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

**(EEE)**

|  |  |  |  |
| --- | --- | --- | --- |
| **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:** | 4060100 |

|  |  |
| --- | --- |
| **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 ofDC 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/courseshttp://iete-elan.ac.in<http://freevideolectures.com/university/iitm> |