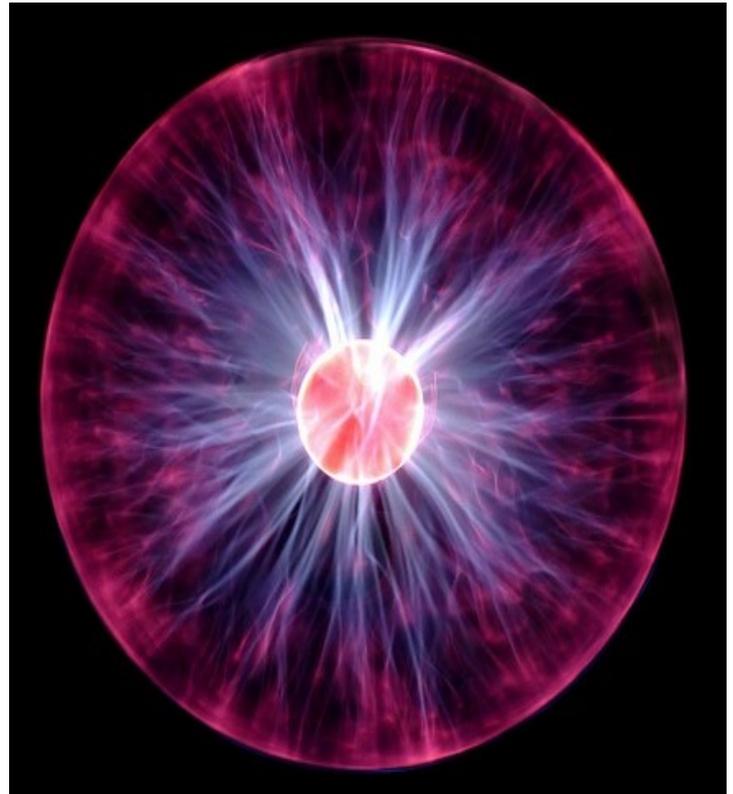
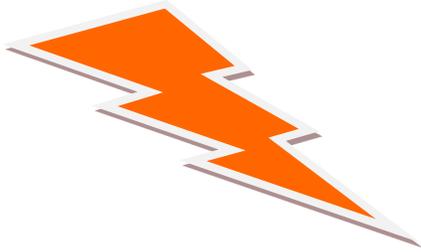


Year - 2019 - 20



ELECTROSPHERE

---- A Technical Magazine

Department of Electrical Engineering
AISSMS 's Institute of Information Technology, Pune.



Volume I

DBMS Applications in Power Systems

Prof. Dr. Shashikant Bakre
Prof. Sachin Shelar

Introduction

In the advent of Information Technology, lot of IT based applications have been introduced in electrical power systems. Some areas are Load Flow Analysis, Fault Calculations, Harmonics Measurements, Network Synthesis, Smartgrids and Microgrids. Various tools available for these applications are Database Management Systems (DBMS), Knowledge Base Systems (Comprising of neural networks, artificial intelligence, expert systems, robotics and fuzzy logic based systems) and Object Oriented Web Enabled Systems. In this article we will have a discussion on DBMS applications in power systems.

Introduction to Database Management Systems (DBMS)

Data is referred as meaningful and relevant Information. In the context of electrical power systems, values of various parameters such as current, voltage, power, power factor, phase angle, energy and frequency may be a data. These parameters are measured by numeric meters and stored in Servers.

Data Files

The traditional way of storage of data is data files. Separate file is created to store data. The data file is connected to the file containing main program. In early days, the system engineers used to conduct load flow analysis in FORTRAN programming wherein separate data file was connected to the main program. Although it is easier to maintain data files, the main limitation of maintaining a data file is large amount of data cannot be stored.

File Management System (FMS)

The system comprising of number of data files is known as File Management System (FMS). The FMS is simple and easy to operate. However there is a problem of Data Inconsistency. If the data file is sent from client side and before reaching server if the electricity is went off, the client side will indicate 'data sent' but server would indicate 'data not received' . This typical situation is called data inconsistency.

Database Management Systems (DBMS)

The problem of data inconsistency observed in case of FMS is handled successfully by Database Management System (DBMS). In DBMS, the user has to define a unit. The transaction (unit) would not be declared completed unless the definition is fulfilled.

For example, in above case if we define 'data sent' and 'data receipt' as one unit of transaction, then in the event of failure of power supply, the definition will not be fulfilled and

Transaction will show incomplete status. Thus data consistency and data integrity are the two main advantages of using DBMS.

Database is the collection of all such data. After collecting huge amount of data, we have to perform number of operations such as traversal, merging, sorting, searching, inserting and deleting. For this purpose a separate data management system is required called Database Management System (DBMS). Broadly there are here types of DBMS- Hierarchical (HDBMS), Network (NDBMS) and Relational DBMS (RDBMS). In a hierarchical DBMS, the data is stored in form of tree structure. For complex applications, HDBMS also becomes complex and difficult to analyze. Network DBMS comprises of data presentation in a network. During early 1970s, the HDBMS and NDBMS packages provided by International Business Machine (IBM) were well known. Today, RDBMS is the most popular and commonly used DBMS because of its ability to deal with complex data in a simple manner, data consistency and integrity discussed above. In RDBMS the data is arranged in form of rows and columns thus forming a tabular data structure. The heading of data is called field and data itself is called records. For example Table 1 shows Meter number, Manufacturer, Current Rating and Class of Accuracy as fields whereas data items such as HT-101, ABB, 5 A, 1 A, 0.5, 0.2 etc. are called records. The field using which corresponding data is opened is called unique key. For example Meter number is a unique field or unique key. As the name indicates, unique field is unique and cannot be repeated elsewhere in a table. For instance, HT-101 is a unique field as there is no other meter number than HT-101.

**Table 1
Meter Database**

Meter Number	Manufacturer	Current Rating	Class of Accuracy
HT-001	ABB	5 A	0.5
HT-002	L&T	1 A	0.2
HT-003	Secure	5 A	0.5
HT-004	Datapro	1 A	0.2

**Table 2
MWh consumption recorded by the meter**

Meter Number	Monthly MWh consumption recorded by the meter in six months in the year 2019					
	January	February	March	April	May	June
HT-101	1001	1050	1021	1037	1032	1063
HT-102	1676	1689	1607	1675	1645	1646
HT-103	1809	1876	1834	1822	1818	1867
HT-104	2012	2011	2016	2017	2066	2045

Table 1 gives meter database whereas Table 2 shows monthly Mwh consumption for the period of six months. It is quite possible to merge these two tables using unique key.

For this purpose, the command can be given through Structured Query Language (SQL).

Further if we want to identify consumers having monthly consumption above 1500 MWh, we can retrieve this information by entering condition like $MWh > 1500$ MWh. Such questionnaire is called query. Such queries are entered in database through SQL.

The commonly used RDBMS packages are Oracle, SyBase, MySQL, MS Access, IBM DB2, MarialDB and Postgress. Among these packages, MySQL, MarialDB and Postgress are open source and available free of cost.

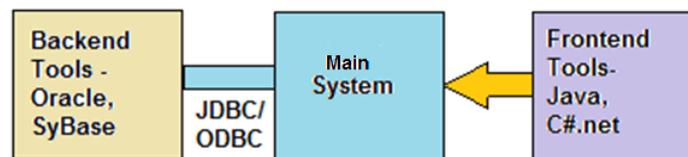


Fig 1
DBMS with Frontend and Backend tools

As shown in Fig 1, the database is interfaced with frontend tools and backend tools. The actual stored data is at backend. It is connected to the system through the bridge called Java Database Connectivity (JDBC) and Open Database Connectivity (ODBC). The connectivity between JDBC and ODBC is provided by JDBC-ODBC Bridge.

The SQL and high level programming languages such as Java, C#.net are provided as frontend tools. These languages perform various operations such as creation, traversal, merging, searching, insertion and deletion of records.

Use of Data Structures

The data structures can be used effectively in DBMS. Arrays, pointers, linked lists, trees, graphs; hash tables, bubble sort, quick sort, linear search and binary search techniques can be used effectively. The working of linked list is similar to the book having 1000 pages. In order to gather certain information, we link required pages of book by writing 'go to page no --' by pencil on previous page at the top. In this way, we can collect required information from 1000 page book through page numbers written on required pages using pencil. Similarly, if the list of 400 kV equipments is to be prepared, such equipments would be identified from huge database of all items having different voltage ratings. These item names are stored at various address locations in a computer memory. The address in memory locations pertaining to particular item would be identified. These equipment names would be connected through pointers addressing memory locations. This is called linked list. In this way, using linked list, the list of 400 kV equipments would be prepared from the large database of all electrical equipments.

Client Server Model for data storage

In AMR systems, the metering data is sent from Substations to Central Monitoring Stations (CMS) or State Load Dispatch Centers (SLDC) for all 27X7 hours. In Maharashtra State Electricity Transmission Co. Ltd (Mahatransco), the billing data required for ABT metering is sent from about 630 numbers of EHV substations to the CMS. This communication is based on Client-Server model wherein Substations are clients and CMS is server. The data is stored in DBMS server provided at CMS end. The data is also stored in a local server provided at client side.

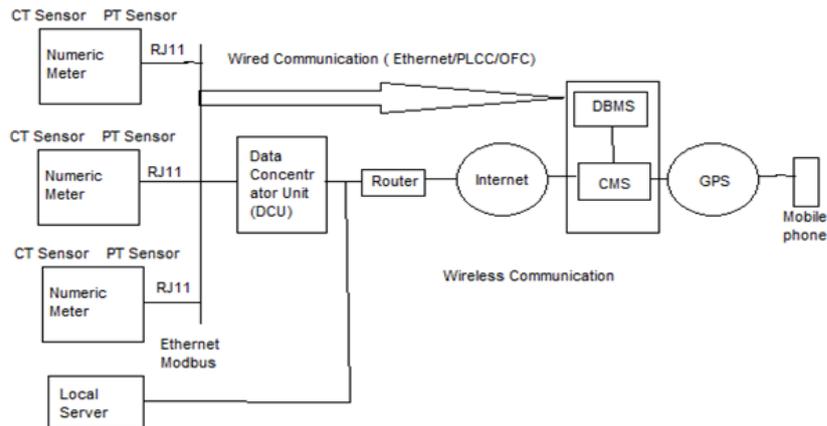


Fig 2
Data storage at Client and Server side

As shown in the figure 2, the data is collected by CT/PT sensors which are received by numeric meters. It is then sent to Ethernet modbus through RJ-11 connector provided at back side of the numeric meter. Thereafter the data is collected by the device called Data Concentrator Unit (DCU). Then it is sent to CMS and later to Mobile phone. There are two channels of unidirectional communication- wired and wireless. The wired communication is conducted through Ethernet, PLCC and OFC whereas wireless communication is arranged through internet and GSM media. In this manner, the data is stored at client side local server and server side CMS DBMS server.

Data warehouse and Data Mining

The DBMS discussed above is limited for a structured database wherein the specific fields and records are available. It would provide information only as per queries. However, it is not suitable for unstructured database. On number of occasions, unstructured data items are required to be included and retrieved as needed. Some examples of unstructured database are Audio/video clips, animations, images, pictures, reviews and profiles. Data warehouse is a system in which structured and well as unstructured data can be stored. Retrieval of such type of data items is not possible through SQL or any other frontend tool. Data Mining is the application software using which required data can be retrieved from the Data Warehouse. Some of the Data Mining software packages are Oracle Data Mining, Microsoft SharePoint, Suspense and Rapid Miner.

MSEDCL New Tariff (September 2019) Review

Prof. Sachin V. Shelar

MERC has approved the new tariff of Maharashtra State Electricity Distribution Company Limited (MSEDCL) from the September 2018

Major Highlights are as below:

1. Introduction of penalty for lead kVARh
2. Reduction of power factor incentive from 7% to 3.5%.
3. Introduction of kVAH billing from 1 April 2020.
4. Creation of new Tariff Category – Electric Vehicle under HT Level
5. Increase in fixed charges from 350/- per kVA to 391/- per kVA

Summary of HT Tariffs for FY 2019-20, effective from 1 April, 2019

Category	Fixed/Demand Charge		Energy Charges	Wheeling Charges	Total Variable Charges
	Unit	Rate			
HT Category - 11 kV					
HT I (A) (i): HT - Industry	Rs./kVA/Month	391.00	7.07	0.76	7.83
HT I (B): HT - Industry (Seasonal)	Rs./kVA/Month	391.00	7.34	0.76	8.10
HT II : HT - Commercial	Rs./kVA/Month	391.00	11.73	0.76	12.49
HT III : HT - Railways/Metro/Monorail Traction	Rs./kVA/Month	391.00	7.00	0.76	7.76
HT IV: HT - Public Water Works (PWW)	Rs./kVA/Month	391.00	6.30	0.76	7.06
HT V(A): HT - Agriculture - Pumpsets	Rs./kVA/Month	69.00	3.77	0.76	4.53
HT V(B): HT - Agriculture - Others	Rs./kVA/Month	69.00	5.20	0.76	5.96
HT VI: HT - Group Housing Societies (Residential)	Rs./kVA/Month	313.00	5.82	0.76	6.58
HT VIII(A): HT - Temporary Supply Religious (TSR)	Rs./kVA/Month	418.00	3.75	0.76	4.51
HT VIII(B): HT - Temporary Supply Others (TSO)	Rs./kVA/Month	391.00	12.00	0.76	12.76
HT IX(A): HT - Public Services-Government	Rs./kVA/Month	391.00	7.90	0.76	8.66
HT IX(B): HT - Public Services-Others	Rs./kVA/Month	391.00	9.70	0.76	10.46
HT X: HT – Electric Vehicle Charging Station	Rs./kVA/Month	70.00	5.24	0.76	6.00

Power Factor Computation Formula

$$Avg PF = \frac{Total kWh}{Total kVAh}$$

Wherein

$$kVAh = \sqrt{\sum (kWh)^2 + \sum (RkVAh Lag + RkVAh Lead)^2}$$

It can be seen that as lead RkVAh are being considered, customer having lead power factor (over compensation) will have lower power factor, so they may get less incentive or penalty.

Power Factor Incentive:

Sl.	Range of Power Factor	Power Factor Level	Incentive
1	0.951 to 0.954	0.95	0%
2	0.955 to 0.964	0.96	0.5%
3	0.965 to 0.974	0.97	1.0%
4	0.975 to 0.984	0.98	1.5%
5	0.985 to 0.994	0.99	2.5%
6	0.995 to 1.000	1.00	3.5%

Power Factor shall be measured/computed upto 3 decimals, after universal rounding off.

Power Factor Penalty:

Whenever the average PF is less than 0.9 (lag or lead), penal charges shall be levied at the rate of the following percentages of the amount of the **monthly electricity bill, excluding Taxes and Duties:**

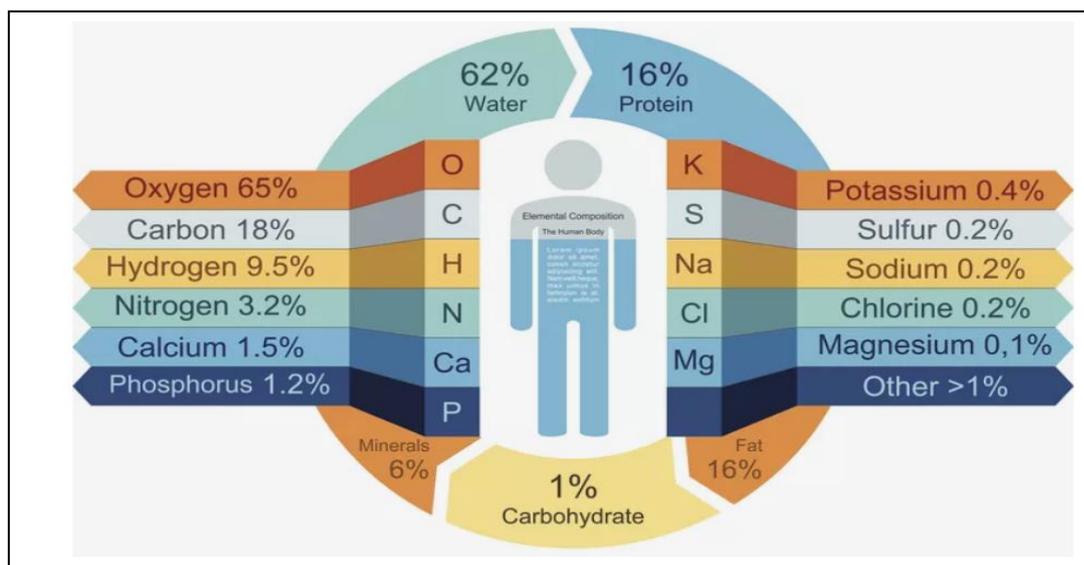
Sl.	Range of Power Factor	Power Factor Level	Penalty
1	0.895 to 0.900	0.90	0%
2	0.885 to 0.894	0.89	1.0%
3	0.875 to 0.884	0.88	1.5%
4	0.865 to 0.874	0.87	2.0%
5	0.855 to 0.864	0.86	2.5%
6	0.845 to 0.854	0.85	3.0%
7	0.835 to 0.844	0.84	3.5%
8	0.825 to 0.834	0.83	4.0%
9	0.815 to 0.824	0.82	4.5%
10	0.805 to 0.814	0.81	5.0%
...

Human Body as A Generator of Electricity

By Sandeep M.Chaudhari

The human body is a good generator of electricity. I would like to support these statements by giving some facts and examples.

Elements of human body



The water content is dominant part almost 62 % . The protein is 16%

Almost 99% of the mass of the human body is made up of six different elements. These are oxygen, carbon, hydrogen, nitrogen, calcium, and phosphorus. Only about 0.85% is composed of another five elements: potassium, sulfur, sodium, chlorine, and magnesium.

The electrical conductivity in S/m ([Siemens](#) per meter) of some of the elements is shown in table-1

Potassium	1.4×10^7 S/m
Carbon	100000 S/m
Calcium	2.9×10^7 S/m
Phosphorus	1×10^7 S/m
Sodium	2.1×10^7 S/m
Magnesium	2.3×10^7 S/m
Chlorine	0.01 S/m

Element/Part of human body	Electrical Conductivity S/m
Skin	0.5
Fat	0.036
Vessel Wall	0.46
Blood	0.35
Muscle	0.7
Bone	0.17

From table 1, it is observed that most of the elements are having good conductivity. The electrical conductivity of human body elements is given in table-2. It can be concluded that there are ample parts in our body which have reasonable electrical conductivity.

How Human Body functions as a Generator of Electricity?

For electrical generator there are basic three things required-Magnetic field, Conductor and relative motion between conductor and magnetic field. Now these requirements of generator functioning are fulfilled due to Mother Nature and us (human body).

In simple words these are fulfilled in following way-

- **Magnetic field**-Magnetic field of Earth around us
- **Conductor**- Blood in veins of humanbody which is a good conductor due to the constituents present in blood
- **Relative motion between conductor and magnet**- The herart continuously circulated blood in our body hence motion of conductor is ensured.

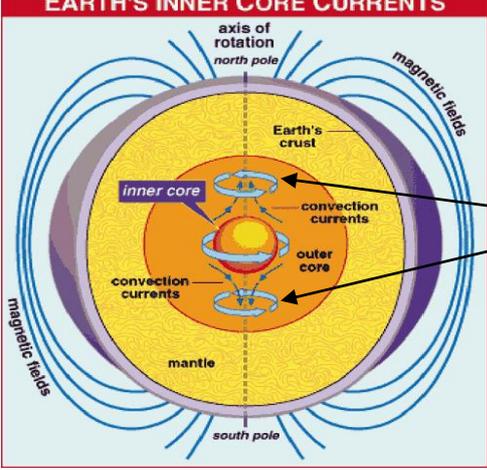
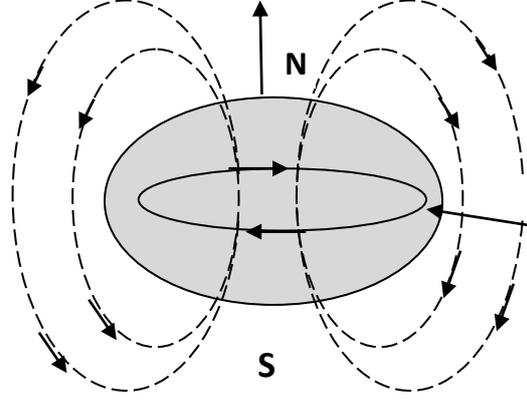
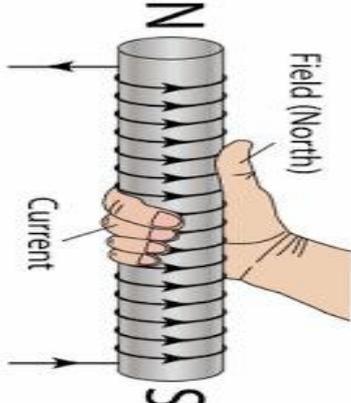
The above 3 elements related to human body generator are discussed in following sections

Magnetic Field-Earth as a giant magnet

We live on earth. The Earth is a giant magnet . The magnetic field of Earth is extremely important to sustaining life on Earth. Without it, we would be exposed to high amounts of radiation from the Sun and our atmosphere would be free to leak into space.

There is lot of iron material inside earth surface in the form of molten lava . The chemical irregularities between different constituents in this molten material cause currents to flow.**Note-Earth is not a permanent magnet, but an electromagnet.**

In following table some diagrams illustrate the earth's magnetic field

 <p>EARTH'S INNER CORE CURRENTS</p> <p>The diagram shows a cross-section of Earth with the following labels: axis of rotation, north pole, south pole, Earth's crust, inner core, outer core, mantle, convection currents, and magnetic fields. Blue lines represent magnetic field lines looping around the Earth. Red arrows indicate convection currents within the outer core.</p>	<p>Parts- Inner core, Outer core, Earth's crust</p> <p>Due to chemical irregularities in the molten lava, different chemical compositions of solid materis inside Earth's surface, churning mass etc, the currents are generated ,these are often termed as eddy currents. These move in circular path as shown.</p> <p>And due to flow of these circular path currents throughout the Earth's mass, magnetic field is generated by Earth.</p>
 <p>The diagram shows a cross-section of Earth with dashed lines representing magnetic field lines. The North (N) and South (S) poles are labeled. Arrows indicate the direction of current flow within the Earth's surface.</p>	 <p>The diagram shows a hand holding a cylindrical rod. The fingers are curled around the rod, and the thumb points upwards. The rod is labeled with 'N' at the top and 'S' at the bottom. The label 'Field (North)' points to the top of the rod, and 'Current' points to the direction of the curled fingers.</p>
<p>It can be seen how the currents within Earth's surface generate magnetic field , right hand rule is applied to determine the direction of Earth's magnetic field. Thus N-S poles are generated by Earth.</p>	

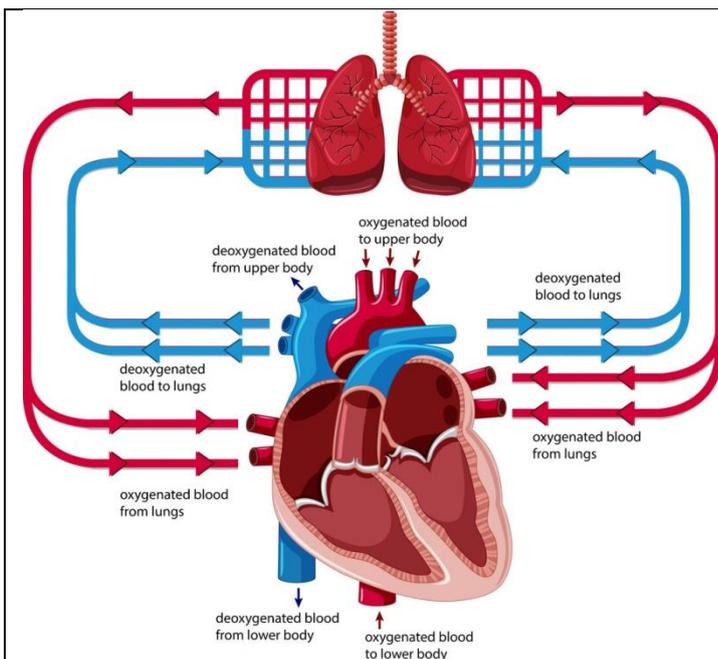
Conductor-Vein and blood system

Veins are blood vessels that carry blood toward the heart. Most veins carry deoxygenated blood from the tissues back to the heart. The walls of veins are made up of three different layers:

- **Tunica externa.** This is the outer layer of the vein wall, and it's also the thickest. It's mostly made up of connective tissue. The tunica externa also contains tiny blood vessels called vasa vasorum that supply blood to the walls of veins.
- **Tunica media.** The tunica media is the middle layer. It's thin and contains a large amount of collagen. Collagen is one of the main components of connective tissue. The electrical conductivity of collagen is about 35 S/m at 30 degree centigrade.
- **Tunica intima.** This is the innermost layer. It's a single layer of endothelium cells and some connective tissue. This layer sometimes contains one-way valves, especially in the veins of arms and legs. These valves prevent blood from flowing backward.

The blood is a good conductor of electricity. The specific conductance of blood varies in the range of 7 to 15 Mho .cm X 1000.

Motion of conductor- Blood flow



The human circulatory system consists of a network of arteries, veins, and capillaries, with the heart pumping blood through it. Its primary role is to provide essential nutrients, minerals, and hormones to various parts of the body. Alternatively, the circulatory system is also responsible for collecting metabolic waste and toxins from the cells and tissues to be purified or expelled from the body

Thus the 3 conditions required to generate electricity are fulfilled by human body i.e.

- Magnetic Field-Earth as a giant magnet**
- Conductor-Vein and blood system**
- Motion of conductor- Blood flow**

The magnetic field of Earth is cut by blood (moving conductor) and emf is generated in it which circulates current in our body. This generated electrical power is utilised by human beings for their activities and living.

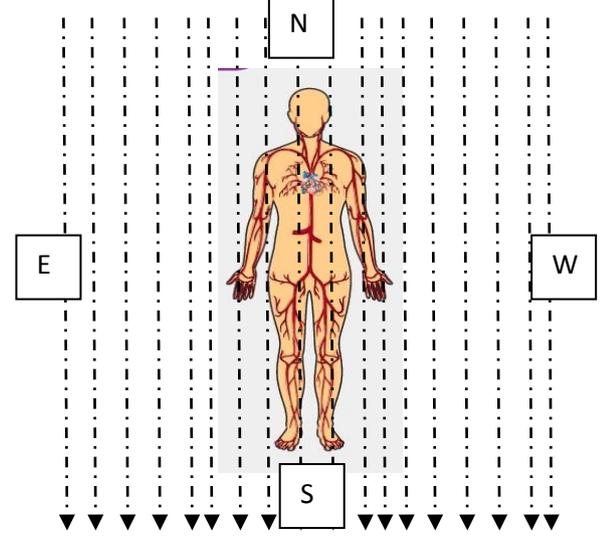
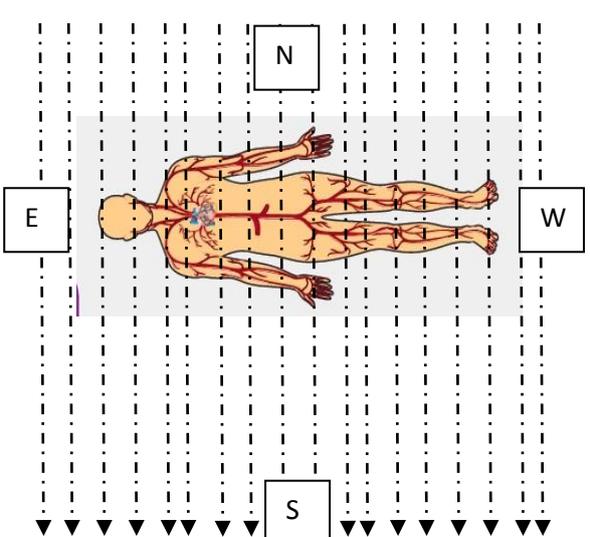
Few examples will support the facts that human body is a generator of electricity-

Sleeping position

Our grandparents always ask us to sleep along East –West direction and not along North-South direction. Why?

Because if we sleep along North-South direction then the blood conductor will cut very few lines of magnetic flux (Earth’s Magnetic flux) and less EMMF will be generated. Hence we feel doziness or lack of freshness when we wakeup.

But if we sleep along East-West direction then the blood conductor will cut very maximum amount of lines of magnetic flux (Earth’s Magnetic flux) and more EMF will be generated. Hence we feel enthusiasm or freshness when we wakeup.

 <p>Earth’s magnetic field</p>	 <p>Earth’s magnetic field</p>
<p>Sleeping direction –Along North-South- Less flux cutting, Less generation of electrical energy</p>	<p>Sleeping direction –Along East-West- Less flux cutting, Less generation of electrical energy</p>

Power Generated by Human brain-

Almost 15 to 20% blood flow is for brain. It is experimentally proved that an average adult brain produces 40 to 60 watt power.

Effect of Full Moon (Pournima) and dark moon (Amavasya) on human body

We all are aware of effect on Moon’s magnetic field on Earth’s magnetic field. On the day of Amavasya the Moon’s magnetic field interacts with Earth’s magnetic field in such a way that the net magnetic field reduces. Hence human body generator generates less electrical energy. Our parents, grandparents do not permit us to go for outing, particularly in night hours during Amavasya (Dark moon day).

ON the Pounima (Full Moon Day) the Moon’s magnetic field interacts with Earth’s magnetic field in such a way that the net magnetic field is more. Hence human body generator generates more electrical energy. We often celebrate our festivals like Kojagiri pounima etc on these days. This is because our human body generator is surrounded with more magnetic flux and more energy is generated it gives us positive energy.

Electromagnetic waves from human body

Since there is flow of electric current in the human body, it also has magnetic field around it. We if sound of any radio is not clear, we move our hand on it or put our hand on it. And most of the times, the sound becomes clear as we do it.

This happens because the magnetic field of human body generator interacts with it.

Wavelength matching

We often make a statement that, I am not comfortable with this person or our wavelengths don't match. Well the internal composition of every human is different so the magnetic field generated by every human body is different. These magnetic field interact and that decides the wavelength matching.

I have tried to put this topic as a part of imaginary thing or fiction. The author does not claim that the every statements made in above article have any experimentation or scientific evidences. Some facts and figures although have evidence of literature. Its just about imagining things around us in some different way.

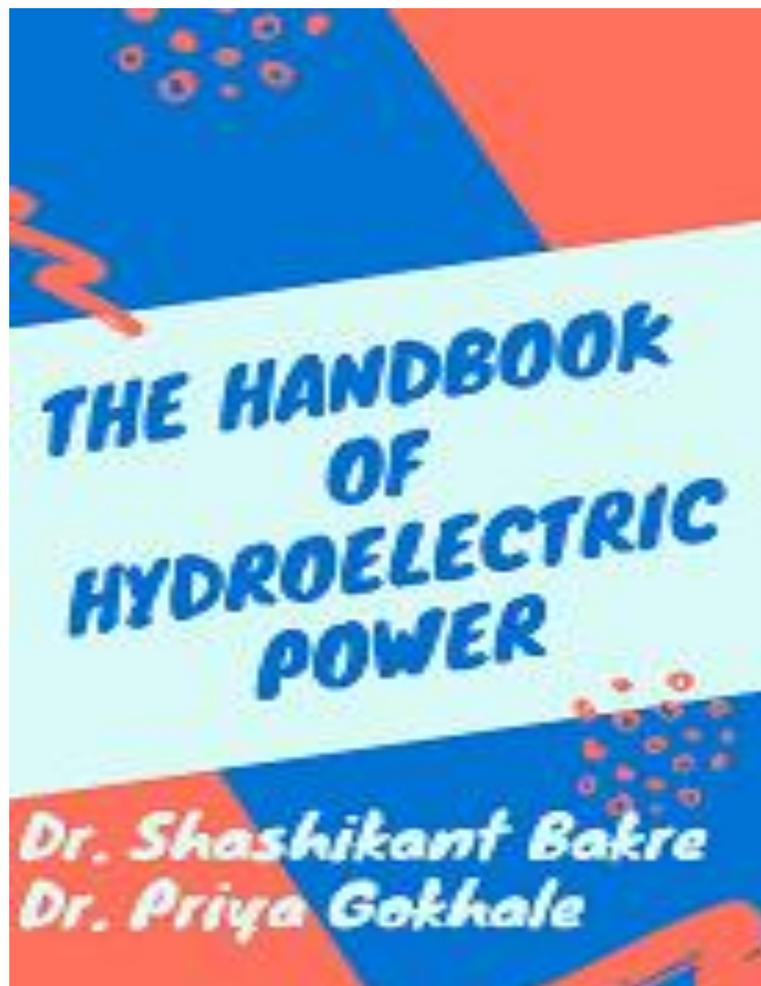
Publication of book on Hydroelectric Power

Prof. Dr. Shashikant Bakre

The book titled “The Handbook of Hydroelectric Power “written by Prof. Dr. Shashikant Bakre has been published on 11th October 2019.

The book was published by IST Publishing House and distributed by Amazon Publishers worldwide. The book is available for readers in e-book and paperback formats. The book is coauthored by Prof. Dr. Priya Gokhale.

As we all know, electricity is an essential ingredient in our daily life. As per demand, electricity is generated as it cannot be stored economically. It is observed in number of cases that the load is ahead of generation. This book illustrates basics of generating electricity with hydroelectric power generation in particular. Hydroelectric power is reliable, quick starting and pollution free type of generation. It can be used as bulk generation in Smartgrids as well as distributed generation in Microgrids. The recent developments in hydropower generation are also discussed in this book.





Prof. S. D. Raste

About ELECRAMA:



ELECRAMA is a platform to connect the world with Indian industry in respect of technology, new trends and innovation for future energy transition. It is also a stage where all global leaders can meet and share their ideas to develop cost effective solutions for the world. India is expected to become the fifth largest Economy in the world by the end of 2025 and we invite our global counterparts to be partner in our growth story.

Anil Saboo

Chairman, ELECRAMA 2020

Overview:

ELECRAMA brings together the complete spectrum of solutions that powers the planet from source to socket and everything in between. Featuring not just equipment & technology, but peerless thought leadership platforms for everything electric - from technical conclaves to industry summits.

ELECRAMA 2020: 14th edition

- **Widest Choice of product and technology across the spectrum on display.**
- **Presence of global majors to small scale manufacturers** – The entire value chain to strengthen supply chain, logistics & vendor capability assessment.
- **Deeper & direct trade engagement with buyers and sellers** through purpose built events.
- **Preview new and upcoming product & technology**, new specs & standards.
- **Explore investment opportunities & closer view of Multi billion dollar Indian Power Sector.**
- **Professional & peer networking** across the globe and hierarchies through dedicated networking events.
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PROJECTIONS FOR ELECRAMA 2020:

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 - Gross area of 1,10,000 Sq Mtrs
 - 450 foreign exhibitors
 - Overall participation from 120 countries
 - More than 1.5 billion USD of business to be generated
 - 3,50,000+ footfalls over five days.
-

WHY SHOULD YOU BE HERE?

- Largest congregation of power sector ecosystem in the geography.
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- Presence of global majors to small scale manufacturers – the entire value chain to strengthen supply chain, logistics & vendor capability assessment.
- Deeper & direct trade engagement with buyers and sellers through purpose built events.
- Preview new and upcoming product & technology, new specs & standards.
- Explore investment opportunities & closer view of US\$250 billion Indian Power Sector Opportunity.
- Professional & peer networking across the globe and hierarchies through dedicated networking events.
- Knowledge Sharing & Career Advancement through seminars, symposia and conferences.



Organizers:

Indian Electrical & Electronics Manufacturers' Association (IEEMA)

IEEMA is the apex association of manufacturers of electrical, industrial electronics and allied equipment in India. Founded in 1948, IEEMA is the first ISO certified industry association with 800+ member organisations encompassing the complete value chain in power generation, transmission and distribution equipment.

IEEMA members contribute to more than 90% of the power equipment installed in India and represent a turnover of over USD 25 billion. IEEMA has a pan India presence with its corporate office at New Delhi, registered office at Mumbai, regional offices at Kolkata and Bangalore and eight state offices.

R.K. Chugh, President – IEEMA

Vipul Ray, Sr. Vice President – IEEMA

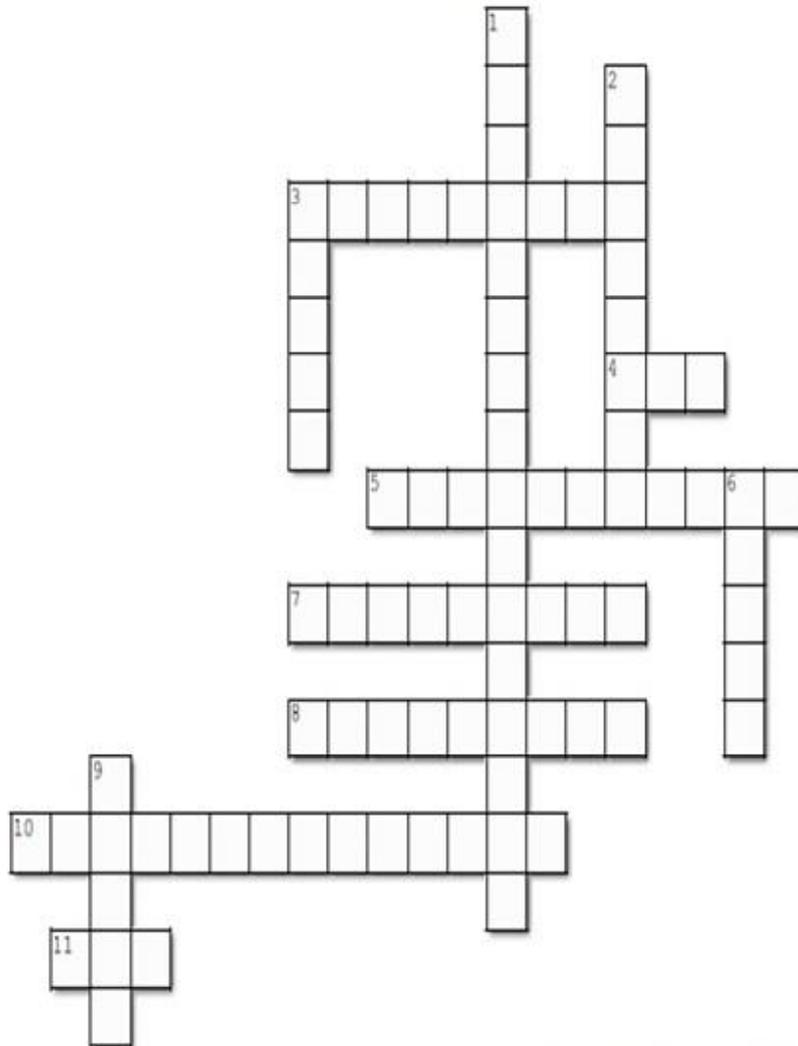
Rohit Pathak, Vice President – IEEMA

Sunil Misra, Director General - IEEMA

Smart Grid Crossword

Prof. S. M. Shaikh

Complete the crossword below using knowledge of Smart Grid



Created using TheTeachersCorner.net [Crossword Puzzle Maker](#)

Across

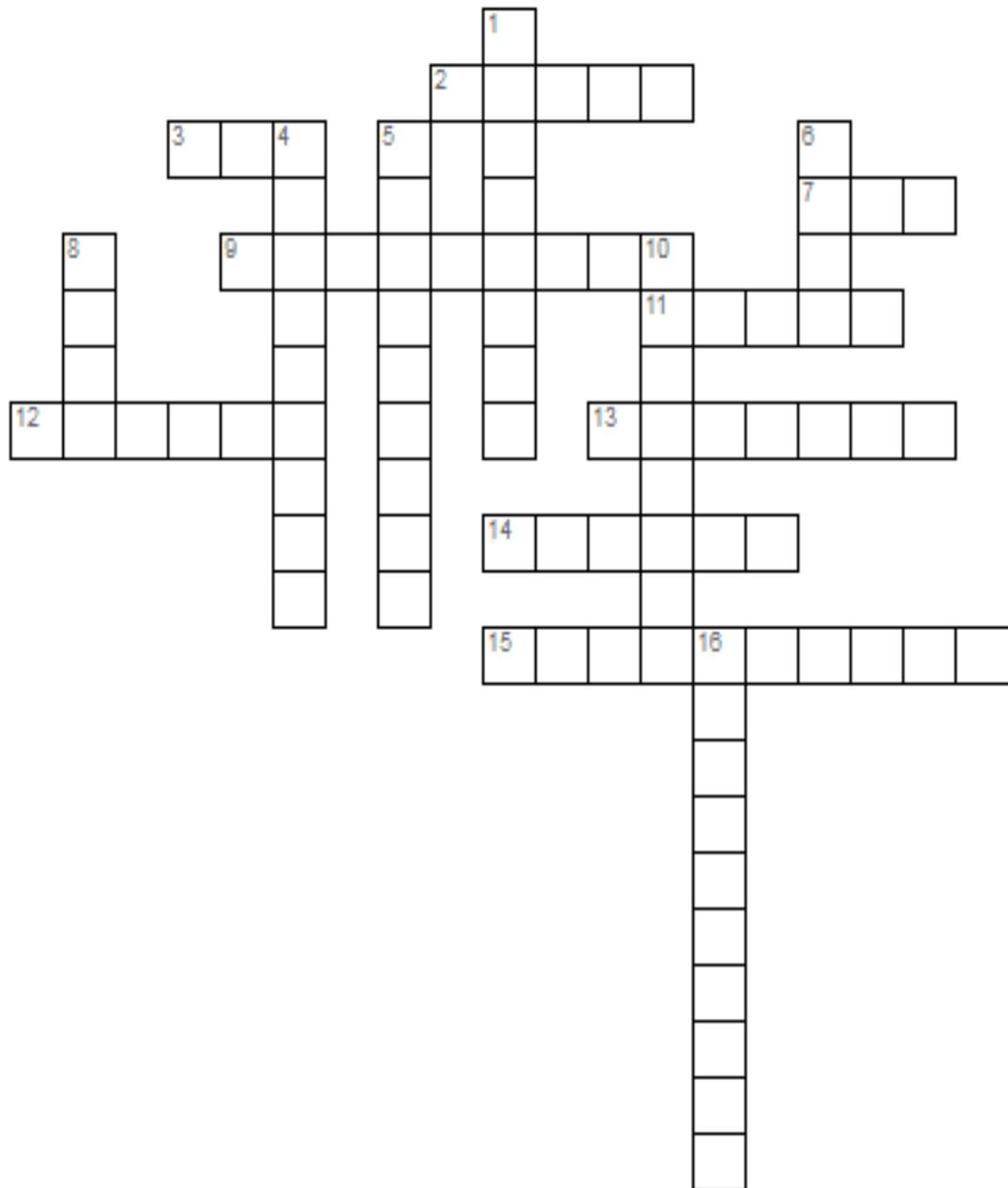
3. 1. The key feature of a smart grid- _____ control
4. 5. According to Albert Betz, the maximum efficiency of wind power generation system is _____
5. 4. The IEEE standard for- Method of evaluating a Phasor measurement unit (PMU) measurement and requirements _____
7. 10. Q-axis sinusoidal disturbance current injection results in perturbations majorly in _____
8. 11. The operating time of rate of change of frequency (ROCOF) relay _____ with the increase in inertia of machine
10. 14. In the hybrid storage system which device helps to compensate for high frequency switching transients _____
11. 9. The performance of current injection-based islanding detection techniques is superior for loads of _____ quality fact

Down

1. 17. In a typical AC microgrid the following helps to regulate voltage and frequency in the islanded mode of operation _____
2. 3. the following standard is used to provide criteria and requirements for the interconnection of distributed generation reso _____
3. 13. Directional relays respond to _____
6. 2. PV installation target of India by 2022 _____
9. 8. In case of digital relays, various relay settings are stored in _____

Basic Electrical Crossword

Prof. S. N. Pawaniker



Across

- 2 passage of current through body
- 3 wiring size
- 7 a law
- 9 measures electrical potential
- 11 a type of ground
- 12 symbol 'T'
- 13 enclosed path of current
- 14 to turn on and off current
- 15 electromagnetic wave

Down

- 1 measures electrical resistance
 - 4 reference point in an electrical current
 - 5 measures electric power
 - 6 symbol 'V'
 - 8 protects against excessive current
 - 10 electric component that transmits current
 - 16 generates a continuous output waveform
-

Sudoku

Prof. A. D. Shiralkar

	2	7	1	4		8		6
8			7		5		3	
	3	9			8		7	5
7	5	4		3	1			9
		2		5		7		
1	9		2	6		5	4	3
9			3		2	6	5	
	7		5		6		1	
6		5		1	9	3		7

8		1	2		2			5
4		7		8		3	1	
	2			6		8		9
	5	3		2	4	6	8	
9		6	1		8		3	7
	8		3	7		9	5	
6		9	8		2		4	
	1	4		9		7		8
2	3		7		5	1		6

Electrical Quiz

Prof. K.S Gadgil

Prof. V.A Yawale

Prof. N.M Rao

- 1) Materials with lots of free electrons are called
- A. conductors
 - B. insulators
 - C. semiconductors
 - D. filters
- 2) Eight-tenths coulomb passes a point in 4 s. The current in amperes is
- A. 1.6 A
 - B. 16 A
 - C. 2 A
 - D. 0.2 A
- 3) A wiper is the sliding contact in a
- A. switch
 - B. photoconductive cell
 - C. thermistor
 - D. potentiometer
- 4) A 120 Ω resistor must carry a maximum current of 25 mA. Its rating should be at least
- A. 4.8 W
 - B. 150 mW
 - C. 15 mW
 - D. 480 mW
- 5) Three 47 Ω resistors are connected in parallel across a 110 volt source. The current drawn from the source is approximately
- A. 2.3 A
 - B. 780 mA
 - C. 47 mA
 - D. 7.06 A
-

6) A practical current source has a finite internal resistance.

- A. True
- B. False

7) The duty cycle of a pulse waveform with a pulse width of $10\ \mu\text{s}$ and a period of $100\ \mu\text{s}$ is 25%.

- A. True
- B. False

8) What is the capacitance when $Q = 60\ \mu\text{C}$ and $V = 12\ \text{V}$?

- A. $720\ \mu\text{F}$
- B. $5\ \mu\text{F}$
- C. $50\ \mu\text{F}$
- D. $12\ \mu\text{F}$

9) A transformer with a 110 V primary has a 15:1 turns ratio. The load resistance, R_L , is $120\ \Omega$. What is the approximate voltage across the load?

- A. 7.3 V
- B. 73 V
- C. 88 V
- D. 880 V

10) A transformer

- A. changes ac to dc
- B. changes dc to ac
- C. steps up or down dc voltages
- D. steps up or down ac voltages

11) The resistor voltage in an RL circuit is always out of phase with the current.

- A. True
- B. False

12) An RL high-pass filter consists of a $470\ \Omega$ resistor and a $10\ \text{mH}$ inductor. The critical frequency is taken across the coil. The circuit's critical frequency is

- A. 125 Hz
 - B. 1,250 Hz
 - C. 564 Hz
 - D. 5,644 Hz
-

13) If the capacitor in an integrator becomes leaky,

- A. the time constant will be effectively reduced
- B. the waveshape of the output voltage across C is altered
- C. the amplitude of the output is reduced
- D. all of the above

14) The rising and falling edges of a pulse waveform contain the higher frequency component.

- A. True
- B. False

15) If the rms voltage drop across a 15 k Ω resistor is 16 V, the peak current through the resistor is

- A. 15 mA
- B. 1.5 mA
- C. 10 mA
- D. 1 mA

DEPARTEMNT OF ELECTRICAL ENGINEERING

INDUSTRY INSTITUTE INTERACTION



Industrial Visit to Lonikand Substation on
01/10/2019



Expert lecture by Mr. Ashok Borgoankar on
Electrical Safety -25/9/2019

Power Quality and Energy Cell Activities



Power Quality Audit of various industries done
by Mr. S. V. Shelar with students

Indian Society of Lighting Engineers Activities



A discussion forum on 'SCOPE OF
ILLUMINATION ENGINEERING' by Industry
Experts on 19/08/19

IEEE Activities



Inauguration of IEEE HAC Lab for Affordable
Agriculture By Mr. Dina Kholkar, TCS, Pune,
on 30/08/2019



SIG projects exhibition at BHAU institute at Pune
On 04/10/2019

WORKSHOP



Three Days Workshop on Industrial Approach on in Electronics' Engineering
24.09.2019 – 26 .09.2019

Renewable Club Activities



Akshay urja Diwas Celebration – 26/8/2019
Expert Talk by Mr Rahul Nalawade , Panama
Renewable Energy Group,Pune

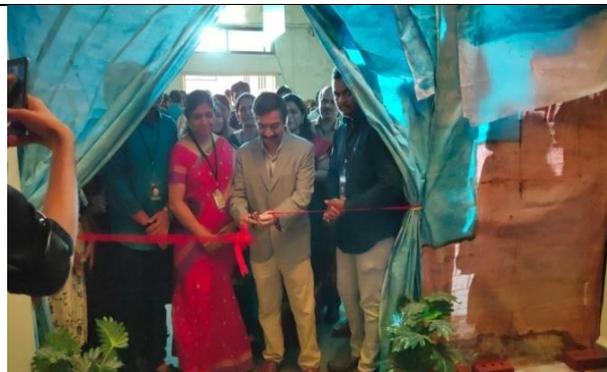


Energy Conservation Drive at different Ganpati
Mandals -2/9/19-11/9/19

EESA Activities



Enthusia team with Principal Dr. P. B. Mane



Enthusia Inauguration

ISTE and IE (I) Activities



Discussion on Super capacitors and chargers
Of Faculty members with Mr. Ramasundaram -
Vice President India , OptiXtal India Energy
solutions



Electrofunda Activity conducted on 28/08/2019