EASTERN UNIVERSITY, SRI LANKA

THIRD EXAMINATION IN SCIENCE - 2007/2008

FIRST SEMESTER (PROPER/REPEAT)

(DECEMBER 2008)

PH 302 THERMODYNAMICS

Time: 01 hour.

Answer ALL Questions

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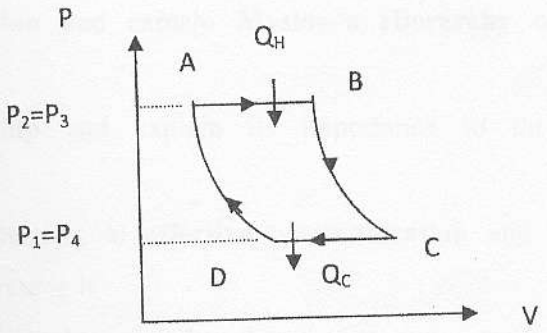
1. Distinguish an isothermal process from an adiabatic process. Show that during an adiabatic process PV^{γ} remains a constant for an ideal gas. The symbols have their usual meanings.
   A diatomic gas ($\gamma = 1.4$) of volume $1.0m^3$ at a pressure of $1.01\times10^5\,Nm^{-2}$ is compressed adiabatically until the volume is reduced to $0.4m^3$. Find the work done on the gas during the compression. Derive any formula you used.

2. Define the efficiency η of a heat engine in terms of the Q_H and Q_C.



The Joule cycle shown above consists of two constant-pressure steps connected by two adiabatic. Show that the Thermal efficiency of a reversible engine operating in this cycle, with an ideal gas of constant heat capacities as the working medium is,

$\eta = 1-\gamma_p^{\frac{(1-\gamma)}{\gamma}}$, where $\gamma_p = \frac{P_2}{P_1} = \frac{P_3}{P_4}$. The symbols have their usual meanings.