**Lesson Plan**

**Name of Faculty :- Sh. JAIPAL**

**Discipline :- Electrical Engineering**

**Semester :- Third Semester**

**Subject :- Electrical Machine -I**

**Lesson Plan Duration:- 15 Week**

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| **Week** | **Theory** | | **Practical** | |
| **1st** | **Lecture Day** | **Topic** | **Practical Day** | **Topic** |
| **1st** | **Unit-1 DC Generators**  Introduction to Electrical Machines: Definition of motor and generator | **1st** | **PRACTICAL-1**  Measurement of the angular displacement of the rotor of the three phase synchronous machines with respect to the stator on application of DC to the field winding and simultaneously to each phase winding in sequence |
| **2nd** | Torque development due to alignment of two fields and the concept of torque angle |
| **3rd** | Generalized theory of electrical machines | **2nd** | **PRACTICAL-1**  Measurement of the angular displacement of the rotor of the three phase synchronous machines with respect to the stator on application of DC to the field winding and simultaneously to each phase winding in sequence |
| **4th** | DC generator: construction, parts, materials and their functions |
| **2nd** | **5th** | Principle of operation of DC generator | **3rd** | **PRACTICAL-2**  Speed control of dc shunt motor (i) Armature control method (ii) Field control method |
| **6th** | E.m.f. equation of generator, armature reaction ,commutation |
| **7th** | Various types of DC generator | **4th** | **PRACTICAL-2**  Speed control of dc shunt motor (i) Armature control method (ii) Field control method |
| **8th** | Applications of DC generators |
| **3rd** | **9th** | REVISION UNIT-1 | **5th** | **PRACTICAL-3**  Study of dc series motor with starter (to operate the motor on no load for a moment) |
| **10th** | REVISION UNIT-1 |
| **11th** | **Unit-2 DC Motors**  DC motor: Types of DC motors | **6th** | **PRACTICAL-3**  Study of dc series motor with starter (to operate the motor on no load for a moment) |
| **12th** | Principle of operation, characteristics |
| **4th** | **13th** | Back e.m.f. and its significance | **7th** | **PRACTICAL-4**  Determine efficiency of DC motor by Swinburne'sTest at (i)Rated capacity (ii)Half /Full load |
| **14th** | Voltage equation of DC motor ,Torque and Speed |
| **15th** | Armature torque, Shaft torque, BHP, losses, efficiency | **8th** | **PRACTICAL-4**  Determine efficiency of DC motor by Swinburne'sTest at (i)Rated capacity (ii)Half/ Full load |
| **16th** | Electric Braking. Applications of DC motors |
| **5th** | **17th** | DC motor starters: Necessity, three point and four point starters | **9th** | **PRACTICAL-5**  To perform open circuit and short circuit test for determining: (i) equivalent circuit (ii) the regulation and (iii) efficiency of a transformer from the data obtained from open circuit and short circuit test at full load |
| **18th** | Speed control of DC shunt and series motor |
| **19th** | Flux and Armature control | **10th** | **PRACTICAL-5**  To perform open circuit and short circuit test for determining: (i) equivalent circuit (ii) the regulation and (iii) efficiency of a transformer from the data obtained from open circuit and short circuit test at full load |
| **20th** | Determination of losses by Swinburne’s test |
| **6th** | **21st** | Brushless DC Motor: Construction and working | **11th** | **PRACTICAL-6**  To find the efficiency and regulation of single phase transformer by actually loading it. |
| **22nd** | Rating and specifications of DC machines |
| **23rd** | REVISION UNIT-2 | **12th** | **PRACTICAL-6**  To find the efficiency and regulation of single phase transformer by actually loading it. |
| **24th** | REVISION UNIT-2 |
| **7th** | **25th** | REVISION UNIT-2 | **13th** | **PRACTICAL-7**  Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations |
| **26th** | **Unit-3 Single Phase Transformers**  Introduction,; Construction |
| **27th** | Types of transformers: Shell type and core type | **14th** | **PRACTICAL-7**  Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations |
| **28th** | Parts and functions, materials used for different parts |
| **8th** | **29th** | Principle of operation | **15th** | **PRACTICAL-8**  Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions such as  Star-star  Star delta  Delta star  Delta - Delta configuring conditions |
| **30th** | EMF equation of transformer: Derivation, Voltage Transformation Ratio |
| **31st** | Transformer No-load and on-load phasor diagram | **16th** | **PRACTICAL-8**  Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions such as  Star-star  Star delta  Delta star  Delta - Delta configuring conditions |
| **32nd** | Mutual and leakage fluxes, Leakage reactance |
| **9th** | **33rd** | Equivalent circuit of transformer: Equivalent resistance and reactance | **17th** | REVISION PRACTICAL-1 |
| **34th** | Voltage regulation and Efficiency |
| **35th** | Open circuit and short circuit tests | **18th** | REVISION PRACTICAL-1 |
| **36th** | All day efficiency. Rating and Specifications of single phase transformer |
| **10th** | **37th** | REVISION UNIT-3 | **19th** | REVISION PRACTICAL-2 |
| **38th** | REVISION UNIT-3 |
| **39th** | REVISION UNIT-3 | **20th** | REVISION PRACTICAL-2 |
| **40th** | REVISION UNIT-3 |
| **11th** | **41st** | **Unit-4 Three Phase Transformers**  Construction of three phase transformers and accessories of transformers such as Conservator, breather, Buchholtz Relay | **21st** | REVISION PRACTICAL-3 |
| **42nd** | Tap Changer (off load and on load) (Brief idea) |
| **43rd** | Types of three phase transformer i.e. delta-delta, delta-star, star-delta and star-star | **22nd** | REVISION PRACTICAL-3 |
| **44th** | Need of parallel operation of three phase transformer |
| **12th** | **45th** | Conditions for parallel operation | **23th** | REVISION PRACTICAL-4 |
| **46th** | Polarity tests |
| **47th** | Criteria for selection of distribution transformer, and power transformer | **24th** | REVISION PRACTICAL-4 |
| **48th** | Amorphous Core type Distribution Transformer |
| **13th** | **49th** | Cooling of transformer. Specifications of three-phase distribution transformers | **25th** | REVISION PRACTICAL-5 |
| **50th** | REVISION UNIT-4 |
| **51st** | REVISION UNIT-4 | **26th** | REVISION PRACTICAL-5 |
| **52nd** | **Unit-5 Special Purpose Transformers**  Single phase and three phase auto transformers: Construction |
| **14th** | **53rd** | working and applications | **27th** | REVISION PRACTICAL-6 |
| **54th** | Instrument Transformers: Construction |
| **55th** | working and applications of Current transformer and Potential transformer | **28th** | REVISION PRACTICAL-6 |
| **56th** | Isolation transformer: Constructional Features and applications |
| **15th** | **57th** | Single phase welding transformer: constructional features and applications | **29th** | REVISION PRACTICAL-7&8 |
| **58th** | ‘K’ factor of transformers: overheating due to non-linear loads and harmonics. |
| **59th** | REVISION UNIT-5 | **30th** | REVISION PRACTICAL-7&8 |
| **60th** | REVISION UNIT-5 |