

COURSE NAME : ELECTRICAL ENGINEERING GROUP
COURSE CODE : EE/EP
SEMESTER : FIFTH
SUBJECT TITLE : A. C. MACHINES
SUBJECT CODE : 9086

Teaching & Examination scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
04	--	02	03	80	20	50#	--	25@	175

Rationale:

This subject is classified under core technology group intended to teach students facts, concepts, principles & procedure for operations and testing of electrical machines such as induction motor, alternator and synchronous motor. Student will be able to analyze the characteristics and qualitative parameters of these machines.

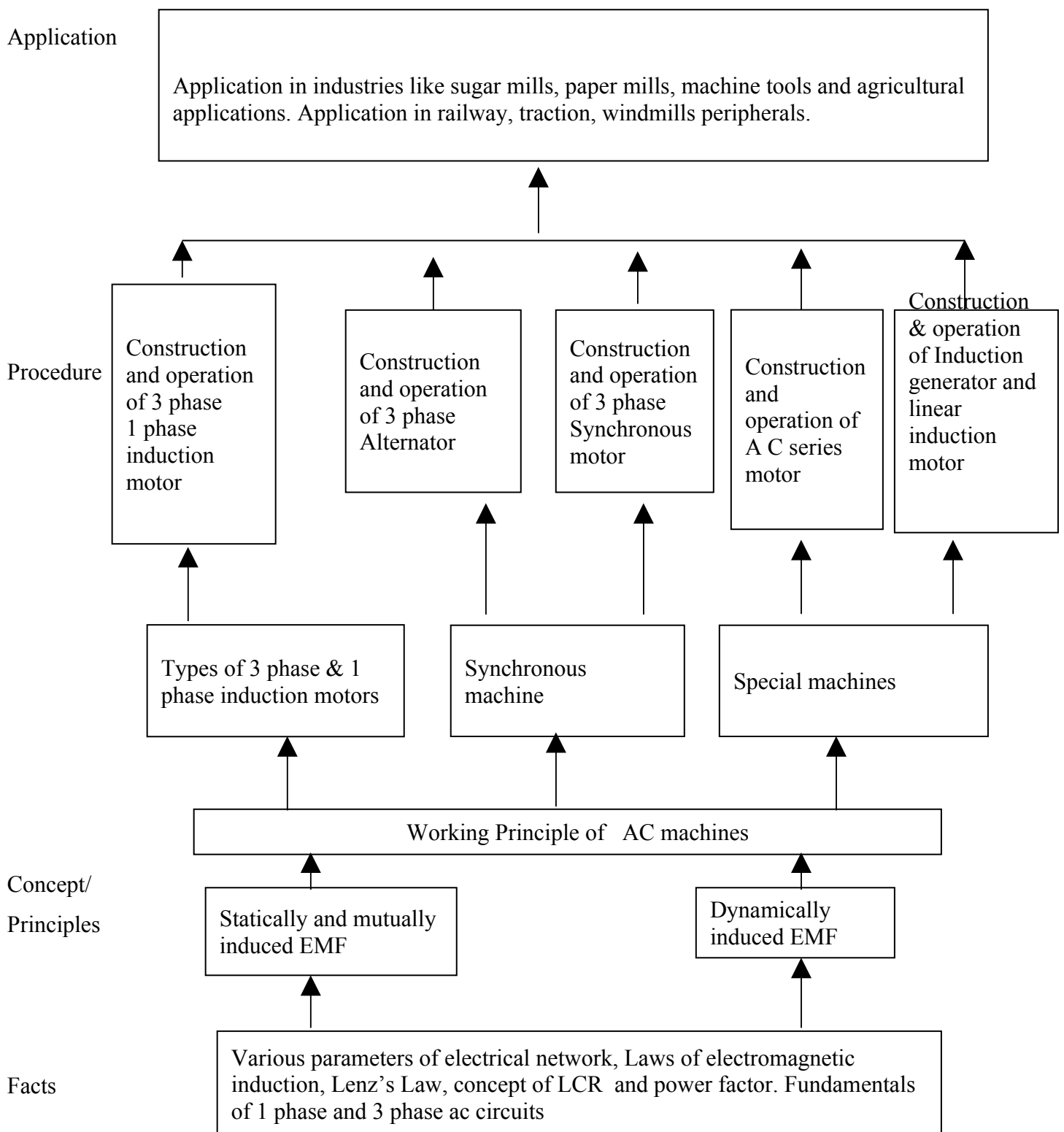
These machines are widely used in industries and for generation of electricity. The knowledge gained by the student is useful in the study of technological subjects such as Utilization System, Manufacturing Processes and Testing and Maintenance of Electrical Machines. The knowledge and skills obtained will be helpful in discharging technical functions such as supervision, controlling and as R & D technician.

Objectives:

Student will be able to

- 1) Know the constructional details & working principal of various types of ac machines
- 2) Operate given machine properly.
- 3) Use the knowledge for testing of machine.
- 4) Select motors of proper rating for particular use.
- 5) Relate this knowledge to understand the subject of higher semester.

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	Three phase induction motor 1.1 Construction of three phase induction motor 1.2 Production of rotating magnetic field 1.3 Principle of working/operation 1.4 Concept of slip 1.5 Equation of rotor induced emf, current, frequency, reactance, and impedance under steady and running condition 1.6 Torque equation of three phase induction motor 1.7 Starting and running torque of squirrel cage and slip ring induction motor 1.8 Condition for maximum and starting torque 1.9 Torque slip characteristics of three phase induction motor 1.10 Effect of change in rotor circuit resistance on torque-slip characteristics 1.11 Effect of change in supply voltage on torque-slip characteristics	12	16
	1.12 measurement of slip by a) Tachometer method b) Comparing rotor frequency and stator frequency 1.13 Speed control of three phase induction motor by a) Pole changing method b) Frequency control method c) By stator voltage control d) Rotor resistance control 1.14 Comparison between squirrel-cage and slip-ring induction motor. 1.15 Applications of three phase induction motor. 1.16 Power stages of three phase induction motor. 1.17 Double cage IM a) Construction b) Characteristic of outer, inner cage & combined characteristic c) Industrial Applications (Numerical on all above) 1.18 I.M. as a generalized transformer 1.19 Vector diagram of IM	12	16
	1.20 Equivalent circuit of 3-phase IM (No numerical) 1.21 Starting of 3-phase IM (No numerical) a) Stator resistance starter b) Star-Delta starter c) Auto transformer starter d) Rotor resistance starter	06	08
	Three Phase Alternator 2.1 Definition and construction of three phase Alternator a) Armature b) Rotor- smooth cylindrical & projecting type 2.2 Derivation of e.m.f. equation of Alternator which includes	12	16

List of Practicals:

- 1) a) To measure the slip of 3-phase IM by
 - i) Tachometer
 - ii) Comparing rotor & stator frequency
 - iii) Stroboscopic method.
- b) To reverse the direction of rotation of 3-phase IM.
- 2) To measure the performance of 3-phase IM by direct loading
- 3) To list different types of starters used for 3-phase IM .Identify & use the same to start & run 3-phase IM
- 4) Using an MG set (DC motor-Alternator) observe the effect of excitation & speed on induced e.m.f. & plot O.C.C. of the given alternator.
- 5) To find the percentage regulation of 3-phase alternator by synchronous impedance method at various power factors.
- 6) To find the percentage regulation of 3-phase alternator by direct loading method at various power factors.
- 7) To list & explain various starting methods of synchronous motor & applying one of them to start the synchronous motor. Plot V & inverted V curve of the same.
- 8) To list the various types of 1-phase IM, Collect the literature for them from Dealers / manufacturers of local places & compare on the following pts.
 - i) Method of starting
 - ii) Cost
 - iii) Performance
 - iv) Starting torque etc.Prepare a report

Learning Resources:**Books:**

Sr.No.	Author	Title	Publisher
01	S. K. Bhattacharya	Electrical Machines	TTTI, Chandigarh
02	B. L. Theraja	Electrical Technology Vol. II	S chand & Co.
03	C.L.Dawes	Electrical engineering	T. M. G. H.