

WEEK 4 REVISION CHAPTER 4.

Total system energy.

$$E = U + KE + PE$$

(internal energy) (kinetic) (potential)

$$e = u + ke + pe, \quad e = \frac{E}{m}$$

mass flow $\Rightarrow \dot{m} = \rho VA$ Energy flow rate / power $\Rightarrow \dot{E} = P = \dot{m}e$ Adiabatic system $\Rightarrow$ no heat transfer, $Q = 0$ Electrical work, W_e and power $\dot{W}_e$ Power, $\dot{W}_e = IV$

$$= I^2 R$$

$$= V^2 / R$$

$$W_e = \dot{W}_e \Delta t$$

$$= VI \Delta t$$

Mechanical Work

$$W = Fs$$

Shaft work

$$T = Fr \quad F = \frac{T}{r}$$

$$W_{sh} = Fs = \left(\frac{T}{r} \right) (2\pi r n) = 2\pi nT, \quad s = 2\pi r n$$

$$\dot{W}_{sh} = 2\pi nT$$