

INSTITUTE	FACULTY OF TECHNOLOGY
PROGRAM	MASTER OF TECHNOLOGY in ELECTRICAL ENGINEERING
SEMESTER	1
COURSE TITLE	ELECTRIC MOTORS & DRIVES
COURSE CODE	01EV1103
COURSE CREDITS	4

Objective:

- 1 The objective is to introduce learner to design of printed circuit boards and their manufacturing using Computer Aided Tools.

Course Outcomes: After completion of this course, student will be able to:

- 1 Illustrate the construction features of different electrical machine (Apply)
- 2 Explain different method to control the speed of motor. (Analyze)
- 3 Analyze the torque speed characteristics of motor. (Create)
- 4 Selection of motor for specific application (Evaluate)
- 5 Method to develop the maximum torque in motor(Apply)

Pre-requisite of course:None

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	DC Motor Motor principle, types of dc motor , significance of back emf, voltage equation and torque equation, , condition of maximum torque, speed of dc motor , torque and speed of dc motor, motor characteristics, , factors controlling the motor speed, Speed control methods for DC motor	8
2	Induction Motor Constructional Features of a Three-Phase Induction Motor, Production of Revolving Field, , Principle of Operation, Reversal of Direction of Rotation of Three-Phase Induction Motors, , Slip, Torque developed by induction motor, , condition for the maximum torque, speed control methods of induction motor	8

Contents : Unit	Topics	Contact Hours
3	Permanent Magnet D.C. Motors: Principle of operation, Magnetic circuit analysis, , Permanent magnet materials ,Magnetic characteristics, , Permeance coefficient ,EMF and torque equations , Commutation , Power controllers ,Motor characteristics and control	8
4	Permanent magnet brushless dc (blde) motors: Introduction, Constructional features, Principle of operation, , Commutation in DC motors, Difference between mechanical and electronic commutators, , Hall sensors, Optical sensors, , Types of BLDC motors, EMF and torque equation, Torque-speed characteristics, Drives - concept and Control of BLDC motors.	8
Total Hours		32

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Experiment-1 Operation of separately excited DC motor under varying load torque condition	2
2	Experiment-2 Simulation of single phase fully controlled converter fed DC drive	2
3	Experiment-3 Simulation of three phase fully controlled converter fed DC drive	2
4	Experiment-4 Simulation of Chopper fed separately excited DC drive	2
5	Experiment-5 Simulation of stator voltage control of induction motor using AC voltage controller	2
6	Experiment-6 Simulation of rotor resistance control of wound rotor induction motor.	2
7	Experiment-7 Verification of V/f profile of induction motor using variable frequency drive	2
8	Experiment-8 Verification of torque speed characteristics of variable frequency drive.	2
Total Hours		16

Textbook :

- 1 Permanent Magnet and Brushless DC Motors, T. Kenjo and S. Nagamori, Clarendon Press, London, 1998

References:

- 1 Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application, Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application, R.Krishnan, CRC Press, New York, 2001
- 2 Stepping Motors – A Guide to Motor Theory and Practice’, Stepping Motors – A Guide to Motor Theory and Practice’, P.P. Aearnley, Peter Perengrinus London, 1982
- 3 Permanent Magnet and Brushless DC Motors, Permanent Magnet and Brushless DC Motors, T. Kenjo and S. Nagamori, Clarendon Press, London, 1988

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	10.00	15.00	30.00	20.00	30.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and classroom
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

- 1 <https://nptel.ac.in/courses/108/105/108105131/>
- 2 <https://sohailansaari.wordpress.com/nptel-handwritten-notes/>
- 3 <http://www.facweb.iitkgp.ac.in/~tkbh/tkbh.php>