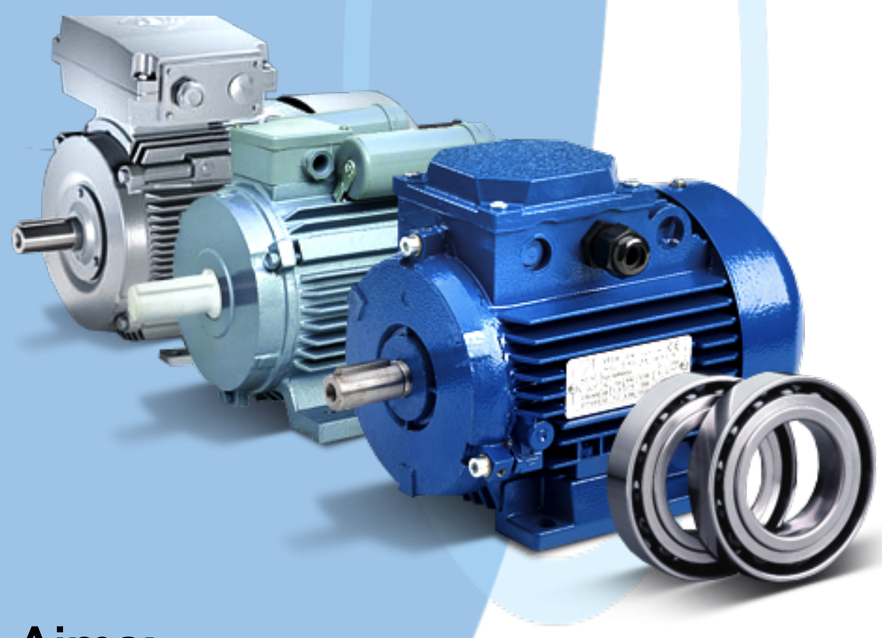
ECS649U/ECS790P

Electrical Machines and Systems



Aims:

- Understanding AC/DC electrical machinery and their application in renewable generation and electrical vehicles.
- Understanding of the power electronic drive and control systems for AC/DC electrical machinery.
- Understanding of the application of three-phase systems in the main grid power system and electrical machines.
- Principals of electrical power systems (supply generation, transmission and distribution).
- Introductory knowledge to modern electrical grid (smart grid, microgrids, nanogrids) and modern transmission (HVDC lines).

Prerequisites:

- Basic circuit theory (KVL, KCL, Thevenin equivalent circuit)
- Ordinary differential equation (ODEs)

Key syllabus:

Electric Machines

- Introduction to Machinery Principles
- The principals of electromagnetism
- The principle of electro-mechanical conversion
- Single-phase and three-phase transformers
- DC Electric machines (DC machinery fundamentals, Generators and Motors , Machine characteristics, DC electric drives and control system)
- AC Electric machines(AC machinery fundamentals, Induction motors, Synchronous machines)

Power Systems

- Electricity supply system (Conventional and renewable sources)
- Generation
- Transmission (High-voltage DC line)
- Distribution (Smart Grid, Microgrids and Nanogrids)

Assessment:

Lab 1 (Transformers): 4%

Lab 2 (DC Machines): 4%

Lab 3 (PWM control of DC Machines): 4%

Lab 4 (Induction Machines – Part 1): 4%

Lab 5 (Induction Machines – Part 2) : 4%

Lab 6 (Electric Vehicles) : 5%

Exam: 75%

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