NILASAILA INSTITUTE OF SCIENCE & TECHNOLOGY
SERGARH-756060, BALASORE (ODISHA)
(Approved by AICTE& affiliated to SCTE&VT, Odisha)

# LESSON PLAN

## SUBJECT : Th-2 (ENERGY CONVERSION-II)

**Name Of The Faculty :-** ER BIJAYA KUMAR BEHERA
**Branch :-** ELECTRICAL ENGINEERING **Semester :- 5TH**
**Session :-** 2024-25 **Examination :-** 2024 (W)

## CHAPTER WISE DISTRIBUTION OF PERIODS

| Sl.No. | Name of the chapter as per the Syllabus | No. of Periods as per the Syllabus | No. of periods actually needed |
|---|---|---|---|
| 1 | Alternator(Synchronous generator) | 14 | 18 |
| 2 | Synchronous Motor | 8 | 11 |
| 3 | Induction motor | 14 | 16 |
| 4 | Single Phase induction motor | 8 | 8 |
| 5 | Commutator motors | 6 | 6 |
| 6 | Special Electric Machine | 5 | 6 |
| 7 | Three phase transformers | 5 | 7 |
| **TOTAL** | | 60 | 72 |

Sign of Faculty

Sign of H.O.D.

| Discipline: ELECTRICAL ENGINEERING | Semester: 3rd | Name of the Teaching Faculty: Er. BIJAYA KUMAR BEHERA |
|---|---|---|
| | | SESSION-2024-25 EXAMINATION-2024(W) |
| Week | Class Day | Theory / Practical Topics |
| 1st | 1st | 1. ALTERNATOR:<br>1.1. Types of alternator and their constructional features |
| | 2nd | 1.2. Basic working principle of alternator and the relation between speed and |
| | 3rd | 1.2. Basic working principle of alternator and the relation between speed and |
| | 4th | 1.3. Terminology in armature winding and expressions for winding factors (Pitch |
| 2nd | 1st | 1.4. Explain harmonics, its causes and impact on winding factor |
| | 2nd | 1.4. Explain harmonics, its causes and impact on winding factor |
| | 3rd | 1.5. E.M.F equation of alternator. (Solve numerical problems). |
| | 4th | 1.6. Explain Armature reaction and its effect on emf at different power factor of |
| 3rd | 1st | 1.6. Explain Armature reaction and its effect on emf at different power factor of |
| | 2nd | 1.7. The vector diagram of loaded alternator. (Solve numerical problems) |
| | 3rd | 1.7. The vector diagram of loaded alternator. (Solve numerical problems) |
| | 4th | 1.8. Testing of alternator (Solve numerical problems)<br>1.8.1. Open circuit test. |
| 4th | 1st | 1.8.2. Short circuit test. |
| | 2nd | 1.9. Determination of voltage regulation of Alternator by direct loading and |
| | 3rd | 1.9. Determination of voltage regulation of Alternator by direct loading and |
| | 4th | 1.10. Parallel operation of alternator using synchro-scope and dark & bright lamp |
| 5th | 1st | 1.11. Explain distribution of load by parallel connected alternators. |
| | 2nd | 1.11. Explain distribution of load by parallel connected alternators. |
| | 3rd | SYNCHRONOUS MOTOR:<br>2.1. Constructional feature of Synchronous Motor |
| | 4th | 2.2. Principles of operation, concept of load angle |

| Week | Class Day | Theory / Practical Topics |
|---|---|---|
| 6th | 1st | 2.3. Derive torque, power developed. |
| | 2nd | 2.4. Effect of varying load with constant excitation. |
| | 3rd | 2.5. Effect of varying excitation with constant load. |
| | 4th | 2.6. Power angle characteristics of cylindrical rotor motor. |
| 7th | 1st | 2.7. Explain effect of excitation on Armature current and power factor. |
| | 2nd | 2.8. Hunting in Synchronous Motor. |
| | 3rd | 2.9. Function of Damper Bars in synchronous motor and generator. |
| | 4th | 2.10. Describe method of starting of Synchronous motor. |
| 8th | 1st | 2.11. State application of synchronous motor. |
| | 2nd | THREE PHASE INDUCTION MOTOR:<br>3.1. Production of rotating magnetic field. |
| | 3rd | 3.2. Constructional feature of Squirrel cage and Slip ring induction motors |
| | 4th | 3.3. Working principles of operation of 3-phase Induction motor. |
| 9th | 1st | 3.4. Define slip speed, slip and establish the relation of slip with rotor quantities. |
| | 2nd | 3.5. Derive expression for torque during starting and running conditions and |
| | 3rd | 3.5. Derive expression for torque during starting and running conditions and |
| | 4th | 3.6. Torque-slip characteristics |
| 10th | 1st | 3.7. Derive relation between full load torque and starting torque etc. (solve |
| | 2nd | 3.7. Derive relation between full load torque and starting torque etc. (solve |
| | 3rd | 3.8. Establish the relations between Rotor Copper loss, Rotor output and Gross |
| | 4th | 3.8. Establish the relations between Rotor Copper loss, Rotor output and Gross |

| Week | Class Day | Theory / Practical Topics |
|---|---|---|
| 11th | 1st | 3.9. Methods of starting and different types of starters used for three phase |
| | 2nd | 3.10. Explain speed control by Voltage Control, Rotor resistance control, Pole |
| | 3rd | 3.11. Plugging as applicable to three phase induction motor |
| | 4th | 3.12. Describe different types of motor enclosures |
| 12th | 1st | 3.13. Explain principle of Induction Generator and state its applications. |
| | 2nd | SINGLE PHASE INDUCTION MOTOR:<br>4.1. Explain Ferrari's principle |
| | 3rd | 4.2. Explain double revolving field theory and Cross-field theory to analyze |
| | 4th | 4.3. Explain Working principle, Torque speed characteristics, performance<br>characteristics and application of following single phase motors. |
| 13th | 1st | 4.3.2. Capacitor Start motor. |
| | 2nd | 4.3.3. Capacitor start, capacitor run motor |
| | 3rd | 4.3.4. Permanent capacitor type motor. |
| | 4th | 4.3.5. Shaded pole motor. |
| 14th | 1st | 4.4. Explain the method to change the direction of rotation of above motors. |
| | 2nd | 5.1. Construction, working principle, running characteristic and application of |
| | 3rd | application of<br>single phase series motor. |
| | 4th | 5.2. Construction, working principle and application of Universal motors. |
| 15th | 1st | 5.2. Construction, working principle and application of Universal motors. |
| | 2nd | 5.3. Working principle of Repulsion start Motor, Repulsion start Induction run |
| | 3rd | 5.3. Working principle of Repulsion start Motor, Repulsion start Induction run<br>motor, Repulsion Induction motor. |
| | 4th | 6. SPECIAL ELECTRICAL MACHINE:<br>6.1. Principle of Stepper motor. |

| Week | Class Day | Theory / Practical Topics |
|---|---|---|
| 16th | 1st | 6.2. Classification of Stepper motor. |
| | 2nd | 6.3. Principle of variable reluctant stepper motor. |
| | 3rd | 6.4. Principle of Permanent magnet stepper motor. |
| | 4th | 6.5. Principle of hybrid stepper motor. |
| 17th | 1st | 6.6. Applications of Stepper motor. |
| | 2nd | THREE PHASE TRANSFORMERS:<br>7.1. Explain Grouping of winding, Advantages. |
| | 3rd | 7.2. Explain parallel operation of the three phase transformers. |
| | 4th | 7.3. Explain tap changer (On/Off load tap changing) |
| 18th | 1st | 7.4. Maintenance Schedule of Power Transformers. |
| | 2nd | 7.4. Maintenance Schedule of Power Transformers. |
| | 3rd | RIVISION |
| | 4th | RIVISION |

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