**20EE2101-ELECTRO MECHANICAL ENERGY CONVERSION -I**

**(EEE)**

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-0-0 |
| **Pre-requisite:** | Faraday’s laws and fundamental concepts of Electrical circuits. | **Sessional Evaluation:**  **External Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Objectives** | To make the student learn about: | |
| 1.The conversion principle of electrical and mechanical energy.  2.The working principle of Generator and its winding diagrams.  3. The performance characteristics of DC machines& parallel operation of  DC generator.  4. The working principle and performance characteristics of DC Motor.  5. The losses and efficiency of DC Machines.  6. Different performance tests on DC machines. | |
| **`** | After completing the course the student will be able to | |
| CO1 | Understand the basics of electromechanical energy conversion. |
| CO2 | Empathize the working principle of Generator and its winding diagrams. |
| CO3 | Identify the suitable DC generator for specific applications. |
| CO4 | Ascertain the suitable DC motor for specific applications. |
| CO5 | Evaluate the efficiency of DC machine and analyse the parallel operation of DC generators. |
| CO6 | Conduct different tests on DC machines. |
| **Course Content** | **UNIT- I**  **Introduction:**- Principle of Electromechanical Energy Conversion- Right hand thumb rule-Fleming’s right hand rule- Fleming’s left hand rule- Faraday’s law of Electro Magnetic Induction-Construction of DC machine. Simple DC Generator working Principle–operation-action of commutator.  **UNIT – II**  **Types of DC Generators and Armature reaction:** Types of Armature windings–lap and wave winding-winding drawings-Problems–Generated EMF equation- Armature reaction-Demagnetising and cross magnetizing conductors-effects of Armature reaction and compensating Methods-Problems. Types- series, shunt, compound DC generator  **UNIT – III**  **Characteristics of DC Generators:** Characteristics of different types of generators– critical field resistance and critical speed – applications – Problems - commutation - methods of improving commutation - compensating winding.  **Parallel operation of DC generators**: Parallel operation of DC shunt, series and compound Generators- Problems.  **UNIT – IV**  **DC Motors:** Working principle–importance of back EMF –Types of DC motors–series, shunt, compound motors-Torque and Power developed by armature–performance characteristics of DC motors–Applications & Problems.  **UNIT – V**  **Speed control, starting of DC motors:** Speed control of DC series & shunt motors–Problems-Starting of DC motors- Constructional details of 3-Point and 4-Point starters –problems.  **Losses and efficiency of DC machine**: Various losses in DC machine and efficiency, power flow analysis- condition for maximum Efficiency-Problems.  **UNIT – VI**  **Testing of DC machines** :Brake test- Swinburne’s test- Hopkinson’s test  –Field’s test- Retardation test-Separation of iron and friction Losses- Problems. | |
| **Text Books & Reference Books** | **TEXT BOOKS:**   1. “Theory and performance of Electrical machines”,by J.B Gupta - SK Kataria publishers,2013. 2. “Principles of Electrical Machines”, by VK Mehta, Rohit Mehta – S.Chand,2006. 3. “Electrical machines”, by I.J. Nagarath and D.P. Kothari 4th Edition, Tata McGraw Hill.   **REFERENCE BOOKS:**   1. “Electrical Machinery”, by P.S Bimbhra - Khanna publishers, 2011. 2. “Performance of DC machines”, by M.G. Say, Second Edition, CBS Publishers. 3. “A Textbook of Electrical Technology: Volume 2, AC and DC Machines”, by Theraja B. L, Theraja A.K. S. Chand,2006. | |
| **E-Resources** | http://nptel.ac.in/courses  http://iete-elan.ac.in  <http://freevideolectures.com/university/iitm> | |