PHYS 321 Alternating Current (ac) Voltage Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



 



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A rectangular coil of *N* turns and of length *a* and width *b* is rotated at frequency *f* in a uniform magnetic field http://edugen.wileyplus.com/edugen/courses/crs4957/halliday9118/halliday9088c30/math/math002.gif, as indicated in Fig. The coil is connected to co-rotating cylinders, against which metal brushes slide to make contact. (a) Show that the emf induced in the coil is given (as a function of time *t*) by

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| http://edugen.wileyplus.com/edugen/courses/crs4957/common/art/pixel.gif |
| http://edugen.wileyplus.com/edugen/courses/crs4957/halliday9118/halliday9088c30/math/math091.gif |   (30-0) |
| http://edugen.wileyplus.com/edugen/courses/crs4957/common/art/pixel.gif |

This is the principle of the commercial alternating-current generator. (b) What value of *Nab* gives an emf with http://edugen.wileyplus.com/edugen/courses/crs4957/common/art/glyphs/isomscr/U02130.gif0 = 160 V when the loop is rotated at 60.0 rev/s in a uniform magnetic field of 0.500 T? |

PHYS 321 Homework on Transformers Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Write down the ideal-transformer equations.



1. A transformer has 500 primary turns and 10 secondary turns. (a) If *Vp* is 120 V (rms), what is *Vs* with an open circuit? If the secondary now has a resistive load of 15 *Ω*, what is the current in the (b) primary and (c) secondary?
2. An ac generator provides emf to a resistive load in a remote factory over a two-cable transmission line. At the factory a step-down transformer reduces the voltage from its (rms) transmission value *Vt* to a much lower value that is safe and convenient for use in the factory. The transmission line resistance is 0.30 *Ω*/cable, and the power of the generator is 250 kW. If *Vt* = 80 kV, what are (a) the voltage decrease *ΔV* along the transmission line and (b) the rate *Pd* at which energy is dissipated in the line as thermal energy? If *Vt* = 8.0 kV, what are (c) *ΔV* and (d) *Pd*? If *Vt* = 0.80 kV, what are (e) *ΔV* and (f) *Pd*?

**The Superconductor YBa2Cu3O7**

Determine the density.