ECE 3600 Final Exam Study Guide The Final Exam will be on Thursday 12/17/09.

The first part will be a **closed book, no calculator** questions, ~ 50 - 60 points. 5 or 6 problems, 100 - 110 points

The second part will be a **open book, open notes, with calculator** problems.

The exam will cover	(closed book) Possible questions
1. Material from Exam 1 and Exam 2	Study the questions from exam 1 and 2
2. HW 1 AC steady-state review, used extensively throughout class	
3. HW 2 RMS & Single-phase AC power. P Q $\mathbf{S}$ $\lvert\mathbf{S}\rvert$ pf correction of pf	Basic relationships and units
4. HW 4 Energy sources, plant efficiencies	Lots possible
5. HW 5 3-phase AC power. $\mathbf{V_L}$ $\mathbf{V_{LL}}$ $\mathbf{V_{LN}}$ $\mathbf{I_L}$ $\mathbf{I_{LL}}$ $\mathbf{I_Y}$ $\mathbf{S_{3\phi}}$ $\mathbf{S_{1\phi}}$ $\mathbf{Z_Y} = \frac{\mathbf{Z_\Delta}}{3}$ $\mathbf{Z_\Delta} = 3\cdot\mathbf{Z_y}$ pf correction of pf	Basic magnitude and phase relationships
6. HW 7 Magnetic circuits $B = \mu\cdot H$ $H = \frac{N\cdot i}{l_m}$	Flux density, Field intensity, Permeability, B-H curve. effects of nonlinearity on some currents (3rd harmonic).
7. HW 7 - 9 Transformers Calculations Impedance transformation OC & SC Tests --> model η & VR Autotransformers 3ϕ Transformers Δ & 3rd harmonic	losses, ideal/non construction, ratings, magnetization reactance, core losses, winding losses, leakage reactance. Autotransformers
8. HW 9 - 11 One-Line Diagrams, variations pu system Per-phase and pu analysis Calculations Base Values S_{base} V_{base} I_{base} Z_{base} Base transformation	Why? basics common symbols
9. HW 12 -14 Synchronous generators and motors Know the phasor diagram!	losses, construction, limits, operation
10. HW 15 - 17 Induction motors Know the model! Powers P_{AG} P_{conv} P_{out} etc. η Torque & speeds Types & effect of R_2 Single phase motors	Poles, slip, why, how Question 7-11 HW17, p3 Typ torque-speed curves Single phase starting

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11. HW 18 - 19 DC motors

Know the model! Torque-speed curve

Powers P_{conv} P_{out} etc. η

Torque & speeds

Series-wound & universal motors Torque-speed curve

12. HW 20 Transmission Lines

Short, Med, Long Z_C SIL Short, Med, Long mi, km

Surge impedance

Surge impedance loading

Series impedance $\mathbf{Z}_{series}$ Shunt admittance & $\frac{\mathbf{Y}_{shunt}}{2}$

Shunt impedance & $2\cdot\mathbf{Z}_{shunt}$

Models and calculations

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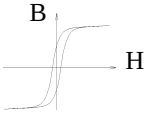
F08 Answers

1. 1. Coal 2. Nuclear 2. a) Natural Gas b) peak

3. a. ≥ 90% b. 35 - 40% c. ~ 38% d. 55 - 60%

4. a) 0.679 b) yes c) The vehicles should be charged during off-peak hours.

5. a) B b) μ c) H d) $B = \mu\cdot H$ e) B-H curve or Hysteresis curve f)



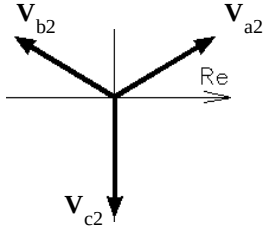
6. Air (and distance)

7. a) Multiple wires per phase b) Reduce corona discharge

8. Yes, the surge impedance loading does not set the power limit. 9. leakage reactance

10. a) 20 b) 1000 c) NOT affected d) 50 or 50:1

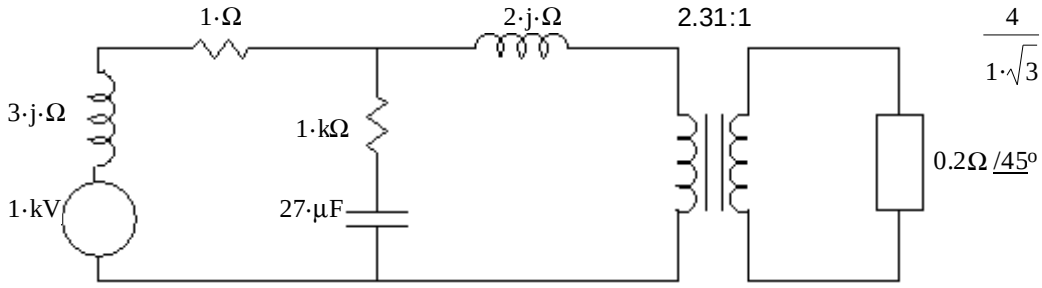
11. No connection to ground means no zero-sequence current can flow.
Since there is no zero-sequence voltage source, no current means no voltage as well. 12.



Open Book

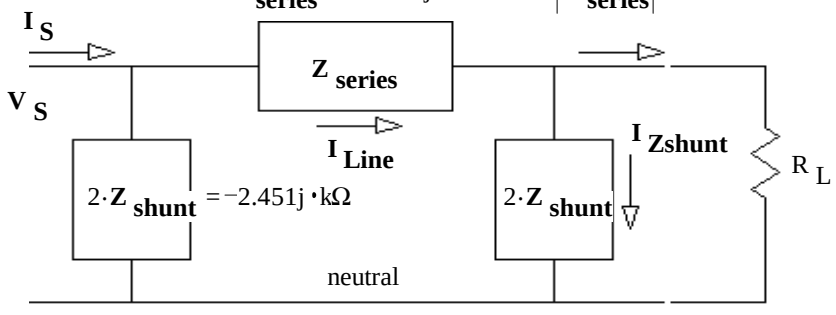
1. a) $144\cdot V$ b) $77.9\cdot\%$ c) $751\cdot\mu f$ d) $87.8\cdot\%$

2.



$\frac{4}{1\cdot\sqrt{3}} = 2.309$

3. a) $\mathbf{Z}_{series} = 24 + 96j \cdot\Omega$ $\left|\mathbf{Z}_{series}\right| = 99\cdot\Omega$ $\arg\left(\mathbf{Z}_{series}\right) = 75.964\cdot deg$



b) $(191.4 - 15\cdot j)\cdot A$

$192\cdot A \angle -4.48\cdot deg$