**Govt. Polytechnic Loharu**

**Electrical Engineering Department**

**Lesson Plan**

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| **Name of Faculty** | **Sh. Anand Kumar** |
| **Discipline** | **Electrical Engineering** |
| **Semester** | **3rd** |
| **Subject** | **Electrical Machine -I** |
| **Lesson Plan Duration** | **From August 2024 to Nov 2024** |
| **Work load [Theory + Practical] Per Week** | **[04+02]** |

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| **Week** | **Theory** | | **Practical** | |
| **1st** | **Lecture Day** | **Topic** | **Practical Day** | **Topic** |
| **1st** | **Unit-1 Introduction to Electrical Machines**  Definition of motor and generator, concept of torque | **1st** | **PRACTICAL-1**  Measurement of the angular displacement of the rotor of a slip-ring induction motor on application of DC to stator of motor winding in sequence and simultaneously to each phase of rotor winding |
| **2nd** | Torque development due to alignment of two fields and the concept of torque angle |
| **3rd** | Electro-magnetically induced emf | **2nd** | **PRACTICAL-1**  Measurement of the angular displacement of the rotor of a slip-ring induction motor on application of DC to stator of motor winding in sequence and simultaneously to each phase of rotor winding |
| **4th** | Elementary concept of an electrical machine |
| **2nd** | **5th** | Comparison of generator and motor | **3rd** | **PRACTICAL-2**  Speed control of dc shunt motor (i) Armature control method (ii) Field control method |
| **6th** | Generalised theory of electrical machines |
| **7th** | REVISION UNIT-1 | **4th** | **PRACTICAL-2**  Speed control of dc shunt motor (i) Armature control method (ii) Field control method |
| **8th** | REVISION UNIT-1 |
| **3rd** | **9th** | **Unit-2 DC Machines**  Main constructional features, Types of armature winding | **5th** | **PRACTICAL-3**  Study of dc series motor with starter (to operate the motor on no load for a moment) |
| **10th** | Function of the commutator for motoring and generation action |
| **11th** | Factors determining induced emf | **6th** | **PRACTICAL-3**  Study of dc series motor with starter (to operate the motor on no load for a moment) |
| **12th** | Factors determining the electromagnetic torque |
| **4th** | **13th** | Various types of DC generator | **7th** | **PRACTICAL-4**  Determine efficiency of DC motor by Swinburne'sTest at (i)Rated capacity (ii)Half /Full load |
| **14th** | Significance of back e.m.f., the relation between back emf and Terminal voltage |
| **15th** | Armature Reaction | **8th** | **PRACTICAL-4**  Determine efficiency of DC motor by Swinburne'sTest at (i)Rated capacity (ii)Half/ Full load |
| **16th** | Commutation methods to improve commutation |
| **5th** | **17th** | Performance and characteristics of different types of DC motors | **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/series motors |
| **19th** | Need of starter, three point dc shunt motor starter and 4-point starter | **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** | Electric Braking &Applications of DC motors |
| **6th** | **21st** | Faults in dc machines & their retrospective, Losses in a DC machine | **11th** | **PRACTICAL-6**  To find the efficiency and regulation of single phase transformer by actually loading it. |
| **22nd** | Determination of losses by Swinburne’s test |
| **23rd** | Rating and Specifications of DC machines | **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** | REVISION UNIT-2 |
| **27th** | REVISION UNIT-2 | **14th** | **PRACTICAL-7**  Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations |
| **28th** | REVISION UNIT-2 |
| **8th** | **29th** | **Unit-3 Transformers(Single phase)**  Introduction | **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** | Constructional features of a transformer and parts of transformer |
| **31st** | Working principle of a transformer | **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** | EMF equation |
| **9th** | **33rd** | Transformer on no-load and its phasor diagram | **17th** | REVISION PRACTICAL-1 |
| **34th** | Transformer – neglecting voltage drop in the windings – Ampere turn balance – its phasor diagram |
| **35th** | Mutual and leakage fluxes, leakage reactance | **18th** | REVISION PRACTICAL-1 |
| **36th** | Transformer on load, voltage drops and its phasor diagram |
| **10th** | **37th** | Equivalent circuit | **19th** | REVISION PRACTICAL-2 |
| **38th** | Relation between induced emf and terminal voltage, regulation of a transformer-mathematical relation |
| **39th** | Losses in a transformer | **20th** | REVISION PRACTICAL-2 |
| **40th** | Open circuit and short circuit test. Calculation of efficiency, condition for maximum efficiency-maintenance of Transformer, scheduled Maintenance |
| **11th** | **41st** | Auto transformer construction, saving of copper, working and applications | **21st** | REVISION PRACTICAL-3 |
| **42nd** | Different types of transformers including dry type transformer |
| **43rd** | Rating and Specifications of Single Phase Transformer | **22nd** | REVISION PRACTICAL-3 |
| **44th** | REVISION UNIT-3 |
| **12th** | **45th** | REVISION UNIT-3 | **23th** | REVISION PRACTICAL-4 |
| **46th** | REVISION UNIT-3 |
| **47th** | REVISION UNIT-3 | **24th** | REVISION PRACTICAL-4 |
| **48th** | REVISION UNIT-3 |
| **13th** | **49th** | **Unit-4 Transformers three phase**  Construction of three phase transformers | **25th** | REVISION PRACTICAL-5 |
| **50th** | And accessories of transformers such as Conservator, breather(Brief idea) |
| **51st** | Buchholz Relay, Tap Changer (off load and on load) (Brief idea) | **26th** | REVISION PRACTICAL-5 |
| **52nd** | Types of three phase transformer i.e. delta-delta, delta-star, star-delta and star-star |
| **14th** | **53rd** | Conditions for parallel operation (only conditions are to be studied) | **27th** | REVISION PRACTICAL-6 |
| **54th** | On load tap changer |
| **55th** | Difference between power and distribution transformer | **28th** | REVISION PRACTICAL-6 |
| **56th** | Cooling of transformer |
| **15th** | **57th** | Rating and Specifications of Three Phase Transformers | **29th** | REVISION PRACTICAL-7&8 |
| **58th** | REVISION UNIT-4 |
| **59th** | REVISION UNIT-4 | **30th** | REVISION PRACTICAL-7&8 |
| **60th** | REVISION UNIT-4 |