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| **GBN Govt. Polytechnic Nilokheri, Karnal****Electrical Engineering Department****Lesson plan**

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| **Name of Faculty** | Sh. Arun Sandhu |
| **Discipline** | Electrical Engineering |
| **Semester** | 3rd |
| **Subject** | Electrical Machines-I |
| **Lesson Plan Duration** | 15 weeks (From 4th August 2025 to 30th Nov 2025) |
| **Work load [Theory + Practical] Per Week** | [03+04] |

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| Theory | Practical |
| Lecture Day | Topic(including assignment/test) | Practical day | Topic |
| 1st (Unit-1) |  **DC Generation** Introduction to Electrical machines.Definition of Motor and Generator | 1st | Introduction of EM lab various specifications of Motors, safety precautions etc. |
| 2st |           Torque development due to alignment of two fields and the concept of torque angle         |
| 3rd |     Generalized theory of electrical machines. |
| 4th | **DC Generator** Construction,parts,materials,and their functions. |
| 5th |    Principal of operation of DC generator,e.m.f. equation of generator,armature reaction, communication. | 2nd | 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 |
| 6th |    Various types of DC generator Applications of DC generators. |
| 7th(Unit-II) |   **DC Motors** DC Motor: Types of DC motor, principal of operation, |
| 8th |    Characterstics of DC Motor |
| 9th |     Back e.m.f. and its significance,Voltage equation of DC motor.      | 3rd | Speed control of dc shunt motor |
| 10th |  Torque and speed; Armature torque       |  (i) Armature control method  |
| 11th |  Shaft torque BHP, losses, efficiency       | (ii) Field control method |
| 12th |  Electric Braking.  |   |
| 13th |    Application of DC motors. | 4th | Evaluation of above practical’s. |
| 14th |     Revision |
| 15th |  **DC Motor Starters:**  Necessity, three point and four point starters.     |
| 16th |       Speed control of DC shunt    |
| 17th |    Series motor: Flux and Armature control.    | 5th | Study of dc series motor with starter (to operate the motor on no load for a moment) |
| 18th |     Determination of losses by Swinburne’s test.      |   |   |
| 19th |   Brushless DC Motor: Construction and working,rating and specifications of DC machines.       |
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|  | 6th | Study of 3 point starter for starting D.C. shunt motor. |
| 3th(unit-3) |  **SINGLE PHASE TRANSFORMER**Introduction, Types of transformers: Shell type and core type; Construction:parts and function,materials used for different parts. |
| 20th |   Principal of operation,EMF equation of transformer |
| 21th | Derivation,voltage transformation ratio.         | 7th | 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 |
| 22th |   Transformer No-load and on load phasor diagrom. |
| 23th |   Mutual and leakage fluxes, Leakage reactance.Equivalent circuit of transformer:      |
| 23th |   Equivalent resistance and reactance. Voltage regulation and Efficiency.       |
| 24th |  Open circuit and short circuit tests         | 8th | Evaluation of above practical. |
| 25th |  All day efficiency Rating and Specifications of single phase transformer.        |   |   |
| 26th |          Transformer on load, voltage drops and its phasor diagram |   |   |
| 27th |  | 9th | Revision of above practical for left out students. |
|          second assignment will be given and tentative 2nd sessional test/evaluation of sessional marks etc |
| 28th |          display and analysis of sessional marks. | 10th | Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations |
| 29th |          construction of 3-phase transformer |
| 30th |          accessories of transformers such as Conservator, breather,  |
| 4th (Unit-4) |   **THREE PHASE TRANSFORMERS** Construction of three phase transformers |
| 31th |     Accessories of transformers such as Conservation,breather    | 11th | Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions such as (a) Star-star (b) Star delta (c) Delta star (d) Delta-Delta configuring conditions |
| 32th |    Buchholtz Relay ,Tap changer (off load and on load) Brief idea       |
| 33th |    Types of three phase transformer i.e. delta-delta,delta-star,star-delta and star-star.       |
| 34th |      Need of parallel operation of three phase transformer,Conditions for parallel operation.    |
| 35th |     Polarity tests.Criteria for selection of distribution transformer     | 12th | Evaluation of above practical. |
| 36th |  Cooling of transformer Specifications of three-phase distribution transformer |
| 37th |          Local visit to complaint centre to show parts /accessories of transformer |
| 5th(unit-5) |    **SPECIAL PURPOSE TRANSFORMER**Single phase and three phase auto transformers: Construction ,working and applications |
| 38th |    Instrument Transformer: Construction ,Working and applications of Current transformer and Potential transformer:      | 13th | Revision of above practical for left out students if any. |
| 38th |   Isolation transformer: Constructional Features and applications.        |
| 39th | Single Phase welding Transformer: constructional features and applications.        |
| 39th |      ’K’ Factor of transformers: overheating due to non-linear loads and harmonics.    |
| 40th |    Previous state boards question will be carried out, any other left out topic      3rd sessional test | 14th | Viva-voce/preparation of practical sessional marks. |
| 41th |          Evaluation of 3rd test |
| 42th |          Display/analysis of 3rd sessional test |
| 43th |          Remedial will be taken if any shortcomings found |
| 44th |          Seminal/group discussion as per evaluation scheme |  15th |  Viva-voce/preparation of practical sessional marks. |
| 45th |          Preparation of sessional, practical award etc. |   |   |