

Course code	Course Name	L-T-P - Credits	Year of Introduction
EE402	Special Electrical Machines	3-0-0-3	2016
<b>Prerequisite: Nil</b>			
<b>Course Objectives</b>			
<ul style="list-style-type: none"> <li>To get an overview of some of the special machines for control and industrial applications</li> </ul>			
<b>Syllabus</b>			
AC Servomotors – construction – operation - DC servomotors – Stepper motor – operation – types-modes of excitation – AC series motor – Universal motor – Hysteresis motor – Reluctance motor – Switched reluctance motor – Permanent magnet DC motor – Brushless DC motor – Linear motors – Linear induction motors.			
<b>Expected outcome.</b>			
<ul style="list-style-type: none"> <li>The students will gain knowledge in the construction and principle of operation of certain special electrical machines having various applications.</li> </ul>			
<b>Text Book:</b>			
E. G. Janardhanan, ' <i>Special Electrical Machines</i> ' PHI Learning Private Limited.			
<b>References:</b>			
<ol style="list-style-type: none"> <li>Irving L. Kosow, '<i>Electrical Machinery and Transformers</i>', Oxford Science Publications.</li> <li>T. J. E. Miller, '<i>Brushless PM and Reluctance Motor Drives</i>'. C.Larendon Press, Oxford.</li> <li>Theodore Wildi, '<i>Electric Machines, Drives and Power Systems</i>', Prentice Hall India Ltd.</li> <li>Veinott &amp; Martin, '<i>Fractional &amp; Subfractional hp Electric Motors</i>'. McGraw Hill International Edn.</li> </ol>			
<b>Course Plan</b>			
Module	Contents	Hours	Sem. Exam Marks
I	AC Servomotors- Construction-principle of operation – performance characteristics – damped AC servomotors – Drag cup servomotor – applications. DC servomotors – field and armature controlled DC servomotors – permanent magnet armature controlled – series split field DC servomotor.	7	15%
II	Stepper motors – Basic principle – different types – variable reluctance- permanent magnet – hybrid type – comparison – theory of operation – monofilar and bifilar windings – modes of excitation – drive circuits – static and dynamic characteristics – applications	7	15%
<b>FIRST INTERNAL EXAMINATION</b>			
III	Single phase special electrical machines – AC series motor- construction – principle of working – phasor diagram – universal motor Hysteresis motor- constructional details- principle of operation – torque-slip characteristics – applications.	7	15%
IV	Reluctance motors – principle of operation – torque equation – torque slip characteristics-applications. Switched reluctance motors – principle of operation – power converter circuits – torque equation – different types – comparison – applications.	7	15%

<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	Permanent Magnet DC Motors – construction – principle of working. Brushless dc motor – construction – trapezoidal type-sinusoidal type – comparison – applications.	7	20%
<b>VI</b>	Linear motors – different types – linear reluctance motor – linear synchronous motors – construction – comparison. Linear induction motors – Expression for linear force – equivalent circuit – applications.	7	20%
<b>END SEMESTER EXAM</b>			

**QUESTION PAPER PATTERN:**

Maximum Marks: 100

Exam Duration: 3Hours.

**Part A:** 8 compulsory questions.

One question from each module of Modules I - IV; and two each from Module V & VI.

Student has to answer all questions. (8 x5)=40

**Part B:** 3 questions uniformly covering Modules I & II. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.

**Part C:** 3 questions uniformly covering Modules III & IV. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.

**Part D:** 3 questions uniformly covering Modules V & VI. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.