**LESSON PLAN**

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| **Discipline:**  Elect. Engg. | **Semester:**  Fourth(4th) | **Name of the Faculty:** Er. R. K Jena/Er T K Swain |
| **Subject:**  Energy Conversion-I (Th-1) | **No. of days per Week class allotted: S**ix (6) | **Semester from Date:16.01.24 to Date: 26.04.24**  **No. of Weeks:** 15 |
| **WEEK** | **CLASS DAY** | **THEORY TOPICS** |
| 1st | 1st | **Ch-01-(D.C.Generator)** :  Operation Principle of generator  Constructional features of D.C machine |
| 2nd | Yoke, pole & field winding, Armature, Commutator |
| 3rd | Armature winding, Back, Front, Resultant & Commutator pitch |
| 4th | Simple Lap & wave winding ,Dummy Coils. |
| 5th | Derive E.M.F equation of a d.c. generator (Solve problems) |
| 6th | Different Types of D.C M/C  a. Self-Excited with ckt. Diagram with voltage equation |
| 2nd | 1st | b. Separately Excited (Shunt & Series) with ckt. Diagram & equations.  C. Separately Excited (Long, short shunt & also the cumulative & differential compound M/C) with Ckt. Diagram & equations. |
| 2nd | Numerical Problems |
| 3rd | Explanation of Armature reaction in D.C M/C &It’s remedies. |
| 4th | Commutation and methods of improving commutation  a (Resistance Commutation)) |
| 5th | b. (Voltage Commutation)  Explanation of Inter poles & Compensating windings |
| 6th | Characteristics Applications of D.C Generators:  Internal Characteristic/OCC/LCC of shunt Generator & Application  Internal Characteristic/OCC/LCC of Series Generator & Application |
| 3rd | 1st | c. Internal Characteristic/OCC/LCC of Compound Generator& Application |
| 2nd | Voltage built up & Critical resistance of a D.C shunt generator |
| 3rd | Losses and efficiency in a d.c generator |
| 4th | Power Stage diagram, Efficiency & condition for max Efficiency. |
| 5th | Numerical problems |
| 6th | Numerical problems |
| 4th | 1st | Parallel operation of D.C. Generators. |
| 2nd | Definition of Parallel operation & it’s condition  Parallel operation of D.C. Shunt generator |
| 3rd | Parallel operation of D.C. Series generator |
| 4th | Numerical problems |
|  | 5th | Application of different types of D.C Generators,  Uses of D.C generators |
| 6th | **Monthly test-01** |
| 5th | 1st | **Possible question answer discussion** |
| 2nd | **Ch-02-(D.C.Motor)** :  Basic working Principle of D.C. Motor |
| 3rd | Significance of back EMF, symbol, ckt diagram & voltage equation |
| 4th | Voltage Equation of Motor & Condition for maximum power developed. |
| 5th | Types of D.C Motor  Definition,Ckt diagram & voltage equation of separately excited & shunt & series motor  b. Definition,Ckt diagram & voltage equation of compound motor |
| 6th | Derive Torque equation of D.C Motor (Gross & shaft torque) |
| 6th | 1st | Numerical problems |
| 2nd | Characteristics of D.C. shunt Motors & Applications:  a.Speed current Characteristic  b.Torque –Current Characteristic  c.Speed –Torque characteristic |
| 3rd | Characteristics of D.C. Series Motors & Applications:  a.Speed current Characteristic  b.Torque –Current Characteristic  c.Speed –Torque characteristic |
| 4th | Characteristics of D.C. Compound Motors &Applications:  (a).Speed current Characteristic (b).Torque –Current Characteristic ( c). Speed –Torque characteristic |
| 5th | Numerical problems |
| 6th | Methods of starting of D.C. Motors (introduction)  a.3-point starter for starting shunt motor |
| 7th | 1st | b.4-point starter for starting compound motor |
| 2nd | **Monthly test-02** |
| 3rd | Speed Control Of D.C Motors  a. Speed Control of d.c. Shunt Motor by flux & armature control method |
| 4th | Numerical problems |
| 5th | b. Speed Control Of D.C series Motor by flux control, Tapped field & series -parallel method |
| 6th | Determination of efficiency of ad.c. Motor by break test method |
| 8th | 1st | Determination of efficiency of a d.c. Motor by Swinburne’s test method |
| 2nd | Numerical problems |
| 3rd | Losses & power stage diagram of D.C. Motor |
| 4th | uses of d.c motors. & Numerical problems |
| 5th | **Possible question answer discussion** |
| 6th | **Ch-03-(Single phase Transformer)** :  Introduction, Definition & working principle |
| 9th | 1st | Constructional details: Different parts such as core, windings. |
| 2nd | conservator, tank breather etc. |
| 3rd | **Monthly test-03** |
| 4th | Types of transformers |
| 5th | Explain types of cooling methods  State the procedure for care &Maintenance |
| 6th | Derivation of EMF equation |
| 10th | 1st | Voltage transformation ratio of an ideal T/F |
| 2nd | Explanation of an ideal T/F on no load with phasor diagram |
| 3rd | Numerical problems |
| 4th | Phasor diagram of an Ideal T/F on load (UPF, Lagging & leading P.F) |
| 5th | Explanation of equivalent resistance, reactance & impedance |
| 6th | Phasor diagram of practical T/F with winding resistance &magnetic leakage foru.p.f,lagging & leading p.f. |
| 11th | 1st | Equivalent circuit diagram |
| 2nd | Derivation of approximate & exact voltage drop of a T/F |
| 3rd | Calculation of voltage regulation at different power factors |
| 4th | **Monthly test-04** |
| 5th | Losses & efficiency of a 1-ph T/F |
| 6th | Open circuit test & S.C test of a 1-ph T/F |
| 12th | 1st | condition for maximum of 1-ph T/F & load corresponding to max efficiency. |
| 2nd | Numerical problems |
| 3rd | Explanation of all day efficiency |
| 4th | Formula for o/p power & losses & numerical problems |
| 5th | Parallel operation of 1-ph T/F |
| 6th | **Possible question answer discussion** |
| 13th | 1st | **Ch-04-(Auto Transformer)**  Constructional feature auto transformer, |
| 2nd | Working principle of an auto transformer, |
| 3rd | Saving of copper in an auto T/F |
| 4th | Uses of an Auto T/F |
| 5th | On-Load Tap changer of the T/F |
| 6th | Off-Load Tap changer of the T/F |
| 14th | 1st | **Possible question answer discussion** |
| 2nd | **Ch-05-(Instrument Transformer)**  Definition, Construction of CT,PT & Ratio Error |
| 3rd | Phase angle Error & Burden. |
| 4th | Uses of CT & PT |
| 5th | **Possible question answer discussion** |
| 6th | Revision |
| 15th | 1st | Revision |
| 2nd | Revision |
| 3rd | Revision |
| 4th | Revision |
| 5th | Revision |
| 6th | Revision |

Syllabus Coverage up to Inter assessment – Chapter-01 & 02.