

# IESA online training on Energy Storage

**Who should attend:** Operation, Maintenance, Service, Project and Factory Personnel from Battery, Inverter, UPS, Solar, Substations, Forklift Trucks, E-rickshaw Manufacturing or user companies and their dealers, Telecom, Datacentre companies, and Engineers.

**Dates:** Every Wednesday spread over 8 weeks.

**Time:** 3:00 PM to 4:30 PM (IST)

**Mode of communication: Online**  
(Each module will be for 90 minutes).



Module 1

13<sup>th</sup> November, 2019

## Understanding All Aspects of Storage Battery (Specially Lead Acid Couple)

- Operating Concept of Secondary Battery, Key Components of Lead Acid Batteries: Cathode & Anode / Positive & Negative Plate Material used & purpose / Separators & Material used / Electrolyte & its properties / Container / Venting system & valves.
- Various Parameters & their importance: Importance of Voltage, Current & temperature control during charge & discharge & their relation with Cyclic Life, Float Life, Capacity, AH & WH efficiency, Self Discharge Loss.
- Protection from Premature Failure
- Life & failure prediction & predictive maintenance
- Question & Answer for the above session

Module 2:

20<sup>th</sup> November, 2019

## Selection, Installation, O&M and Life Prediction of Large UPS batteries

- UPS batteries for Offices, Data Centers & Process Industries
- Understanding Battery operation modes, Criticality of operations, frequency of power outages, maintenance capability, space constraints, floor loading, air circulation, heat evacuation & selection of correct battery type.
- Capability to analyze manufacturers data on battery test results
- A few important routine tests before procuring batteries
- Battery room design and installation
- Routine preventive & predictive maintenance
- Periodic battery balance life & replacement prediction by observing performance data during regular operation and annual maintenance.

Module 3:

27<sup>th</sup> November, 2019

## Off Grid/On Grid Solar Power Plant Batteries – System Design, Sizing, O&M and Procedure for Life Prediction & Enhancement

- Battery operation & selection in solar & Wind solar hybrid – Micro grids – Off Grid / Hybrid, Grid Tie – Load Leveling or controlling solar power fluctuations
- Brief discussion on system size / investment optimization by using batteries in Hybrid Systems (1) Solar + Wind + battery (2) Solar + Wind + Mains Electricity + Battery (3) Solar / Wind + Mains + D.G + Battery.
- Solar & Wind Charge Controller parameter selection for charge – discharge voltage / current profile & synchronizing multiple power inputs for maximizing battery efficiency, service life with minimum 80% of rated output.
- Evaluation of a few Important Type & Routine Test results for ensuring performance & service life.
- Some pointers on batteries used in high temperature or sub zero temperatures
- Typical Failure Modes in Renewable Energy applications & Trouble Shooting

Module 4:

4<sup>th</sup> December, 2019

## Traction Battery O&M, Life Prediction, Different Charging Methods & Periodic Maintenance for Ensuring Full Service Life

- Batteries for Electric Forklifts, Tow/Platform Trucks & Golf Carts – Battery features required for material handling uses.
- Suggested Operating mode/ usage limits and expected service life
- Conventional taper charging process & controls
- Importance of weekly maintenance charge
- Newly developed - very fast charging process & opportunity charge

Module 5:

11<sup>th</sup> December, 2019

### **Inverter Batteries – Selection & Sizing with Correct Charging systems, Fault Diagnosis, Rectification & Replacement Decision**

- Batteries for Domestic & Industrial Inverters – Understanding the Battery operation modes & selection of correct battery type.
- Guide for selecting battery make & capacity from manufacturer's brochure
- Guide for observing in any fault during operation of inverter & battery & taking advance corrective measures with the supplier.
- A few pointers for understanding whether battery needs rectification or replacement, in case of failure.

Module 6:

18<sup>th</sup> December, 2019

### **E-Rickshaw & E Scooter Batteries – Selection, Sizing & Chargers, Life Enhancement, Fault Diagnosis, Rectification & Fast Charging Process**

- Batteries for Electric 3 wheelers & 2 Wheelers - Understanding the use and expectations from Lithium Ion / Lead Acid Flooded and VRLA Batteries
- Knowing the specifications of chargers used for E-Rickshaws & their problems
- 2 & 3 wheeler vehicles – Battery type, capacity and expected range.
- Suggested usage & recharging for increasing E Rickshaw LA battery life from present 10 months to 18 months or more.
- New fast charger for E Rickshaw Charging stations – 80% recharge in 3.5 hours or adding 35 Km run by 65 minute charge.

Module 7 (Part A):

8<sup>th</sup> January, 2020

### **Power Station & Electrical Substation batteries: Selection, Installation, O&M, Life Prediction, and Fault Diagnosis & Rectification**

- Batteries for Utility Power Stations & Distribution Sub Stations – Critical DC backup requirement – Circuit Breakers, Emergency Oil Pump, Barring Gear
- Types of batteries used & whether new & advanced types can be used
- Procedure to calculate battery capacity
- Importance of measuring state of charge on daily basis, for safety
- Importance of finding state of health & balance life during annual maintenance

Module 7 (Part B):

8<sup>th</sup> January, 2020

### **Telecom BTS batteries: Selection for Cycling or Float Application, O&M, Life Prediction & Enhancement, Fault Diagnosis & Rectification**

- Mobile BTS Tower Batteries – D.C backup power supply usage pattern for tower locations with (1) Infrequent Mains Power failure (2) Frequent mains failure (3) No Electricity Grid available.
- Analyzing battery types for above, namely, lead acid VRLA/Gel/ Flooded and Lithium Ion batteries.
- Pointers for basic operation & maintenance needs for longer service life.
- Periodic battery health, balance life & replacement prediction by analyzing performance data during regular operation and annual maintenance

Module 8:

29<sup>th</sup> January, 2020

### **Understanding Different Battery Designs for Various Applications – Advantage & Disadvantage – Type Versus Application**

- Different Types of Batteries, their design difference & applications – Lead Acid: Flooded - Tubular / Flat Pasted, Sealed/ VRLA – AGM / Gel / Lead carbon / Ultra Battery / Bipolar Battery / Alkaline – NiCad / NiFe / NiMH, Lithium Ion Batteries popular types – LFP / NMC
- Battery Capacity Calculation procedure – single & multiple cascading load
- Some Important Type & Routine Tests for different applications for ensuring quality of battery, life and performance.
- Question & Answer for the above session

#### **Trainers:**

- Rajarshi Sen, Technical Advisor, Customized Energy Solutions.
- Dr. Rahul Walawalkar, President, India Energy Storage Alliance.
- Dr. Satyajit Phadke, Manager – R&D, Customized Energy Solutions.
- Debi Prasad Dash, Executive Director, India Energy Storage Alliance.
- Sandeep Gupte, Director-Business Development, Customized Energy Solutions.
- Dr. Tanmay Sarkar, Sr. Consultant, Customized Energy Solutions.

#### **Registration:**

- IESA members: Free
- IESA non-members: Each module can be attended with a price of ₹2,499 + taxes / \$49 and ₹14,999 + taxes / \$399
- 10% discount on 2 registrations. 25% discount on 5 registrations.

#### **For registration contact:**

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**For more information, please visit [www.indiaesa.info](http://www.indiaesa.info)**