

LNCT University
Diploma EX, V Semester Syllabus

ELECTRICAL MACHINES -II (DEX-501)

COURSE OUTCOMES:

After Completing the course student should be able to:

CO-1	Analyse the operation of three-phase induction motors. explain the construction and working principle of squirrel cage and slip ring induction motors.
CO-2	Explain working and characteristics of single-phase induction motors, differentiate between types of single-phase motors: split-phase, capacitor start/run and shaded pole.
CO-3	Understand and evaluate synchronous generators (alternators), explain construction and working of salient pole and cylindrical rotor alternators.
CO-4	Analyse synchronous motor operation and applications, describe the construction, working and starting methods of synchronous motors.
CO-5	Identify and explain special purpose machines

UNIT I: THREE-PHASE INDUCTION MOTORS

Construction and working principle, Types: Squirrel cage and slip ring, Concept of rotating magnetic field, slip, rotor current, torque-slip characteristics, Equivalent circuit and phasor diagram, power stages and efficiency, no-load and blocked rotor test, methods of starting and speed control.

UNIT II: SINGLE-PHASE INDUCTION MOTORS

Types: split-phase, capacitor start, capacitor run, shaded pole, double revolving field theory, equivalent circuit, characteristics and applications, reversal of rotation, introduction to repulsion motors.

UNIT III: SYNCHRONOUS GENERATORS (ALTERNATORS)

Construction and working principle, types: salient pole and cylindrical rotor, emf equation, armature reaction and its effect, voltage regulation (emf, mmf, ZPF methods), parallel operation and synchronizing.

UNIT IV: SYNCHRONOUS MOTORS

Construction and working principle, starting methods, Torque and power developed, V-curves and inverted V-curves, power factor correction, hunting and damping, applications in industry.

UNIT V: SPECIAL PURPOSE MACHINES

Stepper motor - types, working, applications, servo motor - ac and dc types, universal motor - construction, operation, applications, linear induction motor, brushless dc motors (BLDC) - basics and uses.

List of Suggestive Experiments: -

1. Load test on three-phase induction motor.
2. To determine efficiency, slip, torque, and power factor at various load conditions.
3. No-load and blocked rotor test on three-phase induction motor.
4. Load test on single-phase induction motor.
5. To determine performance parameters such as efficiency and torque.
6. Study of split-phase, capacitor start, and shaded pole motors.
7. Open circuit and short circuit test on alternator.
8. To determine regulation and synchronous impedance.
9. Load test on alternator.
10. To draw the performance curves (voltage vs load).
11. Starting and running of synchronous motor.
12. Using damper winding or auxiliary motor.
13. V-curve and inverted v-curve of a synchronous motor.
14. To study the variation of armature current with excitation.

Reference Books: -

1. Electrical Machines, B.L. Theraja
2. Electrical Machinery, P.S. Bimbhra
3. Electric Machines, D.P. Kothari & I.J. Nagrath
4. Electrical Machines, S.K. Bhattacharya
5. Special Electrical Machines, K. Venkataratnam