

**Final Examination Review Sheet
(200 Points)**

1) Three Phase Systems (only as part of problems below)

- a) Power
- b) Reactive power
- c) Single phase equivalent
- d) Power factor correction
- e) Harmonic phenomenon

2) Magnetics (20 points)

- a) Ampere's Law
- b) Faraday's Law
- c) Magnetizing current
- d) Core loss -exciting current
- e) Air gap effects
- f) Leakage flux concepts

3) Transformers (20points)

- a) Ideal transformers
- b) Autotransformers
- c) Equivalent circuits
- d) Efficiency
- e) Transformer ratings
- f) Special transformers

4) Force and Energy (40 points)

- a) Field energy
- b) Electric energy
- c) Energy balance
- d) Force eq's for linear magnetic systems
- e) Force equation applications

5) Introduction to Electric Machines (20 points)

- a) B-field from winding distribution
- b) BLI force and torque
- c) Multi-pole and multi phase windings
- d) Rotating fields

5) DC Machine (20 points)

- a) Emf and torque
- b) Equivalent circuit
- c) Torque - speed curves
- d) Speed control techniques

6) Induction Machine (60 points)

- a) Rotating field
- b) Physics of operation
- c) Equivalent circuit
- d) Torque - speed curve
- e) Calculation of maximum torque
- f) Starting considerations
- g) Variable voltage operation
- h) Variable frequency operation

7) Synchronous Machine (20 points)

- a) Rotating field
- b) Equivalent circuit
- c) Phasor diagrams
- d) Phasor diagrams
- e) Phasor diagrams
- f) Isolated generator
- g) Generator in large system

Note: The exam may include **questions** requiring a short written response (often one sentence) as well as problems with numerical answers. An example of a typical **question** is:

ECE 355 Electromechanical Energy Conversion

1) The magnetizing current in a transformer lags the induced voltage by 90° , yet it creates a power loss in the transformer. Explain.