



**Kadi Sarva Vishwavidyalaya**  
**Faculty of Engineering & Technology**  
**Third Year Bachelor of Engineering**  
With effect from: Academic Year 2019-20

<b>Subject Code: EE603-N</b>	<b>Subject Title: Theory and Performance of Electrical Machines</b>
<b>Pre-requisite</b>	

**A. Course Objective:**

- To present a problem oriented knowledge of special Electrical Machines.
- To focus on the study of single phase ac electrical motors.
- To address the underlying concepts & methods behind several Electrical Engineering machines.
- To focus on testing of DC machines & Induction machines.

Teaching scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
03	00	02	05	04	03	70	30	20	30	150

**B. Outline of the Course:**

Sr. No	Title of the Unit	Minimum Hours
1	Single phase AC machines	13
2	Special Machines	12
3	Testing of DC Machines	10
4	Performance of Induction machine	10

**Total Hours (Theory): 45**

**Total Hours (Lab): 30**

**Total Hours: 75**



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**Detailed Syllabus**

Sr. No	Topic	Lecture Hours	Weight age(%)
1	<b>Single phase A. C. motors</b> Introduction, Double field revolving theory, Cross Field theory, Equivalent circuit of 1-phase induction motor , Starting and types of single phase motors: Split phase, Resistance start, Capacitor start Motor, Capacitor start & Capacitor run induction motor, Shaded pole induction motor, Permanent Capacitor Motor, Commutator Motors, Universal Motors, Repulsion Motors, Speed Control Of single phase motor, Starting & running performance of 1-phase induction Motor, Losses and efficiency of single phase induction motor	<b>13</b>	<b>30</b>
2	<b>Special Machines:</b> Scharge Motor, Phase Advansor, Hysteresis motor, Reluctance motor, Permanent Magnet (PM) synchronous motors, Axial flux PM machines and Doubly salient PM machines. Switched Reluctance Motor: General construction, working and applications .Stepper motor: General construction, working and applications. Induction Regulator, Electrical Welding Generator, Series Boosters, Brushless DC motors,	<b>12</b>	<b>25</b>
3	<b>Testing of DC Machines :</b> Testing Of DC Machines: Power Losses & efficiency of DC Machines, Brake Test, Swinburn Test, Hopkinson's Test, Field Test, Retardation Test, Load Test, Heat Run Test, Testing of Induction Motor	<b>10</b>	<b>25</b>
4	<b>Performance of Induction machine:</b> Control of Induction motor Starting of induction motor, Various types of automatic starters, Effect Of harmonics, Harmonic Torques, Crawling and Cogging, Speed control of induction motors: Control from stator side, control from rotor side, Testing Of induction Motor as per BIS	<b>10</b>	<b>20</b>
<b>Total</b>		<b>45</b>	<b>100</b>



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**C. List of experiments:**

<b>Sr. No.</b>	<b>Name of experiment</b>
1	Brake Test on D.C. Shunt Motor.
2	Swinburn Test on D.C. Shunt Generator.
3	Hopkinson's Test on D.C. Shunt Machine.
4	Field Test on D.C. Series Machine.
5	Retardation Test on DC Series Motor.
6	No load and Blocked rotor test of single phase Induction.
7	Performance analysis of Permanent Magnet (PM) synchronous machine using Ansys Maxwell software.
8	Characteristic analysis of Switched Reluctance Motor using Ansys Maxwell software.
9	Stepper motor & its applications.
10	Hysteresis Motor & its applications.

**D. Students Learning Outcomes**

- The student can be acquired the basic theoretical knowledge of special electrical machines thus being prepared to pursue any area of engineering spectrum in depth as desired.
- The students will be able to effectively employ electrical systems and lead the exploration of new applications and techniques for their use.
- The students will be able to creat actual geometry of machine in 2D as well as in 3D domain using Maxwell software.
- The students can analyze the effect of various parameter on different characteristics of electrical machine by performing simulation .

**E. Text Book**

1. Theory and Performance of Electrical Machines by J.B.Gupta Kataria Pub
2. Electrical Technology Vol II. B. L. Theraja ,S .Chand Publications,
3. Electrical Machine by U.A. Bakshi & M.V. Bakshi, Technical Publication

**F. Reference Books:**

1. Electrical Machines. by Nagarath &Kothari, TMH Publications
2. Performance and Design of A.C. machines by M. G. Say
3. Electrical Machines by P S Bhimbra
4. Electrical Machines by S K Bhattacharya, TMH Pub.