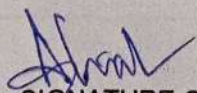


# LESSON PLAN FOR ACADEMIC SESSION: 2026-27(Winter)

|                                                             |                                  |                                                                                                                                             |
|-------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Discipline: Electrical Engineering                          | Semester : 3rd                   | Name of the Teaching Faculty: Er. ANITA SHIAL                                                                                               |
| Subject: Introduction to Electric Generation Systems (TH-I) | No. of days/ week class allotted | Semester From :                                                                                                                             |
| Week                                                        | Class Day                        | Theory Topics                                                                                                                               |
| 1ST                                                         | 1 <sup>st</sup>                  | Unit-I Thermal Power Plants: Coal, Gas/Diesel and Nuclear-based                                                                             |
|                                                             | 2nd                              | 1.1 Layout and working of a typical thermal power plant with steam turbines and electric generators                                         |
|                                                             | 3rd                              | Continue.....                                                                                                                               |
| 2ND                                                         | 1 <sup>st</sup>                  | Continue.....                                                                                                                               |
|                                                             | 2nd                              | 1.2 Properties of conventional fuels used in the energy conversion equipment used in thermal power plants: Coal                             |
|                                                             | 3rd                              | 1.2 Properties of conventional fuels used on the energy conversion equipment used in thermal power plants: Gas                              |
| 3RD                                                         | 1 <sup>st</sup>                  | 1.2 Properties of conventional fuels used in the energy conversion equipment used in thermal power plants: Diesel                           |
|                                                             | 2nd                              | 1.2 Properties of conventional fuels used in the energy conversion equipment -used in thermal power plants: Nuclear fuels-fusion            |
|                                                             | 3rd                              | 1.2 Properties of conventional fuels used in the energy conversion equipment used in thermal power plants: fission action                   |
| 4TH                                                         | 1 <sup>st</sup>                  | 1.3 Safe Practices and working of various thermal power plants: Coal based                                                                  |
|                                                             | 2nd                              | 1.3 Safe Practices and working of various thermal power plants; Gas- based                                                                  |
|                                                             | 3rd                              | 1.3 Safe Practices and working of various thermal power plants: Diesel-based                                                                |
| 5TH                                                         | 1 <sup>st</sup>                  | 1.3 Safe Practices and working of various thermal power plants: Nuclear-based                                                               |
|                                                             | 2nd                              | 1.4 Functions of the following types of thermal power plants and their major auxiliaries 1.4.1 Coal fired boilers: fire tube and water tube |
|                                                             | 3rd                              | 1.4.2 Gas/diesel-based combustion engines                                                                                                   |
| 6TH                                                         | 1 <sup>st</sup>                  | 1.4.3 Types of nuclear reactors: Disposal of nuclear waste and nuclear shielding                                                            |
|                                                             | 2nd                              | Continue.....                                                                                                                               |
|                                                             | 3rd                              | Unit-II Large Hydropower Plants                                                                                                             |
| 7TH                                                         | 1 <sup>st</sup>                  | 2.1 Energy conversion process of hydro power plant                                                                                          |
|                                                             | 2nd                              | Continue.....                                                                                                                               |
|                                                             | 3rd                              | 2.3 Construction and working of hydro turbines used in different types of hydro power plant                                                 |
| 8TH                                                         | 1 <sup>st</sup>                  | 2.3.1 High head-Pelton turbine                                                                                                              |
|                                                             | 2nd                              | 2.3.2 Medium head-Francis turbine                                                                                                           |
|                                                             | 3rd                              | 2.3.3 Low head-Kaplan turbine                                                                                                               |
| 9TH                                                         | 1 <sup>st</sup>                  | 2.4 Safe Practices for hydro power plants                                                                                                   |

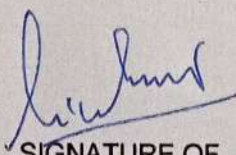


|      |                 |                                                                                            |
|------|-----------------|--------------------------------------------------------------------------------------------|
|      | 2nd             | 2.5 Locations of these different types of large hydro power plants in India                |
|      | 3rd             | Continue.....                                                                              |
| 10TH | 1 <sup>st</sup> | Unit-III Micro-Hydropower Plants                                                           |
|      | 2nd             | 3.1 Lay out of micro hydro power plants                                                    |
|      | 3rd             | Continue.....                                                                              |
| 11TH | 2nd             | 3.2 Different types of micro-hydro turbines for different heads:<br>3.2.1 Pelton turbines  |
|      | 3rd             | 3.2 Different types of micro-hydro turbines for different heads:<br>3.2.2 Francos turbines |
| 12th | 1 <sup>st</sup> | 3.2 Different types of micro-hydro turbines for different heads:<br>3.2.3 Kaplan turbines  |
|      | 2nd             | 3.3 Locations of these different types of micro-hydro power plants in India                |
|      | 3rd             | Continue.....                                                                              |
| 13th | 1 <sup>st</sup> | Unit-IV Economics of Power Generation and Interconnected Power System                      |
|      | 2nd             | 4.1 Related terms: Connected load, firm power                                              |
|      | 3rd             | 4.1 Related terms: Cold reserve, hot reserve, spinning reserve.                            |
| 14th | 1 <sup>st</sup> | 4.1 Related terms: Base load and peak load plants                                          |
|      | 2nd             | 4.1 Related terms: Load curve, load duration curve, integrated duration curve              |
|      | 3rd             | Continue .....                                                                             |
| 15th | 1 <sup>st</sup> | 4.2 Cost of generation: Average demand, maximum demand, demand factor                      |
|      | 2nd             | 4.2 Plant capacity factor, plant use factor, diversity factor                              |
|      | 3rd             | 4.2 Load factor and plant load factor                                                      |
| 16th | 1 <sup>st</sup> | 4.3 Choice of size and number of generator units                                           |
|      | 2nd             | 4.4 Combined operation of power station Causes, Impact and reasons of Grid system fault    |
|      | 3rd             | 4.4 State grid, national grid, brownout                                                    |
| 17th | 1 <sup>st</sup> | 4.4 Blackout; sample blackouts at national and international level                         |
|      | 2nd             | Question discussion                                                                        |
|      | 3rd             | Question discussion                                                                        |

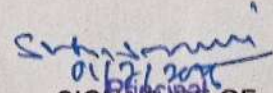


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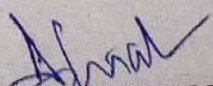


# LESSON PLAN FOR ACADEMIC SESSION: 2026-27(Winter)

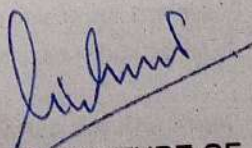
|                                           |                                         |                                                                                                                         |
|-------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Discipline: Electrical Engineering</b> | <b>Semester : 3rd</b>                   | <b>Name of the Teaching Faculty: Er. ANITA SHIAL</b>                                                                    |
| <b>Subject: ELECTRICAL CIRCUITS(TH-2)</b> | <b>No. of days/ week class allotted</b> | <b>Semester From :</b>                                                                                                  |
| <b>Week</b>                               | <b>Class Day</b>                        | <b>Theory Topics</b>                                                                                                    |
| 1ST                                       | 1 <sup>st</sup>                         | Single Phase A.C Series Circuits<br>Generation of alternating voltage<br>Phasor representation of sinusoidal quantities |
|                                           | 2nd                                     | R, L, C circuit elements its voltage and current response<br>R-L, R-C, R-L-C combination of A.C series circuit          |
|                                           | 3rd                                     | Impedance, reactance, impedance triangle                                                                                |
| 2ND                                       | 1 <sup>st</sup>                         | Power factor, active power, reactive power, apparent power                                                              |
|                                           | 2nd                                     | Power triangle and vector diagram                                                                                       |
|                                           | 3rd                                     | Resonance, Bandwidth                                                                                                    |
| 3RD                                       | 1 <sup>st</sup>                         | Quality factor and voltage magnification in series R-L, R-C, R-L-C circuit                                              |
|                                           | 2nd                                     | Single Phase A.C Parallel Circuits<br>R-L parallel combination of A.C. circuits                                         |
|                                           | 3rd                                     | R-C parallel combination of A.C. circuits                                                                               |
| 4TH                                       | 1 <sup>st</sup>                         | R-L-C parallel combination of A.C. circuits                                                                             |
|                                           | 2nd                                     | Impedance, reactance, phasor diagram, impedance triangle                                                                |
|                                           | 3rd                                     | Power factor, active power, apparent power, reactive power, power triangle                                              |
| 5TH                                       | 1st                                     | Resonance in parallel R-L, R-C circuit                                                                                  |
|                                           | 2nd                                     | Resonance in parallel R-L-C circuit                                                                                     |
|                                           | 3rd                                     | Bandwidth, Quality factor and voltage magnification                                                                     |
| 6TH                                       | 1st                                     | Three Phase Circuits<br>Phasor and complex representation of three phase supply                                         |
|                                           | 2nd                                     | Phase sequence and polarity                                                                                             |
|                                           | 3rd                                     | Types of three-phase connections                                                                                        |
| 7TH                                       | 1 <sup>st</sup>                         | Phase and line quantities in three phase star system                                                                    |
|                                           | 2nd                                     | Phase and line quantities in three phase delta system                                                                   |
|                                           | 3rd                                     | Balanced and unbalanced load                                                                                            |
| 8TH                                       | 1 <sup>st</sup>                         | Neutral shift in unbalanced load                                                                                        |
|                                           | 2nd                                     | Three phase power, active, reactive and apparent power in star and delta system                                         |
|                                           | 3rd                                     | Network Reduction and Principles of Circuit Analysis<br>Source transformation                                           |
| 9TH                                       | 1 <sup>st</sup>                         | Star/delta transformation                                                                                               |

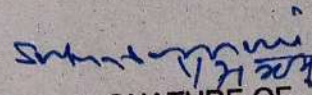


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|------|-----------------|--------------------------------------------------------------|
| 10TH | 2nd             | delta/star transformation                                    |
|      | 3rd             | Mesh Analysis                                                |
|      | 1 <sup>st</sup> | Node Analysis                                                |
|      | 2nd             | <b>Network Theorems</b><br>Superposition theorem             |
|      | 3rd             | Numerical on Superposition theorem                           |
| 11TH | 1st             | Thevenin's theorem                                           |
|      | 2nd             | Numerical on Thevenin's theorem                              |
|      | 3rd             | Norton's theorem                                             |
| 12th | 1 <sup>st</sup> | Numerical on Norton's theorem                                |
|      | 2nd             | Maximum power transfer theorem                               |
|      | 3rd             | Numerical on Maximum power transfer theorem                  |
| 13th | 1 <sup>st</sup> | Reciprocity Theorem<br>Numerical on Reciprocity Theorem      |
|      | 2nd             | <b>Two Port Network</b><br>Open Circuit Impedance Parameters |
|      | 3rd             | Short Circuit Admittance Parameters                          |
| 14th | 1 <sup>st</sup> | Transmission Parameters                                      |
|      | 2nd             | Hybrid Parameters                                            |
|      | 3rd             | Interrelationship of Two Port Network                        |
| 15th | 1 <sup>st</sup> | Inter Connection of Two Port Network                         |
|      | 2nd             | Previous year Question discussion                            |
|      | 3rd             | Previous year Question discussion                            |

  
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**LESSON PLAN: ELECTRICAL AND ELECTRONICS MEASUREMENT 3<sup>RD</sup> – SEMESTER, 2026 (W)**

|                                              |                                                  |                                                                                                                                                                                     |
|----------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Discipline:<br><b>Electrical Engineering</b> | Semester:<br><b>Winter 2026</b>                  | Name of the teaching faculty:<br><b>Er S S sahu</b>                                                                                                                                 |
| Subject:<br><b>EEM</b>                       | No of days/per week class allotted:<br><b>03</b> | No of weeks: <b>15</b>                                                                                                                                                              |
| Week:                                        | Class day:                                       | <b>Theory/practical topics:</b>                                                                                                                                                     |
| <b>1<sup>ST</sup></b>                        | <b>1<sup>ST</sup></b>                            | <b>UNIT-I( FUNDAMENTALS OF MEASUREMENTS )</b><br>1.1 Measurement: Significance, units, fundamental quantities and standards                                                         |
|                                              | <b>2<sup>ND</sup></b>                            | 1.2 Classification of Instrument Systems                                                                                                                                            |
|                                              | <b>3<sup>RD</sup></b>                            | 1.3 Null and deflection type instruments                                                                                                                                            |
| <b>2<sup>ND</sup></b>                        | <b>1<sup>ST</sup></b>                            | 1.4 Absolute and secondary instruments                                                                                                                                              |
|                                              | <b>2<sup>ND</sup></b>                            | 1.5 Analog and digital instruments                                                                                                                                                  |
|                                              | <b>3<sup>RD</sup></b>                            | 1.6 Static and dynamic characteristics                                                                                                                                              |
| <b>3<sup>RD</sup></b>                        | <b>1<sup>ST</sup></b>                            | 1.6 Types of errors                                                                                                                                                                 |
|                                              | <b>2<sup>ND</sup></b>                            | 1.7 Calibration: need and procedure                                                                                                                                                 |
|                                              | <b>3<sup>RD</sup></b>                            | 1.8 Classification of measuring instruments: indicating, recording and integrating instruments                                                                                      |
| <b>4<sup>TH</sup></b>                        | <b>1<sup>ST</sup></b>                            | 1.9 Essential requirements of an indicating instruments                                                                                                                             |
|                                              | <b>2<sup>ND</sup></b>                            | <b>UNIT-II(Measurement of voltage and current)</b><br>2.1 DC Ammeter: Basic, Multi range                                                                                            |
|                                              | <b>3<sup>RD</sup></b>                            | 2.1 DC Ammeter: Universal shunt                                                                                                                                                     |
| <b>5<sup>TH</sup></b>                        | <b>1<sup>ST</sup></b>                            | 2.2 DC Voltmeter: Basic, Multi-range                                                                                                                                                |
|                                              | <b>2<sup>ND</sup></b>                            | 2.2 DC Voltmeter: concept of loading effect and sensitivity                                                                                                                         |
|                                              | <b>3<sup>RD</sup></b>                            | 2.3 AC voltmeter: Rectifier type (half wave)                                                                                                                                        |
| <b>6<sup>TH</sup></b>                        | <b>1<sup>ST</sup></b>                            | 2.3 AC voltmeter: Rectifier type full wave)                                                                                                                                         |
|                                              | <b>2<sup>ND</sup></b>                            | 2.4 CT: construction, working and applications                                                                                                                                      |
|                                              | <b>3<sup>RD</sup></b>                            | 2.4 PT: construction, working and applications                                                                                                                                      |
| <b>7<sup>TH</sup></b>                        | <b>1<sup>ST</sup></b>                            | Revision                                                                                                                                                                            |
|                                              | <b>2<sup>ND</sup></b>                            | <b>UNIT-III(Measurement of Electric Power )</b><br>3.1 Analog meters: Permanent magnet moving coil (PMMC) meter, their construction, working, salient features, merits and demerits |
|                                              | <b>3<sup>RD</sup></b>                            | 3.1 Analog meters: Permanent magnet moving iron (PMMI) meter, their construction, working, salient features, merits and demerits                                                    |
| <b>8<sup>TH</sup></b>                        | <b>1<sup>ST</sup></b>                            | 3.2 Dynamometer type wattmeter: Construction and working                                                                                                                            |



|                  |                 |                                                                                                                                                                                                                                                                               |
|------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | 2 <sup>ND</sup> | 3.3 Errors and compensations of PMMI, PMMC                                                                                                                                                                                                                                    |
|                  | 3 <sup>RD</sup> | 3.3 Errors and compensations of Dynamometer type wattmeter                                                                                                                                                                                                                    |
|                  | 1 <sup>ST</sup> | 3.4 Active and reactive power measurement: One, two wattmeter method                                                                                                                                                                                                          |
| 9 <sup>TH</sup>  | 2 <sup>ND</sup> | 3.4 Active and reactive power measurement: three wattmeter method                                                                                                                                                                                                             |
|                  | 3 <sup>RD</sup> | 3.5 Effect of Power factor on wattmeter reading in two wattmeter method                                                                                                                                                                                                       |
| 10 <sup>TH</sup> | 1 <sup>ST</sup> | 3.6 Maximum Demand indicator(Definition only)                                                                                                                                                                                                                                 |
|                  | 2 <sup>ND</sup> | <b>UNIT-IV ( Measurement of Electric Energy )</b><br>4.1 Single phase electronic energy meter: Constructional features and working principle                                                                                                                                  |
|                  | 3 <sup>RD</sup> | 4.1 Three phase electronic energy meter: Constructional features and working principle                                                                                                                                                                                        |
| 11 <sup>TH</sup> | 1 <sup>ST</sup> | 4.2 Errors and their compensations of Singlephase electronic energy meter                                                                                                                                                                                                     |
|                  | 2 <sup>ND</sup> | 4.2 Errors and their compensations of Three phase electronic energy meter                                                                                                                                                                                                     |
|                  | 3 <sup>RD</sup> | 4.3 Calibration of single-phase electronic energy meter using direct loading                                                                                                                                                                                                  |
| 12 <sup>TH</sup> | 1 <sup>ST</sup> | 4.3 Calibration of single-phase electronic energy meter using direct loading                                                                                                                                                                                                  |
|                  | 2 <sup>ND</sup> | Revision.                                                                                                                                                                                                                                                                     |
|                  | 3 <sup>RD</sup> | <b>UNIT-V(Circuit Parameter Measurement, CRO and Other Meters )</b><br>5.1 Measurement of resistance<br>5.1.1 Low resistance: Kelvin's double bridge                                                                                                                          |
| 13 <sup>TH</sup> | 1 <sup>ST</sup> | 5.1.2 Medium Resistance: Voltmeter and ammeter method                                                                                                                                                                                                                         |
|                  | 2 <sup>ND</sup> | 5.1.3 High resistance: Megger: Series and shunt                                                                                                                                                                                                                               |
|                  | 3 <sup>RD</sup> | 5.1.3 High resistance: Ohm meter: Series and shunt                                                                                                                                                                                                                            |
| 14 <sup>TH</sup> | 1 <sup>ST</sup> | 5.2 Measurement of inductance using Anderson bridge (no derivation and phasor diagram)                                                                                                                                                                                        |
|                  | 2 <sup>ND</sup> | 5.3 Measurement of capacitance using Schering bridge (no derivation and phasor diagram)                                                                                                                                                                                       |
|                  | 3 <sup>RD</sup> | 5.4 Single beam/single trace CRO (Working principle and block diagram only)                                                                                                                                                                                                   |
| 15 <sup>TH</sup> | 1 <sup>ST</sup> | 5.5 Digital storage Oscilloscope: Basic block diagram, working, Cathode ray tube, electrostatic deflection, vertical amplifier, time base generator, horizontal amplifier, measurement of voltage/ amplitude/ time period/ frequency/ phase angle delay line, specifications. |
|                  | 2 <sup>ND</sup> | 5.6 Other meters: Earth tester, Digital Multimeter; L-C-R meter, Frequency meter (ferromagnetic and Weston type), Phase sequence indicator, power factor meter (single phase and three phase dynamometer type), Synchroscope, Tri-vector meter                                |
|                  | 3 <sup>RD</sup> | 5.7 Signal generator: need, working and basic block diagram                                                                                                                                                                                                                   |

Signature of Faculty

Signature of H.O.D

Er. Sidharth Sankar Sahu  
H.O.D. (Electrical)  
U.C.P.E.S., Berhampur

Signature of Academic coordinator

Academic Coordinator  
U C P Engineering School  
Berhampur



**LESSON PLAN**  
**Session (2026-2027)**

|                                                                                |                                                                                 |                                                                    |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------|
| <b>Discipline:</b><br>ELECTRICAL<br>ENGINEERING                                | <b>Semester:</b> 3 <sup>RD</sup> Semester,<br>Winter/2026                       | <b>Name of the Faculty:</b><br>Er S S Sahu<br>Sr. Lect, electrical |
| <b>Subject Name with code:</b><br>DC MACHINES AND<br>TRANSFORMERS<br>(EEPC207) | <b>No. of Days/week:</b> 03<br><br><b>Total No. of Class<br/>(Required):</b> 45 |                                                                    |

| Week | Class Day       | Brief description of the Topic/Chapter to be taught                                           |
|------|-----------------|-----------------------------------------------------------------------------------------------|
| 1st  | 1 <sup>st</sup> | 1. <b>DC Generators</b><br>D.C. generator: construction, parts, materials and their functions |
|      | 2 <sup>nd</sup> | Principle of operation of DC generator                                                        |
|      | 3 <sup>rd</sup> | Fleming's right hand rule                                                                     |
| 2nd  | 1st             | Derive the emf equation of DC Generator                                                       |
|      | 2 <sup>nd</sup> | Schematic diagrams of different types of DC generator                                         |
|      | 3 <sup>rd</sup> | Armature reaction                                                                             |
| 3rd  | 1st             | Armature reaction                                                                             |
|      | 2 <sup>nd</sup> | Commutation                                                                                   |
|      | 3 <sup>rd</sup> | Applications of D.C. generators                                                               |
| 4th  | 1st             | 2. <b>D.C. Motors</b><br>D.C. motor: Types of DC motors                                       |
|      | 2 <sup>nd</sup> | Fleming's left hand rule                                                                      |
|      | 3 <sup>rd</sup> | Principle of operation of Back e.m.f. and its significance                                    |
| 5th  | 1st             | Voltage equation of DC motor                                                                  |
|      | 2 <sup>nd</sup> | Torque and Speed; Armature torque, Shaft torque, BHP, Brake test, losses, efficiency          |



|      |                 |                                                                                                                                       |
|------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------|
|      | 3 <sup>rd</sup> | DC motor starters: Necessity, two point and three point starters                                                                      |
| 6th  | 1 <sup>st</sup> | Speed control of DC shunt and series motor: Flux and Armature control                                                                 |
|      | 2 <sup>nd</sup> | Brushless DC Motor: Construction and working                                                                                          |
|      | 3 <sup>rd</sup> | Revision                                                                                                                              |
| 7th  | 1 <sup>st</sup> | <b>3. Single Phase Transformers</b><br>Types of transformers: Shell type and core type                                                |
|      | 2 <sup>nd</sup> | Construction: Parts and functions                                                                                                     |
|      | 3 <sup>rd</sup> | Materials used for different parts: CRGO, CRNGO, HRGO, amorphous cores                                                                |
| 8th  | 1 <sup>st</sup> | Transformer: Principle of operation                                                                                                   |
|      | 2 <sup>nd</sup> | EMF equation of transformer: Derivation, Voltage transformation ratio                                                                 |
|      | 3 <sup>rd</sup> | Significance of transformer ratings                                                                                                   |
| 9th  | 1 <sup>st</sup> | Transformer No-load and on-load phasor diagram, Leakage reactance                                                                     |
|      | 2 <sup>nd</sup> | Equivalent circuit of transformer: Equivalent resistance and reactance                                                                |
|      | 3 <sup>rd</sup> | Voltage regulation and Efficiency: Direct loading, OC/SC method, All day efficiency                                                   |
| 10th | 1 <sup>st</sup> | Quiz                                                                                                                                  |
|      | 2 <sup>nd</sup> | <b>4. Three Phase Transformers</b><br>Bank of three single phase transformers, (Y-Y, $\Delta$ - $\Delta$ , $\Delta$ -Y, Y- $\Delta$ ) |
|      | 3 <sup>rd</sup> | Single unit of three phase transformer                                                                                                |
| 11th | 1 <sup>st</sup> | Distribution and Power transformers: Construction and cooling,                                                                        |
|      | 2 <sup>nd</sup> | Criteria for selection of distribution transformer, and power transformer.                                                            |
|      | 3 <sup>rd</sup> | Need of parallel operation of three phase transformer                                                                                 |
| 12th | 1 <sup>st</sup> | Conditions for parallel operation.                                                                                                    |
|      | 2 <sup>nd</sup> | Polarity tests on mutually inductive coils and single phase transformers                                                              |
|      | 3 <sup>rd</sup> | Polarity test, Phasing out test on Three-phase transformer                                                                            |
| 13th | 1 <sup>st</sup> | Question Discussion                                                                                                                   |
|      | 2 <sup>nd</sup> | <b>5. Special Purpose Transformers</b><br>Single phase and three phase autotransformers: Construction, working and applications.      |
|      | 3 <sup>rd</sup> | Single phase and three phase autotransformers: Construction, working and applications.                                                |
| 14th | 1 <sup>st</sup> | Isolation transformer: Constructional Features and applications                                                                       |
|      | 2 <sup>nd</sup> | Isolation transformer: Constructional Features and applications                                                                       |



# LESSON PLAN

|                                                      |                                           |                                                                                         |                     |
|------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------|---------------------|
| Discipline-<br>Electrical Engg.                      | Semester-<br>3rd                          | Name of the teaching faculty-Ahirbad Behera                                             | Mode of<br>Teaching |
| Subject-<br>Renewable<br>Energy Power<br>Plant (TH5) | No of<br>days/week<br>class<br>allotted-3 | No of weeks-15                                                                          |                     |
| Week                                                 | Class day                                 | THEORY                                                                                  |                     |
| 1 <sup>st</sup>                                      | 1 <sup>ST</sup>                           | <b>Unit-1 Solar PV and Concentrated Solar Power Plants</b>                              |                     |
|                                                      | 2 <sup>ND</sup>                           | 1.1 Solar Map of India                                                                  |                     |
|                                                      | 3 <sup>RD</sup>                           | Global solar power radiation,                                                           |                     |
| 2 <sup>nd</sup>                                      | 1 <sup>ST</sup>                           | Solar PV                                                                                |                     |
|                                                      | 2 <sup>ND</sup>                           | 1.2 Concentrated Solar Power (CSP) plants.                                              |                     |
|                                                      | 3 <sup>RD</sup>                           | Concentrated Solar Power (CSP) plants, construction and working.                        |                     |
| 3 <sup>rd</sup>                                      | 1 <sup>ST</sup>                           | CSP Plants construction and working of Power Tower,                                     |                     |
|                                                      | 2 <sup>ND</sup>                           | Concentrated Solar Power (CSP) plants, construction and working of Parabolic Trough     |                     |
|                                                      | 3 <sup>RD</sup>                           | Concentrated Solar Power (CSP) plants, construction and working of Fresnel Reflectors.  |                     |
| 4 <sup>th</sup>                                      | 1 <sup>ST</sup>                           | 1.3 Solar Photovoltaic (PV) power plant:                                                |                     |
|                                                      | 2 <sup>ND</sup>                           | Components layout, construction, working.                                               |                     |
|                                                      | 3 <sup>RD</sup>                           | Roof top solar PV power system                                                          |                     |
| 5 <sup>th</sup>                                      | 1 <sup>ST</sup>                           | <b>Unit-II Large Wind Power Plants</b>                                                  |                     |
|                                                      | 2 <sup>ND</sup>                           | 2.1 Wind Map of India                                                                   |                     |
|                                                      | 3 <sup>RD</sup>                           | Wind power density in watts per square meter Lift and drag principle                    |                     |
| 6 <sup>th</sup>                                      | 1 <sup>ST</sup>                           | Wind power density in watts per square meter Lift and drag principle, long path theory. |                     |
|                                                      | 2 <sup>ND</sup>                           | 2.2 Geared type wind power plants: components, layout and working                       |                     |
|                                                      | 3 <sup>RD</sup>                           | Geared type wind power plants: components, layout and working.                          |                     |
| 7 <sup>th</sup>                                      | 1 <sup>ST</sup>                           | Direct drive type wind power plants: components, layout and working.                    |                     |
|                                                      | 2 <sup>ND</sup>                           | Constant Speed Electric Generators: Squirrel Cage Induction. Generators (SCIG),         |                     |
|                                                      | 3 <sup>RD</sup>                           | 2.4 Wound Rotor Induction Generator (WRIG)                                              |                     |
| 8 <sup>th</sup>                                      | 1 <sup>ST</sup>                           | Variable Speed Electric Generators                                                      |                     |
|                                                      | 2 <sup>ND</sup>                           | Doubly-fed induction generator (DFIG), wound rotor synchronous generator (WRSG)         |                     |
|                                                      | 3 <sup>RD</sup>                           | permanent magnet synchronous generator (PMSG)                                           |                     |
| 9 <sup>th</sup>                                      | 1 <sup>ST</sup>                           | <b>UNIT-III Small Wind Turbines</b>                                                     |                     |
|                                                      | 2 <sup>ND</sup>                           | 3.1 Horizon axis small wind turbine                                                     |                     |
|                                                      | 3 <sup>RD</sup>                           | direct drive type, components and working                                               |                     |
| 10 <sup>th</sup>                                     | 1 <sup>ST</sup>                           | Horizontal axis small wind turbine                                                      |                     |
|                                                      | 2 <sup>ND</sup>                           | Geared type, components and working                                                     |                     |
|                                                      | 3 <sup>RD</sup>                           | 3.2 Vertical axis small wind turbine.                                                   |                     |
| 11 <sup>th</sup>                                     | 1 <sup>ST</sup>                           | Direct drive and geared, components and                                                 |                     |



# LESSON PLAN

|                  |                 |                                                                                                        |  |
|------------------|-----------------|--------------------------------------------------------------------------------------------------------|--|
|                  | 2 <sup>ND</sup> | Working Types of towers and installation of small wind turbines on rooftops and open fields.           |  |
|                  | 3 <sup>RD</sup> | 3.3 Electric generators used in small wind power plants                                                |  |
| 12 <sup>th</sup> | 1 <sup>ST</sup> | <b>UNIT-IV Biomass-based Power Plants</b>                                                              |  |
|                  | 2 <sup>ND</sup> | 4.1 Properties of solid fuel for biomass power plants: bagasse, wood chips, rice husk, municipal waste |  |
|                  | 3 <sup>RD</sup> | Properties of solid fuel for biomass power plants: bagasse                                             |  |
| 13 <sup>th</sup> | 1 <sup>ST</sup> | Properties of solid fuel for biomass power plants: wood chips                                          |  |
|                  | 2 <sup>ND</sup> | Properties of solid fuel for biomass power plants: rice husk, municipal waste                          |  |
|                  | 3 <sup>RD</sup> | 4.2 Properties of liquid and gaseous fuel for bio mass power plants                                    |  |
| 14 <sup>th</sup> | 1 <sup>ST</sup> | Properties of liquid and gaseous fuel for bio mass power plants                                        |  |
|                  | 2 <sup>ND</sup> | Properties of liquid and gaseous fuel for bio mass power plants Jatropa, bio,diesel gohar gas          |  |
|                  | 3 <sup>RD</sup> | Properties of liquid and gaseous fuel for bio mass power plants Jatropa, bio,diesel gohar gas          |  |
| 15 <sup>th</sup> | 1 <sup>ST</sup> | 4.3 Layout of a Bio-chemical based (e.g. biogas) power plant:                                          |  |
|                  | 2 <sup>ND</sup> | 4.4 Layout of a Thermo-chemical based (e.g. Municipal waste) power plant                               |  |
|                  | 3 <sup>RD</sup> | 4.5 Layout of a Agro-chemical based (e.g.bio-diesel) power plant                                       |  |

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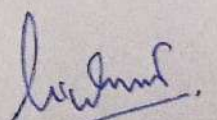


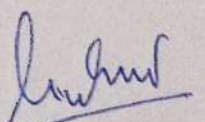
## Lesson plan: DC MACHINE & TRANSFORMER LAB(PR4)

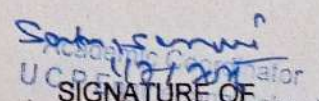
Prepared by: Er S S Sahu, Sr lect., Electrical

Semester: 3<sup>rd</sup> sem (Winter 2026)

| WEEK    | TOPICS                                                                                                                                                  |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Week 1  | Introduction to DC machines laboratory, safety precautions, identification of parts and tools,                                                          |
| Week 2  | 1. Dismantling of DC machine.                                                                                                                           |
| Week 3  | 2. Reverse the direction of rotation of the DC shunt motor.                                                                                             |
| Week 4  | 3. Control the speed of DC shunt motor by field flux and armature voltage control methods.                                                              |
| Week 5  | Evaluation and Viva Voce                                                                                                                                |
| Week 6  | 4. Perform the brake test on DC series motor.                                                                                                           |
| Week 7  | 5. Check the functioning of single phase transformer                                                                                                    |
| Week 8  | 6. Determine regulation and efficiency of single phase transformer by direct loading                                                                    |
| Week 9  | Evaluation and Viva Voce                                                                                                                                |
| Week 10 | 7. Perform open circuit and short circuit test on single phase transformer to determine equivalent circuit constants, voltage regulation and efficiency |
| Week 11 | 8. Perform parallel operation of two single-phase transformers to determine the load current sharing.                                                   |
| Week 12 | Evaluation and Viva Voce                                                                                                                                |
| Week 13 | 9. Perform polarity test on a single-phase transformer whose polarity markings are masked.                                                              |
| Week 14 | 10. Connect the autotransformer in step-up and step-down modes noting the input/output readings.                                                        |
| Week 15 | Evaluation and Viva Voce                                                                                                                                |

  
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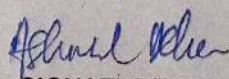


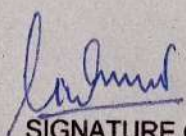
### Lesson plan: Electrical Electronics measurement Laboratory(PR3)

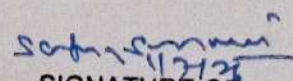
Prepared by: Ashirbad Behera

Semester:3<sup>rd</sup> sem (Winter 2026)

| Weeks  | Topics                                                                                                     |
|--------|------------------------------------------------------------------------------------------------------------|
| Week1  | Identify measuring instruments on the basis of symbols on dial, type, accuracy, class position and scale   |
| Week2  | Identify the components of PMMC and MI instruments                                                         |
| Week3  | Extend range of ammeter and voltmeter by using shunt and multiplier                                        |
| Week4  | Use electro-dynamic watt-meter for measurement of power in a single phase circuit                          |
| Week5  | Use single three phase wattmeter for measurement of active and reactive power of three phase-balanced load |
| Week6  | Use two wattmeters for measuring active power of three-phase balanced load                                 |
| Week7  | Calibrate single-phase electronic energy meter by direct loading                                           |
| Week8  | Use Kelvin's double bridge for measurement of low resistance                                               |
| Week9  | Use voltmeter and ammeter method for measurement of medium resistance                                      |
| Week10 | Use Megger for insulation resistance measurements                                                          |
| Week11 | Use earth tester for measurement of earth resistance                                                       |
| Week12 | Use Tri-vector meter for measuring kW, kVAR and kVA of a power line                                        |
| Week13 | Study of Resolution and sensitivity of Digital Instrument                                                  |
| Week14 | Measure the unknown frequency and phase angle, using CRO by Lissajous figure                               |
| Week15 | Record correction                                                                                          |

  
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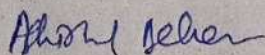
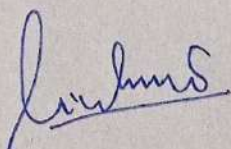
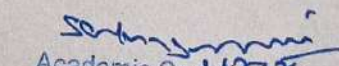


**Lesson plan: PROGRAMMING FOR PROBLEM SOLVING (PR1)**

Prepared by: Ashirbad Behera

Semester: 3<sup>rd</sup> sem (Winter 2026)

| Weeks  | Topics                                                                                         |
|--------|------------------------------------------------------------------------------------------------|
| Week1  | To display our College name twenty times on screen.                                            |
|        | To display and add all even numbers from 1-100                                                 |
| Week2  | To find smallest / largest number from array elements.                                         |
|        | Basics of MATLAB Programming                                                                   |
| Week3  | To sort array elements in ascending / descending order                                         |
|        | elementary features in a vector array                                                          |
| Week4  | To enter elements for 3X3 matrix and display them                                              |
|        | matrices, Eigen values and Eigen vectors, matrix operations                                    |
| Week5  | To calculate addition / subtraction of 2 dimensional matrix                                    |
|        | matrix operators, creating matrix arrangement                                                  |
| Week6  | To calculate multiplication of 2 dimensional matrix                                            |
| Week7  | To demonstrate output of standard library functions Strlen (), strcpy (), strcat (), strcmp () |
| Week8  | To calculate area of circle using function                                                     |
| Week9  | To calculate factorial of any given number using recursion.                                    |
| Week10 | indexing array value, other operations, mathematical operations on array                       |
| Week11 | To demonstrate call by reference, call by value To perform arithmetic functions on pointers    |
| Week12 | array types, loops and execution of control                                                    |
| Week13 | working with M-files, Scripts and functions, plotting and programming output                   |
| Week14 | Introduction to MATLAB Simulink                                                                |
| Week15 | Simulink libraries                                                                             |

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|                                                          |                                                |                                                                                                                                                                                 |
|----------------------------------------------------------|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Discipline: <b>Electrical Engg.</b>                      | Semester: <b>3<sup>rd</sup></b>                | Name of the Teaching Faculty:<br><b>Ashirbad Behera</b>                                                                                                                         |
| Subject: <b>Energy Conservation and Audit (EC&amp;A)</b> | No. of Days/Per week class allotted: <b>03</b> | No. of Weeks: <b>15 Weeks</b>                                                                                                                                                   |
| <b>Week</b>                                              | <b>Class Day</b>                               | <b>Theory/ Practical Topics</b>                                                                                                                                                 |
| <b>1<sup>st</sup></b>                                    | 1st                                            | <b>Unit 1 (Energy Conservation Basics)</b><br>Energy Scenario: Primary and Secondary Energy                                                                                     |
|                                                          | 2nd                                            | Energy demand and supply, National scenario.                                                                                                                                    |
|                                                          | 3rd                                            | Energy conservation and Energy audit; concepts and difference                                                                                                                   |
| <b>2<sup>nd</sup></b>                                    | 1st                                            | Indian Electricity Act 2001; relevant clauses of energy conservation                                                                                                            |
|                                                          | 2nd                                            | BEE and its Roles                                                                                                                                                               |
|                                                          | 3rd                                            | MEDA and its Roles                                                                                                                                                              |
| <b>3<sup>rd</sup></b>                                    | 1st                                            | Star Labelling: Need and its benefits.                                                                                                                                          |
|                                                          | 2nd                                            | <b>Unit 2 (Energy Conservation in Electrical Machines)</b><br>Need for energy conservation in induction motor and transformer                                                   |
|                                                          | 3rd                                            | Energy conservation techniques in induction motor by: Improving Power quality, Motor survey                                                                                     |
| <b>4<sup>th</sup></b>                                    | 1st                                            | Matching motor with loading, Minimizing the idle and redundant running of motor.                                                                                                |
|                                                          | 2nd                                            | Operating in star mode, Rewinding of motor, Replacement by energy efficient motor                                                                                               |
|                                                          | 3rd                                            | Periodic maintenance, Energy conservation techniques in Transformer, Loading sharing                                                                                            |
| <b>5<sup>th</sup></b>                                    | 1st                                            | <b>CLASS TEST</b>                                                                                                                                                               |
|                                                          | 2nd                                            | Parallel operation, Isolating techniques, Replacement by energy efficient transformers, Periodic maintenance.                                                                   |
|                                                          | 3rd                                            | Energy Conservation Equipment: Soft starters, Automatic star delta convertor, Variable Frequency Drives, Automatic p. f. controller (APFC), Intelligent p. f. controller (IPFC) |
| <b>6<sup>th</sup></b>                                    | 1st                                            | Energy efficient motor; significant features, advantages, applications and limitations.                                                                                         |
|                                                          | 2nd                                            | Energy efficient transformers, amorphous transformers; epoxy Resin cast transformer / Dry type of transformer.                                                                  |



|                  |     |                                                                                                                                                                                 |
|------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | 3rd | <b>Unit 3 (Energy conservation in Electrical Installation systems)</b><br>Aggregated Technical and commercial losses (ATC)                                                      |
| 7 <sup>th</sup>  | 1st | Power system at state, regional, national and global level.                                                                                                                     |
|                  | 2nd | Technical losses; causes and measures to reduce by: a) Controlling I <sup>2</sup> R losses.                                                                                     |
| 8 <sup>th</sup>  | 1st | b) Optimizing distribution voltage c) Balancing phase currents                                                                                                                  |
|                  | 2nd | d) Compensating reactive power flow                                                                                                                                             |
|                  | 3rd | Commercial losses: pilferage, causes and remedies<br>Energy conservation equipment: Maximum Energy Demand Controller, KVAR Controller, Automatic Power Factor controller (APFC) |
| 9 <sup>th</sup>  | 1st | Energy Conservation in Lighting System<br>a) Replacing Lamp sources.                                                                                                            |
| 10 <sup>th</sup> | 1st | b) Using energy efficient luminaries.<br>c) Using light controlled gears.                                                                                                       |
|                  | 2nd | d) Installation of separate transformer/servo stabilizer for lighting                                                                                                           |
|                  | 3rd | e) Periodic survey and adequate maintenance programs.<br>Energy Conservation techniques in fans, Electronic regulators.                                                         |
| 11 <sup>th</sup> | 1st | <b>Unit 4 (Energy conservation through Cogeneration and Tariff)</b><br>Co-generation and Tariff; concept, significance for energy conservation : Co-generation                  |
|                  | 2nd | Types of cogeneration on basis of sequence of energy use (Topping cycle, Bottoming cycle)                                                                                       |
| 12 <sup>th</sup> | 1st | Types of cogeneration basis of technology (Steam turbine cogeneration)                                                                                                          |
|                  | 2nd | Gas turbine cogeneration, Reciprocating engine cogeneration                                                                                                                     |
|                  | 3rd | Factors governing the selection of cogeneration system. Advantages of cogeneration.                                                                                             |
| 13 <sup>th</sup> | 1st | Tariff: Types of tariff structure: Special tariffs; Time-of-day tariff, Peak-off-day tariff                                                                                     |
|                  | 2nd | Power factor tariff, Maximum Demand tariff, Load factor tariff.                                                                                                                 |



|                  |     |                                                                                                                                                                       |
|------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | 3rd | Application of tariff system to reduce energy bill                                                                                                                    |
| 14 <sup>th</sup> | 1st | <b>Unit 5 (Energy Audit of Electrical System)</b><br>Energy audit (definition as per Energy Conservation Act)                                                         |
| 15 <sup>th</sup> | 1st | Energy audit instruments and their use.                                                                                                                               |
|                  | 2nd | Energy flow diagram (Sankey diagram)<br>Energy Audit procedure (walk through audit and detailed audit) Energy Audit procedure (walk through audit and detailed audit) |
|                  | 3rd | Simple payback period , Energy Audit report format.                                                                                                                   |

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