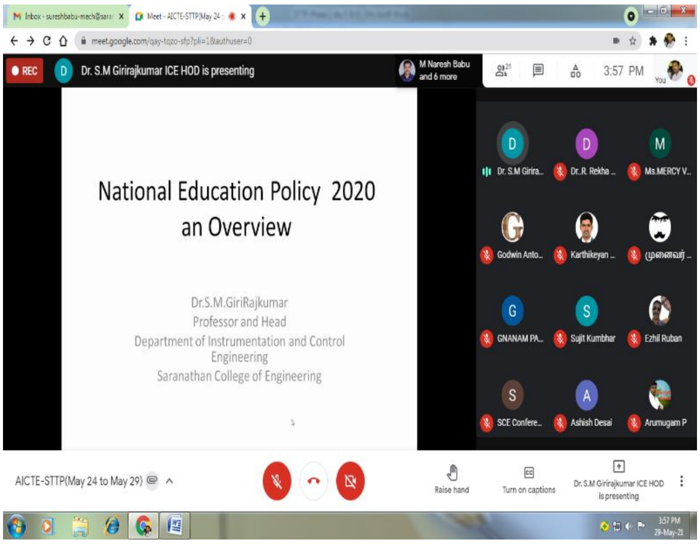
Valediction and talk on National Education Poilcy(NEP

Dr. S.M.Giriraj Kumar,

Professor & Head,

Dept of ICE & Head (T & P),

Saranathan College of Engineering, Trichy.



ABOUT THE COLLEGE

Saranathan College of Engineering was founded in the year 1998 by "VidyaSevaRatnam", "Guru Seva Mani" Auditor Sri. K. Santhanam. The institution was so named in respectful memory of his Guru Prof. Saranathan, the then Principal of National College, Tiruchirappalli. Saranathan College of Engineering is a self-financing college approved by AICTE and affiliated to Anna University, Chennai for the UG courses it offers(Civil, CSE, EEE, ECE, IT, ICE and Mechanical Engineering). All the six (6) eligible UG branches are accredited by NBA, New Delhi. An enviable 'A+' rating by "NAAC" stands testimony to the commitment of the college to impart quality education.

ABOUT THE DEPARTMENT

The Department of Mechanical Engineering was started in the year 2005. The department offers an undergraduate programme B.E. in Mechanical Engineering and a postgraduate programme M.E. in Thermal Engineering. The department is accredited by NBA, New Delhi, since June 2018. The department is also a recognized research centre under Anna University, Chennai. The department has all of the following: state-of-the-art laboratories, CAD centre with advanced software, a department library, experienced and expert faculty members having doctoral degrees, outstanding research publications in peer reviewed International/National journals. The department's mission is to generate employable mechanical engineering graduates with knowledge, skills and ethics and provide them with the professional and soft skills necessary to lead a successful career and equip them with the confidence necessary to contribute positively to the society by performing in their respective chosen fields of endeavour.

PROGRAMME EVALUATION COMMITTEE (PEC)

PATRON:

Shri. S. Ravindran
Secretary

CHAIRPERSON:

Dr. D. Valavan
Principal

CO-CHAIRPERSON:

Dr. G. Jayaprakash
Professor & Head, Mechanical Engineering.

COORDINATOR:

Dr. N. Baskar
Professor, Mechanical Engineering
.

PEC MEMBER

Dr. C. Krishnakumar
Professor & Head, Department of Electrical and Electronics Engineering.

CO-COORDINATORS:

Dr. A. Mercy Vasan
Associate Professor, Mechanical Engineering
Dr. R. Rekha
Associate Professor, Mechanical Engineering

CONVENERS:

Dr. M. R. Anantha Padmanaban
Associate Professor,Mechanical Engineering
Dr. M. Ganesan
Associate Professor, Mechanical Engineering

ORGANIZERS:

Dr. G. Mahesh
Associate Professor, Mechanical Engineering
Mr. R. Suresh Babu
Assistant Professor, Mechanical Engineering
Mr. S. Sathyanarayanan
Assistant Professor, Mechanical Engineering

AICTE

Sponsored

One-week Short Term Training Program
on

Rudiments and practices of Computational Fluid Dynamics in Thermo-fluid Analysis

Phase I - 10.05.2021-15.05.2021
Phase II – 24.05.2021-29.05.2021

Organized by

Department of Mechanical Engineering
Accredited by NBA, New Delhi

SARANATHAN COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)
(Accredited by NAAC with A+ Grade)

www.saranathan.ac.in

OBJECTIVES AND CONTEXT

- To provide a comprehensive training to engineers and researchers on application of CFD techniques over a broad range of applications like turbomachinery and multi-phase flows
- To familiarize the basic concepts, methods and mathematical equations controlling practical thermal and fluid flow phenomena
- To correlate theoretical and practical engineering usages of CFD through hands-on –training on various software packages
- To highlight the contemporary research trends in CFD and promote progressive research in product design and development

RELEVANCE

The short-term training programme is essential in the current scenario to facilitate researchers and engineers to adopt CFD as a standard practice in industry and research. With simulation techniques becoming a vital part of the design process in providing within the time constraints efficient solutions to thermal and fluid system, CFD has started playing a crucial role in product development cycle. The major obstacle, to the evolving of CFD from the stage of being a mere research tool to the stage of being used for real time applications in industries, is the lack of fundamental knowledge and high level of expertise in coding and software usage. This program aims to bridge that gap.

RESOURCE PERSONS

Experts from IITs, NITs, Anna University, DRDO, IGCAR, Industry, etc.

EXPECTED OUTCOMES

This program will enable the faculty, practising engineers and researchers

- ✓ To solve fundamental equations relating to fluid flow and heat transfer problems
- ✓ To acquire software computing skills in CFD and interpret results to make design decisions
- ✓ To forecast implications of design changes and optimize a design, based on CFD results, with an aim to create quality product development and to carry out virtual experimentation on complicated prototypes

TOPICS OF INTEREST

- Fundamental knowledge in theory and concepts of Computational Fluid Dynamics
- Hands on training on modern CFD software tools for solving Thermo-fluid problems
- Industrial visits to understand the significance of CFD applications in solving real time industrial flow problems

EXPECTED SKILLS AND SUGGESTED FURTHER ACTIONS

- Fundamental knowledge in theory and concepts of Computational Fluid Dynamics
- Industrial visits to understand the significance of CFD applications in solving real time industrial flow problems

COURSE DURATION

Each STTP is for a duration of 6 days and will be held online through Google meet. For an effective utilization of the program and to become eligible for the e-certificate attendance on all the days is important. Based on their convenience participants can choose to attend any one of the phases of STTP listed.

REGISTRATION

Registration is based on first come first served basis. Google Meet link will be provided by E-Mail, to the selected participants only.

NO REGISTRATION FEE.

Registration Link :

https://forms.gle/NFq498upV8vqsxVTA

CONDUCT OF TEST AND ISSUANCE OF CERTIFICATE

All the participants have to appear for a test at end of the program. E-Certificates will be issued only to those participants who have attended the program on all the days and have qualified in the evaluation test.

IMPORTANT DATES

Last date of Receipt Application: 04-05-2021 (Google form)

Intimation to Selected Participants: 05-05-2021 (Mail)

ADDRESS FOR CORRESPONDENCE

Dr.G.Mahesh (+91 8610337854)
Associate Professor,
Department of Mechanical Engineering
Saranathan College of Engineering, Panjappur, Tiruchirappalli, Tamil Nadu 620012.

email:saranathanmechdept@gmail.com

STTP Phase II - Participants List

Cert. No.	Email Address	Full Name	Designation	Department	Institute / Organisation Name	District
1	amar-mech@saranathan.ac.in	Mr. K. AMARNATH	Assistant Professor	Mechanical	SARANATHAN COLLEGE OF ENGINEERING	TRICHY
2	amjack1991@gmail.com	Mr. A. MARIA JACKSON	Assistant Professor	Mechanical Engineering	M. Kumarasamy College of Engineering	Karur
3	ashishd331@gmail.com	Mr. ASHISH DESAI	Assistant Professor	Mechanical Enginerring	Sharad Institute of Technology College of Engineering Yadrav	Kolhapur
4	dr.dadamiahshaik@lords.ac.in	Dr. DADAMIAH PMD SHAIK	Professor	Physics	Lords Institute of Engineering and Technology	Hyderabad
5	ezhil.f@licet.ac.in	Mr. EZHIL RUBAN	Assistant Professor	MECHANICAL ENGINEERI	Loyola Icam College of Engineering &Technology	Chennai
6	gmn.mech@rmkec.ac.in	Dr. G.MAHENDRAN	Associate Professor	Mechanical Engineering	R.M.K.Engineering College	Thiruvallur
7	godwinantonya.mech@krct.ac.in	Mr.A. GODWIN ANTONY	Assistant Professor	MECHANICAL ENGINEERI	K.RAMAKRISHNAN COLLEGE OF TECHNOLOGY	TIRUCHIRAPALLI
8	gopinath.mech@prathyusha.edu.in	Mr. GOPINATH NARAYANAN	Assistant Professor	MECHANICAL ENGINEERI	PRATHYUSHA ENGINEERING COLLEGE	THIRUVALLUR
9	karthikeyanphd2022@gmail.com	Mr. S. KARTHIKEYAN	Research Scholar	Mechanical Engineering	Annamalai University	Chidambaram
10	kparumugam5@gmail.com	Mr. P. ARUMUGAM	Assistant Professor	MECHANICAL ENGINEERI	THAMIRABHARANI ENGINEERING COLLEGE	TIRUNELVELI
11	kumarr-mech@saranathan.ac.in	Mr. R. KUMAR	Assistant Professor	MECHANICAL	SARANATHAN COLLEGE OF ENGINEERING	TRICHY
12	lishajoshin@gmail.com	Ms. N.M.LISHA	Research Scholar	Mathematics	Vellore Institute of Technology, Vellore	Vellore
13	mandarjadhav@sitcoe.org.in	Mr. MANDAR ASHOK JADHAV	Assistant Professor	Mechanical Engineering	SITCOE Yadrav	Kolhapur
14	masarathjabeen@lords.ac.in	Mrs. MASARATH JABEEN	Assistant Professor	Mathematics	Lords Institute of Engineering and Technology	Hyderabad

15	narsavi@gmail.com	Dr. M. NARESH BABU	Associate Professor	Mechanical Engineering	Easwari Engineering College	Chennai
16	naveen.hs@srit.ac.in	Dr. NAVEEN JOSHI	Associate Professor	Humanities and Sciences	Srinivasa Ramanujan Institute of Technology	Ananthapuramu
17	palam82@gmail.com	Mr. V. GNANAPAZHAM	Assistant Professor	Mechanical Engineering	Jayam college of Engineering & Technology, Nallanur,Dharmapuri.	Dharmapuri
18	paramaguru-mech@saranathan.ac	Mr. S. PARAMAGURU	Assistant Professor	MECHANICAL ENGINEERI	SARANATHAN COLLEGE OF ENGINEERING	TRICHY
19	ppkakamari@git.edu	Mr. PRASHANT P KAKKAMARI	Assistant Professor	MECHANICAL ENGINEERI	KLS GOGTE INSTITUTE OF TECHNOLOGY, BELAGAVI	BELAGAVI
20	radhakrishnank.mech@krct.ac.in	Mr. K. RADHAKRISHNAN	Assistant Professor	Mechanical Engineering	K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY	Tiruchirapalli
21	rajesh-mech@saranathan.ac.in	Mr.P.V.RAJESH	Assistant Professor	Mechanical Engineering	Saranathan College of Engineering	Trichy
22	ranjithraj-mech@saranathan.ac.in	Mr. A. RANJITH RAJ	Assistant Professor	MECHANICAL ENGINEERI	SARANATHAN COLLEGE OF ENGINEERING	TRICHY
23	satheeshkumar.k@hit.edu.in	Mr. K. SATHEESH KUMAR	Assistant Professor	Automobile Engineering	Hindusthan Institute of Technology	Coimbatore
24	sathya.m.e.thermal@gmail.com	Mr. S. SATHYANARAYANAN	Assistant Professor	Mechanical Engineering	Saranathan college of engineering	Trichy
25	sivasubramanian-mech@saranath	Mr. J. SIVASUBRAMANIAN	Assistant Professor	MECHANICAL ENGINEERI	SARANATHAN COLLEGE OF ENGINEERING	TRICHY
26	sujit.kumbhar64@sitcoe.org.in	Mr SUJIT VISHWANATH KUMBH	Assistant Professor	Mechanical Engineering	SITCOE Yadrav	Kolhapur
27	sureshbabu-mech@saranathan.ac	Mr. R. SURESH BABU	Assistant Professor	Mechanical	Saranathan College of Engineering	Tiruchirappalli
28	thermalsenthil@gmail.com	Dr. R. SENTHILKUMAR	Professor	Mechanical	Vandayar Engineering College	Thanjavur
29	tnkmaths@gmail.com	Dr. T N KAVITHA	Assistant Professor	Mathematics	SCSVMV	Kanchipuram
30	varatharajulu09@gmail.com	Dr. M. VARATHARAJULU	Research Scholar	Production Engineering	National Institute of Technology	Tiruchirappalli
31	venky.sakku@gmail.com	Mr. KONDURU VENKATESWAR	Associate Professor	Applied Mathematics	CHADALAWADA RAMANAMMA ENGINEERING COLLEGE (AUTONOMOUS)	Chittoor

32	vigneshwar-mech@saranathan.ac.	Mr. P. VIGNESHWAR	Assistant Professor	Mechanical Engineering	Saranathan College of Engineering	Trichy
33	vnamaths@gmail.com	Dr V NAGANJANEYULU	Associate Professor	Mathematics	Lords Institute of Engineering and Technology	Hyderabad
34	sriram-mech@saranathan.ac.in	Mr. SRIRAM PRASANTH. M	Assistant Professor	Mechanical Engineering	Saranathan College of Engineering	Trichy
35	jothi-mech@saranathan.ac.in	Mr. JOTHI PALAVESAM. P	Assistant Professor	Mechanical Engineering	Saranathan College of Engineering	Trichy
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AICTE Sponsored STTP on "Rudiments and Practices of Computational Fluid Dynamics in Thermo- fluid Analysis"

Assessment Test & Feedback Form - Phase - II

* Required

1. Email *

2. Full Name In CAPITAL LETTERS (e.g:Dr. S. Cristiano Ronaldo) *

3. Designation *

   Mark only one oval.

   - Lecturer
   - Assistant Professor
   - Associate Professor
   - Professor
   - Research Scholar

4. Department *

5. Institute / Organisation Name (Enter the Name of your Institute/ Organisation only, don't enter the full Address) *

6. District *

7. State *

8. Whatsapp Mobile Number *

9. 1. Which of these could be an optimal mesh? * 1 point

Mark only one oval.

- a) Non-uniform
- b) Uniform
- c) Grids with increasing lengths
- d) Grids with decreasing lengths

10. 2. The Reynolds transport theorem establishes a relationship between _________ and __________ * 1 point

Mark only one oval.

- a) Control mass system, Control volume system
- b) Differential equation, Integral equation
- c) Non-conservative equation, Conservative equation
- d) Substantial derivative, Local derivative

11. 3. The physical principle behind the continuity equation is _________ * 1 point

Mark only one oval.

- a) Mass conservation
- b) Zeroth law of thermodynamics
- c) First law of thermodynamics
- d) Energy conservation

12. * 1 point

4. Consider a model of finite control volume (volume V and surface area S) fixed in space with elemental volume dV, vector elemental surface area $d\vec{S}$, density ρ and flow velocity $\vec{V}$. What is the net mass flow rate out of the surface area?

Mark only one oval.

a) $\iint v\rho\vec{V}\ .dV$

- Option 1

b) $\rho\vec{V}\ .d\vec{S}$

- Option 2

c) $\iiint v\rho\vec{V}\ .d\vec{S}$

- Option 3

d) $\iint v\rho\vec{V}\ .d\vec{S}$

- Option 4

13. 5. What is the physical statement of mass conservation equation for a finite control volume moving along with the flow? * 1 point

Mark only one oval.

- a) Rate of change of mass inside the control volume = 0
- b) Rate of change of mass inside the control volume = constant
- c) Net mass flow through the control surface = Rate of change of mass inside the control volume
- d) Net mass flow through the control surface≠Rate of change of mass inside the control volume

14. 6. What is the physical statement of mass conservation equation for a finite control volume fixed in space? * 1 point

Mark only one oval.

- a) Net mass flow through the control surface = constant
- b) Rate of change of mass inside the control volume = constant
- c) Net mass flow through the control surface = Rate of change of mass inside the control volume
- d) Net mass flow through the control surface≠Rate of change of mass inside the control volume

15. 7. Which of these does not characterize a turbulent flow? * 1 point

Mark only one oval.

- a) Time-independent
- b) Rapid mixing
- c) Three-dimensional fluctuation
- d) Unstable

16. 8. What is Reynolds stress? * 1 point

Mark only one oval.

- a) Stress due to velocity fluctuations
- b) Tangential component of pressure
- c) Stress due to pressure fluctuations
- d) Normal component of viscosity

17. 9. Eddies in turbulent flows result in _________ * 1 point

Mark only one oval.

- a) high diffusion coefficients
- b) less diffusion coefficients
- c) high value of the source term
- d) low value of the source term

18. 10. Transfer of kinetic energy from large eddies to smaller eddies is called as _________ * 1 point

Mark only one oval.

- a) Energy cascade
- b) Momentum cascade
- c) Energy decomposition
- d) Momentum decomposition

19. 11. Reynolds number gives the relative importance of _________ * 1 point

Mark only one oval.

- a) viscous force and tangential force
- b) inertia force and viscous force
- c) inertia force and pressure force
- d) pressure force and viscous force

20. 12. Which is the first step in the numerical solution of a fluid flow problem? * 1 point

Mark only one oval.

- a) Discretization
- b) Physical model of the flow
- c) Mathematical model of the flow
- d) Iteration

21. 13. Choosing a particular type of discretization method is ineffective when __________ * 1 point

Mark only one oval.

- a) mathematical model is complex
- b) mathematical model is simple
- c) grid is coarse
- d) grid is very fine

22. 14. The mathematical model is based on ___________ * 1 point

Mark only one oval.

- a) physical principles and assumptions
- b) physical principles
- c) flow model
- d) flow model and assumptions

23. 15. Initial conditions are used for _________ problems. * 1 point

Mark only one oval.

- a) time-dependent problems
- b) boundary value problems
- c) control volume problems
- d) finite difference problems

Feedback Form

24. How did you come to know of the STTP programme? *

Mark only one oval.

- Social Media
- Friends
- Your College/Department
- Colleagues

25. The guest speakers delivered the information I expected to receive *

Mark only one oval.

- Strongly agree
- Agree
- Neutral
- Disagree

26. The Subject matter was presented effectively *

Mark only one oval.

- Strongly agree
- Agree
- Neutral
- Disagree

27. The pace of the STTP sessions was satisfactory *

Mark only one oval.

- Fully covered
- Moderately covered
- Poorly covered

28. Are you interested in attending any future workshops/STTPs/FDPs conducted by our College? *

Mark only one oval.

- Yes
- No

29. Overall rating of this STTP *

Mark only one oval.

1	2	3	4	5

30. Any Suggestion/Comments *

SARANATHAN COLLEGE OF ENGINEERING

(Approved by AICTE- New Delhi, Affiliated to Anna university- Chennai)
(Accredited by NBA and NAAC with A+ Grade)
Venkateswara Nagar, Panjappur, Tiruchirapalli, Tamil Nadu, India.

Certificate No.: AICTE / STTP / MECH / 2020 -2021 / 12

E-CERTIFICATE

The Program Evaluation Committee (PEC), constituted for the AICTE sponsored Six days Short Term Training Programme (STTP) Phase - II on "**Rudiments and Practices of Computational Fluid Dynamics in Thermo Fluid Analysis**" held from 24-May-2021 to 29-May-2021 in the Department of Mechanical Engineering, Saranathan College of Engineering, Tiruchirapalli, certifies that **Ms. N.M.LISHA , Research Scholar, Vellore Institute of Technology** has participated in the STTP and successfully qualified in the test conducted on 29-May-2021

Dr. N. Baskar	**Dr. G. Jayaprakash**	**Dr. D. Valavan**
Coordinator	**HOD/Mechanical**	**Principal**