Electrical Machine – I

1.1 Course Number: EEV211

1.2 Contact Hours: 3-1-0 Credits: 11

1.3 Semester-offered: 2nd Year -Even

1.4 Prerequisite: Fundamentals of Electrical Engineering

1.5 Syllabus Committee Member: Dr. Umakant Dhar Dwivedi, Dr. Abhishek Kumar Singh, Dr. Sajal Agarwal, Dr. Vijay Kumar Singh, Dr. Ankur Pandey.

2. Objective: To provide basic knowledge of DC machines – Motors/Generators and Single/Multi phase Transformer for industrial use.

3. Course Content:

Single phase Ideal transformer and basic equations. Its equivalent circuit; Core loss: Eddy current and hysteresis loss; Taking Leakage flux, winding resistances and core loss in the equivalent circuit of the transformer; Exact and approximate equivalent circuit. Phasor diagram. Regulation & efficiency; Open circuit and short circuit tests. Estimation of equivalent circuit parameters; Three phase transformer and various connections with vector groups.

DC machine constructional features and basic idea of its operation. Armature winding, commutator segments and brushes; Lap and wave windings and number of parallel paths in armature circuit. Emf equation; Torque equation. Separately excited and shunt generator characteristics; Armature reaction and its ill effects. How to nullify the effects of armature reaction; Shunt, series and compound motor characteristic; Starting, speed control and braking of DC motor, Motor Testing.

4. Readings

4.1 Textbook:

i. *P.K.Mukherjee & S. Chakravorti: Electrical Machines, Dhanpat Rai Publications(P) Ltd., New Delhi*
ii. *I.J. Nagrath, D.P. Kothari: Electrical Machines, Tata McGraw Hill*
iii. *R.K. Srivastava: Electrical Machines, Cengage Learning, India*

4.2 Reference books:

i. *Irving L. Kosow: Electric Machinery and Transfoormers, Prentice Hall India Publication*
ii. *A.E. Fitzerald, Charles Kingsley: Electrical Machines, IV Edition, McGraw Hill*
iii. *A.S. Langsdorf: Theory of Alternating Current Machinery, Tata McGraw Hill*
iv. *M. G. Say: The Performance and Design of Alternating Current Machines, III Ed., CBS Publ. & Dis.*
v. *M. G. Say: Alternating Current Machines, III Edition, ELBS*

vi. *Clayton & Hancock: The Performance and Design of Direct Current Machines, ELBS*
vii. *M.G.Say & O.S Taylor: Direct Current Machines, ELBS*

5. Outcome of the Course:

Students will learn about the different aspects of Electrical Machines and Transformers – Construction, Operation, Control and applications.