**20EE3102- ELECTROMECHANICAL ENERGY CONVERSION – III**

**(EEE)**

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-0-0 |
| **Pre-requisite:** | Basic electrical sciences, Electromechanical energy conversion-I & II | **Sessional Evaluation:**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Objectives:** | To make the student learn about: | |
| 1. The construction and working of different types of alternators.  2.The voltage regulation of synchronous generators using different methods.  3. The theory of salient pole machines.  4. The concept of parallel operation of alternators.  5. The comparison between the characteristics of different types of electrical machines and performing various tests on the machines.  6. The various types of electrical machines. | |
| **Course Outcomes:** | After completing the course the student will be able to: | |
| **CO1** | Understand the construction and working of different types of alternators. |
| **CO2** | Determine the voltage regulation using different experimental methods and theoretical analysis. |
| **CO3** | Understand the characteristics of synchronous generators. |
| **CO4** | Understand the principles of synchronization and parallel operation under different operating conditions. |
| **CO5** | Analyse the working and performance of synchronous motor. |
| **CO6** | Understand the construction, operation and starting methods of single phase induction motors and stepper Motor. |
| **Course Content:** | UNIT-I **Synchronous generators**: Construction, types of alternators, armature windings, EMF equation, armature reaction, leakage flux, synchronous reactance, equivalent circuit, phasor diagram. UNIT-II **Voltage regulation of synchronous generators:** Voltage regulation,  pre-determination of regulation by synchronous impedance, ampere turn and Potier triangle methods, SCR and its importance. UNIT-III **Theory of salient pole machines:** Two reaction theory, phasor diagram, determination of Xd and Xq from slip test- expression for power output of cylindrical and salient pole alternators, power angle characteristics. UNIT-IV **Parallel operation of alternators:** Conditions for parallel operation, synchronization, load sharing, synchronizing power, operation on infinite bus bar, effect of change of excitation, effect of change of mechanical input, excitation systems.  **UNIT-V**  **Synchronous motor:** Theory of operation, phasor diagrams, variation of current and power factor with excitation, hunting and its suppression, determination of V and inverted V curves, methods of starting.  **UNIT-VI**  **Single phase induction motors:** Principle of operation, double revolving field theory, cross field theory, equivalent circuit, determination of equivalent parameters, starting methods, split phase motors, shaded pole motor, repulsion motor, universal motor and Stepper motor. | |
| **Text books**  **&**  **Reference books:** | **Text books:**  1.“Theory and performance of electrical machines”, by J.B Gupta, SK Kataria& sons,3rd Edition,2013.  2.“Electrical machines”, by Ashfaq Hussain, Dhanpatrai& co (P) Ltd,7th Edition.  **Reference books:**  1.“Electrical machinery”, by Dr. P.S Bimbhra, Khanna publishers.  2.“Electrical machines”, by I.J.Nagarath and D.P.Kothari, 5th Edition, Tata McGraw-Hill. | |
| **e-Resources:** | <http://nptel.ac.in/courses>  <http://iete-elan.ac.in>  <http://freevideolectures.com/university/iitm> | |