

## KEY WORDS AND STUDY QUESTIONS FOR CH 7

|                                  |                    |                  |
|----------------------------------|--------------------|------------------|
| energy equation                  | heat transfer rate | HGL              |
| kinetic energy                   | shaft work rate    | EGL              |
| potential energy                 | flow work rate     | pump head        |
| internal energy                  | static pressure    | turbine head     |
| enthalpy                         | pump work rate     | pressure head    |
|                                  | blower work rate   | velocity head    |
| mechanical energy                | fan work rate      | piezometric head |
| thermal energy                   | turbine work rate  | total head       |
| kinetic energy correction factor | pump efficiency    | head loss        |
| pipe flow energy equation        | turbine efficiency |                  |
| extended Bernoulli equation      |                    |                  |

1. Discuss the kinds of flows for which the pipe flow energy equation (eqn. 7.24) can be used. Give two examples of pipe flows where it will not work.
2. Write the relationship between, (a) pump head,  $h_p$ , and power to drive the pump, and (b) turbine head,  $h_t$ , and power produced by the turbine. Include pump efficiency and turbine efficiency in these relationships.
3. What is the fundamental cause of  $h_L$ ? Is  $h_L$  always positive?
4. What equations should be used to relate pressure and velocity at the inlet and outlet of a nozzle? Discuss assumptions.
5. Give the sign conventions for heat transfer and shaft work.
6. Under what conditions does the pipe flow energy equation reduce to the Bernoulli equation?
7. Under what conditions are the HGL and EGL coincident?