Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology
Second Year Bachelor of EE Engineering- Semester IV
With effect from: Academic Year 2018-19

EE404-N	AC Machines
Pre-requisite	

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme						
					Theory		IE Marks	CIA Marks	Pract. Marks	Total	
L	T	P	Total		Hrs	Marks					
Hrs	Hrs	Hrs	Hrs								
03+1*	00	02	06	04	03	70	30	20	30	150	

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- To realization concept of induction motor.
- To realization concept of Synchronous motor
- To make aware about winding of AC machines.

Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	Fundamentals of AC machine windings	06
2	Induction Motor	22
3	Alternator	22
4	Synchronous motor	10
	Total	60

Total hours (Theory): 60
Total hours (Lab): 30
Total hours: 90

DETAILED SYLLABUS

Unit No.	Topic	Lecture Hours	Weightage(%)
1.	**Fundamentals of AC machine windings:** Physical arrangement of windings in stator and cylindrical rotor slots for windings; single turn coil - active portion and overhang; full-pitch coils, concentrated winding, distributed winding, Mush winding	06	10
2.	**Induction Motor:** Classification of AC motors, working principle, Production of rotating magnetic field Synchronous Speed, speed of rotor field, slip, starting & running torque, torque-slip characteristics, Starting & maximum torque, Rotor emf, effect of change in voltage & frequency on torque, speed & slip, Measurement of Slip, No-load & blocked rotor test, equivalent circuit, Phasor diagram, Circle diagram, Effect of rotor resistance on performance of induction motor, Double cage squirrel cage I.M. and its equivalent circuit	22	35
3.	**Alternator** Introduction, Stationary armature, rotor, Armature winding, Distribution factor, Emf equation, Alternator on load, Synchronous reactance, Voltage regulation, Methods of Voltage regulation i.e. EMF method, MMF method, Potier Triangle method, Armature reaction and it's compensation, Short circuit ratio, Effect of increase in excitation, Effect of change in torque and speed, Determination of Synchronous reactance, Synchronizing or parallel operation between two machines, Load angle and Power flow equations, Two reaction model of Salient pole machines, Effect of unequal voltages & percentage impedance, Slip test for measurement of Xd and Xq,	22	35
4.	**Synchronous motor** Methods of starting of synchronous motors, Different torques in Synchronous motor, Synchronous motor with different excitation, Power developed by synchronous motor, Synchronous phase modifiers, V-curves of Synchronous motors, hunting of synchronous machines and its prevention	10	20
	Total	60	100

INSTRUCTIONAL METHOD AND PEDAGOGY:

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed

- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weight age should be given to all topics while teaching and conduction of all examinations.

- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.

- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.

- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.

- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

LEARNING OUTCOME:

- The student can be acquired the basic knowledge of electric circuits, electrical fundamentals, 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.

Text / References books:

1. Electrical Machines. byNagarath&Kothari,TMH Publications
2. Electrical Technology Vol II. B. L. Theraja,S .Chand Publications
3. Performance and Design of A.C. machines by M. G. Say
4. Electrical Machines by P S Bhimbra
5. Electrical Machines by J. B. Gupta, Kataria Pub
6. Electrical Machine Design by A.K.Shawhney, Dhanpatrai& Sons.

List of experiments:

Sr. no.	Experiment
1	To perform load Test on a 3-Φ Induction Motor & Obtain the performance characteristics
2	To perform No-load and Blocked Rotor test on 3-☐ Induction motor and hence determine the parameters of equivalent circuit of given Induction Motor
3	Perform No-Load test and Blocked rotor test on 3-Φ Induction motor & obtain the performance characteristics by using circle diagram.
4	Obtain slip-torque characteristics & Efficiency curve of 3-φ Induction motor from circle diagram.
5	To find out the voltage regulation of a 3-Φ alternator by performing direct load test
6	To find out the voltage regulation of a 3-Φ alternator by synchronous impedance method
7	To find out the voltage regulation of a 3-Φ alternator by Rothert'sm.m.f method or Ampere turn method.
8	To find the voltage regulation of a 3-Φ alternator by zero power factor (ZPF) method or Potier triangle method
9	To determine the short circuit ratio of a synchronous machine
10	To determine the direct axis reactance and quadrature axis reactance of a salient pole synchronous machine.
11	To perform the synchronization of a 3-Φ alternator with the grid.
12	To obtain the V – curves of a synchronous machine.